

NUTRITIONAL STATUS OF WOMEN ENGAGED IN THE COIR INDUSTRY

BY

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1996

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I hereby declare that this thesis, entitled 'Nutritional status of women engaged in the coir industry" is a bonafide record of research work done by me during the course of research and that this 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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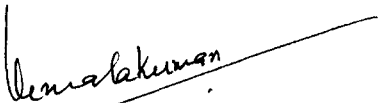
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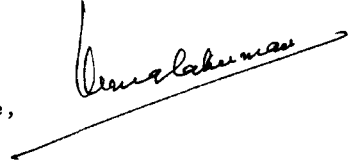
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Dedicated to my Uncle

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INTRODUCTION

INTRODUCTION

The coir industry, one of India's foreign exchange earners, is built upon the fibre extracted from the husk of coconut. The industry has, therefore, developed in areas where there is concentration of coconut cultivation. The history of coir is as old as 200 years. To be more precise, coir went into the commercial way in the year 1859 when an Irish born American started the first coir factory in Alleppey. Since then others followed suit. The long coast line and the good network of lagoons and lakes spread over in the Southern part of Kerala could be a reason for starting of this industry in this part of the country. The abundant availability of coconut husks, which is the chief raw material for the industry, could be another factor for choosing Kerala as the apt place for this industry by the foreigners. Sankaranarayanan and Karunakaran (1985) observed that although there are many countries which specialise in the production of coconuts such as Philippines, Indonesia, Srilanka besides India, Kerala is the classic home of the coir industry.

This is a cottage industry which provides livelihood to a large number of workers in the rural areas of the country and it occupies a very important position in terms of employment generation. No other cottage industry employs such large number

of workers in the different sectors of its production, manufacture and trade. In the light of this feature coir industry is of special importance to Kerala [Pillai *et al* (1981), Sankaranarayanan and Karunakaran (1985), Kannan (1986)]

It has been observed by Pillai *et al* (1981) that about half a million people in Kerala alone depend on this industry which is of an unorganised nature. They also observed that retting, fibre extraction and spinning provide employment to a large number of households all along the coastal belt of the State. It is estimated that about 3.83 lakh persons are directly employed in this industry of which 84 per cent are women (Anonymous, 1994).

Nandini (1986) revealed that statistics relating to women workers in the unorganised sector has become highly inadequate and unreliable in the absence of any systematic and comprehensive study of the conditions of women in this complex group of occupations, self-employed wage earners and entrepreneurs. The above observation has also been expressed by Ghassemi (1990), Kevany *et al* (1990), McGuire and Popkin (1990) and Pauline (1990).

The women who are engaged in the coir industry play a dual role of a housewife as well as of a wage earner and hence they are subject to great stress and strain. The industry

demands back breaking tasks from the women, while the payments are meagre, and are based on Piece-rates. The poor social and economic background of these women, superimposed by heavy physical burden is expected to negatively influence their nutritional and health status. Poor nutritional status has been reported to cause low working efficiency and low work output. Low nutritional status and insanitary working conditions have been reported to precipitate infection, and poor health status, leading to abstinence from work, poor work output and consequent poor economic and nutritional status. Thus a vicious cycle seems to prevail among the women engaged in the coir industry.

Reviewing available literature relating to women in the coir industry in Kerala reveals that research on social aspects have been taken care of but studies pertaining to the health and nutritional aspects are scarce. Hence an attempt is made here to primarily assess the nutritional status of coir workers of Chirayinkil taluk and to study the influence of their nutritional status on the work output, which in turn is expected to affect the socio-economic status and life style of these women.

REVIEW OF LITERATURE

2 REVIEW OF LITERATURE

Women in the workforce

The status of women in a society is seen as a significant reflection of the level of social justice in that society WHO (1984) In many developing countries, the majority of women have inferior social status to men, occupying the lowest paid and most insecure positions requiring least skill as noted by Kevany et al (1990) Khan et al (1988) opined that women were discriminated against, in childhood, adulthood, during marriage and at old age Kaur and Sharma (1988) observed that the rural women's social and economic roles inside and outside the home does not receive due recognition Saito (1992) reported that most rural women tend to be less mobile due to their household obligations and in some cases due to socio-cultural and religious norms Women in the low income families are seriously affected by too many pregnancies, prolonged lactation, long hours of work, poor diet, repeated exposure to disease and extremely limited access to adequate health care As a matter of fact lives of women are constantly under double jeopardy Several scholars including Devadas (1988), McGuire and Popkin (1990), Ramachandran (1992), Kurz and Sapir (1993) have reported similar facts According to McGuire and Popkin (1990) poor women in low-income countries face crucial conflicts as they try to fulfill their economic, biological and social roles and these conflicts can

have detrimental effects on them. According to United Nations Organisation (1986), women constitute one-quarter of industrial workers and forty per cent of agricultural and service workers. Berio (1984) stated that women carry about two-third of the total work burden in the household, close to 90 per cent of the domestic activities, and perform more than 70 per cent of the subsistence economy activities. Women's work in the developing world is almost exclusively classified as unorganised or informal by current procedures of national accounting as observed by Kevany et al (1990). This practice persists despite universal evidence that women contribute substantially to national economic output, as entrepreneurs, consumers, underpaid and unpaid workers. Arunachalam (1985) and Nair (1990) found that the different occupations under the unorganised sector are agriculture, animal husbandry, fisheries, crafts like bamboo/cane/mat weaving, spinning, cashew processing, bidi rolling, embroidery and zari work, agarbathi making, construction of buildings, vending of vegetables, fruits, flowers and many others. It was observed by Gulati (1982) and Banerjee (1983) that women go for such occupations because of the irregular nature of employment that their men are involved in and the low income they make. Raihana and Asiya (1990) reported that illiteracy, family size and non-availability of jobs in other sectors were the reasons why women chose jobs from the unorganised sector. Women in the informal sector faces the

problems of long hours of work, low wages, invisible contribution, arduous labour, poor living conditions, social oppressions, a greater vulnerability because of lack of skills and education, lesser mobility and heavy responsibilities, and lack of access to better technologies, tools and productive assets. The above problems have been observed by Banerjee (1983), Arunachalam (1985) and Nair (1990). Groos and Garner (1990) also observed that women's central role in food production, reproduction and nurturing of the child has important consequences on their own nutrition and health status. According to Sujatha (1990) the difficulties imposed on the home makers due to their dual role were improper care of the family, inability to cope with the household work and lack of time for care of children. Ottesen et al. (1988) reported that in the conflict that arises between fulfilling their role as food providers for their families and catering for their own needs, the latter loses out.

Band (1992) reported that women's workload is not readily comparable to those of men, because of differences in the functions carried and segregation of functions. Ottesen et al. (1988) noted that women and girls have less leisure time than men, making them less able to participate in social, decision making and educational activities. Berio (1984) reported that the total workload was consistently higher for females than males in all age groups from six years and on and workload seemed to

peak at the age of 25-29 years Houston et al (1992) observed that more quantitative overload was associated with more tension and health problems in women Vimal (1984) observed that in the Philippines women workers are being overworked by compulsory overtime In almost all studies women work between eight to ten hours per day, while men work for six to eight hours and in most studies women spend around four to six hours in domestic work and farming, while men spend less than two hours in this area as found by Ghassemi (1990) and from the above fact it is clear that women in the third world spend long hours at work Vazquez et al (1991) conducted a study on working women in Mexico which showed that time devoted to work by these women is very long, amounting to a total of between 66 and 78 hours a week Gillespie and Mason (1991) found that on an average nine to fourteen year old Indian girl living in a rural area spends eight hours every day on work, while a boy of the same age only puts in about three hours Shah and Rathore (1993) found that women from the various unorganised sectors, such as agriculture, construction and domestic work had working hours that ranged from 8-9 hours, 5-7 hours and 2-5 hours respectively Alaka and Chetna (1983) reported that the papad rollers work from 12 to 16 hours a day and earn on an average only Rupees ten a day Mehrotra (1983) revealed that the women paper-bag makers worked without a break for about 18 hours a day Nandini (1986) found that the women vendors, on an average, worked for 13-14 hours per

day According to Gajanayake (1991) the women tea pickers work for longer hours than do the men According to Karuna (1993) the total time spent for household and fishvending activities was more than ten hours a day as far as the fisherwomen were concerned

2.2 Health and nutritional status of women

Ottesen et al (1989) had stated that the term nutritional status pertains to the condition of health of the individual, affected by the intake of foods and the utilization of nutrients He also reported that nutritional status was found to be influenced by factors such as psychological, socio-cultural and physiological influences and also by thoughts, beliefs and emotions According to Kamath (1986) nutritional status is the state of health enjoyed as a result of nutrition

Simopoulos (1982) defined nutritional status as a state of nutriture of an individual or a specific group A research work carried out in different parts of India by ICMR (1981) had revealed that supply of an adequate diet or a balanced diet which provided all the essential nutrients in sufficient quantities and in proper proportions to meet the needs of the body would result in optimum nutritional status According to Krishna (1988) nutritional status is an indicator of socio-economic well-being of a community and Srivasan et al (1991) found that social backwardness went with nutritional backwardness and vice versa

A high correlation was found between poverty and malnutrition, as well as ill-health, ignorance and lack of political power (Anonymous, 1979) Rao (1991) reported that people living in the rural areas were not able to lead a life worthy of human beings due to poverty and their health condition was the result of the pernicious combination 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 The low purchasing power did not allow them to maintain good health Gawn et al (1991) found that capital and wage variables have significant impact on the household nutrient demands and they also found that income, wage and educational status have very different effects on the nutrient choices of low calorie households than on the nutrient choices of high calorie households Examination of nutrient intake data by Gopalan and Kaur (1989) revealed that except for the high income group, most of the urban and rural low income groups have varying degrees of inadequacy of intake of iron, vitamin A and riboflavin Mehta and Singh (1988) found that women with a low health status had an extremely poor level of income Butt et al (1989) in their study on the food and nutrition situation in Pakistan concluded that the lower income groups are deficient in energy, calcium, vitamin A and riboflavin, indicating once again that income is one factor influencing nutritional status Shah et al (1983) revealed that

food preferences, as do income levels, play a role in determining levels of intake of nutrients

The phenomenon of women as heads of households is increasing and several studies on women had highlighted the problems of female-headed households Campbell and Horton (1991) reported that the particularly vulnerable population groups were the poor, female headed households Okeke et al (1988) found that households with adult males are likely to have more members with normal nutritional state and this is because such households have more means for producing as well as purchasing food

Zuniga et al (1986) found the existence of a relationship between nutritional status and land ownership in their study conducted on adults of the rural area of the North-Eastern Brazil Rao (1982) found that the expenditure on protein rich foods was positively associated with size of holding and gross income of the families

According to Park and Park (1991) anthropometric measurements are valuable indicators of nutritional status and they reflect the patterns of growth and development, and how individuals deviate from the average at various ages in body size, build and nutritional status Various studies have been carried out in relation to the anthropometric measurements of women Reports prepared by Anonymous (1992) gave the mean height

of 161 cm as European standards and it is only 150-151 cm for women in Asia. This shows that women are particularly stunted in Asia. The proportion of underweight women is very much higher i.e., it is upto 60 per cent in Southern Asia. Ghassemi (1990) found that rural and poor urban girls reach the age of adolescence some 12-15cm shorter than their well-to-do peers in the same society. Estimates of low arm circumference was also observed among women from Sub-Saharan Africa and South Asia, which was below 22.5 cm for 13 per cent of Sub-Saharan African women and 54 per cent of South Asian women. This was also reported by Anonymous (1992). Dodd and Anjula (1989) compared the nutritional status of working and non-working middle class Maharashtrian women and reported that ten per cent of the working women and fifteen per cent of the non-working women had weight less than 38 kg and height less than 145cm. It was reported by Gopalan and Kaur (1989) that urban women belonging to the middle and high income groups were found to be taller and heavier than were the other urban groups and there was a gradient between the middle and high income groups showing the effect of socio-economic status. They also observed that women working outside the house in rural areas were lighter and had lower skinfold thickness than housewives and this might be due to general poverty, lower purchasing power and lower dietary intake in the face of strenuous manual labour.

Sanchaisuriya *et al* (1993) observed that about twelve per cent of the non pregnant rural Thai women of child bearing age had a BMI below 18.7. The fat stores and muscle mass were smaller when compared to western females while only two per cent had low serum albumin indicating a severe deprivation of nutritional status. Pauline (1990) observed that the low BMI of women in Tanzania was due to too much energy expenditure and high nutritional depletion due to constant infections as well as low dietary intakes. Kennedy and Garcia (1994) reported that, in their study conducted in Gambia and Kenya, the mean BMI of women decreases with increasing household income and the reason is the time allocation patterns of women. Karuna (1993) who conducted a study among 150 fisherwomen in Thiruvananthapuram revealed that 33.33 per cent of these women suffered from different degrees of energy deficiency as indicated by low BMI.

Several studies have shown that women have a very heavy workload and it can be assumed that heavy workload has a negative influence on their nutritional status. According to Lukmanji (1992) the interaction of women's workload and health is complex and multifactorial owing to variations in the environment and socio-economic conditions within developing countries. Results of a study conducted by Paul and Harold (1993) showed that the physically demanding work performed by women in Ghana, Africa has a significantly negative effect on their nutritional status. According to Ottesen *et al* (1989) a heavy workload may

also lead to a poor diet because there will be less time for preparation and cooking and their meal frequencies have been reported to be reduced

Tradition and seasonality also affects the nutritional status of women in a negative way and Butt *et al* (1989) reported that in Baluchistan, even the rich are deficient in important nutrients due to their traditional food consumption patterns Behrman and Doolalipar (1988) found that seasonal variations in environmental conditions, food availability, food prices and labour demands have considerable impact on nutrition and health status of women

Studies have shown that nutritional status is seriously affected by poor dietary intake Ottesen *et al* (1988) reported that women and girls generally consume less food of poorer quality than men and rarely receive special foods during lactation or pregnancy leading to a higher death rate, ill-health and problems associated with child birth A review of previous studies also reveal the same Gopalan and Kaur (1989) indicated that cereals predominate the diets of women in general irrespective of their socio-economic status both in urban and rural areas The common feature of the diets of the low income groups is the low intake of protective foods like pulses, vegetables, fruits, milk, oils and fats and flesh foods including fish Ndaba and O'Keefe (1985) studied the diet of black adults

in rural districts of Natal and Kwazulu, and they found that the diet consisted mainly of refined maize meal. Meat and fresh milk was rarely taken by them. Intake of vegetable was seasonal and the average fibre intake was therefore surprisingly low at approximately 10 g per day per individual. It has been found by McGuire and Popkin (1990) that in Burkina Faso (then Upper Volta) women consumed 0.8 grams of animal protein compared with men who consumed 10.3 grams daily. Scragg *et al* (1991) assessed the dietary intake of Auckland men and women aged 25-64 years and showed that men consumed significantly more fat and cholesterol than women consistent with their increased intake of red meat, fried meat and full cream milk. The women consumed more carbohydrate and fibre than men, consistent with their increased intake of vegetables. Henriksen *et al* (1995) reported that Pakistani women living in Oslo are at great risk of developing vitamin D deficiency during pregnancy and the main reason for this are avoidance of sun exposure, a low dietary intake of vitamin D and then no or little supplementation. Weigel *et al* (1994) observed that rural women in Ecuador had diets that were inadequate in energy, iron, zinc, calcium, folate and several other B-complex vitamins. With the help of a 24-hour dietary recall schedule they also observed that carbohydrates and fat supplied the majority of dietary energy in the plantain, cassava and rice-based diet. Adams *et al* (1993) found that the Nigerian women reported relatively high frequencies of consumption of

beef, fish, eggs, whole milk and palm oil. Their diet was rich in both vitamin A (yams, palm oil, spinach, tomatoes) and vitamin C (tomatoes, oranges, tangerines, mangoes). Their studies indicate that the Nigerian diet is high in fat, which may put the Nigerians at increased risk for cardiovascular disease. On the other hand, the diet may be protective in terms of cancer, because of the high intake of vitamin A and Vitamin C.

Studies from India also indicate poor dietary intake by women. Wadkar et al (1988) studied the dietary pattern of families in Sindhudurg, Maharashtra. They found that total calorie consumption was below the needed minimum, while protein intake was more than the required minimum. Their diet was imbalanced with respect to calorie-protein ratio. Paramjit et al (1983) studied the nutrient intake of women among different income, occupation and family size categories in two villages of Hoshiarpur district. They found that the intake of protein was much higher than the recommended allowances in all groups, vitamin A was found below the recommended level among the low income groups and vitamin C and niacin were below the recommended levels among all the groups showing the result of consumption of imbalanced diets by all the above stated categories. Nagi and Mann (1991) conducted a study on the nutrient intake of Punjabi women and they reported that their mean dietary iron intake was inadequate while that of protein, calcium and ascorbic acid were

adequate Ryan et al (1984) observed that the people living in six villages of South India consumed low amounts of vegetables and the quantity consumed was subject to substantial seasonal variations Consumption of nuts or oilseeds and fats rarely exceeded 20 grams per head per day and was often less than a gram Fruits were invariably absent in the diets Condiments and spices were popular among all age groups Milk and milk products were consumed mostly in the form of buttermilk or milk was added to tea as a whitener Murthy and Reddy (1994) reported that the dietary intake in pregnant, lactating and non-pregnant, non-lactating women of an urban slum in Kurnool, Andhra Pradesh are about 30 per cent less than the ICMR recommended daily allowances Srinivasan et al (1991) analysed the nutritional status of rural families in Tamil Nadu and it was reported that their diet mainly consisted of cereals (rice) and some vegetables Meat was consumed rarely Fruits were found to be the neglected item of the diet Nutritionally the average rural diet supplied sufficient amounts of calcium, iron, thiamine, and niacin Deficiencies were observed with respect to energy protein, carotene, riboflavin and ascorbic acid Studies done in Kerala presents a varied nature Shah et al (1983) reported that the diets of families in Kerala had rice as the major source of calories and over 77 per cent of the families consumed fish daily It was noted that the diets consisted of high quality protein foods or high amounts of protein which are consumed even

by lower income groups. They also consumed more tea and coffee, perhaps as a milk substitute. Gillespie and Mason (1991) reported that the ration-scheme in Kerala was found to be substantially more beneficial than an equivalent transfer of income in terms of effect on energy intake.

Studies on the food intake and nutritional status of women in the unorganised sector reveals interesting findings. Kurian *et al* (1978) has found that the diet of the women engaged in the cashew industry was deficient in protein. Meat, eggs and fruits were not consumed. Mitra (1983) reported that the diet of the jute workers is of an unbalanced nature. It fell short in protein and fat content. Fish, meat and even pulses were fancy foods of their diet. A study conducted by Bansal and Mehta (1985) on brick-kiln workers points to the fact that green leafy vegetables, fats and oils, milk and milk products, sugar and jaggery were deficient in the diets of these workers. Roots and tubers and cereals and millets intake were above the RDA. Vitamin A, C and energy were the most deficient nutrients in the diets of these workers. Results of a study by Kaur and Sood (1988) conducted among spinning mill workers showed that their consumption of cereals, green leafy vegetables, fruits, milk and milk products, sugar and jaggery, fats and oils, eggs and flesh food were inadequate when compared to RDA suggested by ICMR. The diets were deficient in energy, vitamin A and riboflavin, while

the intake of vitamin C and niacin were marginally deficient. Sujatha (1990) revealed that most of the women engaged in stone breaking 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. 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 and oilseeds, sugar and jaggery and animal foods. The diets of these women were poor in retinol, ascorbic acid, thiamine, riboflavin and iron. Similar findings have been reported also by Khan et al (1988), Ghassemi (1990), McGuire and Popkin (1990), Sreenivasan et al (1991) and Ramachandran (1992). Karuna (1993) reported that the availability of energy, fat, calcium, iron, retinol, thiamine, niacin, riboflavin and vitamin C were inadequate in the diets of fisherwomen of Thiruvananthapuram in Kerala. Nayak (1993) reported that 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 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 higher among this group.

According to Beinardo et al (1989) undernutrition due to low food intake was one of the four major causes of undernutrition in Asia. The four diseases viz, nutritional anaemia, xerophthalmia, protein energy malnutrition and endemic goitre were caused generally by the deficiencies of specific nutrients in the diet even when the content of calories was adequate. Devadas (1988) found that productivity of the labour force in the developing countries is generally low and this has been attributed to their poor physique resulting from chronic malnutrition. Poor nutrition restrains productivity in terms of output per unit of input. Wheeler and Tan (1983) stated that nutritional status of an individual has direct and identifiable effect on his or her productivity at work. Devadas (1988) defined working efficiency as the potential of an individual to engage in an activity involving muscle action. The International Dietary Energy Consultancy Group (1987) explained working efficiency or physical working capacity as the ability to perform maximal physical work. Ghassemi (1990) associated low labour productivity with undernutrition and low income.

Women with poor nutritional and health status cannot endure long hours of physical activity. Pant (1992) revealed that the highly deficient diet of the rural people adversely affected their health and working capacity. Devadas (1988) found that chronic malnutrition leads to low productivity among labourers in developing countries. Satyanarayana (1989) has

found that reduced work output of industrial workers is due to early malnutrition Satyanarayana (1988) has also reported that chronically undernourished adolescents have significantly low work capacity Devadas (1988) reported that productivity of the work force depends on the quality and quantity of their calorie and nutrient intake and the resulting nutritional status Kaur and Sood (1988) are also of the opinion that nutrition plays an important role in the efficiency and welfare of the workers as adequate diets are essential for optimum work output They also opined that adequate supplies of energy and other nutrients in the diet improves working efficiency Purushothaman (1989) observed that non-anaemic women performed better and their work output was higher when compared to the anaemic women and it was also noted that iron supplementation conserves energy and their work output was found to increase after supplementation Vijayalakshmi and Selvasundari (1983) observed that work capacity was found to increase as a result of iron supplementation Seshadri (1988) also reported that iron supplementation not only raised their haemoglobin levels but also their work performance While examining the relationship between nutritional indicators and the time devoted to work, Kennedy and Garcia (1984) suggested a significant positive association between both BMI and height and the amount of time devoted to work Both BMI and height appear to increase the capacity to carry out work Satyanarayana et al (1980) reported that boys, who are shorter and lighter

have lower work capacity Zemlianskaia et al (1988) conducted a study on workers aged 30-39 years, engaged in the instrument making industry in Russia to assess the nutritional status of workers with different levels of work capacity Their results revealed that there was a positive correlation between the total physical working capacity (TPWC) with respect to their actual nutrition Spurr et al (1977) reported that the maximal oxygen consumption (VO_2 max) is a measure of work capacity and there exists a strong direct relation between work, capacity, VO_2 max and nutritional status of the body Shetty et al (1987) has reported that reduced physical capacity seen in undernourished adults is largely due to reduced body size which is the result of varying degrees of malnutrition during the active growth period of an individual Satyanarayana (1988) has revealed that poorly nourished young men could never compete, with normally nourished counterparts either with respect to work capacity or wages earned He also reported that both underweight and overweight adversely influences work output Kurian et al (1978) showed that undernourishment among women workers showed itself in constant sickness, emaciation and chronic tiredness among women Agarwal (1983) pointed out that insufficiency of food intake adversely affects the working efficiency Swaminathan (1986) found that high carbohydrate diet proved better than high fat diet for workers Spurr et al (1977) showed that better nourished Guatemalan peasants were able to complete their

assigned work in about half the time as compared to poorly nourished peasants who were receiving no supplements. Mensink and Arab (1989) found that active persons had higher absolute energy intakes compared with inactive persons in all groups. Active older women have statistically significant higher vitamin B₂, iodine and calcium intake than less active older women.

Studies on the nutritional status of women in the unorganised sector reveals interesting findings. Sujatha (1990) reported that among the women engaged in stone breaking, the nutritional disorders commonly found were mottled enamel, conjunctival xerosis, tongue papillae atrophy, angular stomatitis and dental caries. Jyothi (1993) opined that majority of these women had high pulse rate and blood pressure indicating signs of inferior physical fitness. According to Karuna (1993) sixty seven per cent of the fisher women had low haemoglobin and hence they suffered from anaemia. Same observations have been made by Nayak (1993) and Anbarasan (1995).

Several studies conducted all over the world had revealed that women engaged in various occupations face numerous health problems among which an important problem is parasitic infestation. Sanchiasuriya et al (1993) indicated that gastro intestinal parasitic infection rates were high with liverfluke, hookworm and schistosomiasis in rural Thai women of the child bearing age. Virk et al (1994) found that the parasitic load

was slightly higher in females (33.59 per cent) than in males (28.18 per cent) and this could be due to lack of awareness about personal cleanliness and hygiene and illiteracy among rural women. Weigel *et al* (1994) reported that intestinal polyparasitism (96 per cent) and cutaneous leishmaniasis infection (72 per cent) were the major health problems encountered by rural women colonists in the subtropical lowlands of North-West Ecuador. A study of 104 patients with hookworm load by Saraya (1970) show that anaemia and hypoalbuminemia were correlated with the worm load. Pauline (1990) reported that hookworm infestation can cause a negative iron balance.

According to Chakraborty (1985) about 25 million women are engaged in agricultural occupations. Batliwala (1988) and Ottesen *et al* (1988) reported that the arduous task of rice transplanting poses a health hazard to undernourished pregnant women and their unborn babies. Sekimpi (1992) observed that the use of the hand-hoe, which dictate working in the stooping posture, resulted in backache.

Uragoda (1992) in a study conducted on the health effects of rice husk dust, identified symptoms like tightness of chest, asthma and eosinophilia. He also identified agricultural zoonotic diseases like anthrax, brucellosis, bovine tuberculosis and Q-fever. The parasitic diseases observed were malaria, trypanosomiasis and schistosomiasis. Engberg (1993) reported

that the women farm workers are exposed to a multitude of biologic, chemical, physical and mechanical hazards. High rates of machinery-related accidents and respiratory occupational illnesses are seen among agricultural workers.

In the cashew industry, the hands of the shellers are scarred jet black on both sides due to the cashewnut shell oil which has a scalding effect on the human skin, as reported by Kurian et al (1978) and they also found that many of the women were found to be suffering from diseases of the uterus, most probably due to the particular posture that they adopt during shelling.

Kaur and Sood (1988) reported that the health of the workers employed in the spinning mills were impaired due to lack of windows, sheet metal roofs, limited access to natural ventilation and cramped working area. Cotton ginneries showed evidence of chronic bronchitis and mill fever as reported by Uragoda (1992).

Loening (1984) reported that women in the prawn industry are the lowest paid and least organised and the sharp pieces of the prawns anatomy cut into their hands, leaving it scratched and blistered.

A significantly high prevalence of tuberculosis, wheezing, dyspnoea, asthma, allergy, body ache, gas trouble

piles and rheumatic complaints were reported among the beedi workers (Anonymous, 1974) Mohandas (1980) observed that lack of ventilation, over crowding and uncongenial work places are the major factors responsible for aggravation of the above diseases

Domestic servants, according to Baboo and Panwar (1984) complained of body ache, cracked foot, headache and indigestion They also suffer from long hours of work, shifting nature of job, lack of freedom and low prestige due to inferior status of the job, associated with low wages

The mine workers, as reported by Gupta (1958) work under conditions of bad lighting and ventilation Prevalence of tuberculosis is high among these workers Anonymous, 1983) As reported by Mehrotra (1983) the women paper-bag makers live with constant stress and exhaustion they suffer from pain in the back, shoulders, and waist and stiffness in the joints Tuberculosis, stomach problems like constant acidity and vitamin D deficiency leading to 'pica' are other diseases seen among these women In a study conducted by Nandini (1986) among the washerwomen of Madras city, the common problems reported were giddiness, hunger and sleeplessness Their work was physically stressful resulting from carrying a heavy iron box plus performing household chores In the above study, Nandini (1986) has also observed that the flower vendors of Madras city were found to suffer from headaches due to constant contact with

strong scents, and other recurring complaints are stiffness in hands and hips and eye trouble Nair (1990) reported that though accidents and deaths at work sites are common the construction workers hardly get any compensation Reddy (1991) found that the construction workers suffered from cold, headache and nerve disorders

2 3 Status and problems of workers in the coir industry with special reference to women

Global reports on coir production reveals that 90 per cent of coir production is concentrated in India and Sri Lanka (Rani and Krishnamoorthy, 1993) Isaac et al (1992) observed that lower consumer preference, lower labour productivity and uncertain demand potential have discouraged investments in the technology upgradation in the coir industry with highly disappointing consequences for over three lakh workers who depend on this traditional industry for employment Isaac and Raghavan (1990) estimated that the coir industry is the source of employment to a quarter to half a million of Kerala's rural workers in the coastal belt It is estimated that about 3 83 lakh persons are directly employed in this industry with retting, fibre extraction and spinning providing employment to a large number of households all along the coastal belt of the State (Anonymous, 1994) A detailed report prepared by Government of Kerala in 1993 revealed that the total population of the coir

worker's households were 11.08 lakhs. As estimated by Government of Kerala (1990) the spinning sector accounts for 70 per cent of the coir workers and the beating sector accounts for 14 per cent and only less than one per cent of the workers were found to be engaged in the work related to finishing and packing of coir products.

There is a large network of coir co-operative societies in the State. Out of the total number of 829 coir co-operative societies in the State, 767 are in the primary sector engaged in the production of coir fibre and yarn. Of these, only 423 societies (55 per cent) are functional. There are 2.27 lakh members in the 423 primary coir co-operative societies which are operational. They constitute 64 per cent of the workers in the yarn sector. (Anonymous, 1994). Perumal (1986) reported that majority of the coir workers all over India come from weaker sections of the community. Kannan (1986) has reported that 80 per cent of the workers in the coir factories came from the Ezhava community.

The average family size of a coir worker's household was reported as 5.0 and 5.36 by Rajagopal (1993) and Sunil (1986) respectively. Sunil (1986) found that 40 per cent of the workers are within the age group of 25-35 and 18 per cent of the workers are within the age group of 55-65 years.

Rajagopal (1993) listed out the various problems faced by the coir workers as low wage rates, lack of training for production and quality improvement, lack of individual credit facilities, absence of electrification and sanitation facilities, common place for work and finally lack of infrastructure Isaac (1990) reported that the wages of the workers have remained stationary for the last fifty years Due to stagnant productivity of the traditional spinning process, it has become virtually impossible to pay minimum wages to the workers and majority of the coir workers are living below poverty line (Anonymous, 1992) Jayasree (1994) found that 75 per cent of the coir workers belong to the low income groups Ferumal (1986) stated that the coir workers in India are socially and economically backward and because of their ignorance, superstition and illiteracy they are most exploited by intermediaries and owners of coir units He also reported that the income or wage obtained by the coir workers is insufficient to maintain their family and the workers are not able to get the job at a higher wage throughout the year because of keen competition from private sector and low demand for their produce The average monthly income of the coir households from coir sector was only Rs 98 indicating their poor standard of living as reported by Anonymous (1995) Isaac (1990) found that for the ratt spinners, earnings from the coir industry was the main source of the income He also noted that the earnings of the ratt spinners were two to

three times the earnings of the handspinnets Sunil (1988) observed that their annual income is to the tune of Rs 2218 72 and the wages ranged from Rs 30-40 per day Kumari (1989) found that since the coir workers are paid low wages, they borrow money to meet the day to day expenses of the house, for educating their children and for marriages

The severity of underemployment among coir worker, has been pointed out by both Nair (1978) and Isaac (1990) A report published by Government of Kerala (1981) summarises that nearly forty per cent of the coir units gave employment for less than six months in the year 1981 It was also reported that out of 2 27 lakh workers enrolled in the coir co-operative societies only one-third could be provided with work during the year 1988 89 Jayasree (1994) reported that non-availability of coir work and incompetency in any other work, aggravates the problem of underemployment which results in low income among coir workers

Isaac and Raghavan (1990) revealed that the coir workers do not receive any medical benefits, since they do not meet the minimum number of annual days of employment required under the ESI norms It was reported that the coir workers in the State are deprived of the benefits of various labour welfare measures like ESI and EPF scheme, as they are working in the traditional unorganised sector where direct employers are lacking, and labour laws are not applicable (Anonymous, 1991)

According to a report published by Government of Kerala in 1990, 96.9 per cent of coir households were owning houses. As reported by Jayasree (1994) majority of these workers, though they occupy thatched, tiled or concrete houses, it does not indicate their affluence but they own it under the housing scheme implemented by the governmental agencies named under Laksham veedu scheme that provides house for people of low income group. Majority of the coir worker's households do not have electricity (65.83 per cent, toilet facility (67.33 per cent) and drinking water (80.13 per cent) which indicates their economic backwardness. Perumal (1986) reported that most of the households of coir workers do not have the minimum sanitary requirements and majority of the coir workers are living in small huts. Jayasree (1994) observed that lack of education resulting in general ignorance is an obstacle in the progress of the coir workers. Sunil (1986) reported in his study that only 23.33 per cent of the coir workers were educated upto the secondary level and ten per cent were illiterate. Government of Kerala (1990) estimated that 28.83 per cent were illiterate, 44.76 per cent were educated upto lower primary level and 21.60 per cent had attained upper primary education with only 8.58 per cent having reached secondary education level. The percentage of illiterate coir workers is reported to be the highest in Malappuram district (39.17 per cent) and the lowest level of 11.42 per cent has been reported from Kottayam. Rajagopal's study (1993) of coir workers in

Andhra Pradesh revealed that about half of the members were illiterate with 49.36 per cent having attained primary education.

Kurian et al (1978) and Isaac (1990) observed an inadequate dietary intake among coir workers of Kerala. Rice and tapioca featured in the diets frequently while there was absence of meat, eggs, fruits, milk and vegetables, while the consumption of fish was reported to be relatively high.

Several studies have revealed the fact that majority of the workforce in the coir yarn industry are women. In the coastal districts of Andhra Pradesh, namely East Godavari, West Godavari, Krishna, Srikakulam and Vishakapatnam the coir fibre activities are taken up exclusively by rural women as observed by Rajagopal (1993). It was reported by Kannan (1986) that in the beginning of this century, as many as 81000 workers were employed in the coir industry in Travancore with women comprising 75 per cent of the total workers. Isaac (1990) in his study also observed that 90 per cent of the workforce in the coir yarn industry are women. A survey conducted by the Government of Kerala in 1990, clearly showed that 84.19 per cent of the workers are females and only about 15.18 per cent are males (State wise percentage). Isaac (1990) reported that it was women of the Ezhava caste and to a lesser extent those of the Muslim, Latin Christian and Cherum communities that took to coir making as

their chief vocation. They belonged to the families in the lower strata of society, whose earnings of male members were too small to procure the necessaries of life. Jayasree (1994) found that 30.67 per cent of the women included in her study belonged to the Ezhava community and this was followed by Nairs (23.83 per cent) and Schedule Caste (20.17 per cent). Lesser number of women were found from Arayan (6.23 per cent), Viswakaima (1.34 per cent) and Vaniyan community (2.0 per cent). Mathew and Nair (1988) in their study revealed that two-third of the women in their study, were of the Ezhava community. Christians and other non-caste Hindus, Nairs and Harijans make up the remaining third of the sample. Jayasree (1994) reported that for working in the unorganised sector, there is no upper or lower age limit for a worker and in her study she found that majority of the women workers are in the age group 31-40 years (34.67 per cent) followed by 21-30 years (22.83 per cent).

Gulati (1982) found that women working in the coir industry were restricted to only certain jobs that are low paid. Bai (1985) has pointed out that as far as coir manufacturers are concerned women labour is required for certain specific jobs such as defibring and spinning and it was also found that about 99 per cent of coir manufacturers use only women for the purpose of defibring and spinning the nature of the job being risk-ridden and under paid. Kumari (1989) found that the unhealthy working condition, low income, overwork at intervals and starvation have

led to health hazards among the coir workers. It has been reported that workers in the beating and spinning sectors cannot do their work on rainy days since they are not provided with worksheds (Anonymous, 1992). According to Jayasree (1994), coir workers work under deplorable conditions where they lack even basic amenities like drinking water, covering over the head to protect them from the intense heat and there are even no common toilet facility in their vicinity. The Government of Kerala (1990) suggested improvements in the working conditions of workers engaged in spinning of coir, as the coir workers are at present working in unhygienic conditions exposed to rain and sun. Because the jobs are classified as that to be done by male and female, and given the different piece rates fixed for their jobs women end up getting distinctly lower wages than men. Rajagopal (1993) who studied the socio-economic aspects of women coir workers in Andhra Pradesh observed that they were landless and all were living below the poverty line, earning less than Rs 4800 per annum and on an average a member earns Rs 237 per month. Bai (1985) found that most of the women employed in the coir industry prefer this work because they live in and around the area where coir manufacturing centres are located. Kurian et al (1978) observed that there is underemployment among the women coir workers as they had employment only for about 200 days in a year. Jayasree (1994) reported that majority of the coir workers (85.67 per cent) had work only for 11-20 days and 14.33 per cent

had work for below ten days in a month and none of the respondents had work for more than 20 days in a month

Kunju (1966) observed that though coir production is the main occupation of the female members they do this side by side with their domestic duties such as cooking, washing, etc. He has also reported that each worker spends nine or ten hours of the day for coir work. Jayasree (1994) observed that most of the coir families were male headed only for name sake and in the event of separation or divorce, the entire responsibility of looking after the children is shouldered by the mother herself. Isaac (1990) has reported that the incidence of female-headed households was surprisingly high among coir workers and the women spinners were often the main wage earners in terms of contribution to the family income. Jayasree (1994) found that due to overload of work there was no leisure time in between and these women were found working even during the lunch time and she also observed that the employers did not provide any facility to look after their children while the women were at work and so these women have to find some alternative to look after the children before they were sent to school. She has also reported that the welfare measures implemented by governmental agencies were found to be not reaching these coir workers in the unorganised sector.

Jayasree (1994) found that most of the women took food only once or very rarely two times a day and only a few

respondents were found to take food in the afternoon and usually it was the left over food of the previous day Isaac (1990) observed that women coir workers after returning late in the night, prepare kanji and drank only the watery portion He also observed that girls between 16 to 20 years were dwarfed on account of insufficient nourishment and women between 25 and 30 years looked 40 to 50 years of age due to work and starvation

Dayal (1995) reported that most of the coir workers are prone to chronic diseases Jayasree (1994) found that the nature of work was found to be closely connected with the nature of disease, the coir workers were suffering Working under the hot sun, posture adopted when beating the husks, sitting on wet grounds, exposure to coir dust and handling of rough surfaces were the main reasons for the diseases from which they were suffering According to Gangrade and Joseph (1983) the health problems faced by the huskbeaters are respiratory, cardiovascular complaints, asthma, cough, dyspnoea, pericardial pain, palpitation, haemoptysis, skin disease, hyperkeratosis and neurological disorders They also reported that the workers in the coir yarn (spinner) due to handling of rough surfaces and holding the bundle in their arms, suffered from hand injuries linear abrasions of the skin of the palm, pain and bleeding of injuries Sinha (1989) reported that during the preparation of husks, oedema of feet and fingers, paronychia and dermatitis are common In the smoking and bleaching section respiratory

disorders were observed Skeletal deformities, eye strain, finger disorders and also neurological illnesses are noticed Early stages of noise induced hearing loss was observed among workers of the weaving section Chandra (1994) found a high incidence of Entrapment Neuropathy among the coir workers of Alleppey which could be due to constant rubbing of hands and stretching of the legs during the peculiar posture adopted Jayasree (1994) reported that the skin diseases were due to their nature of job The most common gyneac problem seen among the coir workers was prolapse uterus due to the posture of the body while at work She also observed that irrespective of age, respondents from all age groups were having health problems and again the nature of work can be assumed to be the major reason for their health problems

MATERIALS AND METHODS

3 MATERIALS AND METHODS

The study on the Nutritional Status of women engaged in the coir industry envisages an assessment of the nutritional status of women engaged in the spinning of coir and the influence of the nutritional status on their work output

3 1 Locale of the study

The present study was conducted in Chirayinkil taluk of Thiruvananthapuram district because there is a high concentration of coir workers in the districts of Thiruvananthapuram, Kollam and Alappuzha of Kerala State as reported by Anonymous (1992) Chirayinkil taluk of Thiruvananthapuram district has the highest number of coir workers Anonymous (1990) reported that there are 38643 workers in Thiruvananthapuram district out of which 22147 workers belong to Chirayinkil taluk Another reason for selecting the above area was the easy access to Chirayinkil from Thiruvananthapuram

3 2 Selection of respondents

3 2 1 Selection of Macrosample (200 respondents)

Two hundred women engaged in the spinning of coir yarn, from three coir co-operative societies of Chirayinkil taluk of Thiruvananthapuram district formed the macrosample of the

study Only women were selected for the study since 84 per cent of the persons employed in the coir industry are reported to be women (Anonymous 1994) The respondents were selected from Chirayinkil taluk of Thiruvananthapuram district because it was found that the number of female coir workers was highest in Chirayinkil taluk (Anonymous 1990)

Two hundred women specifically, from the spinning sector were selected because the spinning sector accounts for seventy per cent of the coir workers (Anonymous, 1990) Moreover it was reported by Bai (1985) that about 99 per cent of the coir manufacturers employ only women for spinning of coir yarn Out of the total of 11081 workers engaged in spinning of coir in Chirayinkil taluk of Thiruvananthapuram district it was reported that about 10757 were females and the males numbered to only about 324 (Anonymous 1990) These women were selected from the primary coir co-operative societies since there is a large network of coir co-operative societies in the State and at present there are 2 27 lakh coir workers in the 423 primary coir co-operative societies which are functional, and they constituted 64 per cent of the workers of the spinning sector (Anonymous, 1994)

The selection of women was done by stratified sampling technique Out of the 47 coir co-operative societies in Chirayinkil taluk three societies were selected at random The

societies thus selected were The Kadakavoor South Kayar Vyavasaya Sahakarana Sangham, The Chirayinkil Kayar Vyavasaya Sahakarana Sangham and the Anathalavattom Kayar Vyavasaya Sahakarana Sangham. Care was taken to select respondents who were neither pregnant nor lactating and who were free from specific and identified disorders since individuals in the above physiological conditions are known to vary widely in their needs for nutrients when compared to normal adults as observed by Martin and Coolidge (1978). Women who were above the age of fifty years were also excluded since the process of aging brings about marked physiological changes in the body as reported by Begum (1991). She has also stated that the nutrient requirements of the old changes from normal adult requirements and their physical activity is low when compared to a normal persons. Thus two hundred respondents from the above three co-operative societies were selected at random based on their population in each society. Thus 95, 70 and 35 respondents were selected from the above three societies respectively.

3.2.2 Selection of Microsample (40 respondents)

Since two types of activities viz , feeding the slivers and rotating the ratt, are involved in the spinning of coir, twenty respondents from each of the two activities, belonging to the age group of 25-40 years were selected at random for detailed study from among the 200 women in order to assess the interaction

between food intake, nutritional status and work output. Thus 40 women constituted the microsample of the study. Only women between 25-40 years of age were selected because majority of the women were between 25-40 years of age. Another reason was to exclude the possible physiological influences of aging.

3.3 Plan of Action

The study comprises a documentation of systematic investigations on a macro sample of 200 respondents and a micro sample of 40 respondents engaged in spinning of coir yarn, as detailed below.

3.3.1 Investigations on macro sample (200 respondents)

- (1) Survey to ascertain the socio-economic characteristics of the families of the coir worker.
- (2) Survey on food consumption pattern and dietary habits of selected families.
- (3) Survey to identify the socio-economic status of the women engaged in spinning of coir.
- (4) Survey to elicit information on the food habits of selected women.
- (5) Survey to determine the daily time utilisation pattern of the selected women workers.

(6) Recording of the anthropometric measurements of the respondents

(7) Clinical examination of the women to assess their nutritional and health status

(8) Estimation of haemoglobin level of the selected women workers

3 3 2 Investigations on micro samples (40 respondents)

(1) Estimation of actual food intake and nutrient intake

(2) Evaluation of clinical profile . Red blood cells (RBC), Differential leucocyte count (DC), Packed Cell Volume (PCV) and Total Iron Binding Capacity (TIBC)

(3) Identification of hookworm infestation

(4) Work done per unit time

(5) Energy expenditure pattern

(6) Estimation of pulse rate and blood pressure in relation to work done

3 3 3 Other investigations

(1) The average temperature, humidity and rainfall of the area under study were recorded for a period of one year

(2) The sanitary conditions of the area of work was also observed

Based on the above investigations the nutritional status of the coir workers was assessed

3.4 Materials and methods

In the present study the methods selected for assessment of nutritional status were diet survey, anthropometric measurements and clinical examination Swaminathan (1993) has suggested that a combination of the methods are effective in the assessment of nutritional status

The details pertaining to the methods and materials used in the study are outlined below

3.4.1 Preparation of questionnaires/schedules

For conducting the present study six schedules were formulated and pretested The six schedules formulated were (1) The schedule designated as Part I had two divisions, namely A and B

(a) Part I-A was used to elicit the socio-economic background of the families and information was collected on the religion, caste, employment status of the family, sources of income, total monthly income and expenditure of the family and the details about their habitats

(b) Part I-B was used to elicit information on the personal characteristics of the women viz , age, marital status,

educational status and particulars about the nature of their employment

(ii) The schedule designated as Part II also had two divisions namely A and B

(a) Part II-A was used to elicit information regarding the food habits of the families of the respondents with respect to the food expenditure pattern, frequency of use of various foods, daily meal pattern of the family, special foods included during specific physiological conditions and special occasions, food taken from outside and also the use of left-over foods

(b) Part II-B was used to collect information regarding the food habits of the respondents which included time schedule for taking meals, food taken from outside, and specific likes and dislikes

(iii) Schedule, III was used to collect information regarding the daily work schedule in the household and at the work site and details relating to duration of sleep and leisure

(iv) Schedule, IV consisted of a score card evolved by the Nutrition Advisory Committee of the Indian Council of Medicinal Research used for assessing the various clinical signs and symptoms of malnutrition

(v) Schedule, V which was prepared by the Department of Factories and Boilers, Government of Kerala under their Worker's Health - Care Programme, was used to elicit information related to the medical history, general appearance and nutrition, chewing and smoking habits, drug and alcohol addiction, temperament at work site, job satisfaction and work hazards. This schedule was also used to gather information related to the general health condition pertaining to cardio-vascular system, respiratory system, gastro-intestinal system, musculo-skeletal system and genito-urinary system.

(vi) Schedule, VI was used to elicit information related to the actual food intake of the respondents.

3 4 2 Socio-Economic Survey

According to Arora (1991) the socio-economic background of the respondents such as social, economic, religious and the family background in general, have a very distinct part to play in determining the attitudes and behavioural patterns of the individuals. Hence, a socio-economic survey was conducted with the help of the schedule designated as I.

3 4.3 Diet Survey

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 attitudes. So, a diet survey was conducted as part of the study and the schedule designated as Part II was used.

Interview method was used to conduct the socio-economic survey and diet survey.

According to Britten (1995) interviewing is a well established research technique. Evans and Divan (1985) found that there was no significant difference among the different methods like oral recall, printed questionnaire and interview method. The method suggested by Swaminathan (1993) was followed wherein the investigator goes around with a schedule for collecting information from the head of the family or housewife regarding family details, because 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.

The dietary-recall method was also included as part of the diet survey, where the respondent was asked to recall the actual food and drink consumed as suggested by Nelson (1995).

Another method suggested by Nelson (1995), where a list of foods was presented and the respondent was required to say how often each item was eaten in broad terms such as x times per day/per week/per month, was also included in the diet survey.

A food use frequency score sheet was also included in the diet survey schedule 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 (1993). Based on the frequency of use of various food items by the respondents food use frequency scores were calculated as suggested by Reaburn et al (1979) and the formula is given below

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

S_n = Scale of rating

R_n = Percentage of respondents selecting a rating

n = Maximum scale rating

Based on the percentage score obtained the food articles were classified into four groups i.e., most frequently used, moderately used, less frequently used and least frequently used foods

3.4.4 Anthropometric measurements

Another method selected for assessment of nutritional status of the coir workers was anthropometry

Beaton et al (1990) reported that anthropometry is useful because it provides the best general proxy for constraints to human welfare of the poorest, including inadequacies

infectious diseases and other environmental health risks Cole (1993) stated that anthropometry is widely used as a screening tool for diseases in adults According to Gorstein et al (1994) anthropometry is widely used as a tool to estimate the nutritional status of populations and to monitor the growth and health of individuals

The anthropometric measurements used in the present study were height, weight, hip, waist, mid upper arm circumference and skinfold thickness at triceps

According to Gopaldas and Seshadri (1987) height or the total length, apart from nutritional and other environmental factors is influenced by hereditary factors The extent of height deficit in relation to age, as compared to regional standards, may be regarded as a measure of the duration of malnutrition Hence the heights of all the subjects were measured using a stadiometer and compared with standards

According to Kaul and Nyamongo (1990) a change in body weight may be the result of changes in the health of an individual, changes in dietary supplies or even changes in one's physical activity A beam balance was used to measure weights of 200 subjects as an indicator of nutritional status The measurements were compared with standards

The technique outlined by Jelliff (1966) was used for the measurement of both height and weight

The deficit in weight and height can be due to both stunting and thinness, thus it is appropriate to use direct indicators of weight deficit in relation to height, and for this the body mass index ($\text{weight}/\text{height}^2$) can be used as reported by Anonymous (1992) Chadha et al (1995) stated that BMI is used as an indicator of general obesity and it is the body weight in kilogram divided by square of height in metres (kg/m^2) Vandana sen et al (1980) pointed out that $\text{weight}/\text{height}^2$ gives a fair estimate of the magnitude of the protein calorie malnutrition Hence the BMI (Body Mass Index) of all the respondents were computed and compared with standards

According to Lean et al (1995) waist circumference is used as a measure for indicating the need for weight management The technique for waist measurement suggested by Chadha et al (1995) was followed and the circumference of the waist at the umbilicus was measured Again, the technique suggested by Chadha et al (1995) for hip measurement, where the circumference of the hip at the maximum point of protrusion was measured and recorded

The Waist-Hip Ratio (WHR), according to Lean et al (1995), reflects the proportion of body fat located intra-abdominally as opposed to that in the subcutaneous region Hence, after documenting the waist and hip measurements of the respondents their waist-hip ratio was calculated As suggested

by Chadha et al (1995) the waist-hip ratio was calculated by dividing the circumference of the waist by the circumference of the hip

The next anthropometric measurement recorded was the Mid Upper Arm Circumference (MUAC) Measurement of the mid upperarm circumference is the most useful, practical method for assessing muscle mass as this region is easily accessible and measurement requires only a flexible fibre glass tape as reported by Gopaldas and Seshadri (1987) The technique suggested by Jelliff (1966) was followed in the measurement of midupperarm circumference

Triceps Skin fold thickness Triceps was another anthropometric measurement recorded Measurement of skin fold (or fat fold) at triceps is one of the methods for assessment of the amount of subcutaneous fat, which gives an indication of the calorie reserves in the body of an individual as stated by Malina et al (1974) The skin fold thickness was determined using a Fat Calipers (TEC PRESTON) and the technique suggested by Jelliff (1966) was followed in the measurement of triceps skin fold thickness

3 4 5 Clinical Examination

All the 200 women selected for the study were subjected to clinical examination by a qualified medical practitioner

According to Swaminathan (1993) clinical examination is the most important part of nutritional assessment as one gets direct information of the signs and symptoms of dietary deficiency prevalent among the people. As stated by Whitehead (1965) clinical examination is based on examination of changes that can be seen or felt in superficial epithelial tissues especially in the skin, eyes, hair and buccal mucus or in organs near the surface of the body.

The schedules used by the Physician for recording both anthropometric measurements and conducting clinical examination were schedule IV and schedule V, respectively.

3 4 6 Estimation of haemoglobin

The haemoglobin content of blood samples collected from the 200 respondents was estimated as Park (1991) states that haemoglobin level is a useful index of the overall state of nutrition irrespective of its significance in anaemia. Sood (1967) reported that the haemoglobin level formed a satisfactory index for determining iron deficiency for survey purposes. Rajajee (1989) has also reported the same opinion.

Haemoglobin content was estimated by the Cyanmethaemoglobin method as described in the Manual of Laboratory Techniques published by National Institute of Nutrition of ICMR (1983).

3 4 7 Actual food intake

Estimation of actual food intake was done by weighment method. This method was selected since Young (1995) reported that all methods of dietary intake assessment requires either a direct probe of portion size or an estimate of size with reference to a standard size in order to determine energy and nutrient content. Sundararaja *et al.* (1971) reported that weighment method was the ideal choice for assessment of individuals food intake. Tilwe (1978) had indicted that individual intake could be measured accurately only by actual weighing of food items consumed. Devadas and Eswaran (1986) found that food weighment was the most reliable method to assess the actual food intake of an individual. The technique suggested by Swaminathan (1991) was followed in the weighment survey wherein the quantity of each raw food item taken for cooking is first measured and then the total weight of the cooked food followed by the actual quantity of food consumed by both the respondent and family members were weighed out. Raw equivalents of the food items consumed were then computed and the nutrient intake was calculated using the values of composition of foods given in Nutritive Value of Indian Foods published by ICMR (1991). The weighment survey was conducted on a random day since Rao (1975) has reported that the mean intake of food on a random day was no different from that of an entire week and a diet

weighment survey for one or two days was as efficient as for seven days

3.4.8 Evaluation of clinical profile

(i) Red blood cell (RBC) Count Enumeration of red blood corpuscles gives an index of anaemia as reported by Mason and Swash (1980) The technique suggested by Dacie and Lewis (1975) was followed for the measurement of red blood cell count

(ii) Packed Cell Volume (PCV) Packed Cell Volume or Haematocrit reveals the degree of anaemia as reported by Mason and Swash (1980) and it gives the volume of red blood cells/packed cells present in 100 ml of blood The method suggested by Dacie and Lewis (1975) was followed in the measurement of PCV

(iii) Differential leucocyte count (DC) Differential leucocyte count is an useful estimation for detecting abnormalities in the leucocytes or WBC as stated by Lois et al (1986) and according to Chatterjee (1987) variations in the normal count of leucocytes occur after hostile invasion with parasites, in asthma and in skin diseases The method suggested by Dacie and Lewis (1975) was adopted in the present study

(iv) Total Iron Binding Capacity (TIBC) Total Iron Binding Capacity was estimated because it helps to confirm the extend of iron deficiency as suggested by Rajajee (1989) The TIBC was

measured after saturation of transferrin by an iron solution and adsorption of the excess iron on magnesium hydroxy carbonate as suggested by Ramsay (1957) and Piccardi (1972)

3 4.9 Identification of hookworm infestation

Identification of hookworm infestation was carried out because according to Park (1991) stools should be examined for intestinal parasites and he is of the opinion that an history of parasitic infestation, chronic dysentery and diarrhoea, as it provides useful background information about the nutritional status of persons Mason and Swash (1980) has also reported that hookworm infestation is an important cause of anaemia and debility in the tropics where heavy infestations may occur As suggested by Lois et al (1986) the stool specimens collected from the forty subjects were examined for hookworm infestation using the procedure suggested by National Institute of Nutrition (1983) in their Manual of Laboratory Techniques

3 4 10 Work done per unit time and Energy expenditure pattern

The work done per unit time and energy expenditure pattern of forty respondents were recorded since Zemlianskaia et al (1988) suggested that work capacity and energy expenditure are closely associated with a person's nutritional and health status

(i) Measurement of work efficiency - Work done per unit time

Padmanabhan (1981) has defined labour efficiency as the capacity to do productive work per man per unit time. In the present study working efficiency was worked out in terms of the quantity of yarn spun per respondent per unit time.

(ii) Energy expenditure pattern

According to Bray (1981) energy balance is the relationship between energy intake and energy expenditure. Groot and Staveren (1995) has also stated that the body energy reserves are regulated via the balances between energy intake and energy expended. According to Vazquez *et al* (1991) in order to describe the health problems of women in the context of their activities, both inside and outside the home, a descriptive study of different activities has to be carried out. For measuring the energy expenditure in a natural environment the method suggested by Bray (1981) was used. According to this method all the activities were documented by keeping a diary throughout the 24 hours of a day and energy expenditure was computed by multiplying the time spent on a particular activity by the rate of energy expenditure which was expressed in BMR units as given by ICMR (1994). With the help of the Nutritive value of Indian Foods, ICMR (1991) the energy intake was computed from the actual food intake using energy value of foods consumed. From the above

data energy balance was assessed by comparing the energy intake with respect to RDA (Recommended Dietary Allowances)

Thus the energy balance was calculated as an indicator for health status of the 40 respondents

3.4.11 Estimation of pulse rate and blood pressure in relation to work done

The initial and final pulse rate and blood pressure of the forty respondents were recorded at the time they start work and after an hour. The above observations were recorded because Reddy (1983) reported that the pulse rate, cardiac output and oxygen uptake are related to the physical work done by an individual. The technique suggested by Mason and Swash (1980) was followed while assessing the pulse rate and blood pressure of the selected respondents. The blood pressure of the respondents, was measured using a sphygmomanometer. These two parameters are direct indicators of health and hence that of working efficiency.

3.4.12 Recording of the average temperature, humidity and rainfall of the area of study

The average temperature, humidity and rainfall of the area under study was also recorded because according to Lindstrom and Mantysalo (1987) the thermal condition of a working environment is related to the climate and the location of the

work (out of doors or indoors) and that under heat stress the circulation of blood in the body is directed towards the skin the amount circulated to the muscles decreases which results in fatigue and a decrease in their working capacity Park (1991) stated that temperature, humidity and rainfall are important elements which comprise the environment Hence the necessary data for the above observation were obtained from the Meteorological Centre, Thiruvananthapuram

3 5 Analysis of data

3 5 1 Measurement 'quality of life index' based on selected socio-economic variables

From the socio-economic data collected a Rural Quality of Life Index (RQLI) as suggested by Dhanasekaran (1991) was worked out to measure the extend of poverty among the selected coir workers The RQLI is a scientific method of measuring poverty The selected indicators were caste, occupational status of the family, total monthly income of the family, per capita monthly income, number of female earners in the family, food expenditure expressed as a per cent of total monthly income, per capita expenditure on clothing (monthly), number of rooms available, educational status of women and calorie and protein requirement of the women Each of the indicators were rated by giving scores The scores given for each of the parameters ranged from 0 to 6 depending on the variations observed within

the families studied. Scores assigned for each parameter for a family when summed up would give the total score for that family. Sum total of the score of a family would give the quality of life index of that particular family. Maximum score that can be obtained by a family by this calculation is 49. Total scores were thus worked out for all the 200 families surveyed. Based on the total scores obtained by the families, the selected families were classified into four groups as done by Dhanasekaran (1991) in order to find out the quality of life and also to determine level of poverty among them in order to suggest remedial measures.

3.5.2 Identification of "at risk" families

With the data available with respect to the socio-economic and demographic factors pertaining to the two hundred families, an attempt was made to identify the at risk families using the method suggested by Srilatha and Gopinathan (1995). The above poverty index was worked out because it gives a clear picture of the needs of the family and also of the specific package of interventions needed to uplift these families with reference to their environment under Kerala conditions.

3.5.3 Computation of Nutritional Status Index (NSI)

According to Ottesen et al (1989) the assessment of nutritional status is based on one or more of the following

indicators anthropometry, clinical signs including clinical symptoms and physical signs of nutritional problems, or biochemical and laboratory measurements of body nutrients and constituents Hence, in the present study for the assessment of nutritional status a nutritional status index (I) was worked out using the formulae

$$I = \frac{1}{K} \sum_{i=1}^K W_i X_{ij}$$

Where $W_i = 1/S_i^2$, S_i^2 being the variance of i th variable based on sample of n respondents and X_{ij} is the observation corresponding to the j th respondent with respect to the i th variable, K being the number of characters namely height, weight body mass index, hip and waist measurements, triceps skin fold thickness, haemoglobin and clinical score W_i is the information supplied by the sample with respect to i th character

3.6 Statistical Analysis

The data collected through the schedules and direct measurements were subjected to percentage analysis and estimation of parameters like mean, standard error and correlation coefficients to draw valid conclusions

RESULTS AND DISCUSSION

4 RESULTS AND DISCUSSION

4.1 Socio-economic profile of the families

Ndaba and O'keefe (1985) reported that poor socio-economic conditions are the root cause of most of the malnutrition problems observed. According to Ramankutty (1990) better socio-economic status of women is reflected in better literacy, better work participation and greater independence within and outside the family. A clear cut conceptualization is a pre-requisite for notional estimation of the incidence of socio-economic situation of the population and to formulate and implement appropriate programmes for the alleviation and eradication of the problems identified. With this aim, socio-economic profile of the coir workers' families were ascertained as a prelude to this study.

The socio-economic profile of the 200 selected families engaged in the coir industry was studied with reference to their religion, caste, type and size of family, educational and employment status, income and expenditure patterns and also their living conditions.

4 1 1 Religion and caste of the families

Table 1 Religion and caste-wise distribution of the families

(a) Religion	Distribution of families	
	No	Per cent
Hindu	193	96 50
Christian	5	2 50
Muslim	2	1 00
Total	200	100 00
(b) Caste	No	Per cent
Forward caste	0	0
Backward caste	172	86 00
Other backward caste	3	1 50
Scheduled caste	25	12 50
Total	200	100 00

(N = 200 families)

The socio-economic survey of the 200 families revealed that 193 (96 50 per cent) of the families were Hindus, 5 (2 50 per cent) were Christians and 2 (1 00 per cent) of the families were Muslims

The religion-wise breakup of the respondents was assessed since it had been observed by Arora (1991) that religion plays a dominant role in the process of socialization and it

maintains the stability of the social system and social relationships

In the present study it was found that Hindus predominated the sample population studied. This may be because they constitute 57.00 per cent of the total population in rural Kerala as reported by Kannan *et al* (1991). The same trend is found when the demographic profile of Thiruvananthapuram district is taken into consideration. The Kerala Statistical Institute (1992) reveals that Thiruvananthapuram district has a majority of population who follow Hindu religion. Hence it is true that the same trend is seen reflected among the respondents of this study also.

According to Government of India (1981) the caste system is reported to be mainly responsible for perpetuating poverty in rural areas. It has been observed by Arora (1991) that caste is a unique institution of the Indian society. Hence caste system of the 200 families were analysed and it was observed that 172 (86.00 per cent) belonged to the backward communities (BC), 3 (1.50 per cent) belonged to the other backward castes (OBC) and only 25 (12.50 per cent) belonged to the scheduled caste (SC). None of the families belonged to the forward caste category as revealed in Table I (b). Similar caste pattern has been reported by several social scientists. A study conducted among the coir workers in Kerala by Mathew and Nair

(1988) revealed that two-third of the women coir workers belonged to the Ezhava community Harijans constituted another one-third of their sample Kannan (1986) has also reported that 80 00 per cent of the workers in the coir factories of Kerala came from Ezhava community Isaac (1990) has remarked that it was women of the Ezhava caste and to a lesser extent those of the Muslim, Latin Christian and Cheruma communities who took to coir making as their chief vocation Jayasree (1994) observed that 30 67 per cent of the coir workers belonged to the Ezhava community, followed by Nairs (23 83 per cent) and scheduled caste (20 17 per cent) Perumal (1986), in general reported that majority of the coir workers all over India come from the weaker sections of the community

The results obtained in the present study endorses the inferences drawn by other researchers who had taken up studies on coir workers

4.1.2 Type and size of the families

Two important social factors that are reported to influence nutritional status are type of family and family size and so the distribution of the families according to the type and size were subjected to analysis and the details are presented in Table 2

Table 2 Distribution of the families according to the type and size

(a) Type of family	Distribution of families	
	No	Per cent
Nuclear	133	66.50
Joint/Extended	67	33.50
Total	200	100.00
(b) Family size	No	Per cent
Small family (1-5 members)	139	69.50
Large family (Above 5 members)	61	30.50
Total	200	100.00

(N = 200 families)

From the above it is seen that 133 (66.50 per cent) of the families were of nuclear type while 67 (33.50 per cent) were joint/extended type of families.

This data reveals that nuclear type of families were found to be more popular in this community. Similar trend was observed among the coir workers of Andhra Pradesh by Rajagopal (1993). Shah and Rathore (1993) reported that little more than half of the women labourers in the unorganised sector belonged to nuclear families. Predominance of nuclear type families among fishermen families of Tamil Nadu and families residing in Trivandrum has been reported by Sadasivan *et al.* (1980) and Suja (1989), respectively.

This reveals the recent social trend universally observed, where there is fading of joint family system brought in by the social processes such as urbanization which has ushered in the spread of nuclear family system, where the husband, wife and their children reside under one roof. It has been observed that in the nuclear family, the per capita income, as well as the per capita availability of food, and other resources would be higher than that of joint families, and hence this family pattern observed among the coir workers is likely to influence their nutritional status, favourably.

When the family size was analyzed it was seen that 139 (69.50 per cent) of the families had one to five members while 61 (30.50 per cent) of the families had more than five members. Majority of the families in the present study can be categorised under the small family with one to five members in each family. Sunil (1986) has reported the average family size of a coir worker's household in Alleppey district as 5.0. Rajagopal (1993) has also found that majority of the coir worker's families in Andhra Pradesh had four to five members.

The average family size of 5.06 is found to be similar to those observed among rubber plantation workers, which has been reported to be 5.10, by Haridasan (1991). When compared to weavers and stone breakers the coir workers are seen to have a smaller family.

One reason for the family size of the coir workers to be low may be due to the nuclear family system which is widely prevalent in the State. The small family norm might also be due to the higher female literacy and consequent exposure to information through mass media. The other factors contributing to the reduction in household size can be emigration of male adults in search of employment and also a fall in birth rate, which are two characteristic features of modern Kerala.

This small family norm is of great social significance, since it has a direct influence on the per capita availability of income, as well as food. These in turn would have a direct and favourable impact on the nutritional status of these workers and other members in the family.

4 1.3 Demographic profile of the families

In order to estimate the food needs of any population, information on its demographic characteristics, like the total population, age and sex profile is necessary as food requirement, availability and consumption pattern are known to be directly affected by these factors as observed by Reddy *et al* (1993). Hence, information on these parameters were collected and are presented in Table 3.

Table 3 Age and sex-wise distribution of the members of the respondents families

Age (years)	Distribution within the male population		Distribution within the female population		Distribution in the total population (%)		Total		Average members in a family
	No.	Per cent	No.	Per cent	Male	Female	No.	Per cent	
0 - 12 months	5	0.98	3	0.61	0.49	0.29	8	0.79	0.04
1 - 3	15	2.90	20	4.04	1.49	1.98	35	3.45	0.175
4 - 6	16	3.07	11	2.22	1.57	1.08	27	2.67	0.135
7 - 9	15	2.90	22	4.44	1.49	2.18	37	3.66	0.185
10 - 12	26	5.01	20	4.04	2.56	1.98	46	4.55	0.23
13 - 15	27	5.21	34	6.87	2.66	3.35	61	6.02	0.305
16 - 18	28	5.41	29	5.86	2.77	2.87	57	5.62	0.285
≥ 19	306	74.50	356	71.92	38.10	35.14	742	73.24	3.71
Total	518	100.00	475	100.00	51.13	48.87	1013	100.00	5.065

(N = 200 families)

The age and sex based distribution of the population as presented in Table 3 reveals that the 200 families surveyed had a total population of 1013 members. When the age and sex of the selected population were examined in detail, it revealed that, of the total population, 38.10 per cent were adult males and 35.14 per cent were adult females and the remaining were children.

It may be noted that the child population is low when compared to adults. A similar trend was reported by the Kerala Statistical Institute (1992), in their survey, where they observed a decrease in the per cent of population in the younger

age group of 0-14 and an increase in the percentage of population in the older age group of 60 and above, in Kerala

The trend observed among the coir worker's households with respect to the child population is a favourable social phenomena, since, children in a family demand more time, attention and better food than adults, and economically they are dependent on adults. It has also been reported by Elliott and Huppert (1991) that in Britain, women with children under five are most likely to show signs of psychological disturbances

It is interesting to note that the families surveyed have comparatively more number of males when compared to females. The sex ratio in the present study was found to be 518:495. This does not follow the general sex ratio of Kerala, or Trivandrum district where, according to census figures, there are more number of females when compared to males. This is a secular trend of Kerala as a whole. A similar trend was observed among the fishermen community of Valiyaveli of Trivandrum by Karuna (1993), where there were more male members than female members and their proportion was found to be 437 males for 397 females

This again is a positive trend, since, an abundance of male members indicates more numbers of bread winners and that in turn results in a higher income leading to a better nutritional and health status

4 1 4 Details of families with respect to employment

Further socio-economic analysis of the families revealed that in 16 (8 00 per cent) of the families only the respondent was employed whereas in 86 (43 00 per cent) of the families the respondent and another adult member (two members) were employed, and in 98 (49 00 per cent) of the families more than two members were employed. The above information is given below in Table 4

Table 4 Employment status of the family

Details of family members who are employed	Distribution of families	
	No	Per cent
Respondent alone	16	8 00
Respondent and one member	86	43 00
Respondent and more than one number	98	49 00
Total	200	100 00

(N = 200 families)

From the above table it can be inferred that in 8 00 per cent of the families, women were the sole bread winners. This above fact leads us to Table 5 which gives information related to the number of female headed households among the families surveyed.

Table 5 Distribution of the families with respect to family head and sex

Details related to family head and sex	Distribution of families	
	No	Per cent
Maleheaded families	135	67.50
Female headed families	65	32.50
Total	200	100.00

(N = 200 families)

Table 5 reveals that the maleheaded households outnumbered the female headed households. From the numerical data obtained it can be inferred that the above households could have a better nutritional status because male-headed households would have more means for producing as well as purchasing food, as reported by Okeke *et al.* (1988)

However, during the survey, majority of the women reported that though males were the so called family heads, most of the men did not participate in taking decisions related to the purchasing of food nor did they show any interest in bringing up their children. Thus in reality it can be inferred that the women engaged in the coir industry face crucial conflicts as they try to fulfill their economic and social roles and these conflicts can have detrimental effects on their health and nutritional status.

The employment status of the population is an important determining factor with respect to health and nutritional status of the population (Reddy et al , 1993) Table 6 gives information related to the distribution of the family members according to their employment status

Table 6 Distribution of the family members according to their employment status

Employed members		Unemployed members		Persons not available for work		Total	
No	Per cent	No	Per cent	No	Per cent	No.	Per cent
730	72 07	18	1 78	265	26 15	1013	100

(N = 200 families)

Table 6 reveals that the employed members far outnumbered the unemployed members, with the former being 72 07 per cent and the latter being 1 78 per cent of the total population. About 26 15 per cent of the population consisted of persons not available for work since they were either children, sick or old persons. The result of the present study indicates that, contrary to the general belief, the sample population did not suffer from unemployment. The high level of employment, will have a favourable impact on the nutritional status of the members, since, it has a direct influence on income and purchasing power.

After determining the distribution of the family members according to their employment status, the distribution of population by sex and employment status was assessed and the data are presented in Table 7

Table 7 Distribution of population by sex and employment status

Employment status	Distribution of population by sex				Total	
	Male		Female			
	No	Per cent	No	Per cent	No	Per cent
Employed members	420	57 53	310	42 47	730	100
Unemployed members	11	61 11	7	38 89	18	100
Persons not available for work	136	51 32	129	48 68	265	100
Total	667	55 98	446	44 02	1013	100

(N = 200 families)

Data presented in Table 7 reveals that among the employed members the males dominated the females (57 53 per cent and 42 47 per cent, respectively) An interesting finding is that among the unemployed members also the males were seen to outnumber the females The males accounted for 51 32 per cent of the persons not available for work and in the case of females it was 48 68 per cent

A natural inference that would come to mind from the above result is that the increased number of male bread-winners

would, in turn, increase the purchasing power of the families leading to better nutritional status. But during the survey, majority of the women reported that though their men were employed, a large part of the income they earned was not being utilised for the benefits of the other members in the family especially the children and women. Men reportedly spend major portions of their wages on liquor, cigarettes, entertainment and to satisfy their petty personal desires. Because of the above trend which was prevalent among the employed men, it can be inferred that the women played the central role in child care and food procurement. The pivotal role would lead to a conflict between the women's economic roles and their own nutritional needs, with the latter being sacrificed.

Table 8 reveals that out of 730 employed members, 580 (79.40 per cent) were engaged in the coir industry and 150 (20.60 per cent) members were engaged in other occupations.

Table 8 Occupational status of the family members

Details of family members	Distribution of members	
	No	Per cent
Members engaged in the coir industry	580	79.40
Members engaged in other occupations	150	20.60
Total numbers of employed members	730	100.00

(N = 200 families)

The above data indicates that coir industry is the major source of employment and income for 80 00 per cent of the population surveyed. This is mainly so because, the study was conducted among coir workers. Non availability of other work in the area of residence, redundancy of educational qualification and lack of knowledge regarding other occupations were the other reasons as to why majority of the respondents opted coir work.

The work done by the members engaged in the unorganised coir industry are varied and so details regarding the nature of occupation of the family members were collected and the results are presented in Table 9.

Table 9 Distribution of the family members engaged in various activities of the coir industry

Nature of occupation of family members	Distribution of members	
	No	Per cent
Retting	99	17 06
Spinning	270	46 56
Beating	90	15 51
Labourer	121	20 87
Total	580	100 00

(N = 200 families)

Distribution of the family members engaged in the various activities of the coir industry as presented above

reveals that out of the total of 580 members engaged in the coir industry, 99 (17.06 per cent) of the members were employed in the retting sector, 270 (46.58 per cent) were engaged in the spinning sector, 90 (15.51 per cent) were employed in the beating sector and the remaining 121 (20.87 per cent) were employed as labourers in the coir industry, doing loading and unloading of husks, steeping and draining the husks in the process of retting and finishing and packing the coir-products

In the present study, the spinning sector was found to employ the largest numbers of workers and the above result is similar to that estimated by the Government of Kerala (1990) which stated that the spinning sector accounts for 70.00 per cent of the coir workers. Number of members engaged in the retting and beating of coir closely followed the spinning sector which is, again in agreement with the report compiled by Government of Kerala (1990) which proclaimed that the beating sector accounted for 14.00 per cent of the workers. Official records also reveals that only less than one per cent of the workers were found to be engaged in the work related to finishing and packing of coir products

Table 10 gives information related to the distribution of the family members engaged in the coir industry with respect to the years of employment

Table 10 Distribution of the family members engaged in the coir industry with respect to years of employment

Experience in coir industry (in years) (Range)	Distribution of employed members	
	No	Per cent
Less than 5	63	10 86
5 - 10	96	16 55
11 - 20	229	39 49
More than 20	192	33 10
Total	580	100 00

(N = 200 families)

All the family members in the coir industry had a working experience which ranged from less than 5 years to more than 20 years. Only 63 (10 86 per cent) of the members had an experience of less than 5 years, 96 (16 55 per cent) of the members reported that they were employed from 5 to 10 years, while 229 (39 49 per cent) members had undergone 11 to 20 years of employment and 192 (33 10 per cent) of the members were employed for more than 20 years in the coir industry. Thus, majority of the members were employed, from 11 years to more than 20 years, in the coir industry.

This observation leads to the fact that, working with coir has become the way of life of these women and this employment has become the major occupation, and the major source of family and personal income. It may also be inferred that

their years of experience can be linked with their income. Since these women are paid 'piece rates', experience could be a factor which determines the income earned. Women with longer tenure of experience are expected to earn more, and that in turn can go a long way in moulding their life style and status of health.

Since underemployment is reported to be a characteristic feature of the coir industry, it was decided that data related to the days of work availability should be collected and the above details are presented in Table 11.

Table 11 Distribution of the family members with respect to the days of work availability in the coir industry (March 1994-March 1995)

Number of days	Distribution of family members							
	Retting		Spinning		Beating		Other forms of labour in the coir industry	
	No	Per cent	No	per cent	No	Per cent	No	Per cent
≤ 100	99	100	19	7.03	9	10.00	-	-
101 - 125	-	-	40	14.82	15	16.67	-	-
126 - 150	-	-	80	29.63	16	17.78	3	2.48
151 - 175	-	-	131	48.52	50	55.55	118	97.52
Total	99	100	270	100.00	90	100.00	121	100.00

(N = 200 families)

The distribution of the family members with respect to the days of work availability in an year in the coir industry

revealed that the average working days for the 580 members engaged in the various sectors was 149 days during the year 1994-1995 (March to February). It may also be noted that the societies themselves could provide employment only on 175 days, which is approximately 7 months in the above period.

The data presented in Tabel 11 further reveals that members from the retting sector had the lowest number of working days, viz 99 (100.00 per cent) of the members worked for less than 100 days in an year. In both the spinning and beating sectors maximum number of members i.e. 131 (48.52 per cent) and 50 (55.55 per cent) respectively had work for about one third of the year with the working days ranging from 151 to 175 days.

In general it can be found that the average number of working days for the different sectors in the coir industry, namely, retting, spinning, beating and other forms of labour were 62, 153, 149 and 161 days, respectively.

The above result indicating the prevalence of underemployment among the coir workers of Chirayinkil is similar to other reports. The severity of underemployment among coir workers has been pointed out by both Nair (1978) and Isaac (1990). A report published by Government of Kerala (1981) summarises that nearly forty per cent of the coir units gave employment for less than six months in the year 1981. It was also reported by Government of Kerala (1990) that out of

2 27 lakh workers enrolled in the coir co-operative societies in Kerala, only one-third could be provided with work during the year 1988-89

Thus non-availability of work and incompetency in any other work, aggravates the problem of underemployment which results in poverty among coir workers. This state of affair calls for suitable intervention to alleviate poverty. If the days of work cannot be enhanced, they may be motivated and/or trained to take up other work during the lean periods. Thus, underemployment was found to be a major problem faced by the coir workers. There were two factors which contributed to underemployment in the coir industry. The societies were able to provide work for their employees only for 6 to 7 months in an year for want of raw materials. This handicap was superimposed by the absenteeism exhibited by the workers. During the survey it was observed that the workers absented themselves from work and the days of work attendance was very low. Table 12 reveals the distribution of members with respect to the days of work attendance.

Table 12 Distribution of members with respect to the days of work attendance

Number of days of work attendance	Distribution of family members									
	Retting		Spinning		Beating		Other forms of labour			
	No	Per-cent	No	per-cent	No	Per-cent	No	Per cent		
≤ 100	99	100	16	5 93	12	13 33	19	15.70		
101 - 125	-	-	42	15 56	32	35 56	35	28 93		
126 - 150	-	-	91	33 70	21	23 33	29	23 97		
151 - 175	-	-	121	44 81	25	27 78	38	31 40		
Total	99	100	270	100 00	90	100 00	121	100 00		

(N = 200 families)

From the above data it is clear that in the spinning sector only 44 81 per cent of the workers recorded the maximum attendance which ranged from 151-175 days. Poor attendance was observed in the beating sector as well, with just 27 78 per cent of the workers reporting on all days. Persons engaged in other forms of labour also showed poor work attendance with 31 40 per cent of them coming to work for 151-175 days.

Absenteeism is an important factor which would reflect the socio-economic status of the workers. The reasons cited by the members with respect to their absenteeism were varied, ranging from ill health of the respondents, ill health of other family members, family problems, the frequent misunderstanding

between the workers and the officials of the society and also general frustration stemming from their poverty and poor socio-economic background

According to Arora (1991) income is an important indicator of the socio-economic status of an individual and hence details pertaining to earnings from coir industry and total monthly income of the families were collected

Table 13 pertains to information related to the distribution of family members with respect to earnings from the coir industry

Table 13 Distribution of the employed family members with respect to earnings from the coir industry (March 1994-March 1995)

Yearly income in (Rs)	Distribution of employed family members							
	Retting		Spinning		Beating		Labourer	
	No	Percent	No	Percent	No	Percent	No	Percent
≤ 1000	97	97 98	17	6 30	-	-	-	-
1001 - 2000	2	2 02	25	9 26	2	2 22	-	-
2001 - 3000	-	-	10	3 70	6	6 67	90	74 39
3001 - 4000	-	-	56	20 74	8	8 89	31	25 61
4001 - 5000	-	-	162	60 00	74	82 22	-	-
Total	99	100	270	100 00	90	100 00	121	100 00

(N = 200 families)

Details pertaining to the distribution of the family members with respect to earnings from the coir industry from, March 1994 to March 1995, revealed that the average yearly income for 580 members engaged in the various sectors was Rs 3309 80 with the minimum and maximum yearly income being Rs 950 and Rs 4800. Members from the retting sector had the lowest yearly income with 97 (97.98 per cent) of the workers earning less than or equal to Rs 1000 and only 2 members were able to earn from Rs 1001-2000. In both the spinning and beating sectors, 162 (60.00 per cent) and 74 (82.22 per cent) of the workers earned an yearly income ranging from Rs 4001-5000. For the labourers employed in the coir industry maximum number of workers 90 (74.39 per cent) earned an yearly income ranging from Rs 2001-3000.

From the table it is clear that workers from the spinning and beating sector were able to earn the maximum income which ranged from Rs 4001-5000 per annum.

The variation in income could also be attributed to the number of working days, which directly influences the income earned. The average yearly income of Rs.3309.80 indicated that the workers in the coir industry earned low income, but the result of the present study shows a higher income when compared to the result of the study conducted by Sunil (1986) among coir workers of Alleppey. He reported that their annual income is to

the tune of Rs 2218 72 The difference can be explained by the changes in the wage structure over the past ten years

The fact that the spinners employed in the coir industry, were able to earn higher income than others has been endorsed by the reports of Isaac (1990) He noted that the earnings of the ratt spinners were two to three times the earnings of the hand spinners It may be mentioned that all the respondents in the present study were ratt spinners

The survey conducted among 200 coir workers indicated that the major source of income of these families came from coir industry itself However, these families do not have other sources of income, which influences the total earnings and income of these families

4 1 5 Total family income (monthly)

In the present study the total family income was taken into consideration because it determines the family's status and the socio-economic strata of the society to which they belong

Table 14 reveals the distribution of families with respect to their total monthly income

Table 14 Family income in Rs (Monthly)

Income (Rs)	Distribution of families	
	No	Per cent
≤ 1000	21	10 50
1001 - 2000	138	69 00
2001 - 3000	40	20 00
≥ 3001	1	0 50
Total	200	100 00

(N = 200 families)

Table 14 reveals that 138 (69 00 per cent) families had a monthly income that ranged from Rs 1001 to Rs 2000. Another 40 (20 00 per cent) earned an income that ranged from Rs 2001 to Rs 3000 and 21 (10 50 per cent) families had an income less than or equal to Rs 1000. There was just one family who reported to be earning more than Rs 3001 per month.

The average monthly income of the 200 families who were surveyed was found to be Rs 1673. Shah and Rathore (1993) had reported similar trends among families engaged in other occupations under the unorganised sector. They reported that the monthly income of such families ranged from Rs 1001 to Rs 2000 while Meher (1995) observed that the average monthly earning of a weaver household in Orissa was Rs 622 25.

In the present study it was found that the economic status of the coir workers' families are better than that of the

families engaged in occupations like agriculture (Suja, 1989) and Stone breaking (Sujatha, 1990)

The differences and disparity in the distribution of income among the coir workers' households could be mainly attributed to the differences in the number of earning members per household

In the present study, a positive but non-significant correlation was found between employed males and total monthly family income ($r = 0.2937$). Again, a highly positive significant correlation was found between employed females and total monthly family income ($r = 0.4421^{**}$)

4.1.6 Total family expenditure (Monthly)

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. Hence the details of expenditure was assessed in the study.

Table 15 gives information related to the total monthly expenditure of the family on food items.

Table 15 Total monthly expenditure of the family on food items

Monthly expenditure (in Rs)	Distribution of family members	
	No	Per cent
≤ 500	2	1 00
501 - 1500	155	77 50
1501 - 2500	41	20 50
2501 - 3500	2	1 00
Total	200	100 00

(N = 200 families)

The data relating to the total monthly expenditure of the family on food items, revealed that the average expenditure of 200 families surveyed was Rs 1176. Maximum number of families i.e., 77.50 per cent of the families spent from Rs 501-1500 on food items. Forty one (20.50 per cent) of the families were found to spend from Rs 1501-2500.

The monthly expenditure pattern of the families were found to increase in accordance with the rise in income. In the present study a highly positive significant correlation was found between the total monthly family income and monthly expenditure for food ($r = 0.7776^{**}$). Similarly, a positive significant correlation was found between monthly expenditure for food and employed males ($r = 0.3698^{**}$) and employed females ($r = 0.4537^{**}$). In the present study it was observed that food

expenditure was the major item of family expenditure. Seventy seven per cent of the families spent Rs 501-1500 on food. A survey conducted in Andhra Pradesh revealed that 51.43 per cent of the income earned by coir workers was spent on food (Agricultural Finance Corporation, 1980). A survey conducted by NIN (1985) revealed that in low income groups over 90.00 per cent of the family's income was used up for providing the essentials such as food, clothing and shelter. Godawari *et al* (1987) found that in Tamil Nadu, around 65.00 per cent of the families spent 60.00 to 80.00 per cent of their income on food. According to Devadas (1991), in Tamil Nadu, a maximum portion of the income (61-80 per cent) is spent on food by families of low socio-economic strata. Stephanie (1984) revealed that the expenditure on food is high, constituting 60.00 to 70.00 per cent of the total monthly expenditure of an average Indian. In a study conducted by Kaur and Mann (1988) among low socio-economic group families in Punjab similar results were reported where in the major item of expenditure was food. Quiogne (1970) found that lower the income, the higher was the percentage of income spent on food. Wong *et al* (1985) also found a direct relation between the amount of family income and expenditure on food. Karuna (1993) also reported similar findings among the fishermen families of Thiruvananthapuram.

The expenditure incurred on various non-food items also reflects another aspect of the quality of life. Hence, relevant

expenditure data were collected from each of the 200 households, as part of the survey. The expenditure on non-food items, on a monthly basis is given in Table 16.

Table 16 Total monthly expenditure of the family on non-food items

Distribution of families according to total monthly expenditure on non-food items														
Monthly expenditure in (Rs)	Clothing		Shelter		Transport		Education		Medical		Entertainment		Miscellaneous	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
< 100	61	30.5	200	100	185	92.5	153	76.5	190	95	200	100	189	94.5
101 - 200	114	57.0	-	-	13	6.5	35	17.5	9	4.5	-	-	11	5.5
201 - 300	24	12.0	-	-	2	1.0	10	5.0	1	0.5	-	-	-	-
301 - 400	1	0.5	-	-	-	-	2	1.0	-	-	-	-	-	-
Total	200	100	200	100	200	100	200	100	200	100	200	100	200	100

(N = 200 families)

From Table 16 it is evident that for clothing majority of the families (57.00 per cent) were found to spend Rs 101 - 200 per month and just one family reported that they spend Rs 301-400 per month. The low amounts of money spent on clothing may be due to the low purchasing power of the families.

None of the families surveyed spend more than Rs 100 on shelter. The amount spent for shelter was negligible. This was mainly so because 93.00 per cent of the families had their own homes. Therefore the expenditure was mainly for the maintenance of their homes which was done only once in a year by many families. Some families reported that they could not

afford to do the maintenance work of their thatched houses even once in a year

It was found that majority of the families (92.50 per cent) spend less than Rs 100 per month for transportation. The families who reportedly spend Rs 201-300 for transportation had students and workers (other than those employed in the coir industry) as family members who had to travel long distance each day.

During the present study it was found that only 1.00 per cent of the families surveyed spent Rs 301-400 per month on educational activities since these families had children who were attending colleges. Majority of the families surveyed thought that it was essential to send their children to nurseries and schools but financial inadequacy was found to be the major reason for spending an amount less than or equal to Rs 100 by majority of the families (76.50 per cent).

The expenditure incurred on maintenance of health was again negligible and majority of the families (95.00 per cent) spent less than Rs 100 per month. According to the Kerala Statistical Institute (1992) the average monthly medical expenditure for the rural households in Thiruvananthapuram was Rs 95, which is in tune with the results of the present study. Those families who spent from Rs 101 to Rs 300 were the families who had older persons as well as infants as members. The families who were surveyed reported that, it was the income earned by the women, which was utilized for the expenditure

incurred on maintenance of health During the survey it was observed that the health facilities were concentrated in towns The cost of obtaining the health services in terms of travel expenses and the wage lost to absence from work is very high for the coir workers Thus, it can be concluded that on the average, the health status of these workers are often neglected Many coir workers reported that a higher proportion of the small amount kept apart for medical expenses had to be spent on transportation and doctors' fees rather than on purchase of medicines Thus, those who have a higher morbidity and a deficit of working days due to it, had to do with a lesser amount to meet the expenses of treatment

None of the families surveyed spent more than Rs 100 on entertainment and this amount itself was spent during festivals like Oname or Bharani , which are very important social events for those from Chirayinkil taluk of Thiruvananthapuram district

Under the miscellaneous items of expenses incurred as gifts purchased during weddings and other ceremonies were the major items and here again majority of the families spent an amount less than or equal to Rs 100 It is seen that this expenditure arises from a social obligation, and the formality of exchanging gifts drains away a good share of monthly income especially during the season of marriages

4 1 7 Savings

Information related to the saving pattern and habits of the families were collected and it was observed that 90 families, out of the total 200 families surveyed, saved less than Rs 100 per month. Four families reported to have savings of Rs 200 and above per month. The remaining 106 families were not in a position to save any money on a monthly basis.

Table 17 gives the distribution of the families with respect to their nature of savings.

Table 17 Distribution of the families with respect to their nature of savings

Nature of savings	Distribution of families	
	No	Per cent
Bank	1	0.50
Chit funds	69	34.50
Post Office	24	12.00
No savings	106	53.00
Total	200	100.00

(N = 200 families)

Of the 94 families who had the habit of saving money only one family had their savings put in a bank. Majority of the families (34.50 per cent) had put their savings in chit funds and 12.00 per cent families made use of the Post office saving facility.

The assets of the households clearly reflects their poor socio economic conditions. In the present study 106 families (53.00 per cent) out of the 200 families surveyed were not able to save any money and they are devoid of the habit of saving. This trend has also been reported by other researchers. Jayasree (1994) observed that 87.83 per cent of the families employed in the coir industry do not have any kind of savings. The reason for not being able to save any money could be the one observed by Perumal (1986). He reported that the income or wage obtained by the coir workers is insufficient to maintain their family let alone save any money. The low rate of savings could also be due to the extent of underemployment, since many of those who are employed, went to work only one-third of the days in an year. So, unemployment and underemployment could be a major reason for lack of savings.

During the survey it was also observed that the type of family may have an influence on the saving pattern of the coir worker's households. Joint families or large families will have more members whose basic needs have to be satisfied, with respect to food and clothing, with the available income. This coupled with the general trend of unemployment and underemployment aggravates the economic problems faced by these families. The hand to mouth existence of majority of the families leads to such a situation that saving money for needy times is not one of their priority items of family budget.

4.1 8 Debts

From the data collected in relation to the savings and expenditure pattern of the coir workers it was seen that some families had to resort to borrowing of money to maintain their households and hence details with respect to this aspect was collected

Table 18 gives the distribution of families with respect to the amount borrowed per month

Table 18 Distribution of families with respect to the amount borrowed per month

Amount borrowed (in Rs)	Distribution of families	
	No	Per cent
≤ 50	148	74 00
51 - 100	8	4 00
101 - 150	24	12 00
151 - 200	14	7 00
201 - 250	2	1.00
251 - 300	4	2 00
Total	200	100 00

(N = 200 families)

The distribution of families with respect to the amount borrowed per month revealed that 148 (74 00 per cent) of the families borrowed less than or equal to Rs 50 per month Twenty

four (12 00 per cent) of the families borrowed from Rs 101 to 150 per month and six (3 00 per cent) of the families borrowed from Rs 201 to 300 per month

The average amount borrowed per month by the 200 families was Rs 75

Table 19 gives information related to the reasons for borrowing money with respect to the number of families

Table 19 Reasons for borrowing money with respect to the number of families

Reasons for borrowing money	Distribution of families	
	No	Per cent
To meet daily household expenditure	55	52 88
Treatment	20	19 23
Education	11	10 57
Clothing	4	3 85
Repayment of debt	10	9 62
Food	1	0 96
Housing	2	1 93
Marriage	1	0 96
Total	104	100 00

(N = 200 families)

Data presented in Table 19 reveals that maximum number of families viz , 55 (52 88 per cent) borrowed money to meet

daily household expenditure Minimum number of families (one each) had borrowed money for purchasing food materials and for marriage

Data from Table 18 and 19 reveal that on account of their poor earnings majority of the coir workers households are found to be sinking in debt to a great extent The Kerala Statistical Institute (1992) reported that on an average the rural households had a larger per cent (63.80 per cent) of households with debt as compared to the urban households (24.30 per cent) Kumari (1989) reported that since the coir workers are paid low wages they borrow money to meet the day to day expenses of the house, for educating their children and for marriages Perumal (1986) observed that the income or wage obtained by the coir workers is insufficient to maintain their family and quite often they have to resort to borrowing from others to tide over their family expenditure and thus the coir workers become indebted

In the present study, during the survey it was observed that many of the respondents did not like to reveal details about their debts but it can be inferred that the households who had debts seemed to be in the clutches of a vicious cycle On account of their low level of earning coupled with extravagance on social functions like marriage, birth ceremony and death rituals, the households remain perpetually indebted to the money

lenders Further, unforeseen and unavoidable expenditure for treatment of serious illness aggravates their debt It was also observed that workers in the low income brackets borrowed for meeting the expenditure on items like education of their children and medical treatment In higher income groups, reasons for borrowing varied from marriage of the children to construction of houses which demands huge amounts

Table 20 gives information related to the distribution of families with respect to source of money borrowed

Table 20 Distribution of families with respect to source of money borrowed

Source of borrowed money	Distribution of families	
	No	Per cent
Neighbours	46	44 23
Friends	25	24 03
Relatives	20	19 23
Financiers	11	10 58
Society	2	1 93
Bank	0	0 00
Total	104	100 00

(N = 200 families)

Majority of the families 46 (44 23 per cent) were found to borrow money from their neighbours Friends (24 03 per cent),

relatives (19.23 per cent), financiers (10.58 per cent) or from the co-operative society itself (1.93 per cent) were the other sources in the decreasing order. None of the families borrowed from banks.

Data collected with respect to the savings and debts presented in Tables 17 to 20, reveals that it is most unfortunate to realise from this study that lack of savings on one hand was coupled with borrowing money on the other. This, they are compelled to do, to make both ends meet and to pull on life. This again is an indicator of poverty. Employment outside or within the coir industry during lean periods of work may help these families to tide over the economic crisis.

4.1.9 Economic problems of the families

Since the information related to both savings and debts revealed a negative picture, it was thought that a collection of information on the economic problems of the families would be helpful because it would give a clear picture of the needs of the family as also the package of interventions needed to uplift these families.

Table 21 Important economic problems of the families

Economic problem	Distribution of families		Rank
	No	Per cent	
Lack of permanent employment	200	100 00	1
High price	196	98 00	2
Children's education	187	93 50	3
Repayment of loans	160	80 00	4
Medical expenses	139	69 50	5
Housing	122	61 00	6
Absence of male earning member	89	44 50	7
Lack of entertainment	1	0 50	8

(N = 200 families)

Table 21 gives the details related to the important economic problems ranked on a priority basis. The ranking showed that all of the families surveyed opined that lack of permanent and full time employment was the most important problem that they faced. High cost of living, inability to educate their children, problems related to economic burdens imposed by repayment of loans and medical expenses, lack of housing facilities and absence of male earning members in the family were the other problems listed, in the order of priority, as felt by the respondents.

The various economic problems which have been observed in the present study have been quoted by other workers as well. Rajagopal (1993) listed out the various problems faced by the coir workers as low wage rates, lack of training for production and quality improvement, lack of individual credit facilities, absence of electrification and sanitation facilities, common place for work and finally lack of infrastructural amenities.

Apart from the socio-economic dimensions it was felt that the study should focus on the environmental and sanitation aspects also in order to relate such factors to the health of the community under focus. Thus information on the housing conditions, physical amenities within the house and sanitary facilities were collected and results are presented.

4.1.10 Housing conditions

As housing was reported to be a major problem faced by the families belonging to low socio economic groups, more details were collected with respect to the housing conditions of coir workers selected for the study. An assessment of the housing facilities was undertaken as it would help to find out their standard of living. Moreover poor housing, and sanitation are reported to cause health and nutritional problems.

4 1.10 a Area of land available around the house

Information related to the distribution of the families with respect to the area of land available around the house is presented in Table 22

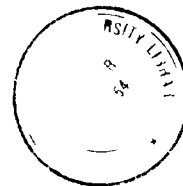
Table 22 Distribution of the families with respect to the area of land (in cents) available around the house

Land area (in cents)	Distribution of families	
	No	Per cent
≤ 5	124	62 00
6 - 10	56	28 00
11 - 15	14	7 00
16 - 20	2	1 00
21 - 25	4	2 00
Total	200	100 00

(N = 200 families)

From Table 22 it can be seen that 124 (62 00 per cent) families had around 5 cents of land around their homes while 56 (28 00 per cent) families had 6 to 10 cents of land around their homes. Fourteen (7 00 per cent) of the families reported that they had 11 to 15 cents and 6 (3 00 per cent) families had 16-25 cents of land around their home. It may be inferred that families with land are liable to have a better nutritional status as reported by Zuniga et al (1986)

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4.1 10 b Ownership of house

An enquiry into the ownership of house of the families revealed that 186 (93 00 per cent) families had their own houses. This above information is given in Table 23 and it is similar to the report published by Government of Kerala in 1990, according to which 96 90 per cent of the coir workers had their own houses.

Table 23 Distribution of families according to the ownership of house

Ownership of house	Distribution of families	
	No	Per cent
Own	186	93 00
Rented	14	7 00
Total	200	100 00

(N = 200 families)

The above two tables (22 and 23) indicates that except for those who do not have a house for themselves, others have a house and a minimum land available for a comfortable and independent way of life. To that extend they are free from the clutches of poverty.

4 1.10 c Nature of house

Since housing conditions would reflect the physical amenities and quality of life to a certain extent it was decided

that such details should be collected during the survey Table 24 gives information with respect to particulars of the house, which include details related to the roof, wall and floor

Table 24 Distribution of families with respect to the particulars of the house

Particulars of the house	Distribution of families	
	No	Per cent
Roof		
Tiled	41	20 5
Thatched	157	78 5
Terraced	1	0 5
Sheet	1	0 5
Total	200	100 0
Wall		
Mud	21	10 5
Brick	44	22 0
Stone	60	30 0
Straw	1	0 5
Coconut leaves	74	37 0
Total	200	100 0
Floor		
Mud	151	75 50
Cement	49	24 50
Total	200	100 00

(N = 200 families)

The details pertaining to the nature of the house revealed that 157 (78.50 per cent) of the respondents had thatched houses. Majority of the houses had walls made of coconut leaves (37.00 percent). Stone walls, brick walls and mud walls were found among 30.00 per cent, 22.00 per cent and 10.50 per cent of the houses, respectively. Floors made of mud was found in majority of the houses.

4.1.10.d Number of rooms

Table 25 reveals the distribution of the families according to the number of rooms.

Table 25 Distribution of the families according to the number of rooms

Number of rooms	Distribution of families	
	No	Per cent
1	7	3.5
2	48	24.0
3	89	44.5
4	38	19.0
5	18	9.0
Total	200	100.0

(N = 200 families)

The average number of rooms available for 200 families whose average family size was five is three. Similar trends have been observed in other studies conducted on families from

unorganised sectors in India. However, Gajjanayake (1991) conducted a study on Indian Tamils working in Sri Lanka's tea estates and reported that each family has one or two rooms. However in this study only 7 (3.50 per cent) of the families had houses with one room. Maximum number of families reported to have houses with three rooms. The remaining families had four to five roomed houses.

The fact that just 9.00 per cent of the families resided in five roomed houses indicates that over crowding was a major problem among these families.

Table 26 reveals the distribution of families according to the availability of rooms per person.

Table 26 Distribution of the families according to the availability of rooms per person

No of rooms	No of persons (In range)	Availability of rooms per person (In range)	Distribution of families	
			No	Per cent
1	3 - 5	0.33 - 0.2	7	3.50
2	1 - 12	2.00 - 0.16	48	24.00
3	2 - 14	1.50 - 0.21	89	44.50
4	2 - 11	2.00 - 0.36	38	19.00
5	1 - 9	5.00 - 0.55	18	9.00
Total			200	100.00

(N = 200 families)

Table 26, given above, confirms the previous finding that the members of the coir worker's households adjusted in houses that did not provide enough space, indicating their social backwardness

4.1.10 e Physical amenities available for the families

Apart from the details related to the land available around the house, nature of house with respect to roof, wall and floor and also the number of rooms, information regarding the facilities available within the house goes a long way in deciding the 'quality of life', and also in reducing drudgery, and providing a healthful living environment. Next to the basic necessities of life, household amenities available to a family decides the health condition of that family

Information related to the physical amenities available for families is presented in Table 22

Table 27 Physical amenities available for families

Drinking water			Electricity		Lavatory								
Well	Pipe	Both	Yes	No	Yes	No							
No per cent	No per cent	No per cent	No per cent	No per cent	No per cent	No per cent							
19	9.50	176	88.00	5	2.50	134	67.00	66	33.00	77	38.50	123	61.50

(N = 200 families)

The results of the present study is in tune with the observation reported by Jayasree (1994) She stated that 80.13 per cent of the households had no access to drinking water, 65.83 per cent did not have electricity and 67.33 per cent did not have toilet facility

However, in the present study, water was available to all the families by way of either a well or a pipe or in some cases both. In the present study 33.00 per cent of the families were not provided with electricity leaving the remaining 67.00 per cent with this facility. Lavatory was not available to majority of the families (61.50 per cent). Moreover the area surrounding the well was used by the children and adults to defecate. It was further noticed that due to lack of sanitary latrines the families were using open grounds available around the house. They made enclosed square areas in the ground using plaited coconut leaves for privacy during defecation. However such enclosures were used only by women. Most men and children used open land, banks of rivers or ponds (which were in plenty in the area of study) or the area beside the well, where the children play and walk with bare feet. Environmental pollution by human excreta, improper disposal of waste and refuse and stagnation of water due to improper drainage also promotes breeding of mosquitoes and flies. This has led to poor environmental sanitation. Most of these family members had poor

personal hygiene These practices could be the reason as to why many women reported that their children repeatedly suffered from gastroenteritis and helminthic infections During the survey it was observed that very few families took the trouble to boil the water before use

Since the physical amenities available to the coir workers' households left much to be desired it can be logically concluded that majority of the households would suffer from the ill effects of poor sanitary conditions such as repeated attacks of infection and infestations

4.1.10.f Sanitary condition of the households

The distribution of families with respect to the sanitary conditions of the households is detailed in Table 22

Table 28 Distribution of families with respect to sanitary condition of the household

Sanitary condition of household	Distribution of families	
	No	Per cent
Good	10	5.00
Fair	181	90.50
Poor	9	4.50
Total	200	100.0

(N = 200 families)

The above table reveals that only 5 00 per cent of the families lived under very tidy and neat conditions and there was an equal number of households whose surroundings were very poor and untidy. The finding is an expected one and it is also in tune with the study conducted by Perumal (1986) who reported that most of the households of coir workers of Tamil Nadu do not have the minimum sanitary requirements since they were living in small huts.

Details related to the type of fuel used was collected and it has been observed by previous workers such as Mohanty (1995) that a large number of economically better off households still use cooking devices which are primitive like fire wood and other agricultural wastes and the heat and smoke emitted by such devices are a health hazard to the household members, especially women. Therefore such characteristics were selected to measure the environmental status of the households.

In the present study all the 200 families surveyed were found to be using firewood as a source of fuel and only two families were using kerosene along with the fire wood and this result is similar to the one reported by Rawat (1991) who observed that wood and cowdung are the main sources of fuel for a vast number of poor families. Thus, as previously stated the use of fire wood may pose a health hazard to the women coir workers.

4.2 Socio-economic profile of the respondents

Review of previous literature reveals a reluctance to discuss women as individuals with basic human rights (Ottesen et al , 1989) In the various health and nutrition studies conducted on women, little focus is seen on women's own needs or the perceptions of their own needs, how these are met or not met and on the conflict between such needs and the needs of other members of the household With the above observation in the present study, more details related to women were collected separately and the details are given below

4.2.1 Age of the respondents

Age, being a vital factor, was taken into consideration since a number of socio-economic factors as also certain health and nutrition related characteristics are dependant on the respondents' age Table 29 presents the distribution of respondents according to their age

Table 29 Distribution of respondents in accordance with age

Age (in years) Range	Distribution of respondents	
	No	Per cent
16 - 21	20	10 00
22 - 26	37	18 50
27 - 31	27	13 50
32 - 36	34	17 00
37 - 41	26	13 00
42 - 46	31	15 50
47 - 51	25	12 50
Total	200	100 00

(N = 200 respondents)

The data presented in the above table reveals that 18 50 per cent of the respondents were in the age group of 22 to 26 years. Seventeen per cent of the respondents were in the age group of 32 to 36 years. This was followed by respondents in the age group of 42-46 years who accounted for 15 50 per cent of the women who were surveyed. About 10 00 and 12 50 per cent constituted those in the age groups 16 to 21 years and 47 to 51 years, respectively.

The results obtained in the present study is similar to previous findings. According to Jayasree (1964), for working in the unorganised sector there is no upper age or lower age limit

for a woman In the present study also, the women who were surveyed were between the age of 16 to 51 years This indicates that there is no age specification pertaining to women who took up the activities related to coir An observation of interest is that child labour is not observed in this field

4.2.2 Marital status of the respondents

Next to age the marital status plays an important role with respect to the socio-economic differentiation women have to face and so that marital status of the respondents were studied and the results are presented in Table 30

Table 30 Distribution of the respondents in accordance with marital status

Marital status	Distribution of respondents	
	No	Per cent
Married	105	52.50
Unmarried	53	26.50
Separated (but not divorced)	24	12.00
Widowed	18	9.00
Total	200	100.00

(N = 200 respondents)

Table 30 reveals that majority (52.50 per cent) of the respondents were married The unmarried respondents formed 26.50 per cent of the total respondents Those respondents who were

separated but not divorced formed 12 00 per cent while about 9 00 per cent of the respondents were widows

From the data it is clear that an overwhelming majority of the respondents were married. The results of the present study is similar to the observations reported by other workers in the same field. Jayasree (1994) reported that out of 600 respondents who were surveyed, 7 00 per cent were unmarried, 10 33 per cent were widowed, 13 50 per cent were separated and 1 50 per cent were divorced.

Thus in the present study it can be said that the women coir workers were better off since only about 12 00 per cent of the respondents were divorced or separated and the 52 50 per cent who were married could be assumed to have a better nutritional status since the presence of male members indicate better means for producing as well as purchasing food. Marital status also influence job performance since divorce, separation or widowhood affects the mental health and well being and it indirectly affects work output on one hand and nutritional status on the other. Houston et al (1992) observed that marital dissatisfaction was associated with greater quantitative overload which in turn could lead to a poor nutritional status. During the survey it has also been noticed that older women who are married have better decision making powers than younger, unmarried women.

4 2 3 Educational status of the respondents

The level of education of the respondents were also recorded in this study, since it is an important variable which determines personality achievements, career and social status Education can be related to awareness pertaining to health care The educational status of the respondents are given in Table 31 which also reveals the distribution of respondents in accordance with their level of education

Table 31 Distribution of respondents in accordance with their level of Education

Educational level	Distribution of respondents	
	No	Per cent
Illiterate	48	24 00
Primary	48	24 00
Secondary	63	31 50
High School	41	20 50
Total	200	100 00

(N = 200 respondents)

Data presented in Table 31 reveal that equal percentage of respondents (viz , 24 00 per cent each) were illiterate as well as with primary level of education Thirty one per cent of the respondents were educated upto the secondary school level and 20 50 per cent of the respondents had achieved high school education and none of the respondents had gone to colleges

An observation made during the survey was that the present generation was better educated than the older generation. None of the respondents had attained an educational status above the high school level and this may be due to mass poverty and a preference for the traditional caste based occupation among the coir workers.

Women's education is hypothesised to exert a major influence on health and nutritional status and even though poverty restricts food availability, proper education of the mothers would improve the nutritional status and health of the family members. Jain (1984) established that maternal education had a significant influence on nutritional status since a literate mother used scarce resources better than did an illiterate mother with higher income.

There are many socio-economic conditions unique to Kerala. Kerala has a highly literate population, compared to other states. This, especially the high female literacy has to be given due consideration when we look for explanatory factors. Steek et al (1991) observed that women with more education had food consumption patterns more consistent with current health promotion messages. The effect of education on nutritional status was established by Huffman et al (1985) who reported that educational level was associated positively with height, weight and haematocrit values.

4.2 4 Details of respondents with respect to employment

People take up employment mainly to earn an income and to improve their quality of life. It is clear that a permanent employment assures a steady flow of income. At the same time such an employment would help them to other benefits which ensures social security. On this view, details related to payment, availability of medical aid and festival allowances were collected from the workers.

The tenure of payment is weekly with Saturday being the pay-day and the wage details are presented in Table 32.

Table 32 Details with respect to the wages paid per day for the different activities under the coir co-operative society

Different sectors under the coir co-operative societies	Wages/day (Rs Ps)
Spinning	28 20
Beating	27 00
Retting	80 00
Labour work in the society	60 00

From the above table it is clearly visible that both retting and labour work done by men are paid a much higher wage when compared to spinning and beating done exclusively by women. Thus it is clear that there is sex discrimination with respect to the wages paid but this discrimination is of a completely

concealed or subtle nature since the jobs are classified on gender basis and are given different piece rates fixed for the jobs, and ultimately the women end up getting distinctly lower wages than men

It was also observed that there was a delay in the payment of wages if the finished products were not disposed of, which added to the economic burden of the respondents

During the survey it was revealed by the authorities of the co-operative societies that all the respondents are entitled to 'leave wages' which means that they are eligible to avail six days of leave in a year with daily wages. Other than the above economic aid the workers of the society were given a festival advance of Rs 400 for women and Rs 500 for men. The difference in the festival advance again points to the gender discrimination. The above advance is given during the two important local festivals, namely 'Bharani' and 'Onam'. The money is taken back from their wages by the authorities, in 13-14 instalments, i.e., about Rs 30 is taken back per week from their weekly wages.

The pathetic picture of the workers came to the front when it was reported by the workers that none of them were aware of any medical aid or medical reimbursement which are generally available to employees of organised sectors. It was also found that majority of the workers were not availing the coir workers

pension The observation made during the present study is in tune with the results of previous workers Isaac and Raghavan (1990) revealed that the coir workers do not receive any medical benefits, since they do not meet the minimum number of annual days of employment required under the ESI norms All the above presented facts make it clear that even though there are many schemes implemented by the government for the upliftment of the needy, they were not reaching the women in the unorganised sector

Details related to the number of days of work availability, the yearly income earned by the women and also the years of experience in their field of work were collected Information on the above three aspects would give an idea about the socio-economic status enjoyed by these women in their family Women's employment may also exert an influence on nutritional status of the members through increased women's status , power , autonomy and decision-making ability

The number of days the respondents were employed also influence their income Table 33 reveals information related to the distribution of the women with respect to the days during which they worked

Table 33 Distribution of the respondents with respect to the days spent in spinning of coir (March 1994 to March 1995)

Number of days	Distribution of respondents	
	No	Per cent
101 - 125	17	8 50
126 - 150	68	34 00
151 - 175	115	57 50
Total	200	100 00

(N = 200 respondents)

From table 33 it is evident that majority of the respondents viz 115 (57 50 per cent) went to work for 151 to 175 days during the year 1994-95. About 8 50 per cent of the respondents went to work for about 101 to 125 days. The three societies which were taken for the study provided work for 175 days during the year 1994-95. The mean number of days of work during the observed year was 146. The facts presented above show two aspects. One is the extend of underemployment and the other is the absenteeism among workers.

The fact that the societies were functional for just 175 days indicate that the workers were out of work for 60 00 per cent of the days in a year. During the survey in 1994-95, the months of May to September were periods when the workers were out of work. The rest of the months saw heavy work being carried out.

except for the month of July 1994 during which period the societies had to close down due to labour unrest. During May to June the coir workers were forced to remain idle due to inadequate supply of raw materials. The societies did not function during the months of August and September since the festival of Onam falls during this period and then again it was also the period of heavy rains.

Thus from the above observation it can be seen that the women workers have what is known as seasonality of employment and among the poor households this can have both direct and indirect effects on food intake and nutritional status. The former occurs through the high energy demands of peak work season and the latter through the resultant fluctuations in intra-household food availability.

As the women coir worker's occupation tends to be seasonal, households that are dependent on the women's income for their nutritional adequacy would become especially vulnerable during seasons of lean work or no work. Palmer (1981) reported similar observations among women agricultural labourers.

Though work was available during one half of the year many of the women surveyed reported that they could not attend work regularly due to various health and family problems. Despite of underemployment, absenteeism is not uncommon among these workers. This is reflected in the observation that though

the societies provided work for 175 days in the year 1994-95 many attended work only for 146 days This is the weakness of an unorganised sector The workers are at their liberty to attend work or not and this liberalized nature could be a contributory factor that attracts women to take up coir work

Both underemployment and absenteeism could have a negative impact on the nutritional status of both the women as well as the other members of the household because the nutritional adequacy of the coir workers' households was related more to women's employment than to men's employment and Gulati (1978) estimated that on days when both the male head of the household and his wife were employed, their shortfalls in terms of calories were 11 00 and 20 00 per cent, respectively, while on days on which the women were unemployed, the shortfalls increased to 26 00 to 50 00 per cent

Several studies have established the relationship between the economic status and nutritional and health status of families and individuals Ottesen et al (1989) has reported that where females have high economic value, they receive larger shares of food and health resources, and where their economic value is lower, they remain at considerable disadvantage Keeping the above point in view the yearly income earned by the women from coir work was assessed and the details are presented in Table 34

Table 34 Yearly income earned by the respondents from spinning

Yearly income (Rs)	Distribution of respondents	
	No	Per cent
2001 - 3000	6	3 00
3001 - 4000	49	24 50
4001 - 5000	145	72 50
Total	200	100 00

(N = 200 respondents)

The results presented in Table 34 reveal that the yearly income earned by 72 50 per cent of respondents ranged from Rs 4001-5000 and 24 50 per cent of respondents earned from Rs 3001 to Rs 4000 and Rs 2001 to 3000 was earned by 3 00 per cent of the respondents from among the 200 workers who were surveyed. The average yearly income of the 200 women was found to be Rs 4200. The same observation was reported by Rajagopal (1993) who studied the socio-economic aspects of women coir workers in Andhra Pradesh. He reported that they were all living below the poverty line, earning less than Rs 4800 per annum and on an average a member earned Rs 237 per month.

From the above results it is clear that majority of the women are contributing a substantial amount to the total family income. This above fact could lead us to infer that where women exercise control over their wages, they would spend them on food

and other basic needs, unlike the men who tend to spend portions of their wages on liquor, cigarettes, etc (Kannan et al , 1991)

Data presented in Table 35 reveals the distribution of respondents in relation to experience in the coir industry

Table 35 Distribution of respondents in relation to experience in the coir industry

Experience in Coir Industry (in years)	Distribution of respondents	
	No	Per cent
Less than 5	16	8 00
6 - 10	69	34 50
11 - 15	56	27 50
16 - 20	29	14 50
More than 20	31	15 50
Total	200	100 00

(N = 200 respondents)

The mean value for 200 respondents with respect to the years of experience in the coir industry was 12 years Thirty four per cent of the respondents had an experience ranging from 6 to 10 years and twenty seven per cent had an experience ranging from 11 to 15 years Only 8 00 per cent of the respondents worked for less than five years and 15 50 per cent of the respondents had an experience which was for more than twenty years

The above facts indicates that very few women surveyed had less than five years of experience. The result is similar to the one observed by Jyothi (1993) among the stone breakers of Thiruvananthapuram. The result can lead us to two conclusions with respect to its influence on the health and nutritional status. The first conclusion is that since majority of the women are well experienced, it can have a positive effect on their nutritional status. This is because in the coir industry wages are paid as 'piece-rate'. This means that the worker get paid according to the quantity produced and here experience can make a person efficient leading to greater output which in turn increases the person's income and that ultimately is expected to increase the nutritional status.

The second conclusion is related to those women with less working experience. We could predict that the health risks are higher for such women since they are new to the occupation which demands from them skills that they lack. The work output may be low leading to low income and a low purchasing power. This has been supported by Morales del valle and Lopez (1990) also.

4 2.5 Details related to working conditions

Details related to amenities of the working area was collected since better working conditions have been reported to be conducive to higher work output.

During the survey it was found that shade and resting place was available for the workers though they were not provided with toilet facilities or facilities like creche for their children. Jayasree (1994) reported that the coir workers of Thiruvananthapuram were not provided with even basic amenities like drinking water, shade, resting place and there was no common toilet facility in their vicinity. The coir workers who were selected as respondents for the study may be considered lucky when compared to their counterparts working elsewhere since they were provided with shade and resting places.

The coir workers are not the only group to be suffering with lack of facilities. Shah and Rathore (1991) reported that, in general, in the unorganised sector, women were not provided with facilities such as creches for keeping small children, they were not granted maternity leave, toilet facility was not available as also they did not receive any medical support in the form of medicines, and ultimately they were not given bonus on festivals like Diwali, Holi, Id or Christmas.

The exploitation of the coir workers by Capitalist owners in terms of wages, leave facilities and bonus facilities could be due to the absence of a proper trade union as suggested by Perumal (1986).

From the above situation it can be concluded that though women's employment increases household income with

consequent benefit to household nutrition, the gain may be offset by diminished facilities provided at the work site. The exploitation meted out by the officials could lead to poor job satisfaction which could lead to low productivity, and in the unorganised sector this means low wages which ultimately leads to poor income, low purchasing power and consequent mal or under nutrition.

4.2.6 Sanitary condition of the work area

The poor working facilities which has been observed could lead to the natural conclusion that the sanitary condition under which the workers are employed would leave much to be desired. According to Philip (1996) two major determinants of health and well being are heredity and the environment. Of these two, the environment plays a significant role and at the same time offers a greater scope for intervention. He is also of the opinion that the occupational environment poses health risks in the work place. Hence the details pertaining to the sanitation of the work site were collected.

The women were provided with ratts near the ponds and banks of rives which had stagnant water due to the continuous use of the water for the retting of husk. The problem was all the more hazardous since the women work barefooted, which increases the chances for diseases.

Details revealing the sanitary condition is shown in Table 36

Table 36 Distribution of respondents with respect to sanitary condition of the work place

Sanitary condition of work place	Distribution of respondents	
	No	Per cent
Good	30	15 00
Fair	95	47 50
Poor	75	37 50
Total	200	100 00

(N - 200 respondents)

From Table 36 it can be seen that majority of the respondents i e , 47 50 per cent worked under fair sanitary conditions with respect to the work place Thirty seven per cent of the respondents worked under poor sanitary conditions and just 15 00 per cent of the respondents were working under good sanitary working conditions

Thus it is evident from the above facts that about 85 00 per cent of the women worked under sanitary conditions that ranged from fair to poor The present observation is similar to the previous studies Perumal (1986) observed that the unhygienic work surroundings contributed to the social deprivation the coir workers faced

The above result clearly indicates that this group of workers' health and nutritional status could be affected negatively due to their poor working conditions and this fact is supported by Kverenchkhiladze et al (1993) who studied the working conditions and health status of women employed in the clay brick industry. They had successfully established the correlation between the work conditions and gynaecologic morbidity, occurrence of complicated pregnancy and delivery and also impaired physical development and health status of newborns and children.

4.3 Rural Quality of Life Index (RQLI)

From the socio-economic data collected a Rural Quality of Life Index (RQLI) as suggested by Dhanasekaran (1991) was worked out to measure the extent of poverty among the selected households. The selected indicators were caste, occupational status of the family, total monthly income of the family, per capita monthly income, number of female earners in the family, food expenditure expressed as a percentage of total monthly income, per capita expenditure on clothing (monthly), number of rooms available, educational status of women and calorie and protein requirement of the women.

A scoring system was adopted to study the influence of the above variables. The variables as also the distribution of the families with respect to the scores obtained for each parameter are detailed below.

4.3 1 Caste

Among the variables selected the caste of the women was an important indicator of quality of life because according to Government of India (1981) the caste system is mainly responsible for perpetuating poverty in rural areas

4.3.2 Occupational status of the family

The second variable selected was the occupational status of the family because wide variations were observed in the occupational status of the selected families and it has been observed by Dandekar and Rath (1971) that at least 30 00 per cent of the rural population in India living below the poverty line was due to unemployment and under employment

Caste	Score	Distribution of families	
		No	Per cent
Scheduled caste	0	25	12 50
Other backward communities	1	3	1 50
Backward communities	2	172	86 00
Forward caste	3	0	0
Total		200	100 00

(N = 200 families)

Occupational category/family	Score	Distribution of families	
		No	Per cent
No work	0	0	0
Casual worker (one member)	1	62	31 00
Casual worker (two members)	2	125	62 50
Casual workers + government job	3	8	4 00
Casual worker + job outside the country	4	3	1 50
Casual worker + government job + job outside the country	5	2	1 00
Total		200	100 00

(N = 200 families)

4.3.3 Total monthly income of the family

Household income should be taken into consideration because it is the family income which really determines the family's status and the socio-economic strata of society to which they belong (Arora, 1991)

4.3.4 Per capita monthly income of the family

In this study the per capita monthly income of the family was also used, as a yardstick, to measure the quality of life, to nullify the difference caused by the variations in family size and in the number of person's employed in the family. The distribution of the families with respect to the scores allotted for the above two variables were

Family income in Rs (monthly)	Score	Distribution of families	
		No	Per cent
≤ 1000	0	21	10 50
1001 - 2000	1	138	69 00
2001 - 3000	2	40	20 00
≥ 3001	3	1	0 50
Total		200	100 00

(N = 200 families)

Per capita income in Rs (Monthly)	Score	Distribution of families	
		No	Per cent
≤ 300	0	1	0 50
301 - 600	1	95	47 50
601 - 900	2	90	45 00
901 - 1200	3	7	3 50
1201 - 1500	4	3	1 50
1501 - 1800	5	3	1 50
≥ 1801	6	1	0 50
Total		200	100 00

(N = 200 families)

4 3 5 Number of female earners in the family

As felt by Misra (1989) female earnings should be considered as an indicator of quality of rural life as there is a

possibility of increase in the adult female workers and in the female participation rates in future. So, the number of female earners per household was considered as an indicator and the details are given below

Number of female earners	Score	Distribution of families	
		No	Per cent
1	0	16	8.00
2	1	85	42.50
3	2	42	21.00
4	3	35	17.50
5	4	22	11.00
Total		200	100.00

(N = 200 families)

4.3.6 Food expenditure pattern

The economic status of a family can also be determined by the food expenditure pattern. It is an accepted fact that poor households will spend higher proportion of income on food. Lipton (1989) in his study on under nutrition and poverty had reported similar results. The distribution of families with respect to the scores allocated to this variable is given below

Food expenditure in percentage of income (monthly)	Score	Distribution of families	
		No	Per cent
≤ 50	0	16	8 00
51 - 57	1	25	12 50
58 - 64	2	41	20 50
65 - 71	3	29	14 50
72 - 78	4	35	17 50
79 - 85	5	30	15 00
≥ 86	6	24	12 00
Total		200	100 00

(N = 200 families)

4.3 7 Per capita expenditure on clothing (monthly)

Since Dhanasekaran (1991) states that mass poverty can be recognized in the form of shabby clothing and since clothing satisfies a basic need next to food, the per capita expenditure on clothing was included as an indicator of quality of life index

Per capita expenditure on clothing (monthly)	Score	Distribution of families	
		No	Per cent
≤ 10	0	2	1 00
11 - 20	1	33	16 50
21 - 30	2	152	76 00
31 - 40	3	10	5 00
41 - 50	4	2	1 00
≥ 51	5	1	0 50
Total		200	100 00

(N = 200 families)

4.3.8 Number of rooms available/household

According to Government of India (1985) non-availability of shelter may reflect low socio-economic status and the development of housing, therefore, must enjoy high priority in a poor society such as ours where housing amenities are far below the minimum standards that have been internationally accepted Hence, the number of rooms available per household was also accounted as an indicator

Number of rooms/household	Score	Distribution of families	
		No	Per cent
1	0	7	3 50
2	1	48	24 00
3	2	89	44 50
4	3	38	19 00
5	4	18	9 00
Total		200	100 00

(N = 200 families)

4 3 9 Educational status of women

Illiteracy compounds the problem of rural poverty and the minimum years of education is recognised as a very important input for human resource development and removal of poverty, as reported by Government of India (1981) Hence, to study the

influence of the above factor, scoring was adopted and distribution of families with respect to scores obtained are detailed below

Educational level	Score	Distribution of respondents	
		No	Per cent
Illiterate	0	48	24 00
Primary	1	48	24 00
Secondary	2	63	31 50
High school	3	41	20 50
College	4	0	0
Total		200	100 00

(N = 200 respondents)

4.3.10 Calorie and protein requirement of women

In earlier studies poverty was measured using the calorie requirement as a yardstick which was propounded by the Planning Commission (Mathur, 1982). As per the seventh five year plan draft, the recommended nutritional requirements were 2400 calories per person per day in rural areas (Dewett, 1990). According to Wadkar *et al* (1988) an optimum proportion of calories and proteins are necessary for a balanced diet. Since extensive diet surveys carried out in the country had shown that a good proportion of the population belonging to low income groups and the low quality of life was not able to fulfill the

requirement of nutrients including the major ones like calories and proteins (Krishna, 1988) In the present study, calorie and protein requirements were considered as the basis for developing the index The scores along with the distribution of families is given below

Calorie requirement/day (Kcal)	Score	Distribution of respondents	
		No	Per cent
≤ 1600	0	0	0
1601 - 1800	1	14	7 00
1801 - 2000	2	46	23 00
2001 - 2200	3	102	51 00
2201 - 2400	4	38	19 00
Total		200	100 00

Protein requirement/day (gm)	Score	Distribution of respondents	
		No	Per cent
≤ 30	0	6	3 00
31 - 35	1	39	19 50
36 - 40	2	69	34 50
41 - 45	3	44	22 00
46 - 50	4	40	20 00
51 - 55	5	2	1 00
Total		200	100 00

(N = 200 respondents)

The scores assigned for each parameter for a family when summed up would give the total score for that family. Sum total of the score of a family would give the quality of life index of that particular family. Details are presented in Appendix IX. Based on the total scores obtained by the families the selected families were classified into four groups as done by Dhanasekaran (1991) in order to find out the quality of life and also to determine level of poverty among them in order to suggest remedial measures.

The distribution of families with respect to the level of poverty is presented in Table 37.

Table 37 Distribution of respondents with respect to the poverty levels based on the quality of life index

Levels of poverty*	Score range	Distribution of respondents	
		No	Per cent
Destitutes	Below 4	-	-
Very very poor	4 - 14	33	16.50
Very poor	15 - 25	133	66.50
Poor	26 - 39	34	17.00
Total		200	100.00

(N = 200 families)

Source: Dhanasekaran (1991)*

Poverty level of the selected families based on the Rural quality of life index

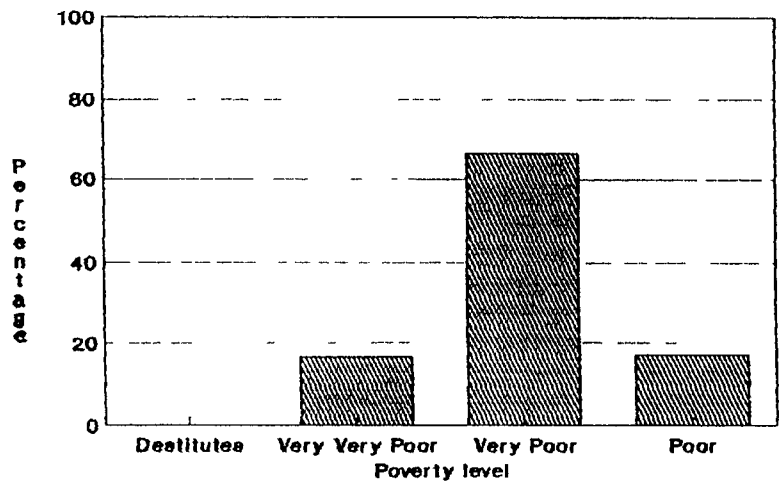


Table 37 reveals that 16.50 per cent of the families were found to be very very poor, 66.50 per cent as very poor and 17.00 per cent as poor. Thus all the families surveyed were found to be poverty stricken.

The above finding is similar to the one reported by Dhanasekharan (1991). He revealed that 82.00 per cent of the families in the rural areas of Tamil Nadu lived below the poverty line.

The reason for such a state of affairs could be due to the prevailing socio-economic cultural obstacles in the study area. The fact that all the families lived below the poverty line could have a direct detrimental effect on the nutritional status of these women.

In the present study a highly significant and positive association was found between the nutritional status and quality of life index ($r = 0.9307^{**}$).

4.4 Poverty Index for the families

An attempt was made to identify the at risk families using the method suggested by Srilatha and Gopinathan (1995). Here poverty is defined on the basis of a risk index called the Poverty Index and a family is considered under 'high risk' if any four or more of the nine risk factors listed on the index are

present The poverty index along with the nine risk factors as also the distribution of households are given below

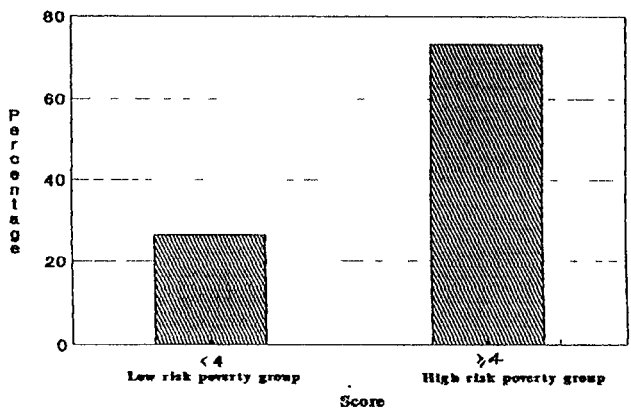
Table 38 Distribution of families with respect to the risk factors of the Poverty Index

Sl No	The risk factors of the poverty index	Distribution of respondents	
		No	Per cent
1	Family belonging to SC/ST	25	12 30
2	With children under five years old	66	33 00
3	Having even one illiterate adult	89	44 50
4	With only one or no adult employed	16	8 00
5	Living in kutcha house	125	62 50
6	Without a household latrine	123	61 50
7	With no access to safe drinking water	-	-
8	Consuming only two or less meals	39	19 50
9	With an alcoholic or drug addict or with a major crisis in the family	26	13 00

(N = 200 families)

Data presented in Table 38 reveal that housing and latrine facility were a risk factor for 62 50 per cent and 61 50 per cent of families, respectively. Forty four per cent of the families reported positively to the presence of at least one illiterate adult. Children under five year old was present in 33 00 per cent of the families. Only 8 00 per cent of the families had to live on the income earned by one employed adult.

Distribution of family based on the poverty index



The distribution of families based on the poverty index is presented in Table 39. Details related to the 200 families has been given in Appendix X.

Table 39 Distribution of families based on the poverty index

Levels of poverty*	Score range	Distribution of respondents	
		No	Per cent
Low risk poverty group	<4	53	26.50
High risk poverty group	≥4	147	73.50
Total		200	100.00

(N = 200 families)

Source: Srilatha and Gopinathan (1995)*

Data presented in Table 39 reveals that 73.50 per cent of the families belonged to the high risk poverty group with 26.50 per cent belonging to the low risk poverty group. The above analysis gives a clear picture of the needs of the families surveyed. These needs may be satisfied through implementation of different developmental programmes. The programmes should aim at ensuring universal primary education for every child, assistance for shelter upgradation, subsidy for household latrines, income generation schemes for women and promotion of kitchen garden.

4.5 Diet survey

A diet survey was conducted to determine the Household Food Security (HFS) among the coir worker's families. Household

food security refers to a households ability to acquire food and a working definition of HFS given by Gillespie and Mason (1991) is A household is food secure when it has access to the food needed for a healthy life for all its members (adequate in terms of quality, quantity, safety and culturally acceptable), and when it is not at undue risk of losing such access Food consumption is one of the most important determinants of the nutritional status of the population Information on the food consumption pattern is an essential pre-requisite for planning food needs at the national level and in the present study the diet survey revealed information regarding the food habits of both the families and the women with respect to frequency of use of various foods, daily meal pattern of the family, special foods included during specific physiological conditions, foods taken from outside and also use of left over foods and the food expenditure pattern

The results related to the diet survey are presented in the following pages

4 5 1 Food habit of the families

All the families, 200 (100 00 per cent), were non-vegetarians As revealed in earlier studies, on unorganised working women in Thiruvananthapuram district, by Suja (1989), Felsy (1989), Sujatha (1990), Jyothi (1993) and Karuna (1993),

the food consumption pattern of the coir worker's families was also observed to be of the habitual non-vegetarian type with rice as the staple food. It was observed by Stephanie (1984) that in South India only about 28.00 per cent of the total population is completely vegetarian and veganism is virtually unknown.

Though they were all branded as non-vegetarians it was observed that the consumption of fish was very high among the families who were surveyed and they rarely consumed other non-vegetarian food items.

Based on the above observation other details pertaining to food purchase and consumption were collected and analysed.

4.5.2 Frequency of purchase of various foods

The distribution of families with respect to the frequency of purchase of various foods is presented in Table 40.

Table 40 Frequency of purchase of various foods by the families

Food items	Distribution of families											
	Daily		Weekly		Monthly		One in six months		Never		Total	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Cereals - Rice	5	2.5	161	80.5	34	17.0	-	-	-	-	200	100.00
Cereals - Wheat	-	-	-	-	180	90.0	14	7.0	6	3.00	200	100.00
Pulses	-	-	3	1.50	55	27.50	2	1.0	140	70.00	200	100.00
Green leafy vegetables	-	-	6	3.00	84	42.00	27	13.5	83	41.50	200	100.00
Other vegetables	15	7.5	184	92.00	-	-	1	0.5	-	-	200	100.00
Roots and tubers	11	5.5	127	63.50	59	29.50	1	0.5	2	1.00	200	100.00
Fruits	-	-	88	44.00	58	29.0	2	1.0	52	26.00	200	100.00
Nuts and oilseeds	-	-	200	100.00	-	-	-	-	-	-	200	100.00
Milk	199	99.50	-	-	-	-	-	-	1	0.50	200	100.00
Fats and oils	1	0.50	192	96.00	7	3.50	-	-	-	-	200	100.00
Sugar and jaggery	-	-	181	90.50	19	9.50	-	-	-	-	200	100.00
Egg	-	-	-	-	62	31.00	49	24.50	89	44.50	200	100.00
Meat	-	-	-	-	19	9.50	103	51.50	78	39.00	200	100.00
Fish	199	99.50	-	-	1	0.50	-	-	-	-	200	100.00
Spices and Condiments	-	-	127	63.50	73	36.50	-	-	-	-	200	100.00
Health drinks	-	-	-	-	10	5.00	-	-	190	95.00	200	100.00
Miscellaneous foods	-	-	30	15.00	27	13.50	-	-	143	71.50	200	100.00

Data presented in Table 40 indicates that 199 (99.50 per cent) families purchased perishable food items like milk and fish daily. This was followed by vegetables and roots and tubers.

About 2.50 per cent and 0.50 per cent of the families purchased rice and oil daily. None of the other food items were purchased on a daily basis.

All the 200 families reportedly purchased oilseeds every week. Vegetables, oils and sugar followed suit in the order mentioned. Roots and tubers and also spices and condiments were purchased by 63.50 per cent of the families on a weekly basis. Only about 1.50 per cent and 3.00 per cent of the families were in the habit of purchasing pulses and green leafy vegetables at least once in a week. Wheat was purchased every month by majority (90.00 per cent) of the families. Notable items that were purchased once in six months included meat which was consumed by about 51.50 per cent of the families.

It is an interesting observation that 40.00 to 70.00 per cent of the families abstained from purchasing protective foods such as green leafy vegetables and body building foods such as egg and pulses. This is a direct indication to prove the fact that there is need for effective nutrition education among these women.

In the present study, rice being the staple food, majority of the families purchased it every week and it formed a part of their daily diet. Wheat was also purchased and used but to a lesser extent since wheat has been recently introduced in the diets of low socio-economic groups of Kerala. The Public Distribution System (PDS) was observed to contribute a great deal to the purchasing power of low income families in Kerala, and the coir workers' families were found depending on the above for

purchase of the staples Kerala has an extensive regular rural distribution of ration foods, two of which are rice and wheat. Rationing system assures an equitable distribution of subsidised commodities. Gillespie and Mason (1991) reported that a ration scheme in Kerala was found to be substantially more beneficial than an equivalent transfer of income in terms of effect on energy intakes. But during the survey it was observed that there were families who chose not to opt for the ration foods and this was because the rationed commodity was perceived to be of a lower quality than the open market alternative and the difference in terms of cost was only marginal.

The purchase and use of pulses was reportedly poor among the coir workers households. According to NIN (1993) 96.00 per cent of the population consumers an inadequate level of pulses as compared to cereals. It was observed that only 50.00 per cent of the population consumed inadequate levels of cereals. Unless appropriate steps are taken to substantially augment the production of pulses in the country, the quality of our dietaries will further deteriorate.

The high rate of fish consumption indicates that in Kerala even those from the lower income brackets consumed quality protein foods. In the present study roots and tubers especially tapioca was a moderately used food and the consumption of tapioca depended on the extent of local cultivation. Majority of the

respondents regarded fruits as special foods to be used for festivals and other occasions although banana was purchased and used regularly by few of the families. Fats and oils were purchased by the coir workers for seasoning purposes along with spices and condiments, which were included in virtually all dishes and chilly was used in abundance.

4.5.3 Frequency of use of various foods

The distribution of families with respect to the frequency of use of various foods is given in Table 41

Table 41 Frequency of use of various foods by the families

Food items	Distribution of families													
	Daily		Once in a week		Twice in a week		Monthly		Once in six months		Never		Total	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Cereals - Rice	200	100.0	-	-	-	-	-	-	-	-	-	-	200	100.00
Cereals - Wheat	-	-	4	2.00	11	5.50	177	88.50	2	1.00	6	3.00	200	100.00
Pulses	-	-	6	3.00	-	-	52	26.00	2	1.00	140	70.00	200	100.00
Green leafy vegetables	-	-	6	3.00	-	-	84	42.00	27	13.50	83	41.50	200	100.00
Other vegetables	45	22.5	80	40.00	74	37.00	-	-	1	0.50	-	-	200	100.00
Roots and tubers	33	16.5	95	47.50	10	5.00	59	29.50	1	0.50	2	1.00	200	100.00
Fruits	-	-	78	39.00	10	5.00	58	29.00	2	1.00	52	26.00	200	100.00
Nuts and oilseeds	200	10.0	-	-	-	-	-	-	-	-	-	-	200	100.00
Milk	199	99.5	-	-	-	-	-	-	-	-	1	0.50	200	100.00
Fats and oils	194	97.0	-	-	6	3.00	-	-	-	-	-	-	200	100.00
Sugar and jaggery	200	100.0	-	-	-	-	-	-	-	-	-	-	200	100.00
Egg	-	-	-	-	-	-	62	31.00	49	24.50	89	44.50	200	100.00
Meat	-	-	-	-	-	-	19	9.50	103	51.50	78	39.00	200	100.00
Fish	199	99.5	-	-	-	-	1	0.50	-	-	-	-	200	100.00
Spices and Condiments	200	100.0	-	-	-	-	-	-	-	-	-	-	200	100.00
Health drinks	-	-	10	5.00	-	-	-	-	-	-	190	95.00	200	100.00
Miscellaneous foods	-	-	36	18.00	-	-	21	10.50	-	-	143	71.50	200	100.00

It can be seen from the data presented in Table 41 that food items like rice, nuts and oilseeds (coconut), sugar, spices and condiments were used daily by all the families and major foods like pulses and fruits were not consumed daily. In fact, pulses were never used by about 70.00 per cent of the families. About 39.00 per cent of the families used fruits once in a week and about 26.00 per cent never consumed fruits. As with purchase, meat was consumed only once in six months by majority of the families. Health drinks were never used by about 95.00 per cent of the families and the remaining 5.00 per cent of the families used them once in a week.

To make the facts presented in Table 41 more precise, food use frequency scores were calculated based on the frequency of use of various food items by the families. The food articles were classified into most frequently used, moderately used, less frequently used and least frequently used foods, based on the percentage score obtained. The details are presented in Tables 42 and 43.

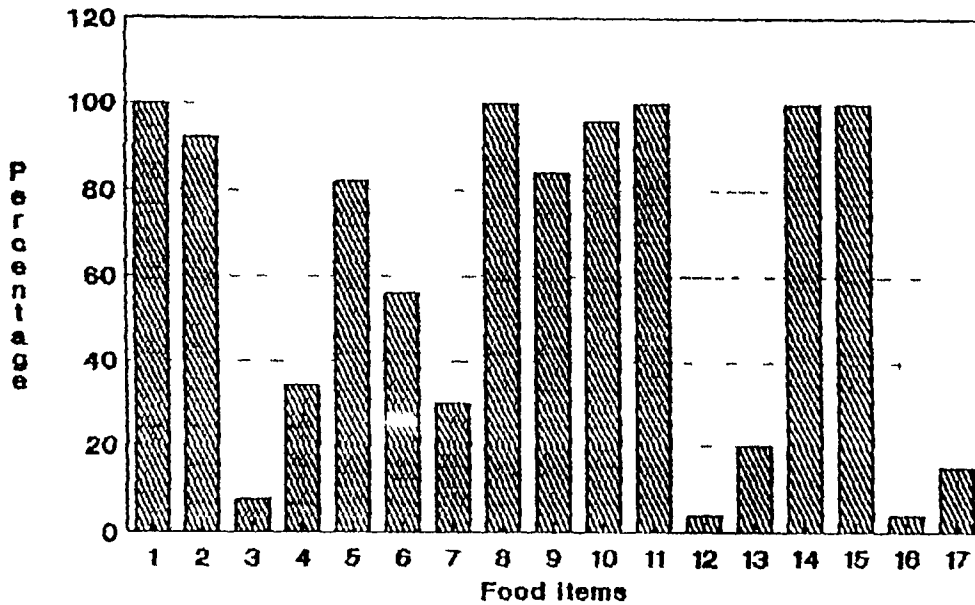
The mean scores as well as the percentage scores for various food articles is presented in Table 42.

Table 42 Scores obtained for various food articles

Food items	Mean score	Percentage of total score
Cereals - Rice	5 00	100 00
Cereals - Wheat	4 60	92 00
Pulses	0 38	7 60
Green leafy vegetables	1 70	34 00
Other vegetables	4 10	82 00
Roots/tubers	2 80	56 00
Fruits	1 50	30 00
Nuts/Oil seeds	5 00	100 00
Milk	4 20	84 00
Fats/oils	4 80	96 00
Sugar/Jaggery	5 00	100 00
Egg	0 20	4 00
Meat	1 00	20 00
Fish	4 99	99 80
Spices/Condiments	5 00	100 00
Health drinks	0 20	4 00
Miscellaneous food items	0 75	15 00

As indicated in Table 42 only four food items i.e., rice, nuts and oilseeds, sugar and jaggery and spices and condiments were found to obtain a mean score of 5. Food items like fats and oils and fish obtained a mean score of 4.80 and 4.99 respectively.

Scores obtained for various food articles



ORAS

- | | |
|---------------------------|-----------------------|
| 1. Rice | 11. Sugar/Jaggery |
| 2. Wheat | 12. Egg |
| 3. Pulses | 13. Meat |
| 4. Green leafy vegetables | 14. Fish |
| 5. Other vegetables | 15. Spices/condiments |
| 6. Roots/Tubers | 16. Health drinks |
| 7. Fruits | 17. Miscellaneous |
| 8. Nuts/Oil seeds | food items |
| 9. Milk | |
| 10. Fats/Oils | |

Table 43 indicates the classification of food items based on the percentage of total food score which is shown in Table 42

Table 43 Classification of food items based on food scores

Particulars	Percentage of total scores (%)	Food items
Daily used foods	76-100	Cereals - rice, other vegetables, nuts and oilseeds, milk, fats and oils, sugar and jaggery, fish, spices and condiments
Moderately used foods	51-75	Roots and tubers
Less frequently used foods	26-50	Green leafy vegetables, fruits
Least frequently used foods	≤ 25	Pulses, egg, meat, health drinks, miscellaneous foods - bakery items and other commercially prepared foods

From Table 43 it is evident that cereals, especially rice, other vegetables, nuts and oilseeds (coconut), milk, fats and oils, sugar and jaggery, fish, spices and condiments were found to be the most frequently used food items with the

percentage total score ranging from 76-100 Pulses, egg, meat, health drinks and miscellaneous foods (which included bakery items and other commercially prepared foods) were the least frequently used food items with the percentage total score less than 25

In general, cereals were found to predominate the diets of these households with respect to the protective foods like pulses, vegetables, milk, fruits and flesh foods, the intake was found to be uniformly low However, the consumption of tubers (tapioca) and fish were high The diet of the coir workers is similar to the diets consumed by the low income groups of Kerala The above finding is similar to the one reported by Isaac (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 present study is also in line with the reports of Lina and Reddy (1984) who endorsed that a typical Kerala dietary pattern would be based on rice, fish, tapioca and coconut Chadha et al (1995) reported that there was higher intake of cereals, milk and milk products and sugar and jaggery and lower intake of pulses, vegetables, fruits, flesh foods and oils and fats by the rural population Srinivasan et al (1991) analysed the nutritional status of rural families in Tamil Nadu and it was

reported that their diet mainly consisted of cereals (rice) and some vegetables. Meat was consumed rarely. Fruits were found to be the neglected item of the diet.

The ill balanced nature of the diet of the coir workers can be traced to their poor purchasing power vis-a-vis high and rising prices of essential goods and this leads us to the monthly food expenditure pattern of the families.

4.5.4 Monthly food expenditure pattern of the families

Data presented in Table 44 reveals the food expenditure pattern of the families as a percentage of monthly income.

Table 44 Food expenditure pattern of the families in percentage of monthly income

Food stuffs	Distribution of respondents		Percentage income spent
	No	Per cent	
Cereals	30	15.00	1 - 25
	164	82.00	26 - 50
	6	3.00	51 - 75
Pulses	60	30.00	1 - 15
	140	70.00	Nil
Green leafy vegetables	117	58.50	1 - 5
	83	41.50	Nil
Other vegetables	180	90.00	1 - 10
	20	10.00	11 - 20

Table 44 contd

Food stuffs	Distribution of respondents		Percentage income spent
	No	Per cent	
Roots and tubers	112	56 00	1 - 5
	80	40 00	6 - 10
	6	3 00	11 - 15
	2	1 00	Nil
Fruits	148	74 00	1 - 5
	52	26 00	Nil
Nuts and oil seeds	30	15 00	6 - 10
	170	85 00	11 - 15
Milk	43	21 50	1 - 5
	108	54 00	6 - 10
	48	24 00	11 - 15
	1	0 50	Nil
Fats and oils	46	23 00	1 - 5
	136	68 00	6 - 10
	18	9 00	11 - 15
Sugar/Jaggery	100	50 00	1 - 5
	50	25 00	6 - 10
	50	25 00	11 - 15
Egg	111	55 50	1 - 10
	89	44 50	Nil
Meat	200	100 00	Less than 1.00%
Fish	24	12 00	1 - 10
	170	85.00	11 - 20
	6	3 00	21 - 30
Spices/Condiments	52	26 00	1 - 5
	132	66 00	6 - 10
	16	8 00	11 - 15
Health drinks	10	5 00	1 - 5
	190	95 00	Nil
Miscellaneous foods	24	12 00	1 - 5
	33	16 50	6 - 10
	143	71 50	Nil

From Table 44 it is observed that 82.00 per cent of the families spent 26 - 50 per cent of their income on cereals and about 3.00 per cent of the families spent from about 51 - 75 per cent of their income for the same. This trend could be explained on the basis of the observation made by Reddy et al (1993) who reported that cereal intake shows a decreasing trend with better economic status.

Majority of the families did not incur any expenditure on pulses and health drinks. Fifty six to seventy four per cent of the families spent just 1-5 per cent of their income on food items like green leafy vegetables, roots and tubers, fruits and sugar. Less than 1.00 per cent of the income was spent on meat by all the families surveyed. Purchase of food items like milk, oils and spices and condiments accounted for 6-10 per cent of the income of about 54-66 per cent of the families. About seventy two per cent of families said that they did not incur any expenditure on various miscellaneous foods which included bakery items and other commercially prepared foods.

As seen from the data presented in Table 44, the major expenditure incurred by the families was on purchase of cereals. This observation is in tune with the result obtained by Kaur and Mann (1988) who reported that in the low income groups major expenditure was incurred on cereals. Prema and Menon (1980) conducted a study in the coastal areas of Trivandrum and found that 76.00 per cent of the income was spent on carbohydrate rich

foods like cereals and roots. Similar trend in expenditure was observed among Kanikkar families by Felsy (1989) and among women engaged in stone breaking by Sujatha (1990). It was reported by Godawari et al (1987) that around 50.00 per cent of the families in Tamil Nadu spent 30 - 40 per cent of their income on cereals. The expenditure pattern of the coir workers households on food items viz, roots and tubers, fruits and sugar and jaggery is similar to that reported by Jyothi (1993) who worked among the stone breakers of Thiruvananthapuram. The expenditure incurred on food items like milk, fruits, vegetables, meat and health drinks was considerably low and this is in line with the earlier findings. Godawari et al (1987) reported that in Tamil Nadu 4.00 per cent of the families did not spend money on leafy vegetables and others spend less than 6.00 per cent of their total income on it. Mathew (1989) reported that leafy vegetables and fruits were not included in the diets of female industrial workers. The main reason for avoiding or minimising the use of milk, pulses and fruits was the low income earned by these families and also, to a lesser extent, ignorance and lack of knowledge about nutritious foods and balanced diet. A study conducted in rural areas of Uttar Pradesh by Nathawat and Mathur (1993) reveal that the consumption of pulses and vegetables was occasional due to ignorance.

4 5 5 Frequency of cooking meals

Information was collected with respect to the number of times the meals were cooked and Table 45 reveals relevant information

Table 45 Distribution of the families with respect to the number of times the meals are cooked

No of times the meals are cooked	Distribution of families	
	No	Per cent
Once	65	32 50
Twice	98	49 00
Thrice	37	18 50
Total	200	100 00

(N = 200 families)

From Table 45, given above, it is clear that about half the families surveyed cooked two meals per day. This was followed by 32 50 per cent families who two meals per day. However there were 18 50 per cent families who cooked food thrice a day.

The above finding is different from the previous findings and studies. It was reported that the households in rural areas of Uttar Pradesh cooked foods only once a day (Anonymous, 1987). Karuna (1993) also observed that the fishermen families in Trivandrum cooked food only once in a day.

In the present study it was interesting to note that it was in the joint families that the meals were cooked thrice a day. This trend could be because the quantity of food to be cooked was larger in such families and hence it may be necessary to cook thrice a day. It was also observed that in such families the women were in a position to take help from the other female members of the family. Of course, this may increase the fuel consumption and the expenditure related to it.

4.5.6 Frequency of meals consumed

An enquiry into the frequency of meals consumed by the families revealed that majority followed the three meal-a-day pattern. Out of the 200 families surveyed, 141 families (70.50 per cent) had the habit of consuming three meals a day, namely breakfast, lunch and dinner. Ten per cent of the families had the habit of consuming four meals a day and 19.50 per cent had only two meals a day. The above observation is similar to the trend observed among the stone breakers by Jyothi (1993). Stephanie (1984) observed that among the rural families two or three meals are consumed daily and this depends on the working schedule and the amounts of foods that can be afforded. Swaminathan (1986) has revealed that increasing the frequency of meals in terms of size and number influences the work performance of individuals engaged in heavy activities.

4 5 7 Meal timings followed by the families

With respect to the time schedule for taking foods, all the families surveyed took meals according to the convenience of the members and none of them followed a specific time schedule. This may be due to the varying work patterns and schedules followed by the members of the respective families.

During the survey it was observed that supper was the only meal during which all the members of the family were present. Here, an interesting feature observed was that the women and girls ate last and least. This pattern was especially true in joint families and surprisingly the women who accepted this trend held the view that women should take food after everyone, especially after serving food to the males.

4 5 8 Daily meal pattern of the families

The daily meal pattern of the families were further studied using the dietary-recall method. The meal patterns were observed since it will give information regarding the food items commonly consumed. Table 46 reveals the daily meal pattern of the families surveyed.

Table 46 Daily meal pattern of the families

Sl No	Type of food	Distribution of families							
		Early morning		Break fast		Lunch		Dinner	
		No	Per cent	No	per cent	No	Per cent	No	per cent
1	Black coffee	95	47 50	-	-	-	-	-	-
2	Tea	105	52 50	-	-	-	-	-	-
3	Yesterday's left over food	-	-	99	49 50	-	-	-	-
4	Cereals, cereals and dhals, coconut preparatopms with coffee or tea	-	-	23	11 50	-	-	-	-
5	Wheat preparations with coffee or tea	-	-	10	5 00	-	-	-	-
6	Rice, fish, coconut	-	-	-	-	130	65 00	128	64 00
7	Rice, tapioca, fish, coconut	-	-	-	-	13	6 50	20	10 00
8	Rice, fish, vegeta- bles, coconut	-	-	-	-	57	28 50	52	26 00
9	Not taking any food	-	-	68	34 00	-	-	-	-
Total		200	100 00	200	100 00	200	100 00	200	100 00

Data presented in Table 46 reveals that 47 50 per cent of the families had the habit of taking black coffee and 52 50 per cent of the families consumed black tea early in the morning. The major item for breakfast was the left over rice of previous night kept in water for about 49 50 per cent of the families, while 11 50 per cent consumed either preparations made from

cereals or cereal with dhal (puttu, dosa, appam and idli), alongwith a coconut based side dish. Either coffee or tea was consumed with breakfast also. Wheat preparations were included in the breakfast of 5.00 per cent of the families. Rest of the families (34.00 per cent) did not have any breakfast.

Rice with fish curry (fish + coconut) was the common menu for lunch as well as dinner of about 65.00 per cent of the families. Alongwith this tapioca was also included in lunch and dinner by 6.50 per cent and 10.00 per cent of the families respectively. Instead of roots and tubers, other vegetables were included in lunch by 28.50 per cent and in dinner by 26.00 per cent of the families surveyed.

It was noted that the diet pattern followed by the families were monotonous and as in the case of the other communities in Kerala, cereal preparations, cereal and dhal preparations with coffee or tea were found to predominate the breakfast of the coir workers families also. Similarly cereal and fish preparations were the major items for lunch and dinner. Thus it can be clearly seen that the diet was unbalanced since major foods like pulses, milk, fruits, egg and flesh foods were not commonly used items.

4.5.9 Special foods given during special conditions

Details regarding the special foods given to the different vulnerable groups like pregnant women, lactating

mothers, infants, pre-schoolers, adolescents and the aged were collected Table 47 reveals the above relevant data

Table 47 Special foods given during special conditions

Type of food	Distribution of families with respect to special foods given during special conditions											
	Pregnancy		Lactation		Infancy		Pre-school		Adolescent		Old age	
	No	Per cent	No	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Milk	4	2.00	-	-	180	90.00	125	62.50	-	-	-	-
Milk and supplementary foods	-	-	-	-	6	3.00	4	2.00	-	-	-	-
Milk and commercially prepared baby foods	-	-	-	-	10	5.00	1	0.50	-	-	-	-
No special foods	196	98.00	200	100.00	-	-	68	34.00	200	100	200	100
Total	200	100.00	200	100.00	200	100.00	200	100.00	200	100	200	100

(N = 200 families)

Data presented in Table 47 reveal that in 180 (90 00 per cent) families milk was given to the infants in addition to breast milk The same trend was observed among pre-school children where again milk was given by 125 (62 50 per cent) of the families

Specially prepared supplementary foods were given by only 3 00 per cent and 2 00 per cent of the families for infants and pre-school children respectively

Supplementary foods alongwith milk was given by only 2 00 per cent and 1 00 per cent of the families to infants and

pre-schoolers respectively. The supplementary foods that were usually given included ragi and banana based preparations.

Milk and commercially prepared baby foods were given to infants by 5.00 per cent of the families.

Thirty-four per cent of the families did not give any special foods to the pre-schoolers.

No special items or foods were prepared at home for pregnant and nursing mothers, by majority of the families. In 2.00 per cent of the families milk was given to pregnant women.

Adolescent children and aged persons were given only the regular adult diet.

It was alarming to note that the pregnant women, lactating mothers, adolescents and aged persons were not given special foods to nourish their body probably due to lack of income and knowledge about the significance of diet in the above periods. Among the coir workers low food intake during pregnancy was a major problem. Numerous women reported to consume little or no extra food during pregnancy and some of them said that they consciously limited their intake in the fear of developing large foetuses which could make labour more difficult. Jayasree (1994) has also observed similar features among the coir workers of Thiruvananthapuram. However, Parvathi and Babitha (1989) in their studies among rural females of Khasis of

Meghalaya found that special conditions like pregnancy and lactation did not receive any special attention except in an increased intake of the normal adult diet. Saha and Kanchan (1991) found that the pregnant mothers in rural areas were not aware of the special health care needs of pregnancy. The reason for the above trend seen among the coir workers could be lack of education and awareness.

4.5.10 Dietary changes for sick persons

Next to the vulnerable groups, the sick persons occupy an important place with respect to their altered nutritional demands. Special attention was bestowed to observe the dietary changes, if any, prescribed for those suffering from fever, diarrhoea and disorders related to parasitic infestation, the three problems commonly reported by these families. Table 48 reveals the food restrictions followed in the diets of sick persons.

Table 48 Food restrictions for sick persons by the families

Type of food	Distribution of families					
	Fever		Diarrhoea		Parasitic infestation	
	No	Per cent	No	Per cent	No	Per cent
Sold foods	142	71.00	181	90.50	81	40.50
No restrictions	58	29.00	19	9.50	119	59.50
Total	200	100.00	200	100.00	200	100.00

(N = 200 families)

From Table 48 we can infer that food restrictions were mainly observed in some families by withdrawing solid foods from the diets of the sick persons in fever and diarrhoea. Parvathi and Babitha (1989) in their studies among rural males and females of Khasis of Meghalaya had found that bland diets were given during fever, diarrhoea and chickenpox. In the present study, 29.00 per cent and 9.50 per cent families did not observe any diet restrictions for fever and diarrhoea respectively.

4.5.11 Food fads and faulty food habits

Details related to food fads and faulty food habits were collected. Faulty food beliefs such as the papaya fruit leading to abortion in pregnant women, curds producing cold and milk not essential for adults were commonly reported by the majority of the coir workers. The above observation indicates that the above mentioned protective foods are likely to be avoided by these families, and this has been reflected in their dietary pattern also.

4.5.12 Foods taken from outside

Consumption of food from hotels and restaurants is on the rise since many of the women are employed and so this aspect was checked out with respect to the coir workers families. Even though there was a high percentage of employed women among the families surveyed, they rarely consumed food from hotels and

restaurants and those families who did consume such foods, did so only during the time of local festivals and fairs. The above observation indicates their traditional habits/customs or their low income and poor purchasing power. The fact that these families never opted for foods other than home made ones again increases the already heavy workload of the women coir workers and this in turn has a negative impact on the women's health and nutritional status.

4.5.13 Role played by women in the preparation and distribution of food

Information collected during the diet survey with respect to the role played by women in the preparation and distribution of food revealed a similar trend with previous studies. Among the households surveyed, the responsibility of preparation and distribution of food was rarely taken over by men.

The study revealed that in 170 (85.00 per cent) families it was the respondent who was responsible for deciding the frequency of the inclusion of various foods in the daily diet.

In 20 (10 per cent) of the families it was both the respondent and other female members who decided the frequency of the inclusion of various foods in the daily diet.

In 10 (5 per cent) of the families it was the responsibility of the other female members to decide the frequency of the inclusion of various foods in the daily diet

The above data reveals that in majority of the families it was the housewife who was responsible for deciding the frequency of the inclusion of various foods in the daily diet. This finding is in line with that of Miglani et al (1991)

The above roles played by women could have both a positive and a negative effect on the nutritional status of women. The positive effect is that since women have more control over the preparation and distribution of food, they could improve the nutritional status of the children and also of the women themselves vis-a-vis their men. On the other hand, increased participation in food preparation and distribution may increase women's workload and thereby have a negative influence on their health.

Taking both the positive and negative effect into consideration it was observed that the latter was more noticeable because majority of the women considered being good housewives and mothers as a moral obligation and so when food was scarce, the women had the tendency to take a sacrificing role in their attempt to satisfy the basic needs of other household members, thus neglecting their own health and nutritional status.

4 5 14 Womens' eating patterns at the work site

Women's eating patterns at the work site revealed that majority of the respondents took packed food daily to the work site which they themselves had to prepare at home and the reason could be that there were no shops or hotels near the societies. The women usually consumed rice with vegetables and fish or rice with tapioca and fish at the work site. The left over rice and dishes of the previous night also formed part of the lunch of the women. None of the women reported to be having any specific likes or dislikes with regard to food.

Thus from the diet survey it was found that cereals, tapioca and fish were found to predominate the diets of these households. Intake of pulses, vegetables, milk, fruits and flesh foods was found to be uniformly low. Majority of the families did not provide the vulnerable groups with special foods. There were a number of faulty food habits and food fads that were prevalent among these families.

Ultimately we can draw the inference that the coir workers suffered from household food insecurity and the causes of insecurity could include unemployment, underemployment, inadequate wages and also the exorbitant cost of food stuffs. Poverty, as measured by flow of income and/or food, is a fundamental cause of household food insecurity. Poor households spend a high proportion of their income on food and are therefore

vulnerable to adverse changes in their income or the price of food. This has also been suggested by Fortmann (1984). Seasonality in employment is another factor since it may result in transitory food insecurity and cause fluctuations in individual nutritional status as reported by Carloni (1981). The household food insecurity will directly affect the dietary pattern of the women since they are the managers of the food at home and their sacrificing nature when coupled with heavy workload leads to undernutrition or malnutrition.

The relation between women and household food security can be explained as that, the economic and social status of women may be the pivotal link between household food security and the adequate health and nutritional status of individuals. From the data presented two inferences, with respect to the women, can be drawn. First, the dual stress of work inside and outside the home could have an adverse effect on their nutritional status. At the same time, it would not be wrong if we assume that her employment outside the home might benefit these women and their family by increasing their purchasing power.

4.6 Time allocation pattern of the women

Studies dealing with the relationship between women's workload and health have most often been examined as to how it influences the nutrition and health of the offspring. According to Daltabuit (1991) the nutritional and medical professions have

been more interested in womens nutrition from the point of view of child bearing and lactation, rather than showing interest in the health of the women for their own sake It was reported by Mahtab (1991) that in rural areas women do several tasks simultaneously, some close to their homes and some further away from home A strict division of outside-the-home and in the home work therefore becomes meaningless Hence in the present study an attempt has been made to given an account of the daily work schedule of the women coir workers with respect to their homes and work sites, so that the influence of their workload in relation to their health and nutritional status could be assessed

A large number of women were early risers with 72 00 per cent of the respondents reporting that their day starts as early as 4 00 or 4 30 am and none of them reported to wake up after 5 30 am The above fact itself is an indication to the long hours of work they have to tread through the day These women also complained that they have less time than their menfolk to spend on their personal needs Berio (1984) have reported that the women's work day is longer than a man

According to Mehta and Singh (1990) domestic services involves an important sphere of activities as far as women are concerned These activities include the procuring of water and fuel wood, cooking of meals and feeding of the young, among other

regular household chores and all the above activities are essential parts of the food preparation, distribution and consumption. Women generally provide a major per cent of the labour input in this sphere. Keeping the above facts in mind, the time spent by the women for various household tasks was assessed and the relevant data are presented in Table 49.

Table 49 Time spent by the respondents for household tasks

Time (Hour)	Distribution of Respondents	
	No	Per cent
One	33	16.50
Two	74	37.00
Three	56	28.00
Above three	37	18.50
Total	200	100.00

(N = 200 respondents)

Table 49 reveals that 37.00 per cent of the women spent two hours per day on household tasks while 28.00 per cent of the respondents spent three hours per day to complete their domestic duties and the percentage of women who spent more than three hours for household tasks constituted 18.50 per cent of the sample surveyed.

During the survey it was observed that the women reportedly spent major part of their time at home for preparing

food for themselves and for their families Childcare, surprisingly, consumed much less time

Eighty five per cent of the women endorsed that they did not receive any help from other family members in their household tasks and this could be because majority of them belonged to nuclear families where there were no relatives This might lead to more physical and psychological problems

An interesting observation made during the survey was that these women were found to manage their time and energy in a judicious manner by combining different tasks Many of the women brought firewood when they returned home from the work site Water was fetched in combination with washing of clothes and bathing of children However, child care is a major problem faced by women employed in the unorganised sector Child care was always combined with other tasks

An attempt was made in this study to find out as to how they manage their children, while at work Out of 59 respondents who had small children, 12 (20.30 per cent) said that they took their child to the work site while 25 (50 per cent) of them left them at the nearest creche or Anganwadi The rest (54.20 per cent) of the respondents left their children at home with non-working relatives The 12 (20.30 per cent) respondents who took their child with them to the work site reported that they were not provided with any facilities to take care of the children

These women made cradles with cloth and placed their children in them while they were at work. All the above respondents said that they were able to feed their children only once during their work time and that was during the lunch break. In the case of those women who are forced to take their children to the work place it could be said that the presence of the mother alone does not guarantee close interacting between the mother and child and the quality of care may be worse under the existing conditions of the work site, with poor sanitation and polluted atmosphere.

There were women who chose ICDS anganwadis as part time alternatives of child care. But attendance of infants and toddlers at ICDS anganwadis was low in these areas. It was found that some of the mothers preferred to send their children to the private nursery schools rather than to the anganwadis. These women felt that their children would be taken care of in a better way by the private nursery schools in comparison to the ICDS anganwadis.

In the case of women who have to leave their small children at home, they will not always have access to adequate substitutes to take over their child care activities. In many instances relatively small children are put in charge of their elder siblings. Child care, through the help of older siblings and grandparents, helps women save their time, but are not always adequate in meeting the child's needs for early stimulation, and to meet their emotional and psychic needs.

Women's employment in the unorganised sector, in the context of inadequate protective legislation or lack of enforcement of existing legislation, has been considered unfavourable to child care because it keeps the mother away from home i e , away from the child . There were no viable arrangements which permitted women to take care of even the nutritional needs of their infants and young children . Though legislation calls for creches and day care centres to be provided to women in the unorganised sector, such requisites are not taken care of by the authorities

Thus a reduction of women's child care burden should be ensured through provision of adequate child-care facilities . A scheme proposed by the Special Task Force on Coir Industry (1992), where Rs 20 00 lakhs was suggested for construction of creches and for meeting recurring expenses, should become a reality to help these women

The time allocation pattern of the women revealed that they spent a major part of their day at the work site . Employment related factors such as the location of work site, time spent at work and in travel, the energy cost and ergonomic nature of the work may greatly affect womens nutritional status as stated by Bryson and Judy (1981) . Hence details related to the above factors were analysed and Table 50 reveals the distribution of respondents with respect to the mode of reaching the work site

Table 50 Mode of reaching the work site

Means of reaching the work site	Distribution of the respondents	
	No	Per cent
Walking	193	96 50
Bus	7	3 50
Total	200	100 00

(N = 200 respondents)

From Table 50 it is evident that about 96 50 per cent of the respondents reached the work site by walking with just 3 50 per cent of the women reaching the work site using the public transport service. This is so because most of the women live in the nearby areas of the coir co-operative societies. Bai in 1985 had reported that most women employed in the coir industry find it convenient to work there because they live in and around the area where coir manufacturing centres are located. Similar trend was observed among the women workers of other unorganised sectors as well. Jyothi (1993) observed that for majority of the women stone breakers the work site was easily accessible (i.e., within half a kilometer) and they reached their work spot by walking.

The women engaged in the coir industry, like any other employee has the dual role to play and are burdened with the double days work. Isaac (1990) also reported similar findings.

These women were found to spent one-third of the day in their activity outside their homes, as depicted in Table 51

Table 51 Time spent by the respondents in spinning of coir/day

Time (in hr min)	Distribution of respondents	
	No	Per cent
6 00 - 7 00	103	51 50
7 01 - 8 00	97	48 50
Total	200	100 00

(N = 200 respondents)

From the data given in Table 51 it can be seen that about 51.50 per cent of the women spent six to seven hours at the work site and about 48.50 per cent of them spent upto 8 hours at the work site. According to Jayasree (1994) only 19.14 per cent of the workers in the spinning sector worked for more than ten hours while 80.80 per cent of workers in the husk beating worked for more than ten hours per day. In the present study a large number of women finished their work faster producing the stipulated quantity of yarn since spinning was done by the combined effort of three women and the women were required to collectively produce 2800 metres of yarn per day.

The women in the co-operative societies were entitled to a break of thirty minutes, during the afternoon. Jayasree (1994) in her study reported that the coir workers whom she

observed, did not even avail this leisure time. However, in the present study the women stopped their work at 12 00 pm and this break period which ended at 12 30 pm was used for taking food and rest. This has a positive effect on the health and work output since a leisure permits women to break away from 'boredom fatigue' as well as 'physical fatigue'. This has also been reported by Varghese et al (1992).

Thus evaluation of time allocation for various activities viz , household and coir work reveals that these women can be categorised as 'heavy workers'. According to Bleiberg et al (1980) energy expenditure of the women will influence their nutritional status. Hence the total energy expenditure of the women for a day, for fulfilling all their duties was calculated with the help of schedule III (Appendix V) which was used to collect information regarding the daily work schedule in the household and at the work site. From the above schedule details related to the type of activity and time spent for each activity were obtained. The energy expenditure was computed by multiplying the time spent on a particular activity by the rate of energy expenditure which was expressed in BMR units as given by ICMR (1994).

The distribution of the respondents according to their daily total energy expenditure pattern is given in Table 52. The details related to the total energy expenditure per day is presented in Appendix XI.

Table 52 Distribution of the respondents according to their daily total energy expenditure pattern

Total energy expenditure pattern per day (K cal)	Details of respondents	
	No	Per cent
2401 - 2500	40	20 00
2501 - 2600	75	37 50
2601 - 2700	80	40 00
> 2700	5	2 50
Total	200	100 00

(N = 200 respondents)

Details presented in Table 52 revealed that 40 00 per cent of the respondents were found to have a total energy expenditure ranging between 2601 to 2700 kilocalories per day. It was also observed that 37 50 per cent of the respondents had a total energy expenditure of 2501 to 2600 kilocalories. Twenty per cent of them had an energy expenditure pattern of 2401 to 2500 kilocalories per day. It was also observed that 2 50 per cent of the respondents were found to have a total energy expenditure of more than 2700 K cal.

The ICMR (1994) has specified a Recommended Dietary Allowance of 2225 Kilocalories for women doing moderate activity. In the present study it was observed that majority of the women spend more energy than the above RDA. From the above results it

can be inferred that there is a conflict between women's economic roles and their own nutritional needs. We may also say that economic participation may increase energy expenditure of women engaged in the coir industry.

The distribution of the respondents on the basis of energy deviation from their RDA is presented in Table 53.

Table 53 Distribution of respondents on the basis of energy deviation from their RDA

Energy deviation (%)	Details of respondents	
	No	Per cent
10 00 - 15 00	60	30 00
15 01 - 20 00	95	47 50
20 01 - 25 00	45	22 50
Total	200	100 00

(N = 200 respondents)

From the above Table it can be seen that all the women spent more energy than their RDA. It was observed that 47 50 per cent of the women spent 15 01 to 20 00 per cent more energy than their actual RDA and 22 50 per cent spent more than 20 01 to 25 00 per cent of energy than that of the RDA. According to Bleiberg *et al* (1980) one of the reasons for the negative energy balance of some of the female agricultural workers was the compulsion to spend long hours for heavy work. A negative energy

balance was also observed in women engaged in stone breaking in Thiruvananthapuram by Sujatha (1990)

The distribution of respondents according to the energy expenditure for different activities is presented in Table 54

Table 54 Distribution of the women workers according to the energy spent for different activities

Energy spentt (Kcals) (Range)	Distribution of respondents					
	Household activities		Employment outside the home (coir work)		Sleep	
	No	Per cent	No	Per cent	No	Per cent
≤ 350	20	10 00	-	-	95	47 50
351 - 600	16	8 00	-	-	105	52 50
601 - 850	68	34 00	-	-	-	-
851 - 1100	81	40 50	103	51 50	-	-
1101 - 1350	10	5 00	97	48 50	-	-
> 1350	5	2 50	-	-	-	-
Total	200	100 00	200	100 00	200	100 00

(N = 200 respondents)

From Table 54 it is clear that about 10 00 per cent of the women spent less than or equal to 350 Kcal for their household activities and the highest energy expenditure of more than 1350 Kcal was observed among 2 50 per cent of the women for this purpose

Computation of energy expenditure for employment outside the home (spinning of coir) revealed that 51.50 per cent of the women spent from 851 to 1100 kilocalories of energy on this account. Forty eight per cent of the women were found to spend 1101 to 1350 Kcal for the same activity. In addition large number of these women were found to be suffering from lack of adequate sleep and rest. This could lead to a poor health status and resultant poor work output because Youssef and Hetler (1984) had reported that adequate sleep and rest reduces nutritional depletion and restores energy stores in the muscles and fat which in turn increases strength and endurance.

In the present study we may infer that the women coir workers are at a disadvantage as clearly outlined by Hussain (1988) who reported that heavy schedule of work of rural women leads to complete physical exhaustion and reduced working efficiency.

According to Martorell and Merchant (1992) pregnancy and lactation are two important periods when the women are under considerable physiological stress.

According to McGuire and Popkin (1990) poor women in most societies continue to undertake heavy physical activity during pregnancy and resumes this activity soon after delivery of their children. Hence, in the present study details were

collected with respect to the work done outside the home during the periods of physiological stress

Results reveal that 97.28 per cent of the women were engaged in this work even during the later stages of pregnancy and 61.20 per cent of the respondents returned to their work, two to three weeks after delivery. Thus it can be seen that these women have to continue to do heavy manual work throughout pregnancy and immediately thereafter in order to earn wages and to feed the family. Extensive physical activity during pregnancy may have an adverse effect on the outcome of pregnancy. According to Short (1992) a major factor hypothesized to have an adverse effect on the outcome of pregnancy is physical stress, which may occur in combination with poor nutrition, fatigue or harmful body postures. But Ramachandran (1992) observed that a reduction in work time or work productivity associated with childbirth and lactation may adversely affect the families income and food security.

Another interesting observation made during the survey was that among the coir workers, early marriage is still a common phenomenon which follows early pregnancy. According to Huffman *et al* (1985) early pregnancy not only stunts height, but it leads to low birth weight and also increased risk of obstetric complications.

Report of the Special Task Force on Coir Industry (1992) emphasises that the introduction of treadle rath would not

only guarantee significant improvement in the quality of coir yarn but also would help to reduce the drudgery of work. It would also bring about some improvement in the productivity without creating any undue displacement of workers. Thus mechanisation would improve the household food supply which in turn results in improved health and nutritional status of all members of the family. It would also reduce stress, enhancing the status of the women.

4.7 Anthropometric measurements of the women

Anthropometric measurements of the respondents were recorded and their usefulness stems from its close correlation with the multiple dimensions of individual health and development and its interaction with the socio economic and environmental determinants. According to Beaton et al (1990) anthropometry is useful because it provides strong and feasible predictors, at individual levels, of subsequent ill health, functional impairment and / or mortality. Studies on anthropometric measurements of women in developing countries are even fewer than dietary studies. Wallace (1987) observed that anthropometry is not synonymous with nutritional status, moreover, anthropometry may be correlated with physical activity, morbidity and psychological development. In poor communities, such as the coir workers, dietary inadequacies and infections are often major epidemiological determinants of growth failure.

Hence the health and nutritional status of the respondents were ascertained through the anthropometric measurements such as height, weight, waist, hip, mid-upper-arm circumference and triceps skin fold thickness

4.7.1 Height and weight

According to Ramachandran (1987) the body weight and height for age are parameters to assess the nutritional status

Details pertaining to the height of the 200 respondents are given in Appendix XII. The distribution of respondents with respect to their height given in ranges are presented in Table 55

Table 55 Distribution of respondents with respect to their height

Height (cm)	Distribution of respondents	
	No	Per cent
130 - 136	9	4.50
137 - 141	6	3.00
142 - 146	30	15.00
147 - 151	54	27.00
152 - 156	75	37.50
157 - 161	26	13.00
Total	200	100.00

(N = 200 respondents)

Details presented in Table 55 reveals that the height of the 200 respondents ranged from a minimum of 130 cm to a maximum of 161 cm

Further analysis of the above data revealed that only about 20 00 per cent of the respondents had their height equal to or above the standard height recommended for an Indian reference woman as depicted in Table 56

Table 56 Distribution of respondents with respect to their height

Height (cm)	Distribution of respondents	
	No	Per cent
Below normal (< 155)	161	80 50
Normal (155)*	5	2 50
Above normal (> 155)	34	17 00
Total	200	100 00

(N = 200 respondents)

* Source ICMR (1994)

The weight of all the respondents were measured and the details are given in Appendix XII The distribution of the respondents with respect to their weight are given in Table 57

Table 57 Distribution of respondents with respect to their weight

Weight (kg)	Distribution of respondents	
	No	Per cent
28 - 32	13	6 50
33 - 37	58	29 00
38 - 42	55	27 50
43 - 47	52	26 00
48 - 52	22	11 00
Total	200	100 00

(N = 200 respondents)

Data presented in the above table reveals that the weight of the respondents ranged from 28 to 52 kg

Table 58 Distribution of respondents with respect to their weight

Weight (kg)	Distribution of respondents	
	No	Per cent
Below normal (< 50)	194	97 00
Normal (50)*	4	2 00
Above normal (> 50)	2	1 00
Total	200	100 00

(N = 200 respondents)

* Source ICMR (1994)

Data presented in Table 58 further discloses the fact that 97 00 per cent of the women were underweight when compared to the standard weight suggested for a reference woman

The mean values of height and weight in relation to age are presented in Table 59

Table 59 Mean age, height and weight of the respondents

Details of the respondents	Mean	Variance	Std Error	Coefficient of variation
Age (years)	32	17.74	0.666	13.09
Height (cm)	149	33.60	0.916	3.88
Weight (kg)	38	22.46	0.749	12.49

(N = 200 respondents)

Data presented in Table 59 reveals that the mean age of the 200 respondents who were surveyed was found to be 32 years and their mean height and weight were 149 cm and 38 kg respectively

The above readings show that the respondents were below the standard reference woman's height (155 cm) and weight (50 kg) suggested by ICMR (1994)

The results presented in Tables 55 to 59 indicates that stunting and wasting are common among the women coir workers. It is also inferred that their low stature reflects under nutrition, as well as consequent inability to enhance their genetic potential. Nutritional deprivation in early childhood and adolescence also results in the failure to achieve full growth

potential as reported by Beaton et al (1990) This may be true in the case of women engaged in the coir industry also

According to McGuire and Popkin (1990) women with low height and weight measurements are more likely to deliver babies with low birth weights Thus we may assume that majority of the women coir workers may give rise to another generation of stunted individuals

Body height and weight are subject to genetic influences but weight is also influenced by the balance between energy intake and energy expenditure According to Beaton et al (1990) body weight is influenced by both energy intake and energy expenditure In the present study also, a highly positive and significant correlation was observed between weight and energy intake ($r = 0.4178^{*}$) and energy expenditure ($r = 0.5267^{**}$) Bray (1981) reported that with increasing body weight there was an increase in energy expenditure also

A highly positive significant correlation was also found between the age of the coir workers and their weight ($r = 0.3775^{**}$) This age related change may be ascribed to a combination of reduced energy requirements and altered hormonal profile as explained by Gopalan and Kaur (1989) Anselmo et al (1992) also observed the fact that aging seemed to be associated with increase in weight

A highly positive significant correlation was also found between weight and years of married life ($r = 0.4834^{**}$) This above result can be explained by the fact that the older women may have reduced energy expenditure due to expertise and experience in managing their work and time through two conscious efforts of work simplification and motion mindedness The older women might have gained these qualities with longer years of married family life According to Varghese et al (1992) work simplification is the conscious seeking of the simplest, easiest and quickest method of doing work, and motion mindedness is an awareness of the motions involved in doing a task and an interest in possible ways of reducing them However, Huffman et al (1985) reported that weight was consistently lower for older, higher parity women, which is not seen in the present study

The results obtained in the present study is similar to the previous studies Reports prepared by Anonymous (1992) revealed that the mean height of women in Asia is only 150-151 cm compared to European standard of 161 cm This indicates that women are particularly stunted in Asia and also that the proportion of underweight women is upto 60.00 per cent in Southern Asia Dodd and Anjula (1989) compared the nutritional status of working and non-working middle class Maharashtrian women and reported that ten per cent of the non-working women had weight below 38 kg and height less than 145 cm Ghassemi (1990) found that rural and poor urban girls reach the age of

adolescence some 12-15 cm shorter than their well-to-do peers in the same societies Gopalan and Kaur (1989) reported that women working outside the house in rural areas were lighter than housewives and this might be due to general poverty, lower purchasing power and lower dietary intake in the face of strenuous manual labour

Using the values obtained for height and weight of the 200 respondents their Body Mass Index (BMI) was calculated and are presented in Appendix XII According to Royston and Lopez (1987) BMI is of value in distinguishing the nutritional state of different groups, monitoring the adequacy of food and in specifying the proportion of malnourished in a population Using the BMI values the women were classified into four groups as suggested by Reddy et al (1993) in order to ascertain the extend of energy deficiency which can be attributed to their diet as well as physical activity The above details are presented in Table 60

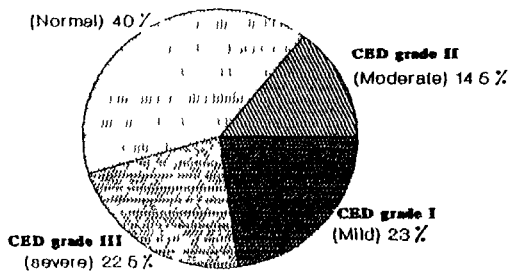
Table 60 Distribution of respondents with respect to BMI

BMI class	Presumptive diagnosis	Distribution of respondents	
		No	Per cent
< 16 0	CED grade III (severe)	45	22 50
16 1 - 17 0	CED grade II (moderate)	29	14 50
17 1 - 18 5	CED grade I (Mild)	46	23 00
18 6 - 25 0	Normal	80	40 00
Total		200	100 00

*Source NNMB (1991)

(N = 200 respondents)

Classification of respondents based on grades of malnutrition



Data presented in Table 60 reveals that 22.50 per cent of the women belonged to the lowest BMI class of below 16.0. It was also observed that 14.50 per cent of the women had a BMI between 16.1 to 17.0. These women (37.00 per cent) may be considered to suffer from chronic energy deficiency (CED) of grade III and II. However Reddy et al (1993) are of the opinion that persons with BMI value less than 18.5 are considered to suffer from chronic energy deficiency (CED).

Forty per cent of the women though classified as normal, with a BMI between 18.6 to 25.0, were found to have lower body weight when compared to reference standards. Experts from NIN (1991) are of the opinion that BMI values between 18.6 and 25.0 can be considered as compatible with health for both men and women. Previous studies have revealed that chronic energy deficiency as revealed in this study is a common feature of developing countries. Reddy et al (1993) from India reported that on the national level, only half the adults had normal nutritional status while the rest suffered from different degrees of CED. Sanchaisuriya et al (1993) observed that about twelve per cent of the non-pregnant rural Thai women of child bearing age had a BMI below 18.7. But here it is observed that about a quarter of the coir workers included in the study had a BMI below 16 which indicate absolute wastage which could be due to infections as well as low dietary intake.

The low BMI could have a negative influence on their work output since Shetty et al (1987) had reported that reduced physical capacity seen in undernourished adults is largely due to reduced body size which is the result of varying degrees of malnutrition during the active growth period of an individual Pauline (1990) observed that the low BMI of women in Tanzania was due to too much energy expenditure and high nutritional depletion due to constant infections as well as low dietary intakes

4 7.2 Waist circumference

The waist circumference of the respondents was measured and details related to the 200 respondents have been presented in Appendix XII and Table 61 reveals the distribution of respondents with respect to their waist measurements

Table 61 Distribution of respondents with respect to their waist circumference

Waist circumference inches/ (cm)	Distribution of respondents	
	No	Per cent
20-25 (50 8 - 63.5)	110	55.00
27-31 (68 5 - 78 4)	90	45 00
Total	200	100 00

(N = 200 respondents)

From Table 61 it is clear that 55 00 per cent of the respondents had a waist measurement that ranged between 20-25

inches and 45 00 per cent of the women had a measurement that ranged from 27-31 inches. The mean waist measurement of the 200 women was 25 4 inches.

4 7 3 Hip circumference

Details related to the hip measurements are presented in Appendix XIII. Table 62, presents the distribution of respondents with respect to their hip measurement.

Table 62 Distribution of respondents with respect to their hip circumference

Hip circumference inches/ (cm)	Distribution of respondents	
	No	Per cent
24-29 (60 9 - 73 6)	62	31 00
30-35 (76 2 - 88 9)	138	69 00
Total	200	100 00

(N = 200 respondents)

Data presented in Table 62 reveals that 69 00 per cent of the respondents had a hip circumference that ranged between 30-35 inches and 31 00 per cent of the women had a hip measurement that ranged from 24-29 inches.

4 7 4 Waist-Hip Ratio (WHR)

After documenting the waist and hip measurements of the respondents the waist hip ratio was calculated. Details are

presented in Appendix XIII Table 63 reveals the distribution of respondents with respect to their waist-hip ratio (WHR)

Table 63 Distribution of respondents with respect to their waist-hip ratio

Waist-Hip Ratio (Ranges)	Distribution of respondents	
	No	Per cent
0.7 (Normal)	2	1.00
0.71 - 0.8 (Femoral gluteal obesity)	64	32.00
0.81 - 0.9 (Abdominal obesity)	134	67.00
Total	200	100.00

(N = 200 respondents)

Distribution of respondents with respect to their waist-hip ratio shows that only 1.00 per cent of the respondents were having normal waist-hip ratios. Sixty seven per cent of the respondents had waist-hip ratios that revealed incidence of abdominal obesity, and 32.00 per cent of the respondents had femoral gluteal obesity where the waist-hip ratio ranged from 0.71 to 0.8.

From the data the mean waist-hip ratio for the 200 respondents was found to be 0.82.

From the above data it is alarming to note that 99 per cent of the women suffered from abdominal obesity or femoral gluteal obesity. This could be attributed to hereditary

characters or to poor posture. It can also be due to ineffective pre and/or post natal care. Abdominal obesity and femoral gluteal obesity should be considered as health risks since Tuomilehto *et al* (1990) reported that WHR was independently related to several cardio-vascular risks factors and an increased WHR indicates increased accumulation of abdominal fat. The increased incidence of cardiovascular diseases has become a factor of concern for the health professionals and planners as there was a noted escalation in the incidence of the metabolic disorders even among people belonging to low socio-economic brackets who have low body weight and lessened intake of calories and other nutrients. Under this circumstance the elevated level of femoral gluteal obesity and abdominal obesity observed among these poor women need to be examined critically since there is scientific evidence proving its association with cardiovascular diseases.

The results of the present study is in tune with the trend observed by Despres and Lamarche (1993) among Canadian women aged 18-74 years where 34.00 per cent of the respondents had WHR values above 0.80.

4.7.5 Mid upper arm circumference (MUAC)

The mid upper arm circumference (MUAC) of all the respondents were measured and the details are presented in Appendix XIV. Distribution of respondents based on MUAC measurements are presented in Table 64.

Table 64 Distribution of respondents with respect to the mid-upper arm circumferences (MUAC)

Arm circumference range (cm)	Distribution of respondents	
	No	Per cent
≤ 24 0	145	72 50
24 1 - 28 0	55	27 50
Total	200	100 00

(N = 200 respondents)

Data presented in Table 64 reveals that 72 50 per cent of the respondents had measurements below or equal to 24 0 cm, while 27 50 per cent were in the range of 24 1 to 28 0 cm. None of the respondents had an arm circumference range which was greater than 28 0 cm. A report published by NNMB (1991) has revealed that the MUAC of adult women in Kerala ranged from 24 0 to 27 4 cm. Thus, the MUAC of 72 50 per cent women coir workers were below when compared to the State level. Ghassemi (1990) has also reported low arm circumferences among women from Sub-Saharan Africa and South Asia, which was below 22 5 cm among 13 00 per cent of Sub-Saharan African women and 54 00 per cent of South Asian women.

Chesher (1979) has found a positive relationship between work output and arm circumference. Hence in the present study it can be assumed that the work capacity of the respondents would be affected negatively due to lowered arm circumference.

4 7 6 Triceps skinfold (TSF) thickness

The triceps skinfold thickness was recorded for all the 200 respondents and details are presented in Appendix XV. This measurement helps to assess the amount of subcutaneous fat which in turn gives an indication of the calorie reserves in the body of an individual as stated by Malina et al (1974)

The distribution of respondents with respect to their skinfold thickness is presented in Table 65

Table 65 Distribution of respondents with respect to their triceps skinfold thickness

Skinfold thickness (mm)	Distribution of respondents	
	No	Per cent
≤ 6	31	15 50
7 - 10	103	51 50
11 - 14	66	33 00
Total	200	100 00

(N = 200 respondents)

Data presented in Table 65 reveals that the triceps skinfold thickness ranged from 7 0 to 10 0 mm for 51 50 per cent of the respondents. For 33 00 per cent of the respondents it ranged from 11 0 to 14 0 mm and for the rest of the 15 50 per cent of the respondents it was below or equal to the value of 6 0 mm. The average skinfold thickness for the 200 respondents was

9.26 mm This above result reveals a poor status of coir workers when compared to the rest of the state where the mean fat fold at triceps ranged from 13.3 to 14.6 mm for adult women (NNMB, 1991)

Similar trends were observed by other researchers too. Jyothi (1993) reported that 59.00 per cent of the stone breakers of Thiruvananthapuram district had a skinfold thickness ranging from 6.0 to 10.5 mm. From the study conducted by Flores (1984) among agricultural labourers it was observed that their work capacity was significantly affected by fat free mass. Hence in the case of the coir workers we can assume that their low skinfold thickness could affect their work capacity negatively.

In the present study correlation analysis of the above anthropometric indices revealed a significant positive association between skinfold and haemoglobin ($r = 0.4067^{**}$). This is similar to the results obtained by Micozzi *et al* (1989). A significant positive association was also found between skinfold thickness and nutritional status ($r = 0.8818^{**}$).

In order to find out the interactions between various anthropometric parameters mainly height, weight, WHR, MUAC and TSF thickness, correlation analysis was carried out.

Results indicated a highly positive and significant correlation between height and weight ($r = 0.6017^{**}$), MUAC ($r = 0.5971^{**}$) and skinfold thickness ($r = 0.7185^{**}$).



Weight of the coir workers showed a highly positive and significant correlation with MUAC ($r = 0.7209^{**}$), skinfold thickness ($r = 0.7182^{**}$) and WHR ($r = 0.3735^{**}$)

In the present study a highly positive and significant correlation was found between MUAC and WHR ($r = 0.8458^{**}$)

Thus we may assume that the commonly accepted anthropometric indicators of nutritional status such as height, weight, MUAC and TSF thickness may be influenced by both food intake as well as non-nutritional health factors such as disease and parasitism. The lowered anthropometric measurements observed among the coir workers could affect their work output negatively. According to Satyanarayana (1988) nutritional and health situations (governed by social, economic and political factors) which lead to lower adult nutritional anthropology may be associated with reduced work output.

In conclusion, based on the anthropometric measurements, the nutritional status of majority of coir workers presents a grim picture and efforts need to be initiated to elevate their nutritional status through a multi-channelled approach.

4.8 Clinical examination to assess nutritional deficiency symptoms

A clinical examination was conducted on the 200 respondents, by a medical practitioner since Park and Park (1991)

observed that the ultimate objective of a clinical examination is to assess levels of health of individuals in relation to the food they consume

The nutritional status of the respondents were assessed through clinical examination of the respondents with the help of schedule IV given in Appendix VI. The results presented in Table 66 reveals the distribution of respondents with respect to the presence of nutritional deficiency symptoms

Table 66 Nutritional deficiency symptoms observed among the respondents

Deficiency symptom	Details of respondents	
	No	Per cent
Moon face	0	0
Parotid enlargement	3	1 5
Oedema	3	1 5
Pellagra	0	0
Pigmentation at knuckles/fingers/toes	5	2 5
Crazy pavement dermatitis	0	0
Phrynoderma	6	3 0
Koilonychia	1	0 5
Spongy bleeding gums	15	7 5
Emaciation	2	1 0
Marasmus	0	0
Conjunctival xerosis	0	0
Bitots spot	0	0
Corneal xerosis	0	0
Night blindness	3	1 5
Photophobia	0	0
Angular stomatitis	15	7 5
Glossitis	8	4 0
Cheilosis	5	2 5
Epiphyseal enlargement	0	0
Mottled enamel	18	9 0
Thyroid enlargement	4	2 0
Anemia	17	8 5
Dental caries	60	30 0
Flurosis	0	0
No health problems	35	17 5

(N = 200 respondents)

Data presented in Table 66 reveals that among the 200 respondents, 35 (17.50 per cent) were clinically asymptomatic with respect to nutrition related deficiency symptoms

It was found that 30.00 per cent of the women were found to be affected by dental caries and 9.00 per cent had mottled enamel. Anaemia was observed in 8.50 per cent of the respondents. Both spongy bleeding gums and angular stomatitis were observed in 7.50 per cent of the respondents. Glossitis was observed in 4.00 per cent of the respondents. Phrynoderma was noticed in 3.00 per cent of the respondents. Cheilosis and pigmentation of knuckles and fingers and toes were found in 2.50 per cent of the respondents. Two per cent of the respondents showed symptoms of thyroid enlargement. It was observed that 1.50 per cent of the respondents who underwent the clinical examination were suffering from parotid enlargement, oedema and night blindness. Emaciation was observed in 1.00 per cent of the respondents who were surveyed.

The findings of the present study indicate that only few of the women showed deficiency symptoms related to nutrition, in spite of their poor dietary intake and food habits. This can be explained on the basis of the drawbacks of clinical signs. According to Park and Park (1991) many deficiencies are unaccompanied by physical signs and most physical signs lack a specific and subjective nature.

The results of the present study are similar to the NNMB (1984) report according to which the presence of deficiency symptoms are low in Kerala. However they have reported a high incidence of dental caries in Kerala. Then another problem of relevance here could be the presence of spongy bleeding gums. It could be due to decreased intake of vitamin C as their dietary intake of vitamin C rich foods as fresh fruits and green leafy vegetables were much below the desired levels. Their vitamin C intake met only 22.43 per cent of the RDA.

Thus from the results obtained, from the present study, among the coir workers it can be assumed that other than the 17.50 per cent women who were clinically asymptomatic, the rest of the respondents who suffered from mild or moderate forms of nutrition related deficiency symptoms may fall victims of lowered productivity. Devadas (1988) found that productivity of the labour force in the developing countries is generally low and this has been attributed to their poor physique resulting from chronic malnutrition.

4.9 Clinical examination to assess the occupational health status

WHO (1989) has described a term work related diseases to describe not only recognised occupational diseases but other disorders to which the work environment and performance of work

contribute significantly as one of the several causitive factors

A medical examination was carried out to assess the occupational health status of workers of this sector with the help of schedule V, given in Appendix VII, which is used by the Department of Factories and Boilers to assess the health status of industrial workers

With the view that these factors may directly or indirectly influence their health status, productivity, income and nutritional status all of which have a cascading effect in a sequential manner

4 9 1 General appearance

Details related to the distribution of respondents with respect to their general appearance is presented in Table 67

Table 67 Distribution of respondents with respect to their general appearance (body built, hair, nail and skin)

I) Details regarding Body Built	Distribution of respondents	
	No	Per cent
Well built	82	41 00
moderately built	87	43 50
Poorly built	31	15 50
Total	200	100 00

II) Details regarding Hair	Distribution of respondents	
	No	Per cent
Normal	139	69 50
Sparse	38	19 00
Discoloured	0	0
Easily plucked	23	11 50
Total	200	100 00

III) Details regarding Nail	Distribution of respondents	
	No.	Per cent
Normal nails	165	82 50
Brittle nails	34	17 00
Clubbing of nails	0	0
Koilonychia of nails	1	0 50
Total	200	100 00

IV) Details regarding skin	Distribution of respondents	
	No	Per cent
Normal Skin	106	53 00
Dry Skin	38	19 00
Lesions's present	56	28 00
Total	200	100 00

(N = 200 respondents)

Data presented in Table 67 reveals that 43.50 per cent of the respondents were found to be of moderate built with 15.50 per cent of the respondents being poorly built and 41.00 per cent belonging to the well built group

Details related to the respondents hair revealed that majority of the respondents (69.50 per cent) had normal hair with 19.00 per cent having sparse hair and 11.50 per cent of them having hair which was easily plucked. None of the respondents were observed to be having discoloured hair

Data revealed that 82.50 per cent of the women had normal nails and 17.00 per cent of them were observed to have brittle nails. None of them had clubbing of nails and only one of the woman had koilonychia of nails

During the clinical examination it was observed that 53.00 per cent of the women had normal skin, while 19.00 per cent of the respondents had dry skin. Twenty eight per cent of the coir workers had skin lesions

From the above data we may interpret the prevalence of poor dietary intakes among the women coir workers. Women with sparse and easily pluckable hair could be suffering from protein deficiency. Presence of brittle nails, koilonychia and dry skin could be due to poor intake of the various essential nutrients specially iron and calcium. Presence of skin lesions may be the result of their work environment which leaves much to be desired

4 9 2 Systemic examination

The distribution of respondents with respect to their occupational health status are presented in Table 68

Table 68 Distribution of respondents with respect to clinical examination for the assessment of occupational health status of workers

Clinical examination	Distribution of respondents	
	No	Per cent
1) Cardio vascular system (C V S) - Mytral valve prolapse	1	0 50
2) Respiratory system (R S) - Bronchial asthma	2	1 00
- Allergy bronchitis	3	1 50
3) Gastro - Intestinal System (G I S) - Incisional hernia	1	0 50
4) Musculo-Skeletal System	-	-
5) Genito - Urinary System - Uterine prolapse	2	1 00
6) ENT - Chronic sinusitis	5	2 50
- Chronic suppurative otitis Media (C S O M) (Ear discharge)	4	2 00
- Vascular headache	4	2 00
- Atrophic rhinitis (atrophy of nasal mucosa)	1	0 50
- Chronic tonsillitis	4	2 00
7) Vision comments - Dimness of vision	35	17 50
8) Blood Pressure - Above normal (greater than 100/60 to 140/90)	5	2 50

(N = 200 respondents)

Data presented in Table 68 reveal that 1 00 per cent and 1 50 per cent of the women were suffering from bronchial asthma and allergy bronchitis when their respiratory system was checked for abnormalities. Out of the 200 respondents 1 (0 50 per cent) was found to be suffering from incisional hernia when their gastro-intestinal system was examined. However the incidence of such disorders were found to be low among coir workers though they were poor. According to Kannan et al (1991) prevalence of respiratory tract infectious and gastro intestinal disorders among rural people could be attributed to the poor nutritional status environmental sanitation and personal hygiene. Kannan et al (1991) have also reported that in Kerala the incidence of asthma was high in adults. In the present study no significant gastro-intestinal disorders were found amongst the workers and the one (0 50 per cent) case reported could not be correlated with the occupational factors. None of the 200 respondents were found to be suffering from abnormalities of the musculo-skeletal system. One per cent of the women were found to suffer from uterine prolapse which was an abnormality of the genito-urinary system. However ENT problems such as chronic sinusitis, chronic suppurative otitis media, vascular headache, atrophic rhinitis and chronic tonsillitis were observed among the respondents. It was found that 35 (17 50 per cent) of the respondents suffered from dimness of vision. The dimness of vision could be due to vitamin A deficiency since their diets

were low in vitamin A rich foods. It was found that 97.50 per cent of the respondents had the normal blood pressure of a healthy adult with 2.50 per cent of the respondents having above normal blood pressure values.

The findings of the present study are suggestive of no specific influence of occupational factors in the causation of abnormalities and the causes of the diseases most likely appears to be non-occupational on the basis of expert opinion.

4.9.3 Medical history

Details related to the medical history of the respondents was collected and according to Mason and Swash (1980) the aim behind such information is to get from the respondents an accurate account of their complaint and to see this against the background of their life as a whole. Table 69 reveals the distribution of respondents with respect to their medical history.

Table 69 Distribution of respondents with respect to their medical history

Disease	Distribution of respondents	
	No	Per cent
Heart disease	4	2 00
Blood pressure	5	2 50
Diabetes mellitus	10	5 00
Tuberculosis	21	10 50
Jaundice	35	17 50
Gall stone	0	0
Arthritis	114	57 00
Thyroid enlargement	4	2 00
Kidney diseases	3	1 50
Skin diseases	56	28 00
Malaria	2	1 00
Epilepsy	1	0 50

(N = 200 respondents)

Data presented in Table 69 reveals that 57 00 per cent of the respondents reported a history of arthritis. Similarly 28 00 per cent of the respondents had suffered from skin diseases. This could be related to their work since Gangrade and Joseph (1983) reported that the coir workers suffered from neurological disorders, arthritis and skin diseases. According to Park and Park (1991) working for long hours in unphysiological

postures is the cause of backaches and diseases of joints and muscles. Jayasree (1994) has also opined that the presence of arthritis and skin diseases could be related to their nature of work. In the present study a history of tuberculosis was reported by 10.50 per cent of the women. According to Ramankutty *et al* (1991) there are 3.7 lakh cases of tuberculosis in the State of which about 93,000 are thought to be 'open' or sputum positive. According to Park and Park (1991) tuberculosis is a social disease and the social factors include poor quality of life, poor housing, over crowding, undernutrition, large family and early marriage. And all the above factors are part and parcel of the life style of the coir workers. Five per cent of the respondents reported to be suffering from a history of diabetes mellitus. According to Jervell (1995) diabetes, in addition to being a disease in itself, is also a risk factor for coronary heart diseases. He is also of the opinion that the aetiology of diabetes mellitus that poor women were suffering from could be related to severe undernutrition throughout childhood and adolescence. The respondents with an history of high blood pressure could be labelled as 'essential hypertension' as no definite cause could be found. This has been suggested by Mason and Swash (1980). About 1.00 per cent of the respondents reported a previous attack of malarial and according to Park and Park (1991) housing plays an important role in the epidemiology of malaria. The ill-ventilated and ill-lighted houses provide

ideal indoor resting places for mosquitoes. None of the respondents had a medical history related to gall stones. This may be explained by the fact that the diet of the coir workers was low in fat and cholesterol, which were the main components of gall stones as reported by Swaminathan (1993).

4.9.4 Prevalence of Vices

In the present study the prevalence of certain vices, such as smoking of beedis and cigarettes, chewing of tobacco and consumption of drugs, were examined. According to Ramankutty et al (1991) information on these aspects should be deemed as important from two aspects. First, by themselves they offer a picture on these habits which have been proved to be contributory causes to a number of chronic and fatal diseases, such as lung cancer, heart disease and cirrhosis of the liver, second, consumption habits of these items could be correlated to prevalence of acute and/or chronic illnesses among the respondents.

Information related to the above vices revealed that their prevalence was absent, except for the use of betelnut for chewing, among the women coir workers. During the survey it was observed that chewing betelnut was found to be increasing as the age advanced with the maximum proportion of users being in the oldest age groups. In the present study we can assume that the

low prevalence of the above vices among the women coil workers could indicate a better health status since Gamsky et al (1992) observed a higher prevalence of chronic cough, chronic phlegm and persistent wheezing among smokers. Similarly Teufel (1994) reported that women drinkers frequently skipped meals and these women had the tendency to fast while drinking which could increase their risk of liver diseases.

4.9.5 Family planning

According to Park and Park (1991) family planning is a decisive factor determining the quality of life and it has vital implications on nutritional status. Absence of family planning leads to the presence of more mouths to feed from finite resources. This is especially true in the case of the coil workers, majority of whom lead a hand-to-mouth existence. So, details related to the various methods adopted for family planning were collected and data indicate that out of 147 women, 66 (44.89 per cent) women had undergone tubectomy which is a permanent method of family planning. Temporary methods of planning were followed by 79 (53.74 per cent) of the respondents. Under the temporary methods of planning, Copper T was being used by 25 (31.65 per cent) women. Contraceptives were being used by around 54 (68.35 per cent) women. It was also observed that two (1.36 per cent) of the women were not using any family planning methods.

Details related to the family planning techniques adopted by the women revealed a positive trend and according to Park and Park (1991) this positive trend could be attributed to the higher levels of education in Kerala. Most studies illustrate the significance of family planning as a method that extends the birth intervals. According to Mason and Lofti (1992) spacing reproductive events is necessary for maternal recovery. This is especially true in the developing countries where a substantial proportion of women are lactating and pregnant at the same time and this situation is likely to increase the stress on women's health and nutrition. Thus, the women coir workers are in a better situation since large number of women in the reproductive age had adopted family planning techniques.

The results of the present study is similar to the findings of Haridasan (1991) who reported that 73.00 per cent of women workers in rubber plantations have been practising family planning.

4.9.6 Temperament at work site

According to Gale (1993) behavioural changes are now recognised as earliest manifestations of underlined diseases and so details related to the temperament at work site was collected and data reveal that 55.00 per cent of the workers were calm at the worksite with 25.00 per cent of them being irritable. It was reported that 20.00 per cent of the workers were nervous at the

worksite The remaining 20 00 per cent of women possessed a serious or sober temperament at the work site

From the above data it is clear that except for the 55 00 per cent workers, who were reportedly calm at the worksite, the remaining workers exhibited negative temperaments This trend could be related to job dissatisfaction coupled with family problems. Table 70 reveals the distribution of respondents in relation to their response to the factors affecting job satisfaction

Table 70 Job satisfaction

Factors affecting job satisfaction	Distribution of Respondents according to response			
	Yes		No	
	No	Per cent	No	Per cent
Supervisors	78	89 00	22	11 00
Interpersonal relation	150	75 00	50	25 00
Area of work	30	15 00	170	85 00
Work load	0	0	200	100 00
Safety measures	0	0	200	100.00
Safety equipment	0	0	200	100 00
Incentives	0	0	200	100 00

(N = 200 respondents)

When asked about the various factors affecting job satisfaction 36 00 per cent of the women complained of

dissatisfaction in their job attributed to poor interpersonal relationship with co-workers and/or supervisors. Poor conditions (water logging and lack of work sheds) of the working area affected 170 (85.00 per cent) of the respondents in a negative way with regard to job satisfaction.

All respondents reported that workload, lack of safety measures, lack of safety equipments and absence of incentives as factors that led to job dissatisfaction.

Thus the reasons for the negative temperaments, exhibited by majority of the workers, ranged from misunderstandings with supervisors to absence of incentives. In a similar study, Rajagopal (1993) listed out the various problems faced by the coir workers of Andhra Pradesh as low wage rates, lack of training for production and quality improvement, lack of individual credit facilities, absence of electrification and sanitation facilities, common place for work and finally lack of infrastructure facilities. Such factors if taken care of would induce better satisfaction which may facilitate enhanced productivity because Verma et al (1988) have opined that job satisfaction is important for one's psychological well being and for high productivity.

4.9.7 Work hazards

Since the workers were not provided with safety measures and machinery with respect to their work, they were

exposed to a number of work hazards. Among the various work hazards, all the 200 respondents who were surveyed, cited problems related to flying particles, exposure to heat and sunlight as major ones. Noise was felt as a work hazard by 93.00 per cent of the workers while 14.70 (14.70 per cent) of the workers thought otherwise. In the present study noise was mainly generated by the ratts used for spinning. According to Lindstrom and Mantysalo (1987) exposure to continuous, steady noise in monotonous types of work can cause the workers mental stress to the point that they become fatigued and have sleeping difficulties. Workers exposed to noise were also reported to show symptoms of neuroticism and anxiety. This could perhaps be one of the reasons for certain workers exhibiting an irritable and nervous temperament at the work site. It has been observed by Brisson et al (1992) that the garment workers in Quebec, who belonged to the unorganised sector had higher levels of symptoms of anxiety and depression when compared to workers in the organised sector.

According to Park and Park (1991) the physical factors in the working area which may be adverse to health are heat, light, noise and vibrations. They also reported that these factors act in different way on the health and efficiency of the workers. According to Candeias (1994) the physical risks that the workers are exposed to at their workplace include the important elements of the environment such as the temperature,

humidity and rainfall. Keeping the above point in mind, the average temperature, humidity and rainfall of the area under study was recorded.

Data related to the temperature, humidity and rainfall of the area for the year 1994-95 is presented in Table 71.

Table 71 Distribution of mean temperature, relative humidity (RH) and rainfall for the year 1994-95

Month (1994-1995)	Mean temperature (°C)		Mean RH (%)	Mean Rainfall (mm)
	Maximum	Minimum		
March	32.0	23.1	86	0.58
April	31.8	24.5	85	3.72
May	32.1	25.4	85	6.47
June	30.0	24.4	90	7.56
July	29.6	23.4	89	7.72
August	29.3	23.5	89	8.52
September	30.1	24.0	87	10.51
October	29.7	23.4	90	2.29
November	30.2	23.3	91	3.46
December	31.2	22.1	91	0.29
January	31.3	25.4	85	0.27
February	30.1	24.4	89	-
Yearly mean	31.0	24.0	91	4.28

Data presented in Table 71 reveals that the year March 1994 - February 1995 recorded a mean maximum temperature of 31.0°C and a mean minimum temperature of 24.0°C. The mean Relative Humidity (%) which is high considering the fact that a relative humidity (RH) of 100% is taken as complete saturation. From the table it is clear that the months of August and September recorded the maximum rainfall which was 852 mm and 1051 mm, respectively.

In the present study we may assume that the recorded temperature for the year 1994-95 could have played a negative effect on the working capacity of the respondents. According to Park and Park (1991) heat exhaustion and heat cramps are commonly seen in persons doing muscular work in high temperature. The cause of the above disorders is loss of sodium and chlorides in the blood. According to Lindstrom and Mantysalo (1987) under heat stress, the circulation of blood in the body is directed towards the skin and the amount circulated to the muscles decreases which results in fatigue and a decrease in their working capacity.

The area under study where the respondents were employed recorded a mean relative humidity (RH) of 91%. The high relative humidity could be considered as a main physical risk for the workers. According to Park and Park (1991) there is no evidence that humidity has an effect on physical health although

it has an effect on comfort. If the relative humidity exceeds 65%, the individual feels sticky and uncomfortable. This in turn could lead to reduced working capacity.

The months of August and September recorded the maximum rainfall and during these months the workers were left unemployed. This period of unemployment directly affected their purchasing power with respect to food, hence bringing down their health and nutritional status.

Thus from the above information related to temperature, humidity and rainfall, we may assume that the environmental elements also play a negative role with respect to the coir workers' overall health, nutritional status and work output.

4.9.8 Psycho-social factors affecting the women

Details related to the psycho-social factors affecting the women, engaged in the spinning of coir, which could indirectly affect their working efficiency were collected and Table 72 reveals the same.

Table 72 Distribution of respondents with respect to the psycho-social factors affecting them

Psycho-social factor	Distribution of respondents		Rank
	No	Per cent	
Financial problem/low pay	200	100 00	1
Domestic unhappiness	196	98 00	2
Worry/tension/anxiety	193	96 50	3
Over work	191	95 50	4
Accomodation (over crowding)	159	79 50	5
Abnormal family members	4	2 00	6

(N = 200 respondents)

Data presented in Table 72 reveals that financial problems associated with low pay, domestic unhappiness, over work, inconveniences related to accomodation due to over crowding were the major problems faced by more than 90 00 per cent of the respondents in the order of concern. Mentally retarded or handicapped family members were a cause of concern for 2 00 per cent of the respondents.

4.10 Biochemical estimation

As another reliable method to assess the nutritional status, the haemoglobin levels of the respondents were measured since Park and Park (1991) stated that it was an useful index of the overall state of nutrition irrespective of its significance.

in anaemia The details are presented in Appendix XV The above data revealed that the Hb levels of the 200 respondents ranged between 6.16 to 15.88 gms/100 ml

Data presented in Table 73 reveals the distribution of the respondents with respect to their haemoglobin

Table 73 Distribution of respondents with respect to their haemoglobin levels

Haemoglobin levels (gms/100 ml)*	Distribution of respondents	
	No	Per cent
11.00 (Normal)	74	37.00
Below normal	126	63.00
Total	200	100.00

(N = 200 respondents)

* Source Swaminathan (1993)

As is evident from Table 73, 63.00 per cent of the respondents had haemoglobin levels below the normal suggested levels and 37.00 per cent of the respondents had haemoglobin levels in the normal range which was from 11.00 gms/100 ml as suggested by Swaminathan (1993) The average haemoglobin levels of 200 respondents was 11.48 gms/100 ml

The picture thus obtained is in tune with the studies done by previous workers Jyothi (1993) observed that 82.00 per cent of the stone breakers had haemoglobin levels that ranged from 7.5 to 11.9 gms/100 ml, which were below the normal

suggested levels. Sujatha (1990) in her study also reported the same view. Rammohan and Devaki (1988) observed that the average haemoglobin level of women suffering from mild to moderate iron deficiency was 8-10 gms/100 ml.

Though only 10.00 per cent were found to be anaemic through clinical examination done earlier, haemoglobin estimation has proved that 63.00 per cent of the coir workers are anaemic since their haemoglobin levels were below the standard levels.

According to Garcia and Mason (1992) there are multiple causes of anaemia and they include iron deficiency, malaria, intestinal parasites, other nutrient deficiencies such as folate and vitamin B₁₂, and genetically determined haemoglobinopathies such as Thalassaemia. Another reason for the prevalence of low haemoglobin levels among the women could be the fact that iron supplies from animal sources are extremely low and cereals and roots and tubers account for a large proportion of iron in the diet of the low income groups. The above fact has also been supported by Senauer and Garcia (1991).

Anaemia is liable to affect their productivity since Purushothaman (1989) observed that non-anaemic women performed better and their work output was higher when compared to the anaemic women. Viteri (1994) found a relationship between anaemia and working capacity in both men and women. Reddy (1983) reported that moderate reductions in the haemoglobin levels can

reduce the work efficiency and lower the resistance to infections Ohira et al (1979) indicated that elevation of haemoglobin by iron treatment resulted in an increase in work capacity Seshadri (1988) also demonstrated that anaemic children had a lower work tolerance than children with normal haemoglobin levels Devadas (1988) also clearly indicated the need for iron supplementation to improve work capacity

Correlation between haemoglobin levels and anthropometric measurements revealed a highly positive and significant correlation between skinfold thickness and haemoglobin ($r = 0.5365^{**}$) Haemoglobin levels were also correlated with energy expenditure ($r = 0.6220^{**}$)

Hence measures need to be taken to combat anaemia through supplementation and fortification along with measures to prevent infection and infestation

4.11 Evaluation of Nutritional Status of Microsample (40 respondents)

As presented in Chapter 3, namely, Materials and Methods, of the study the evaluation of nutritional status was conducted in two levels - on a macrosample of 200 coir workers and on a microsample of 40 women coir workers

The results and discussions of the investigations carried out on the microsample are presented in the following

pages The investigations on the microsample include evaluation of anthropometric measurements, estimation of actual food intake and nutrient intake, evaluation of clinical profile, identification of hookworm infestation, work done per unit time, energy expenditure pattern and estimation of haemoglobin, pulse rate and blood pressure in relation to work done

4.11.1 Anthropometric measurements

The anthropometric measurements of the microsample was evaluated separately to confirm its association to the poor nutritional status prevalent among the women coir workers Details presented in Table 74 reveals the same

Table 74 Details related to the anthropometric measurements of the microsample

S1 No	Age	Height (cm)	Deviat- ion from normal* (155 cm)	Weight (kg)	Deviation from normal** (50 kg)	Body Mass index (BMI)	Deviation from normal*** (18.6)
1	30	154	-1	37	-13	15.60	-3.0
2	33	130	-25	37	-13	15.14	-3.46
3	40	154	-1	40	-10	21.89	+3.29
4	40	152	-3	39	-11	18.55	-0.05
5	39	153	-2	46	-4	15.64	-2.96
6	33	150	-5	38	-12	17.36	-1.24
7	33	151	-4	42	-8	16.86	-1.74
8	40	157	+2	45	-5	16.88	-1.72
9	40	152	-3	39	-11	16.44	-2.16
10	34	156	+1	38	-12	19.65	+1.05
11	37	136	-19	38	-12	16.88	-1.72
12	32	146	-9	37	-13	20.31	+1.71

Sl No	Age	Height (cm)	Deviation from normal* (155 cm)	Weight (kg)	Deviation from normal** (50 kg)	Body Mass index (BMI)	Deviation from normal*** (18.6)
13	33	148	-7	37	-13	14.07	-4.53
14	32	159	+4	48	-2	18.66	0
15	34	147	-8	33	-17	20.24	+1.64
16	36	153	-2	45	-5	18.42	-0.18
17	30	152	-3	43	-7	17.80	-0.8
18	26	147	-8	35	-15	18.61	-0.01
19	30	152	-3	35	-15	16.69	-2.91
20	28	154	-1	40	-10	15.58	-3.02
21	30	143	-12	36	-14	18.36	-0.24
22	32	147	-8	36	-14	15.80	-2.8
23	27	141	-14	34	-16	18.25	-0.35
24	29	145	-10	31	-19	17.70	-0.9
25	27	148	-7	32	-18	18.42	-0.18
26	30	145	-10	33	-17	16.88	-1.72
27	30	146	-9	30	-20	19.17	+0.57
28	33	153	-2	44	-6	15.61	-2.99
29	33	151	-4	39	-11	17.33	-1.27
30	30	145	-10	36	-14	19.28	+0.68
31	40	143	-12	32	-18	20.54	+1.94
32	38	155	0	46	-4	18.61	+0.01
33	27	153	-2	34	-16	17.35	-1.25
34	29	144	-11	32	-18	19.47	+0.87
35	28	147	-8	39	-11	19.14	+0.54
36	30	148	-7	30	-20	17.34	-1.26
37	27	145	-10	27	-23	15.14	-3.46
38	30	153	-2	30	-20	19.53	+0.93
39	30	151	-4	30	-20	16.89	-1.71
40	27	159	+4	27	-23	18.98	+0.38
Mean	32	149.1	1.6	37	-13	17.75	1.52

* Source ICMR (1994)

** Source ICMR (1994)

*** Source

Sl No	Age	Waist Hip ratio (WHR)	Deviation from normal* (0 7)	Mid-Upper arm circumference (MUAC)	Deviation from normal** (24 cm)	Triceps skin fold thickness (TSF)	Deviation from normal*** (13 mm)
1	30	0 82	+0 12	22	-2	8	-5
2	33	0 87	+0 17	21	-3	6	-7
3	40	0 80	+0 1	25	+1	10	-3
4	40	0 82	+0 12	23	-1	8	-5
5	39	0 78	+0 08	25	+1	12	-1
6	33	0 80	+0 1	24	0	9	-4
7	33	0 86	+0 16	24	0	11	-2
8	40	0 84	+0 14	24	0	12	-1
9	40	0 82	+0 12	23	-1	8	-5
10	34	0 85	+0 15	22	-2	8	-5
11	37	0 74	+0 04	22	-2	6	-7
12	32	0 80	+0 1	20	-4	6	-7
13	33	0 82	+0 12	23	-1	7	-6
14	32	0 87	+0 17	25	+1	12	-1
15	34	0 85	+0 15	23	-1	9	-4
16	36	0 84	+0 14	25	+1	12	-1
17	30	0 87	+0 17	25	+1	11	-2
18	26	0 82	+0 12	24	0	8	-5
19	30	0 80	+0 1	22	-2	9	-4
20	28	0 80	+0 1	25	+1	10	-3
21	30	0 84	+0 14	21	-3	6	-7
22	32	0 81	+0 11	23	-1	6	-7

Sl No	Age	Waist Hip ratio (WHR)	Deviation from normal* 0 7	Mid-Upper arm circumference (MUAC)	Deviation from normal** 24 cm	Triceps skin fold thickness (TSF)	Deviation from normal*** 13 mm
23	27	0 81	+0 11	22	-2	6	-7
24	29	0 78	+0 08	20	-4	5	-8
25	27	0 72	+0 02	23	-1	9	-4
26	30	0 73	+0 03	23	-1	10	-3
27	30	0 74	+0 04	22	-2	8	-5
28	33	0 87	+0 17	25	+1	11	-2
29	33	0 71	+0 01	24	0	10	-3
30	30	0 81	+0 11	22	-2	6	-7
31	40	0 80	+0 1	21	-3	6	-7
32	38	0 84	+0 14	26	+2	11	-2
33	27	0 72	+0 02	22	-2	9	-4
34	29	0 84	+0 14	23	-1	9	-4
35	28	0 75	+0 05	22	-2	9	-4
36	30	0 85	+0 15	20	-4	6	-7
37	27	0 85	+0 15	21	-3	7	-6
38	30	0 82	+0 12	22	-2	9	-4
39	30	0 71	+0 01	22	-2	8	-5
40	27	0 87	+0 17	25	+1	12	-1
Mean	32	0 80	+0 10	23	+2	7	-4

* Source

** Source NNMB (1991)

*** Source NNMB (1991)

Data presented in Table 74 gives the actual figures for the 40 respondents with respect to height, weight, waist-hip ratio, mid-upper arm circumference, and triceps skin fold thickness. Deviations from the standard and the mean values are also detailed in Table 74.

The age of the respondents ranged from 25-40 years with the mean age being 32 years.

The height measurements revealed that it ranged from 130 to 159 cm with a mean height of 149 cm.

The weight of the respondents revealed that there were respondents possessing weights as low as 27 kg and also those possessing up to 48 kg. The deviation table further revealed that the weight deviation from reference weight, among the 40 respondents ranged from 2 kg to 23 kg.

The BMI of the women reflected their poor height and weight measurements. The lowest BMI was 14.07 and the highest was 21.89. The mean BMI was 17.75 with a standard deviation of 1.52.

The Waist-Hip Ratio (WHR) of the respondents revealed that it ranged from 0.71 to 0.87 with the mean WHR being 0.80.

Data related to Mid Upper Arm Circumference (MUAC) shows that it ranged from 20 to 26 cm and the mean MUAC was 23 cm with the mean standard deviation being 2 cm.

The Tricep Skinfold Thickness (TSF) also revealed alarming results. It ranged from the lowest value of 5 mm to the highest of just 12 mm which is quite low when compared to the standard. The mean TSF was 7 mm with the standard deviation being 4 mm.

Thus the existence of stunting and wasting can be confirmed among the women coir workers.

With respect to BMI, the 40 respondents of the microsample were found to be suffering from mild energy deficiency (Grade I). The mean WHR of the respondents was 0.80 with a mean standard deviation of 0.10. This is indicative of the presence of femoral gluteal obesity among the 40 respondents.

Measurements related to the MUAC and TSF thickness of the respondents also revealed a negative picture when compared to the standard values, indicating overall poor physical stature.

Thus the above estimations of the 40 respondents confirm the previous conclusion that the nutritional status of the women coir workers were poor based on anthropometric measurements revealing inherent stunting and wasting.

This stunting and wasting could be due to an imbalance between energy intake and energy output. According to Nair and Poehlman (1991) energy balance is determined by energy intake and

energy expenditure Durnin (1990) also stated that satisfactory energy balance is not attainable if the energy intake is low

4.11.2 Energy intake and expenditure pattern

Data related to energy intake was calculated from their food intake (weighment survey) Their energy expenditure was calculated using prediction equation based on their work schedule with relevance to age and weight as suggested by ICMR (1994)

From the above data energy balance was assessed by comparing the energy intake and expenditure and RDA

The above details calculated for all the 40 respondents along with their age and body weight are presented in Table 75

Table 75 Energy consumption and expenditure pattern of the women (40 respondents)

Sl No	Age (years)	Weight (kg)	RDA (kcal)	Energy consumed	Energy difference from RDA (kcal)	Energy expenditure (kcal)	Body stored energy utilized (kcal)
1	30	37	2225	1695	-530(-23 82)	2515	820(48 37)
2	33	37		1632	-593(-26 65)	2648	836(51 22)
3	40	40		1940	-285(-12 80)	2633	693(35 72)
4	40	39		1662	-563(-25 30)	2587	925(55 65)
5	39	46		1711	-514(-23 10)	2590	879(51 37)
6	33	38		1683	-542(-24 35)	2566	883(52 46)
7	33	42		1625	-600(-26 96)	2602	977(60 12)
8	40	45		1529	-696(-31 28)	2600	1071(70 04)
9	40	39		1550	-675(-30 33)	2514	964(62 19)
10	34	38		1719	-506(-22 74)	2597	878(51 07)
11	37	38		1678	-547(-24 58)	2455	777(46 30)
12	32	37		1681	-544(-24 44)	2490	809(48 12)
13	33	37		1498	-727(-32 67)	2470	972(64 88)
14	32	48		1606	-619(-27 82)	2645	1039(64 69)
15	34	33		1720	-505(-22 69)	2603	883(51 33)
16	36	45		1741	-484(-21 75)	2624	883(50 71)
17	30	43		1666	-559(-25 12)	2618	952(57 14)
18	26	35		1468	-757(-25 12)	2567	1099(74 86)
19	30	35		1765	-460(-34 02)	2562	797(45 15)
20	28	40		1763	-462(-20 67)	2528	765(43 39)

Sl No	Age (years)	Weight (kg)	RDA (kcal)	Energy consumed	Energy difference from RDA (kcal)	Energy expenditure (kcal)	Body stored energy utilized(kcal)
21	30	36		1688	-537(-20 76)	2475	787(46 62)
22	32	36		1637	-588(-26 42)	2463	826(50 45)
23	27	34		1753	-472(-21 21)	2478	725(41 35)
24	29	31		1546	-679(-30 51)	2474	928(60 02)
25	27	32		1736	-489(-21 97)	2588	852(49 07)
26	30	33		1660	-565(-25 39)	2601	941(56 68)
27	30	30		1663	-562(-25 25)	2580	917(55 14)
28	33	44		1600	-625(-28 08)	2594	994(62 12)
29	33	39		1635	-590(-26 51)	2602	967(59 14)
30	30	36		1779	-446(-20 04)	2484	705(39 62)
31	40	32		1721	-504(-22 65)	2479	758(44 04)
32	38	46		1595	-630(-28 31)	2606	1011(63 38)
33	27	34		1559	-666(-29 93)	2537	978(62 73)
34	29	32		1586	-639(-28 71)	2599	1013(63 87)
35	28	39		1667	-558(-25 07)	2563	896(53 74)
36	30	30		1682	-543(-24 40)	2476	794(47 20)
37	27	27		1715	-510(-22 92)	2465	750(43 73)
38	30	30		1621	-604(-27 14)	2468	847(52 25)
39	30	30		1543	-682(-30 65)	2526	983(63 70)
40	27	27		1579	-646(-29 03)	2677	1098(69 53)
Mean	32	37		1657	-569(-25 77)	2553	892(54 22)

Numbers in parenthesis indicate percentage

The data presented in Table 75 reveals that the energy consumed varied from 1468 to 1940 k cal with a mean value of 1657 kcal, which is much below the RDA of 2225 kcal as suggested by ICMR (1994) for an adult moderate worker. Their energy expenditure included all their responsibilities within the household as well as within the work site. Their energy expenditure ranged between 2455 to 2677 k cal with a mean of 2553 kcal.

This clearly indicates that there is a energy gap. This gap may be expressed in two ways. The table indicates that the energy intake was deficient by 12.80 to 34.02 per cent (mean of 25.77 per cent) accounting to a difference of 285 to 757 kcal (mean of 569 kcal) when compared to the calorie intake recommended by ICMR for a normal adult woman (non-pregnant, non-lactating) doing moderate activity.

It is astounding to find that the calorie deficit bounces to leaping heights when compared to the actual energy expended by the women in carrying out her household as well as coir related activities, when compared to the poor diet consumed by them. This comparison reveals that while the expenditure was between 2455 to 2677 (mean 2533 kcal) the energy consumed through food accounts for a sum between 1468 to 1940 kcal (mean 1657 kcal). The difference between the two varies from 693 to 1099 k cal (mean 982 kcal). This leads to a deficit of 35.72 to 74.86 per cent (mean 54.22 per cent) in terms of kcal.

This leads to the fact that this extra energy that the coir worker expends, over and above her intake (through her food) has to come from her body reserves. This in turn results in wasting, which is indicated by their poor body weight which ranged from 27 to 48 kg (with a mean of 37 kg). Thus their body weight is 2 to 23 kg lower when compared to the standard weight of an adult woman weighing 50 kg.

When the energy intake of the coir workers were compared with the average intake of energy among slum dwellers of Trivandrum it was even lower than that of the slum dwellers (2249 k cal). The coir workers mean intake was just 569 kcal.

The coir workers average intake of energy was found to be lower when compared to the diets consumed by those living in other states such as Karnataka, Andhra Pradesh, Maharashtra and Madhya Pradesh. Though Tamil Nadu ranked lowest, their energy intake of 1830 kcal was above the quantity consumed by the coir workers of Trivandrum (NNMB, 1991).

Similar trends were observed among women from other occupations in the unorganised sector. A study conducted by Rajammal (1975) among women doing manual work in building construction revealed that their food and energy intake was found to be below the allowances recommended by ICMR.

The negative energy balance and the consequent low body weight observed among the coir workers could be attributed to an interplay of several factors. Primarily it could be due to low food intake in terms of quantity. Secondly it could be due to their heavy work load of hours in a day both outside and within the household. Lack of leisure, domestic problems leading to psychological stress and incidence of infection and infestation might also have led to drainage of energy reserves with consequent lowering of body weight.

In the present study a significant positive correlation was found between energy intake and weight of the respondents ($r = 0.4178^{**}$) and also with skinfold thickness ($r = 0.3396^{**}$).

Apart from lowered food intake which has been earmarked as a reason for low energy intake, energy deficit could also arise from consumption of food of low calorie density. The foods that may contribute energy are primarily those which supply carbohydrates, fats and proteins. In order to analyse the cause of energy deficit and to find out the nutrient content of the diets consumed by the coir workers their actual food intake was measured. This in turn would help to assess their nutritional status also.

4.11.3 Actual food intake and nutrient intake

According to Ottesen et al (1989) nutritional status pertains to the condition of health of the individual, affected

by the intake of foods and the utilization of nutrients. The actual food intake of 40 women engaged in the coil industry was determined by food weighing method suggested by Swaminathan (1991) to assess the quantity, quality and nutrients present in their diet. The quantity of each food item was compared with the quantity specified in a balanced diet. The details are presented in Appendix XVI.

Data presented in Table 76 reveals the above information.

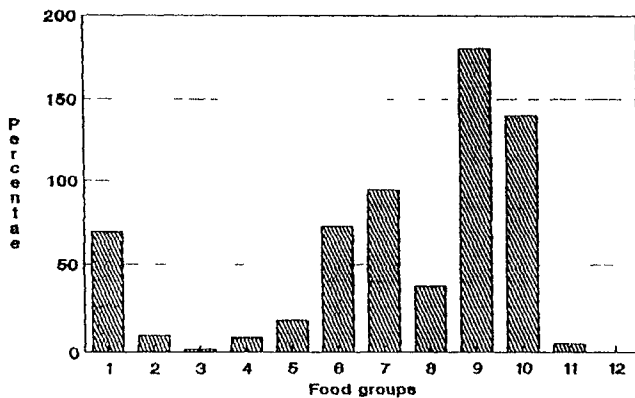
Table 76 Actual food intake of the respondents

Food groups	RDA* (gms)	Average quantity consumed (gms)	Percentage of RDA met
Cereals	440	306.65	69.69
Pulses	45	4.25	9.44
Green leafy vegetables	100	2.075	2.075
Other vegetables	40	3.375	8.44
Roots and tubers	50	9.125	18.25
Milk	150	109.625	73.08
Nuts and Oilseeds	30	28.45	94.83
Fats and Oils	25	9.375	37.5
Fish	30	54.12	180.40
Sugar and jaggery	20	28.175	140.87
Fruits	60	3.125	5.21
Egg	15	0	0

(N = 40 respondents)

*ICMR Advisory Committee (1981)-(Adult women doing moderate work)

**Food intake of respondents
as percentage of RDA**



Food intake

1. Cereals
2. Pulses
3. Green leafy vegetables
4. Other vegetables
5. Roots/tubers
6. Milk
7. Nuts/Oilseeds
8. Fats/Oils
9. Fish
10. Sugar/Jaggery
11. Fruits
12. Egg

Data presented in Table 76 revealed that the diet consumed by the women were not balanced. The intake of pulses, green leafy vegetable, other vegetables, roots and tuber and fruits was very poor and the consumption rate was below 20.00 per cent of the RDA. Intake of fish was very high and egg was absent in their daily diet. The intake of sugar was more than the recommended level for an adult women doing moderate activity. Similar facts have been reported by other workers as well. Kurian et al (1978) and Isaac (1990) observed that rice and tapioca featured frequently in the diets of the coir workers while there was absence of meat, eggs, fruits, milk and vegetables. Chadha et al (1995) reported higher intake of cereal, milk and milk products and sugar and lower intake of pulses, vegetables, fruits, flesh foods and oils and fats by the rural population. Gopalan and Kaur (1989) reported that the common feature of the diets of the low income groups is the low intake of protective foods like pulses, vegetables, fruits, milk, oils and fats and flesh food including fish. According to Srinivasan et al (1991) the consumption levels of cereals, vegetables, pulses, milk and milk products and oils were very low among occupational groups viz , agricultural labourers, artisans, etc. They also reported that the food group which was found to be met nearly the suggested RDA was cereals and the food group which met the RDA least was green leafy vegetables followed by milk, other vegetables and fruits. Ndaba and O' Keefe (1985) studied

is computed. The nutrients present in the diets consumed by the respondents was calculated using the Values of composition of foods given in the Nutritive Value of Indian Foods published by ICMR (1991). Details related to nutrient intake of the 40 respondents are presented in Appendix XVII.

The results are presented in Table 77 given below.

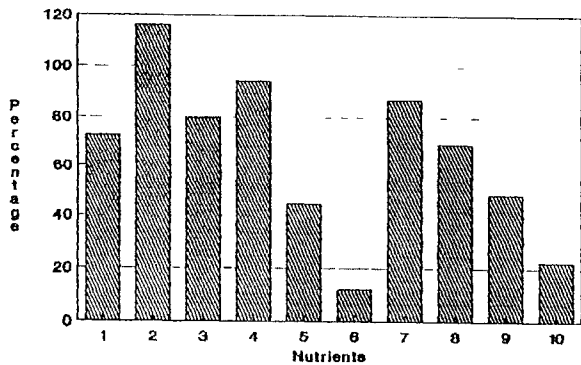
Table 77 Actual nutrient intake of the respondents

Nutrients	RDA	Mean nutrient intake	Percentage of RDA met from the diet
Energy (Kcal)	2225	1617.57	72.70
Protein (g)	50	58.08	116.17
Fat (g)	20	15.90	79.50
Calcium (ug)	400	376.88	94.22
Iron (mg)	30	13.41	44.71
Carotene (ug)	2400	291.21	12.13
Thiamine (mg)	1.1	0.958	87.11
Niacin (mg)	14	9.70	69.28
Riboflavin (mg)	1.3	0.630	48.50
Vitamin c (mg)	40	8.97	22.43

(N = 40 respondents)

Details presented in Table 77 reveal that the intake of calories was below the RDA by 28 per cent. However, it is interesting to note that the protein intake was notably higher.

**Nutrient intake of respondents
as percentage of RDA**



Nutrient intake

- 1 Energy
- 2 Protein
- 3 Fat
- 4 Calcium
- 5 Iron
- 6 Carotene
- 7 Thiamine
- 8 Niacin
- 9 Riboflavin
- 10 Vitamin C

than the prescribed RDA (16 per cent) This could be related to the fact that the consumption of fish was very high among the respondents Similar observations have been reported by NNMB (1994)

In the case of fat, it was observed that the coir workers were able to meet only 79.50 per cent of RDA since they consumed 16 gm against a RDA of 20 gm In this context it may be recollected that the visible fat intake was only 10 gms against the RDA of 25 (as given in Table 76) However when the whole dietary pattern was taken into consideration it was the oilseeds and nuts (mainly coconut) which would have helped to increase the fat intake on the whole, and it seems to be an invisible source It has also been reported by NNMB (1994) that in Trivandrum, the consumption of nuts and oilseeds, particularly coconuts was high

Data related to calcium intake of the respondents revealed that the coir workers were able to meet 94.22 per cent of RDA from their diets This could, perhaps, be due to the high consumption of fish The above result is similar to the report published by NNMB (1994) where it was revealed that the intake of calcium in Trivandrum was almost twice that of RDA

The intake of iron, carotene, riboflavin and vitamin C were poor, among the women coir workers It should be emphasised that vitamin A (retinol/carotene) is the most limiting nutrient found in the diets of these women This could perhaps be

attributed to the poor consumption of meat, egg, green leafy vegetables, other vegetables and fruits. It is of significance to note that though non-vegetarian by habit their dietary is predominated by fish with a consequent neglect of meat and egg which might have added to precipitate the above state of affairs.

The fact that only 44 per cent of the RDA for iron was met from the diet consumed by these coir workers would invariably lead them to suffer from iron deficiency anaemia which may affect their working efficiency.

Studies which were previously done on women from rural backgrounds also revealed similar findings. Nagi and Mann (1991) conducted a study on the nutrient intake of Punjabi women and they reported that their mean dietary iron intake was inadequate while that of protein, calcium and ascorbic acid were adequate. Murthy and Reddy (1994) reported that the dietary intake in non-pregnant, non-lactating women of an urban slum in Kurnool, Andhra Pradesh are about 30-00 per cent less than the ICMR recommended daily allowances. Srinivasan et al (1991) analysed the nutritional status of rural families in Tamil Nadu and they observed that the diet supplied sufficient amounts of calcium, iron, thiamine and niacin. Deficiencies were observed with respect to energy, protein, carotene, ascorbic acid and riboflavin. According to Garcia and Mason (1992) iron consumption behaves differently from other nutrients. It is more

income elastic owing to the fact that as income increases consumers will purchase more meat and fish. Studies done in Kerala presents a varied nature and is similar to the present study. Shah et al (1983) noted that the diets consisted of high quality protein foods or high amounts of protein which are consumed even by lower income groups. Bhatt and Dahia (1985) have indicated that majority of the Indian home diets are deficient in vitamin A. According to Chadha et al (1995) the average daily total calorie and protein intake was significantly higher in rural groups than the urban population and this could be due to increased intake of cereals. They also reported that the intake of total calories, iron, retinol, riboflavin and Vitamin C was less than RDA in rural population.

Studies conducted on women employed in other occupations under the unorganised sector also reveal a poor nutrient intake. Kurian et al (1978) found that the diet of the women engaged in the cashew industry was deficient in protein. Mitra (1983) reported that the diet of the brick-kiln workers were deficient in Vitamin A, C and energy. Sujatha (1990) revealed that the diets of women engaged in stone breaking were found to be deficient in retinol, iron, thiamine, riboflavin, niacin and vitamin C.

Thus from the results obtained in the present study we can assume that low nutrient intake was one of the reasons for the prevalence of the various nutrition related deficiency

symptoms among the respondents, the details of which were presented in Table 66

4.11.4 Evaluation of Clinical profile

Clinical evaluation of the respondents done earlier (Table 66) had revealed the presence of mild or moderate forms of nutritional deficiency symptoms associated with dental caries, bleeding gums and anaemia, in a minority. Detailed study on the food consumption pattern and nutrient intake done on microsample revealed that their diets were inadequate both quantitatively and qualitatively. In order to overcome ambiguity in the interpretation of results, microscopic examination of blood smears and estimation of haemoglobin were done on a microsample as suggested by Swaminathan (1990) who writes that for the proper interpretation of the results of clinical assessment it is necessary to determine the extent to which infection and infestation and other metabolic disorders have contributed to the incidence of malnutrition through microscopic examination of stool specimens and of blood smears for a suitable proportion of the sample.

Hence the blood samples collected from the microsample of 40 women were subjected to laboratory tests to identify the specific cellular constituents and their pattern of distribution. The details pertaining to RBC, PCV and DC are given in Appendix XVIII

The general picture of the micro samples with respect to the cellular constituents are presented in Table 78, 79 and 80

Table 78 Distribution of respondents with respect to Red blood cells (RBC)

(1) Red blood cell (million per cu mm)	Distribution of respondents	
	No	Per cent
4 2 - 5 4 (Normal)*	11	27 50
Below 4 2	29	72 50
Total	40	100 00

(N = 40 respondents)

* Source Mason and Swash (1980)

Data presented in Table 78 revealed that in the case of Red blood cells (RBC) count 27 50 per cent of the respondents had normal values which ranged from 4 2 to 5 4 million 72 50 per cent of the women belonged to the ranges where the RBC count was below 4 2 million

This result clearly indicates the prevalence of anaemia among 72 50 per cent of the subjects under focus because Bell et al (1965) reported that if the number of red blood cells is less than 4×10^{12} /litre the state is described as anaemic

Table 79 Distribution of respondents with respect to Packed cell volume (Haematocrit)

Packed Cell Volume (%)	Distribution of respondents	
	No	Per cent
38 - 42 (Normal)*	11	27 50
Below 38	29	72 50
Total	40	100 00

(N = 40 respondents)

* Source Swaminathan (1991)

According to Chatterjee (1987) the ratio of red blood corpuscles to plasma is expressed as the haematocrit values ICNNO (1963) in their Manual on Nutrition surveys as quoted by Swaminathan (1990) has suggested guidelines for interpretation of blood data Accordingly the haematocrit/(PCV) value expressed as a percentage below 30 is considered to be deficient, low when it is between 30 and 37, acceptable when it is between 38 and 42 for women who are non-pregnant and non-lactating Based on this 72 50 per cent of the coir workers from the microsample had values below accepted standards The result of the present study indicate a deficiency in the haemoglobin concentration of the red cells as explained by Penington *et al* (1984)

Table 80 Distribution of respondents with respect to their Differential count of Leucocytes (DC)

Differential count of Leucocytes (%)	Distribution of respondents	
	No	Per cent
(i) Neutrophil polymorphs		
Normal count (40 - 75%)*	34	85 00
Above normal count	6	15 00
Total	40	100 00
(ii) Lymphocytes		
Normal count (20 - 50%)*	33	82 50
Above normal count	7	17 50
Total	40	100 00
(iii) Eosinophils		
Normal count (1-6%)*	9	22 50
Above normal count	31	77 50
Total	40	100 00

(N = 40 respondents)

* Source Dacie and Lewis (1975)

According to Mason and Swash (1980) an abnormality in the number and/or distribution of white cells does not necessarily imply a white cell disorder as almost any illness may alter the total or differential white cell counts. In the present study, with respect to neutrophil polymorphs, about 85 00 per cent of the respondents had normal counts. It was observed that 15 00 per cent of the respondents had above normal counts.

The reasons for this could be various as suggested by Penington et al (1984) It could be due to infection, metabolic disturbances or serum sickness According to Mason and Swash (1980) abnormalities in white cell count may be due to vitamin B₁₂ or folic acid deficiency as well as inherited conditions

Data related to lymphocytes indicate 82 00 per cent of the respondents had normal counts It was found that 17 00 per cent of the respondents had above normal lymphocyte count and we may assume that the above 17 00 per cent of the respondents may be suffering from sub-clinical infections

It was observed that 77 50 per cent of the respondents had above normal counts of Eosinophils The above women could be suffering from infection, allergic disorders, parasitic infestations, skin diseases or pulmonary eosinophilia This has been reported by Penington et al (1984)

From the clinical examinations conducted on blood smears of 40 respondents it may be concluded that deficiency disorders superimposed by infection and allergic reactions are prevalent to a high degree and they in turn might influence the health and nutritional status of these women in a negative manner The presence of nutritional deficiency has been established from their dietary analysis presented earlier Allergic reactions have been reported in the medical history They are liable to suffer from infections as identified from the

working environment which is water logged and dirty. And the presence of infection through sub-clinical estimation is reflected in the fact that 15-77 per cent had abnormal counts of WBC with special reference to neutrophil polymorph, lymphocytes and eosinophils. Infestation by parasites might also alter blood profile. Hence the parasitic load was also estimated as a part of the clinical examination.

Stool samples collected from 40 respondents were tested for the presence of hookworm. Details are presented in Table 81.

Table 81 Distribution of respondents with respect to hookworm infestation

Details related to Hookworm infestation	Distribution of respondents	
	No	Per cent
Present	9	22.50
Absent	31	77.50
Total	40	100.00

(N = 40 respondents)

Though 77.50 per cent had no infestation, those who were found positive (22.50 per cent) could have succumbed to hookworm infestation due to poor sanitation and lack of personal hygiene. According to Tomkins and Watson (1989) intestinal parasites like hookworm may be associated with a reduction in food intake, malabsorption, endogenous nutrient loss and anaemia.

Poor food and nutrient intake as also prevalence of anaemia which was already observed among the coir workers could be related to the presence of hookworm infestation

As revealed earlier in Table 78 the iron intake of the coir workers in general was poor and this itself could be one of the reasons for the prevalence of hookworm infestation since Park and Park (1991) has reported that hookworm infestation does not occur in the healthy individual whose iron intake is adequate

Sanitary details related to the household and the worksite of the coir workers had revealed a negative picture. This above fact could play an important role in the prevalence of hookworm infestation among the coir workers. Park and Park (1991) has cited indiscriminate defecation and also walking barefoot as human habits which promote hookworm infestation. The above two habits were also observed among the coir workers.

It can be assumed that hookworm infestation could negatively affect the work capacity of these women. According to Evans and Stephenson (1995) hookworm infestation leads to fatigue and a decreased capacity for work in adults. They are also of the opinion that substantial socio-economic development is unlikely to be achieved if the prevalence of this condition is not reduced.

Since iron deficiency anaemia is well known to be associated with hookworm infestation, public health measures to

deal with hookworm should routinely include iron supplementation. Improvements in environmental sanitation are also essential for long term prevention of infection by intestinal parasites. Finally, programmes which include regular treatment of this vulnerable population with antihelmintics are advocated.

4.11.5 Biochemical Assessment

Nutritional status evaluation done on the macrosample of 200 women had given indications to the fact that the nutrient and food intakes of the coir workers were inadequate. The anthropometric and clinical evaluation had indicated only the prevalence of mild forms of mal-nutrition, in a limited number of women. These examinations were found to be inadequate to expose the magnitude of the nutritional problems. Hence, detailed clinical evaluation was conducted, which revealed the influence of probable sources of infections and infestation. In order to highlighten the influence of the food intake on the nutritional status, biochemical investigations were undertaken on the micro sample (40 women). Since variations in the intake of different nutrients present in the diet are reflected by changes in the concentration of the corresponding nutrients or metabolites influenced by the nutrients in blood, tissues and in urine. Hence, biochemical assessment can reveal sub-clinical states of deficiency due to lowered intake or absorption or impaired transport or abnormal utilisation of a nutrient as reported by Swaminathan (1990).

The most deficient nutrients of the diets consumed by the coir workers were found to be vitamin A, riboflavin, vitamin C and iron. From clinical evaluation, it was found that a considerable number of women had lower values for RBC and abnormal values with reference to WBC's. The status of the above nutrients of the body could be affected by an alteration in the number of the above cellular constituents and hence to identify associated deficiencies the haemoglobin levels of the micro sample were estimated as Swaminathan (1990) has opined that haemoglobin level of blood is a reliable index of the overall state of nutrition, in addition to its diagnostic importance in anaemia.

The haemoglobin values are presented in Appendix XV and the abstract is presented in Table 82 given below.

Table 82 Distribution of respondents with respect to their Hb levels

Haemoglobin (gms/100 ml)	Distribution of respondents	
	No	Per cent
11.00 g/100 ml (Normal)*	6	15.00
Below normal	34	85.00
Total	40	100.00

(N = 40 respondents)

*Source Swaminathan (1993)

From the data presented in Table 82, it is alarming to note that 85.00 per cent had haemoglobin values below the normal value of 11.00 g/100 ml, as suggested by Swaminathan (1993), confirming that they were anaemic.

Similar findings have been reported by other workers also. The Hb levels of mill workers, (Preet and Bhavana, 1988) and women from Trivandrum district engaged in Stone breaking, (Sujatha 1990) were found to be between 9.00 to 10.00 g/100 ml which was low when compared to the normal level recommended by WHO. In a study conducted among 150 employed homemakers of Trivandrum city, 50.00 per cent of the women were found to have haemoglobin levels between 12.00 to 13.00 g/100 ml (Florence, 1989). Felsy (1989) reported that 60.00 per cent of the Kanikkar tribal women of Amboori, Trivandrum had haemoglobin levels below 12 g and hence were anaemic.

The main reason for the low haemoglobin levels observed among the coir workers could be their poor dietary habits. It has been revealed that the diets consumed by the women were poor as they contained lesser amounts of iron containing foods such as green leafy vegetables, dried fruits, meat and egg. The nutrient intake levels also indicated that their iron requirement met only 44.00 per cent of the RDA. Moreover their diets were poor in Vitamin C (only 22.00 per cent of RDA was met) which is expected to decrease the iron utilization. NIN (1991) reported that the availability of iron from the composite diet is more important

than the individual foods because of profound interaction between foods influencing iron absorption Fogelholm et al (1993) who evaluated the iron status in non-pregnant urban and rural Finnish women, found that in the analysis of covariance, high frequency of menstruation, prolonged menstrual bleeding time, blood donation and use of Intra-uterine devices (IUD) had negative effects ($P < 0.05$) on iron status. However such factors were not involved in the case of coal workers nullifying the above effects with reference to their iron status.

However to confirm the presence of iron deficiency anaemia the blood samples were subjected to estimation of Total Iron Binding Capacity (TIBC) (Appendix XVIII). The results of the above estimation are presented in Table 83.

Table 83 Distribution of respondents with respect to their TIBC

Total Iron Binding Capacity (ug/100 ml)	Distribution of respondents	
	No	Per cent
250 - 410 ug/100 ml (Normal)*	21	52.50
Above 410 ug/100 ml	19	47.50
Total	40	100.00

(N = 40 respondents)

*Source Piccardi et al (1972)

As revealed in Table 83, 47.50 per cent had above normal values which indicates poor body iron reserves. Bothwell et al (1979) reported that exhaustion of body iron reserves is

associated with decrease in stainable iron in the bone marrow, fall in serum ferritin to levels below normal and increase in iron absorption and iron binding capacity. The increase in the TIBC in general, occurs before a fall in serum iron and therefore its increase suggests depletion of iron stores. This indicates that poor intake of iron and poor iron stores might have precipitated anaemia among these women.

The results reveal that majority of the women did not possess normal values prescribed as far as the cellular constituents of blood were concerned. This result is in tune with the results obtained previously by other workers. The WHO criteria for the diagnosis of iron status revealed that in adult females, the serum iron, TIBC and haematocrit per cent were interpreted to be deficient, if the levels were below 40, below 15 and below 31 respectively. This has been reported by Gopaldas and Seshadri (1987). Jyothi (1993) revealed that majority of women engaged in stone breaking had TIBC levels below normal and she also reported that the values for PCV in 100 ml blood deviated from the normal values in most cases.

Evaluation of clinical as well as biochemical parameters confirms the presence of anaemia among 85.00 per cent of the coal workers who formed the microsample. Dietary (Weighment) survey has also proved the fact that iron deficiency coupled with vitamin C deficiency might have precipitated

anaemia To further analyse the cause of anaemia, the nature, type and degree of anaemia the available data on cellular constituents of blood were subjected to further scrutiny According to Mason and Swash (1980) accurate estimation of Hb and the PCV or haematocrit helps in indicating the degree of anaemia They also reported that a reliable red cell count enables the computation of useful indices such as Mean Corpuscular Haemoglobin (MCH) and the Mean Corpuscular Volume (MCV) The MCH when calculated gave information as to whether the resulting anaemia was hypochromic or normochromic The MCV when calculated revealed as to whether the respondents were suffering from macrocytic, microcytic and normocytic anaemia

The MCH and MCV values were calculated using the following formulae

$$(1) \text{ MCH} = \frac{\text{Haemoglobin in grams per litre of blood}}{\text{Red cells in million per cu mm}}$$

$$(2) \text{ MCV} = \frac{\text{Volume of Packed Red cells in ml per litre}}{\text{Red cells in million per cu mm}}$$

The values obtained revealed the type of anaemia. The distribution of respondents with respect to the type of anaemia from which they suffered is given in Table 84

Table 84 Distribution of respondents with respect to the type of anaemia

Type of Anaemia	Distribution of respondents	
	No	Per cent
(1) Macrocytic anaemia	6	17.60
(2) Hypochromic anaemia	5	14.80
(3) Normochromic anaemia	8	23.50
(4) Microcytic anaemia	11	32.30
(5) Normocytic anaemia	4	11.80
Total	34	100.00

(N = 40 respondents)

The results presented in Table 84 indicate that 11 (32.30 per cent) of the women suffered from microcytic anaemia which was closely followed by normochromic anaemia (8 women - 23.50 per cent), macrocytic anaemia (6 women - 17.60 per cent), hypochromic anaemia (5 women - 14.80 per cent) and normocytic anaemia (4 women - 11.80 per cent)

The presence of such type of anaemia could be attributed to nutritional as well as other causes. P²onington et al (1984) has attributed a number of causative factors that precipitate anaemia including tuberculosis, liver diseases, arthritis, hookworm infestation, folate deficiency, vitamin B₁₂ deficiency, protein malnutrition and scurvy

Nutritionists are aware of the presence of vitamin deficiency disorders leading to anaemia with or without iron deficiency

Hence further analysis of the data presented in Table 83 revealed that (9 00 per cent) had microcytic hypochromic anaemia since they had reduced number of RBC which had a decreased size with very low haemoglobin concentrations. Such type of anaemia are indicative of iron deficiency anaemia and also a deficiency of B₆. Several investigators have shown that impairment of synthesis of haem and erythrocyte formation occur in B₆ deficiency in experimental animals and human beings. This may be due to the fact that pyridoxal phosphate is required for synthesis of haem which is a part of haemoglobin.

The presence of megaloblastic anaemia and pernicious anaemia are also suspected among the samples. Two (6 00 per cent) of women had RBC counts between 2.3 million/mm³ which contained only 6 to 9 per cent haemoglobin, which is indicative of nutritional megaloblastic anaemia suggesting folic acid and B₁₂ deficiency. It was found that 3 (9 00 per cent) had macrocytic anaemia with RBC count below 2.5 and 1.5 million/mm³ along with 8-9 per cent of haemoglobin suggestive of pernicious anaemia, indicative of B₁₂ deficiency as one of the reasons.

Further iron deficiency anaemia per se could be attributed to all those who had haemoglobin levels between

5-9 g/100 ml and RBC count of 3-4 5 million/mm³ Six (18 00 per cent) persons out of 40 women had iron deficiency anaemia

This leads to the confirmation that nutritional deficiencies with special reference to iron, B₆, B₁₂, folic acid and vitamin C would have all contributed to the high incidence of 85 00 per cent of anaemia among the microsample of 40 women studied in detail Further, anaemia could also be due to infestation by hookworms among nine (22 50 per cent) of the respondents of the microsample Increased perspiration due to heavy manual work without protection from direct sunlight could also be accounted as a factor leading to iron loss and consequent increase in the number of anaemics This has also been observed by Park and Park (1991)

All the above findings are indicative of the fact that the nutritional status of the coir workers are poor with reference to anthropometric measurements, food and nutrient intake, clinical and biochemical profile

4. 12 Nutritional Status Index

Nutritional status is an indicator of social well being of a community (Krishna 1988) According to Robinson (1970) nutritional status is the condition of the health of the individual as influenced by the utilization of the nutrients It can be determined through taking a careful medical and dietary

history, a thorough physical examination and appropriate laboratory investigations, and correlating the information so obtained Ottesen *et al* (1989) reported that nutritional status was found to be influenced by factors such as psychological, socio-cultural and physiological influences and also by thoughts, beliefs and emotions

In the present study the nutritional status of the 200 women coil workers was assessed using a nutritional status index (NSI) which was statistically worked out with the help of certain selected indicators. The characters selected were height, weight, body mass index, hip and waist measurements, triceps skinfold thickness, haemoglobin and clinical score. The scores obtained by the 200 women are given in Appendix XIX. The distribution of the respondents based on the NSI is presented in Table 85.

Table 85 Distribution of respondents based on the Nutritional Status Index

Nutritional status index	Distribution of respondents	
	No	Per cent
≤ 20	18	9.00
21 - 24	120	60.00
≥ 25	62	31.00
Total	200	100.00

(N = 200 respondents)

Data presented in Table 85 reveal that the mean Nutritional Status Index value for the 200 respondents was 23.31. The lowest recorded NSI value was 16 which was found in 12 (6.00 per cent) of the respondents. The highest NSI value was 28 which was observed among 8 (4.00 per cent) of the respondents. From the Table it can be seen that 9.00 per cent of the respondents had a NSI value which was equal to or less than 20. Sixty per cent had a NSI value that ranged from 21-24 and 31.00 per cent of the respondents had a NSI value that was greater than equal to 25.

The above result with respect to the NSI is indicative of the poor nutritional status of the coir workers. This is an expected outcome considering the fact that the individual factors taken into consideration, for computing NSI, itself were found to be below the normal standards. Further, the interactions of the above factors with that of the NSI has reaffirmed the above finding.

Correlation studies of the data show that there was a highly significant association between nutritional status index with weight ($r = 0.6680^{**}$), with haemoglobin ($r = 0.6870^{**}$), with body mass index ($r = 0.3884^{**}$) and with clinical score ($r = -0.9647^{**}$).

Further analysis revealed that the poor nutritional status of the coir workers were related to low RQLI (Rural Quality of Life Index) and high poverty as there was a highly

significant positive correlation between quality of life index ($r = 0.9307^{**}$) with nutritional status index and a negative but highly significant correlation between poverty index ($r = -0.4895^{**}$) and nutritional status index, which indicates that by improving the quality of life and thereby reducing the poverty index, the nutritional status can be enhanced

However as indicated in Table 86 when the socio-economic variables that might have a bearing on quality of life, when correlated with NSI, such as family size, family income, expenditure for food, area of land around house, number of employed males, number of employed families, age of women, earnings in a year from coir work, years of married life, years of employment in coir industry, working hours per day and number of days of work availability, there was a positive correlation though insignificant

Table 86 Correlation (r) between NSI and selected socio-economic variables

Selected variables	Correlation coefficient (r)
Family size	0.0532
Family income	0.0991
Monthly expenditure for food	0.0396
Area of land around house	0.0299
Number of employed males	0.0654
Number of employed females	0.0639
Age of the women	0.1028
Earnings in a year from coir work of the women	0.0406
Years of married life	0.0631
Years of employment in coir industry	0.0075
Working hours per day	0.0556
Number of days of work availability	0.0405

This above result could be due to the fact that all the subjects selected for the study were part of an homogenous community residing side by side possessing similar social, economic and cultural background Hence the inter-individual variations would not have been profound enough to be reflected in the correlations worked out though they have showed a positive relationship

4.13 Work output

In the present study the work output of the women were observed in terms of yarn produced during an hour since the interaction of womens work load and health is multifactorial owing to changes in the socio-economic conditions (Lukmanji, 1992) Various studies have proved the fact that a relationship exists between nutritional status and working efficiency According to Wheeler and Tan (1983) the nutritional status of an individual has direct and identifiable effect on his or her productivity at work

The above observations indicates that poor nutritional status negatively influences the work output Work output when decreased would lead to poor socio-economic gains Poor nutritional status and working under insanitary conditions would lead to poor health status which further results in poor work output or abstinence from work, both leading to poor income as well as low quality of life It is been proved beyond doubt from the earlier part of this study that cent per cent coir workers have

poor quality of life ascertained through RQLI suggested by Dhanasekaran (1991) and are impoverished as per the poverty index calculated through the indicators suggested by Srilatha and Gopinathan (1995). Superimposed on this findings is the revelation that their nutritional status is also poor. This in turn might affect their work output. Hence in order to find the interaction between the nutritional status and the work output, the coir yarn produced by the women per unit time was assessed (Appendix XX). The details are presented in Table 87.

Table 87 Distribution of respondents with respect to their work output

Substance produced during observed hour (metres of yarn)	Distribution of respondents	
	No	Per cent
560	11	27.50
525	7	17.50
509	9	22.50
495	4	10.00
467	9	22.50
Total	40	100.00

(N = 40 respondents)

From Table 87 it is evident that about 27.50 per cent of the respondents exhibited maximum efficiency by producing 560 metres of yarn during the observed hour. Seventeen per cent of the respondents were able to produce 525 metres of yarn, whereas

22.50 per cent of the women were able to produce 509 metres of yarn. This was followed by 10.00 per cent of the workers who produced only 495 metres of yarn in one hour. Twenty two per cent of the respondents were able to produce the minimum quantity of yarn which amounted to 467 metres.

From the above table it can be inferred that the 22.50 per cent respondents exhibited minimum efficiency probably due to their poor nutritional status. Devadas (1988) found that productivity of the labour force in the developing countries is generally low and this has been attributed to their poor physique resulting from chronic malnutrition. Poor nutrition restrains productivity in terms of output per unit of input. Ghassemi (1990) also associated low labour productivity with undernutrition and low income.

The differences observed in the work output could be attributed to differences in body weight also. Satyanarayana et al (1979) reported that short stature and reduced body size due to undernutrition will mean lower levels of productivity for sustained moderate physical work.

According to Gardner et al (1977) nutritional anaemia assumes great importance as a factor that may limit physical work capacity (PWC) of individuals. Seshadri (1988) is of the opinion that for working adults in the developing countries this has an

important economic implication. Data on clinical and biochemical profile of the coir workers had indicated the presence of anaemia among 85.00 per cent of the subjects. Hence, an attempt was made to find out if anaemia would impair the physical efficiency and work output of the coir workers. Based on their haemoglobin levels initially the forty respondents were classified into three groups viz, the deficient group (< 10.0 gm Hb/100 ml), the subnormal group ($10.0 - 11.0$ gm Hb/100 ml) and the normal group (> 11.0 gm Hb/100 ml). The classification was reported by Swaminathan (1993).

The initial and final pulse rate and blood pressure of the forty respondents were then recorded from the time they start work and after one hour. These measurements were recorded because Reddy (1983) reported that the pulse rate, cardiac output and oxygen uptake are related to the physical work done by an individual. The work done per unit time was also recorded. The normal group with haemoglobin levels more than 11.0 gm/100 ml was taken as the standard.

The variations in work output as influenced by the three levels of haemoglobin was statistically assessed and the details are presented in Table 88.

Table 88 Mean work output according to variations in the Hb levels

Group No	No of women	Haemoglobin levels	Mean work out put (yarn spun during one hour)	Difference from the Normal (III) group
I	12	< 10 0 (Deficient)	473 9	68 8*
II	8	10 0-11 0 (sub-normal)	507 3	35 4*
III	20	> 11 0 (Normal)	542 7	-
			----- F _{2,37} = 69 06** -----	

From the data presented in Table 88 it is clear that there was a statistically significant difference in the mean work output among the three groups. Women belonging to Group III were found to have the highest mean work output. The work output was found to be decreasing with decreasing haemoglobin levels, and it was the lowest for women in Group I who was deficient (< 10 0 gm/100 ml) in haemoglobin levels. The results obtained clearly indicate that subjects with lower haemoglobin concentrations had a lower work capacity.

The low productivity among the groups with deficient and subnormal haemoglobin levels could be due to their poor dietary habits. Devadas (1988) observed that poor nutrition restrains productivity in terms of output per unit of input. Wheeler and Tan (1983) stated that nutritional status of an

individual has direct and identifiable effects on his or her productivity at work Ghassemi (1990) associated low labour productivity with undernutrition and low income According to Dallman (1981) the impaired work performance in iron deficient rates whose anaemia is corrected by transfusion is due to increased production of lactic acid which in turn appears to be related to L - glycerophosphate oxidase The level of this enzyme increases with recovery and improvement in work performance According to Finch et al (1979) iron deficiency may impair work performance and exercise capacity in two ways - by decreasing the haemoglobin concentration and thus the oxygen carrying capacity of the blood and by reducing the muscular performance due to reduced concentration of iron containing enzymes

The same trend has been found when the initial and final pulses rate readings were compared with the work output of the respondents possessing varying concentrations of haemoglobin a given in Table 89 Details related to the initial and final pulse rate readings is given in Appendix XXI

Table 89 Pulse rate (Initial and final) according to variations in the Hb levels

Group No	No of women	Haemoglobin levels	Mean Pulse Rate			
			Initial Pulse Rate	Difference from the Normal (III) group	Final Pulse Rate	Difference from the normal (III group)
I	12	<10 0 (Deficient)	80 8	6 4*	86 5	6 4*
II	8	10 0 - 11 0 (Sub-normal)	77 3	2 9*	84 0	3 9*
III	20	> 11 0 (Normal)	74 4	-	80 1	-
			F _{2,37} =42 4**		F _{2,37} =34 4**	

The data presented in Table 89 reveals that there was a statistically significant difference among the first two groups when compared with the normal group. Data reveal that both the initial and final pulse rate was significantly lower for the women with higher haemoglobin levels and it was the highest for women with deficient haemoglobin levels.

The initial and final blood pressure when related to work output of the respondents categorised into three groups based on their haemoglobin value revealed interesting results as shown in Table 90. Details related to the initial and final blood pressure is presented in Appendix XXII.

Table 90 Blood pressure (Initial and final) according to variations in the Hb levels:

Group No.	No of women	Haemoglobin levels	Mean Blood Pressure							
			Initial systole	Difference from normal group	Initial Diastock	Difference from normal group	Final Systole	Difference from normal group	Final Diastock	Difference from normal group
I	12	< 10.0 (Deficient)	132	20 [*]	85	12 [*]	138.5	19.2 [*]	86.8	10.8 [*]
II	8	10.0 - 11.0 (Subnormal)	120.8	8.8 [*]	79.3	6.3 [*]	127.3	8 [*]	82	6.0 [*]
III	20	> 11.0 (Normal)	112	-	73	-	119.3	-	76	-
			$F_{2,37} = 33.7^{**}$		$F_{2,37} = 33.2^{**}$		$F_{2,37} = 32.4^{**}$		$F_{2,37} = 33.1^{**}$	

The initial and final blood pressure, indicated in terms of systole and diastole, was seen to be statistically significant in women with low haemoglobin levels. The women with deficient haemoglobin levels were found to have high blood pressure both before and after activity.

Similar results have been reported previously in the case of work output, pulse rate and blood pressure with respect to haemoglobin levels.

Seshadri (1988) reported that the post exercise pulse rates were significantly higher for anaemic children when compared to the normal children. It was also observed that low haemoglobin levels in women may increase both systolic and diastolic pressure before and after activity. According to Devadas (1988) the mean pulse rate and blood pressure for the

anaemic subject increased dramatically. However, after supplementation, the increase in pulse rate and blood pressure was not so marked. Similar observations have been reported by Vijayalakshmi and Natarajan (1986).

The findings of the study supported by similar findings leads to the fact that anaemia observed among 85.00 per cent of the respondents has a profound influence on their work output. As these women are expected to produce a specified quantity of yarn in a day (2800 metres) to earn a day's wages, the woman who has a lower working efficiency would take a longer time to finish her work. This in turn would take away her leisure time, and the time that she can allot to take care of herself, her family and her children. Thus, improving the work efficiency, would help her to save her time and energy. If this is to be achieved, her health status need to be upgraded and this can be done by increasing their iron intake through increasing the intake of foods rich in iron, or by iron supplementation. The prophylaxis programme with iron and folic acid, which is given now to pregnant women may be extended to similar vulnerable groups and this may be continued till they attain normal iron status. Anaemia, if caused by infection or infestation, also need to be tackled by appropriate means.

Thus, the ultimate aim of any form of intervention to improve the health status of these coir workers should aim at

improving their nutritional status, as a part of the system that improves their quality of life. Health and nutrition education should form the interlinking fibres of the quality matrix of their life style.

SUMMARY AND CONCLUSION

SUMMARY AND CONCLUSION

The study entitled **Nutritional status of women engaged in the coir industry** was carried out to assess the nutritional status of women engaged in the spinning of coir yarn and to find out its influence on their work output, which in turn could affect their socio-economic status

The study was conducted at two levels - on a macrosample of 200 women coir workers and on a microsample of 40 women, all employed in the coir co-operative societies, from Chirayinkil taluk of Thiruvananthapuram district

Their nutritional status was evaluated through multiple channels involving diet survey, anthropometry, clinical and biochemical estimations and weighing of actual food intake

From the data collected through the above methods it was found that the workers had a poor nutritional status which in turn affected their health as well as work output

During the study a number of factors which might have contributed to the poor nutritional status were observed and these factors are highlighted below

Socio-Economic Status

* The findings of the present study with respect to their social status reveals the fact that 97.00 per cent of the

families were Hindus belonging to the backward communities (86 00 per cent) Nuclear type families with one to five members in each family was found to be more popular among this community Demographic profile of the families indicated that the child population is low when compared to adults and among the adults there were comparatively more males than females

* The economic position of the coir worker's families unveiled a grim picture The main occupation of the community was coir work Eighty per cent of the families had a monthly income that ranged between Rs 1000-2000 The tenure of payment was weekly The hand to mouth existence was precipitated by lack of savings coupled with borrowing money, which brought in economic instability pushing majority of the respondents into the clutches of poverty

* Their poverty was found to force them to spend the major part of their income on food which is the basic necessity and it is because of the same that their expenditure on education, shelter and health were found to be very low

* Their socio-economic problems are aggravated by the seasonality of employment To worsen the situation once again a high degree of absenteeism was also observed among the workers The workers absented themselves for a variety of reasons though the major one was related to family predicaments and imbroglios

* The state of poverty is reflected in their housing conditions which projected the problem of overcrowding which in turn gives rise to a poor sanitary state

The problem of insanitation is exacerbated by the absence of latrines and proper drainage system among other physical amenities, not available to the households as well as at the work site

With regards to fuel, all the families were found to be using firewood and smoke emitted from this was a health hazard to the household members, especially the women

* Their poor social and economic status was directly reflected in their educational status which revealed that 24 00 per cent were illiterate Their level of illiteracy and ignorance were seen to be capitalised on by the authorities The exploitation can be clearly seen with regards to the variations in the wages and bonuses/festival allowances paid to these women workers which was lower than that paid for men in the field The workers were not aware of medical aid/reimbursement benefits to which they were rightfully entitled The same trend was observed in the case of the coir worker's pension These workers were not provided with toilet facilities or conveniences like creche for their children

* Inadequate permanent and full time employment high cost of living inability to educate their children problems related

to economic burdens imposed by repayment of loans and medical expenses, lack of housing facilities and absence of male earning members in the family were the important economic problems, in the order of priority, as felt by the families, which have led them to a life of miserable existence

The above mentioned social and economic factors would have negatively affected their nutritional status, since lack of purchasing power coupled with social deprivation, and ignorance have been shown to degrade nutritional status

Lack of Hygiene and Sanitation

The coir workers had poor sanitation and hygiene both at the household (due to overcrowding, open firewood choolas lack of drainage, lack of latrines and associated factors) and at the work site (due to presence of stagnant water as also lack of toilet facilities) Open yard defecation and walking on barefoot along with associated unhygienic environmental condition in and around their house and work site leads to infection and infestation resulting in poor health and nutritional status This is confirmed by the fact that 22.50 per cent have succumbed to hookworm infestation revealed by the examination of stools The above normal counts for white blood cells with special reference to neutrophil polymorphs, lymphocytes and eosinophils, observed among 15 to 77 per cent of the workers could also give an insight

to the clinical symptoms indicative of infection/infestation or allergic manifestations

Poor Food and Nutrient Intake

All the above unpleasant situations when coupled with a poor food intake seem to further deteriorate the nutritional status of the coir workers

* The families suffered from household food insecurity. Their diets were ill-balanced and were deficient with respect to pulses, egg, meat, green leafy vegetables and fruits. All the families were habitual non-vegetarians and rice and fish formed the basic constituents of their diets. Poor purchasing power coupled with ignorance and lack of education among the coir workers could be the reasons as to why the vulnerable / sick persons in the family were not provided with adequate nutrition. They could also be the reasons for the prevalence of a number of faulty food habits among these families.

* Weighment survey conducted among the microsample (40 women) confirmed their dietary inadequacies. The intake of pulses, green leafy vegetables, other vegetables, roots and tubers and fruits was very poor and the rates of consumption of the above were below 20.00 per cent of the RDA. Intake of fish was very high and egg was not consumed, at all.

* Data related to the nutrient intake revealed that their intake of iron, carotene, riboflavin and vitamin C were poor when compared to RDA

- However the protein intake was notably higher than the prescribed RDA

- The average intake of calories was below the RDA by 28 00 per cent

* Their poor nutrient intake was reflected in the clinical examination conducted to assess the nutritional deficiency symptoms, which revealed the prevalence of dental caries, mottled enamel, bleeding from the gums glossitis and anaemia

* A clear energy gap existed among the coir workers It was revealed that while the expenditure was between 2455 to 2677 (mean of 2533 kcal) the energy consumed through food accounted for a sum between 1468 to 1940 kcal (mean of 1657 kcal) This leads to a energy deficit of 35 72 to 74 80 per cent (mean of 54 12 per cent) in terms of kcal This leads to the statement that the women engaged in the coir industry like any other employee has a dual role to play and are burdened with the double days work

* The poor food consumption pattern coupled with the high energy expenditure could be the reasons for the poor

anthropometric measurements seen among the women coil workers. Eighty one per cent and 97.00 per cent of the women had height and weight below the standard. This indicates that stunting and wasting are common features of the women coil workers. Data related to the Body Mass Index (BMI) revealed that 37.00 per cent may be considered to suffer from chronic energy deficiency (CED) of grade III and II. It was alarming to note that 99.00 per cent of the women suffered from abdominal obesity and femoral gluteal obesity. Their mid-upper arm circumference (72.50 per cent women coil workers) and triceps skinfold thickness was below the desirable limit indicating poor nutritional status. This further represents previous as well as present state of malnutrition.

Thus, the food consumption pattern and nutrient intake reflected in poor anthropometric measurements and fragile clinical picture of the respondents pointed towards the prevalence of poor nutritional and health status among the coil workers.

* The poor health status of the respondents were further realized through laboratory tests. It was found that 63.00 per cent of the respondents who formed the macrosample (200 women) and 85.00 per cent from the micro sample had haemoglobin values below the normal values, indicating that they were anaemic. The presence of anaemia was once again confirmed in 72.50 per cent of the microsample when their Red Blood Cell (RBC) count as well as

the Packed Cell Volume (PCV) were estimated. The results of Total Iron Binding Capacity (TIBC) revealed that 47.50 per cent had poor body iron reserves.

* From the above facts and figures, the presence of nutritional deficiencies with special reference to iron, B₆, B₁₂, folic acid, vitamin C and other associated nutrients related to low food intake, superimposed by infection and infestation could be attributed to the prevalence of anaemia reaffirming poor health and nutritional status. The mean nutritional status index of the 200 respondents was 23.31 and the results obtained indicate that majority of the women had a poor nutritional status.

From the ongoing discussion, it can be emphatically stated the coil workers are primary victims of poor health status and also of poor nutritional status. The cumulative effect of all the above factors would have a redounding effect on the women's work output and work efficiency as revealed by several research workers.

Nutritional status and work efficiency/output

Only about 27.50 per cent of the respondents (from the microsample) were able to produce 560 meters of yarn which was the maximum quantity of yarn produced in a unit time. The remaining 72.50 per cent women exhibited minimum efficiency with

respect to the group as a whole. Their lowered efficiency could be related to their depressed health and nutritional status. This was substantiated pragmatically by correlation analysis which revealed that the subjects with lower haemoglobin concentrations had a lower work output. It was also found that the initial and final pulse rate before and after work done over a unit time was significantly lower for the women with higher haemoglobin levels and it was highest for women with deficient haemoglobin levels revealing an inverse association. The women with deficient haemoglobin levels were also found to have higher blood pressure both before and after activity. The reduced work output further aggravates their various socio-economic activities giving rise to a vicious cycle within which the coir workers are entrapped. Among the various work hazards, all cited problems related to flying particles, noise, exposure to heat and sunlight as major hazards. However it is gratifying to note that occupational disorders were not prevalent to an extent that merits mention.

Poor Quality of Life - The fate of the coir workers

The pathetic condition of the coir workers with respect to their socio-economic status is authenticated by the fact that all the families were found to be poverty stricken when the Rural Quality of Life Index (RQLI) was calculated. The RQLI was developed using selected indicators such as caste, occupational

status of the family, total monthly income of the family, per capita (monthly) income, number of female earners in the family, food expenditure pattern of the family, per capita expenditure on clothing (monthly), number of rooms available, educational status and calorie and protein requirement of the women

A similar trend was observed when the Poverty Index was worked out using the yardsticks suggested by Srilatha and Gopinathan (1995) based on the Kerala situation. It was found that 73.50 per cent families of the coir workers belonged to the high risk poverty group. Of the various yardsticks, housing and lack of latrines were the risk factors for about 62.50 per cent. The risk factors such as having one illiterate adult (44.50 per cent), presence of children under five years of age (33.00 per cent), consuming only two or less meals (19.50 per cent), presence of an alcoholic or drug addict in the family or presence of a major crisis in the family (13.00 per cent), family belonging to SC/ST (12.30 per cent) and absence of employed adults (8.00 per cent) were indicated as major risk factors identified among the families, several of which acting synergistically on one another dragging them into the depths of poverty.

Correlation studies of the data revealed that the poor nutritional status of the coir workers were related to the low Rural Quality of Life Index (RQLI) and higher levels of poverty.

which indicates that by improving the quality of life and thereby reducing the extend of poverty, the nutritional status and health status of this poor lot could be enhanced

From the present study it may be confirmed that the women coir workers are going through an arduous life and it may be possible to uplift them only through a multi-channeled approach specially designed to suit them

Recommendations

Based on the above observations, the following suggestions and recommendations are given to improve the nutritional status as well as the quality of life of women coir workers of Chirayinkil taluk of Thiruvananthapuram district

* The problem of underemployment calls for suitable interventions, since underemployment leads to poverty. If the days of work cannot be enhanced then, the workers may be motivated and/or trained to take up subsidiary occupations during the lean seasons

* Discrimination in wages and allowances based on gender based activities need to be wiped out and laws need to be enforced whereby equalisation of wages is brought into force

* Efforts need to be taken to prevent absenteeism among the workers. One method is through family counselling since family problems were often quoted as reasons for absenteeism

* Organising and motivating the promotion of self-help groups among the community may be undertaken since such groups are in a better position to understand the crux of the various problems encountered within the group, and to find out solutions and to take up favourable participatory actions

* The workers quality of life may be improved to a certain extent by the provision of smokeless choolas or improved choolas, toilet facilities, and proper drainage

* Educational camps should be held regularly in pockets where coir workers are concentrated. These camps should stress on the benefit of hygienic practices and improvement of environmental sanitation. The educational camps should also make the workers cognisant about the various benefits which they are rightfully entitled to. These benefits may be related to the enhancement of their health and quality of life (medical aid, maternity leave, toilet facilities, provision of creches and other child care facilities)

* Since these families had poor dietary habits superimposed by various food fads and fallacies, nutrition education programmes should be organised for the workers to help them make the right choice of food, with respect to their socio-economic background

* The workers should be provided with foot wear and gloves at the worksites to avoid infestation/infection and injuries

* Medical camps should be conducted whereby the workers are given free medical advice

* Since anaemia and infestations are commonly seen among this group, the medical camps must provide the workers with iron and folate tablets as also anti-helminthic drugs

* Report of the Special Task Force on Coir Industry (1992) emphasises that the introduction of the treadle patt would help to reduce the drudgery of work without creating any undue displacement of workers. Hence the treadle patt may be introduced with immediate effect to help the workers. Improved mechanization without displacement of women would be an added boon.

The coir workers, who spin the 'golden yarns' of the economic and social fabric of the State of Kerala, the land of palms, are found to be treading through a path of poverty and food insecurity leading them to poor nutritional and health status. Hence, efforts need to be initiated to elevate their nutritional status through a multi-channeled approach consisting of special supplementary feeding, enhancement of public distribution benefits or introduction of food-for-work

programmes, provision of health improvement measures such as immunization, nutrition intervention and prophylaxis programmes along with attractive working conditions and environment which are specially designed to suit the coir worker's community and may be enforced so that it would improve not only their quality of life but also would help to nurture a healthy future generation

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APPENDICES

APPENDIX - I

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

DEPARTMENT OF HOME SCIENCE, VELLAYANI

INTERVIEW SCHEDULE TO ELICIT THE SOCIO-ECONOMIC BACKGROUND
OF THE FAMILIES ENGAGED IN COIR INDUSTRY

(PART I - A)

- 1 Name of the respondent
- 2 Address
- 3 Religion
- 4 Caste
 - (i) SC
 - (ii) ST
 - (iii) OBC
 - (iv) Others
(Specify)
- 5 Type of family
 - (i) Nuclear
 - (ii) Joint
 - (iii) Extended
- 6 Family size
 - (i) Total number of family members
 - (ii) Number of male adults
 - (iii) Number of female adults
 - (iv) Number of male children
 - (v) Number of female children
 - (vi) Age classification of children

Sl No	Age	Number of Male children	Number Female children
(1)	(0-1 yr) infant		
(2)	(2-6 yr) Pre-school child		
(3)	(6-15 yr) school going		
(4)	(15-21 yr) College		

7 Composition of the family

Sl No	Name	Relation-ship with respondent	Sex	Age	Edica-tion	Occu-pation	Income per month	Food habits
								Veg Non Veg

8 Employment status of the family

8 (a) Details regarding the members engaged in Coir Industry - ✓

Sl No	Name of the member	Status of the member	Type of work under-taken	How long have you been em-ployed in the Coir industry	Part time	Full time	No of days of work of available in a yr/ month/ week (current status)	Earn-ings daily/ weekly/ yearly (Current status)
-------	--------------------	----------------------	--------------------------	-------------------------------------------------------	-----------	-----------	-----------------------------------------------------------------------	--------------------------------------------------

9 Other sources of income (specify)

- (i)
- (ii)
- (iii)
- (iv)

13 (b) Amount borrowed per week/month/year

13 (c) From where did you borrow? Specify

- (i)
- (ii)
- (iii)

14 The most important economic problem of your family

Housing

High price ✓

Children's education

Treatment

Repayment of loans

Entertainment

Lack of permanent employment

Absence of male earning member

Others (specify)

15 Living conditions

15 (a) (i) Area available around the house

(ii) Area of the house

15(b) Whether the house is Own

Ranked

Leased

15 (c) Nature of the house

(1) Roof Tiled

Thatched

Terraced

Covered with the sheet

Asbestos

Others (specify)

15 (k) Source of fuel Purchased

Collected

If 'collected' is it from Nearby place

Own land

Forest

Others (specify)

15 (l) Distance covered for collection of (a) Fuel

(b) Water

15 (m) Time required for collection of (a) Fuel

(b) Water

15 (n) Who does the collection of water and fuel

APPENDIX - II
 KERALA AGRICULTURAL UNIVERSITY
 COLLEGE OF AGRICULTURE
 DEPARTMENT OF HOME SCIENCE, VELLAYANI

SCHEDULE TO FLICIT THE SOCIO-ECONOMIC BACKGROUND
 OF THE FAMILIES ENGAGED IN COIR INDUSTRY

(PART I - B)

- 1 Name of the respondent
- 2 Address
- 3 Age
- 4 Marital status
 - Married
 - Unmarried
 - Widowed
 - Divorced
- 4 (a) If 'Married' how many years has it been since you have married
- 5 Educational status
- 6 Food habit
 - Vegetarian
 - Non-Vegetarian
- 7 Particulars about employment
- 7 (a) Name and address of the organisation in which employed
- (b) Place of employment
 - Home
 - Society
- (c) No of working hours in a day
- (d) Tenure of payment
 - Monthly
 - Weekly
 - Daily
- (e) No of off days in a week with wages

(f) Other leaves

(i) Medical leave

(ii) Casual leave

(iii) Other leave (specify)

(g) Do you receive adequate facilities in the work place?
(Specify)

Shade

Resting place

Toilet facilities

Others (specify)

(h) Do you receive any medical aid or medical reimbursement.

Yes

No

(i) Are you given festival allowance Yes

No

or

Are you given festival advance? Yes

No

7 (1) a) If 'Yes' when are you given such allowances

b) How much are you given

c) Period of repayment

d) Instalments of repayment

7 (j) Sanitary condition of the work place Good

Fair

Poor

8 a) Details regarding female occupation

S1 No	Name of the women	Status of the women	Type of work under-taken	How long have you been employed if the Coir Industry	Part time	Full time	No of days of work availability in a year/month/week (current status)	Earnings daily/weekly/monthly year (Current status)

8 (b)

S No	Are you employed in the coir Industry	Period of Lean work/ No work	Period of Heavy work
	----- Permanently Temporarily		

APPENDIX - III

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

DEPARTMENT OF HOME SCIENCE, VELLAYANI

SCHEDULE TO ELICIT THE SOCIO-ECONOMIC BACKGROUND
OF THE FAMILIES ENGAGED IN COIR INDUSTRY

(PART II - A)

- 1 Namen of the respondent
- 2 Address :
- 3 Food expenditure pattern of the family

Sl No	Item	Frequency of purchase					Quan- tity pur- chased	Amount spend on each item per purch- ase
		Daily	Weekly	Mon- thly	Once in 6 mon- ths	Never		
1	Cereals Rice Wheat							
2	Pulses							
3	Green leafy veg							
4	Other vegetables							
5	Roots & tubers							
6	Fruits							
7	Nuts and oil seeds							
8	Milk & milk products							

	frequency of use									Once in 6 mon- Never ths	
	Daily			Weekly			Monthly				
	On- ce	Twi- ce	Thri- ce	Quar- ter	On- ce	Twi- ce	Th- rice	On- ce	Twi- ce	Th- rice	
5	Roots & tubers										
6	Fruits										
7	Nuts & Oil seeds										
8	Milk and milk products										
9	Fats and Oils										
10	Sugar and jaggery										
11	Egg										
12	Meat										
13	Fish										
14	Spices & condiments										
15	Health drinks										
16	Processed food										
17	Miscellaneous foods										

5 Who is the person responsible for deciding the frequency of the inclusion of various foods in the daily diet?

6 How many times the meals are cooked?

Once

Twice

Twice

Morethan that

- 7 Who does the cooking?
- 8 Do you have a specific time schedule for taking foods?

Yes

No

- 8 (a) If yes specify the meal timings below.

Sl No	Meal	Timing
1	Breakfast	
2	Lunch	
3	Tea	
4	Dinner	

- 9 Daily meal pattern of the family (Dietary recall method)

Meal time	Menu-I day	Menu-II day	Menu-III day
Early morning			
Breakfast			
Midmorning			
Lunch			
Evening			
Tea			
Dinner			

- 10 Do you left over foods? Yes
- No

APPENDIX - IV
 KERALA AGRICULTURAL UNIVERSITY
 COLLEGE OF AGRICULTURE
 DEPARTMENT OF HOME SCIENCE, VELLAYANI

INTERVIEW SCHEDULE TO ELICIT INFORMATION REGARDING
 THE FOOD HABITS OF WOMEN ENGAGED IN COIR INDUSTRY

(PART I - B)

- 1 Name of the respondent
- 2 Address
- 3 Marital status
 - Married
 - Unmarried
 - Widowed
 - Divorced
- 4 Food habit
 - Vegetarian
 - Non-Vegetarian
- 5 Do you have a specific time schedule for taking foods?
 - Yes
 - No
- 6 If 'Yes' specify the time and food that is consumed

Meal	Time	Food consumed

Breakfast		

Lunch		

Tea		

- 7 Do you take food from outside?
 - Yes
 - No

- 8 If 'Yes' how often do you take food from outside and specify the food taken

Sl No	Food item	Frequency of use									Once in 6 months	Never	
		Daily			Weekly			Monthly					
		1	2	3	4	On- ce	lwi- ce	Thri- ce	Once	Twice	Thrice		

- 9 Do you take packed food to the work site. Yes

No

- 10 If 'Yes' how often do you take packed food from home and specify the food taken

Sl No	Food item	Frequency of use									Once in 6 months	Never	
		Daily			Weekly			Monthly					
		1	2	3	4	On- ce	Twi- ce	Thri- ce	Once	Twice	Thrice		

- 11 Who prepare the food that you bring to the work place?

- 12 Do you have any specific likes and dislikes of foods?

S No	Food item	Like	Dislike

13 Foods taken/avoided by you during special conditions

S No	Conditions	Foods taken	Foods avoided
1	Pregnancy		
2	Lactating period		
3	Adolescent age		
4	Old age		
5	Diseased conditions		
	i) Fever		
	ii) Diarrhoea		
	iii) Parasitic infection		
	iv) Others (specify)		

APPENDIX - V
 KERALA AGRICULTURAL UNIVERSITY
 COLLEGE OF AGRICULTURE
 DEPARTMENT OF HOME SCIENCE, VELLAYANI

QUESTIONNAIRE TO ELICIT INFORMATION REGARDING
 THE DAILY WORK SCHEDULE IN THE HOUSEHOLD AND WORK SITE

(PART - III)

- 1 Time of waking up
- 2 Time spent on personal activities
- 3 The household works done before going to the work site

Sl No	Type of work	Time taken
-------	--------------	------------

- 4 At what time do you start for work from the home
- 5 The time of reaching the work place
- 6 Time taken to reach the work site
- 7 Distance covered to work site from home
- 8 Means of reaching the work site

Working
 Bus
 Train
 Any other (specify)

- 9 At what time do you start actual work

- 10 Ending time of work
- 11 Average time of working time/day
- 12 Average yarn spun by respondent
per day/week/month
- 13 Do you rest in between work Yes
- a) No
- 13 b) If 'Yes' - mention frequency and specify time (in min)
- 14 a) Do you take food in between work Yes
- No
- 14 b) If 'Yes' how many times Once:
- Twice
- Thrice
- More than 3 times.
- 14 c) Mention the foodstuffs eaten in between work
- (i)
- (ii)
- (iii)
- d) Source of food eaten in between work.
- (i) Home
- (ii) Hotel
- (iii) Thattukada
- (iv) Other (specify)
- 15 The time of return to home.
- 16 Time of reaching the home
- 17 The type of works done after reaching the home

S No	Type of works	Time taken

27 If 'Yes' how do you spent that time?

Leisure activity

Time spend

Home

Workplace

APPENDIX - VI

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

DEPARTMENT OF HOME SCIENCE, VELLAYANI

SCHEDULE USED FOR ASSESSING ANTHROPOMETRIC MEASUREMENTS
AND CLINICAL SYMPTOMS OF THE WOMEN ENGAGED IN THE COIR INDUSTRY

(PART IV)

- 1 Name of the respondent
- 2 Age
- 3 Anthropometric measurements:
 - (i) Height (cm)
 - (ii) Weight (kg)
 - (iii) Mid-upper-arm circumference (cm)
 - (iv) Hip (inches)
 - (v) Waist (Inches)
 - (vi) Triceps Skinfold (mm)
- 4 Clinical symptoms
 - 1 Hair - Sparse
 - Discoloured
 - Tasily plucked
 - 2 Moon face
 - 3 Parboiled enlargement
 - 4 Oedema
 - 5 Pellagra
 - 6 Pigmentation at Knuckles/fingers/toes
 - 7 Crazy pavement dermatitis
 - 8 Phrynoderma

- 9 Koilonychia
- 10 Gume-spongy bleeding
- 11 Emacilation
- 12 Marasmus
- 13 Conjunctival xerosis
- 14 Bitot's spot
- 15 Corneal xerosis/Keratomalacia
- 16 Night blindness
- 17 Photophobia
- 18 Angularstomatitis
- 19 Cheilosis
- 20 Epiphyseal enlargement
- 21 Mottled enamel
- 22 Enlargement of thyroid
- 23 Anaemia
- 24 Dental caries
- 25 Flurosis
- 26 No health problems

APPENDIX - VII
 GOVERNMENT OF KERALA
 DEPARTMENT OF FACTORIES AND BOILERS
 WORKERS HEALTH-CARE PROGRAMME
 (PART V)

- 1 Name of the respondent .
- 2 Age of the respondent .
- 3 General appearance
 - (i) Built
 - (ii) Hair
 - (iii) Nail
 - (iv) Skin
- 4 Nutrition
 - (i) Good
 - (ii) Average
 - (iii) Poor
- 5 Chewing habit

Chewing habit	Yes	No	Duration
Betal nut			
Tobacco			
Supari			
Any other			

6 Smoking habit

Smoking habit	Yes	No	Duration
Pipe			
Cigarettes			
Beedis			
Cigars			
Others			

7 Temperament at work site

No	Temperament	Work spot	Home	Other place
1	Sober			
2	Nervous			
3	Irritable			
4	Calm			

8 Family planning

- (i) Permanent
- (ii) Temporary
- (iii) Details of Permanent methods used
- (iv) Details of temporary methods used
- (v) Nil

9 Medical History Questionnaire

No	Disease	Has the disease	Had the disease	Age at on set	Duration
1	Heart disease				
2	Blood pressure				
3	Diabetes mellitus				
4	Tuberculosis				
5	Liver disease				
6	Jaundice				
7	Gall stone				
8	Arthritis				
9	Thyroid disease				
10	Kidney disease				
11	Skin disease				
12	Malaria				
13	Epilepsy				
14.	Others				

10 Family History

No	Disease	Father	Mother	Other	Details
1	Hypertension				
2	Diabetes				
3	Heart disease				
4	Epilepsy				
5	Tuberculosis				
6	Asthma				
7	Others				

11 Drug Addiction Yes

No

If 'YES'

No	Name of drug	Frequency	Duration	Reason
1				
2				
3				

12 Psycho-social factors

No	Factor	Yes	No
1	Stress		
2	Frequent travel		
3	Financial problem		
4	Worry		
5	Tension		
6	Anxiety		
7	Abnormal family member		
8	Over work		
9	Domestic unhappiness		
10	Less pay		
11	Accomodation		
12	Others		

13 Job satisfaction

No	Factor	Yes	No
1	Shift		
2	Supervisors		
3	Interpersonal relation		
4	Area of work		
5	Work load		
6	Safety measures		
7	Safety equipment		
8	Incentives		
9	Promotions		
10	Leave problem		
11	Others		

14 Work hazards

No	Exposure to	Yes	No
1	Mechanical		
2	Friction		
3	Trauma		
4	Flying particles		
5	Heat		
6	Cold		
7	Noise		

No	Exposure to	Yes	No
8	Uncomfortable position		
9	Sunlight		
10	Humidity		
11	Inadequate ventilation		
12	Glare		
13	Vibration		
14	Positive atmospheric pressure		

15 Clinical examination

Details	Findings
Blood pressure	
Cardiovascular system	
Respiratory system	
Gastro intestinal system	
Musculoskeletal system	
Genito Urinary System	
E N T	
Vision comments	

16 Complaints, if any

17 Specific health problems related to work

APPENDIX - VIII
 KERALA AGRICULTURAL UNIVERSITY
 COLLEGE OF AGRICULTURE
 DEPARTMENT OF HOME SCIENCE, VELLAYANI

SCHEDULE USED FOR ASSESSING THE ACTUAL FOOD INTAKE OF THE
 WOMEN ENGAGED IN COIR INDUSTRY (BY FOOD WEIGHMENT METHOD)

(PART - VI)

Name of the meal	Menu	Weight of the total raw ingredients (g)	Weight of the total cooked food consumed by the family (g)	Amount of cooked food con- sumed by the res- (g)	Raw equiva- lents used by the in- dividual (g)
Break fast					
Lunch					
Tea					
Dinner					
Others					

APPENDIX - IX
RURAL QUALITY OF LIFE INDEX (RQLI) OF THE FAMILIES (200)
SCORES OBTAINED

Sl No	Score	Sl No	Score	Sl No	Score	Sl No	Score
1	15	26	19	51	22	76	17
2	13	27	18	52	14	77	25
3	23	28	19	53	14	78	17
4	18	29	21	54	21	79	18
5	18	30	14	55	15	80	33
6	17	31	13	56	17	81	16
7	21	32	21	57	30	82	11
8	19	33	16	58	32	83	19
9	15	34	19	59	16	84	18
10	19	35	17	60	23	85	21
11	11	36	13	61	23	86	32
12	14	37	13	62	29	87	18
13	13	38	17	63	33	88	16
14	25	39	16	64	18	89	16
15	21	40	33	65	20	90	20
16	23	41	20	66	34	91	16
17	22	42	22	67	13	92	17
18	17	43	11	68	21	93	18
19	17	44	15	69	25	94	18
20	16	45	18	70	13	95	15
21	13	46	26	71	22	96	26
22	11	47	14	72	15	97	27
23	13	48	22	73	15	98	11
24	13	49	11	74	14	99	26
25	18	50	17	75	11	100	23

Sl No	Score	Sl No	Score	Sl No	Score	Sl No	Score
101	22	126	21	151	14	176	25
102	15	127	16	152	27	177	31
103	17	128	16	153	15	178	15
104	25	129	32	154	26	179	25
105	23	130	17	155	14	180	19
106	15	131	18	156	21	181	28
107	22	132	20	157	11	182	19
108	34	133	23	158	23	183	25
109	32	134	34	159	18	184	11
110	17	135	25	160	15	185	31
111	16	136	20	161	20	186	26
112	19	137	28	162	11	187	17
113	15	138	30	163	17	188	20
114	29	139	27	164	16	189	30
115	30	140	10	165	15	190	17
116	23	141	26	166	15	191	18
117	21	142	17	167	15	192	18
118	20	143	20	168	16	193	15
119	10	144	18	169	16	194	31
120	25	145	17	170	34	195	27
121	11	146	16	171	15	196	34
122	22	147	18	172	16	197	25
123	21	148	15	173	14	198	19
124	30	149	21	174	13	199	21
125	15	150	17	175	17	200	23

APPENDIX - X

AT RISK INDEX OF THE FAMILIES (200)

Sl No	Score	Sl No	Score	Sl No	Score	Sl No	Score
1	5	26	4	51	4	76	4
2	6	27	4	52	6	77	3
3	3	28	4	53	6	78	5
4	4	29	4	54	4	79	4
5	4	30	6	55	5	80	2
6	4	31	6	56	5	81	5
7	4	32	4	57	3	82	7
8	4	33	5	58	3	83	4
9	5	34	4	59	5	84	4
10	4	35	4	60	3	85	4
11	7	36	6	61	3	86	3
12	6	37	6	62	3	87	4
13	6	38	4	63	2	88	5
14	3	39	5	64	4	89	5
15	4	40	2	65	4	90	4
16	4	41	4	66	1	91	5
17	4	42	4	67	6	92	4
18	4	43	7	68	4	93	4
19	4	44	6	69	3	94	4
20	5	45	4	70	6	95	6
21	6	46	3	71	4	96	3
22	7	47	6	72	6	97	3
23	6	48	4	73	6	98	7
24	6	49	7	74	6	99	3
25	4	50	4	75	7	100	3

Sl No	Score	Sl No	Score	Sl No	Score	Sl No	Score
101	4	126	4	151	6	176	3
102	5	127	5	152	3	177	3
103	4	128	5	153	5	178	6
104	3	129	2	154	3	179	3
105	3	130	4	155	6	180	4
106	6	131	4	156	4	181	3
107	4	132	4	157	7	182	4
108	1	133	3	158	3	183	3
109	2	134	2	159	4	184	7
110	4	135	3	160	5	185	3
111	5	136	4	161	4	186	3
112	4	137	3	162	7	187	5
113	6	138	3	163	4	188	4
114	3	139	3	164	5	189	3
115	3	140	7	165	5	190	4
116	3	141	3	166	5	191	4
117	4	142	5	167	5	192	4
118	4	143	4	168	5	193	6
119	7	144	4	169	5	194	3
120	3	145	4	170	2	195	3
121	7	146	5	171	6	196	1
122	4	147	4	172	5	197	3
123	4	148	6	173	6	198	4
124	3	149	4	174	6	199	4
125	6	150	4	175	5	200	3

APPENDIX - XI

TOTAL ENERGY EXPENDITURE PATTERN OF THE WOMEN (200)

Sl No	Energy Expendi- ture (kcal)	Sl No	Energy Expendi- ture (kcal)	Sl No	Energy Expendi- ture (kcal)	Sl No	Energy Expendi- ture (kcal)
1	2515	26	2601	51	2622	76	2560
2	2468	27	2580	52	2485	77	2638
3	2633	28	2594	53	2494	78	2548
4	2587	29	2602	54	2612	79	2585
5	2590	30	2484	55	2524	80	2670
6	2566	31	2479	56	2552	81	2544
7	2602	32	2606	57	2663	82	2450
8	2600	33	2537	58	2674	83	2595
9	2514	34	2599	59	2538	84	2583
10	2597	35	2663	60	2629	85	2610
11	2455	36	2476	61	2625	86	2673
12	2490	37	2465	62	2661	87	2589
13	2470	38	2565	63	2680	88	2535
14	2645	39	2526	64	2584	89	2543
15	2603	40	2677	65	2602	90	2601
16	2624	41	2601	66	2878	91	2533
17	2618	42	2621	67	2464	92	2553
18	2567	43	2456	68	2615	93	2577
19	2562	44	2489	69	2636	94	2591
20	2528	45	2575	70	2466	95	2505
21	2475	46	2646	71	2620	96	2651
22	2463	47	2480	72	2497	97	2655
23	2478	48	2623	73	2509	98	2420
24	2474	49	2460	74	2493	99	2652
25	2588	50	2569	75	2453	100	2630

Sl No	Energy Expenditure (kcal)	Sl No	Energy Expenditure (kcal)	Sl No	Energy Expenditure (kcal)	Sl No	Energy Expenditure (kcal)
101	2619	126	2605	151	2482	176	2635
102	2512	127	2534	152	2654	177	2670
103	2568	128	2546	153	2519	178	2495
104	2644	129	2676	154	2650	179	2639
105	2632	130	2555	155	2486	180	2596
106	2508	131	2576	156	2413	181	2658
107	2616	132	2601	157	2449	182	2598
108	2731	133	2626	158	2628	183	2640
109	2675	134	2722	159	2581	184	2419
110	2559	135	2642	160	2520	185	2671
111	2540	136	2601	161	2601	186	2649
112	2592	137	2659	162	2459	187	2549
113	2500	138	2665	163	2554	188	2601
114	2662	139	2656	164	2530	189	2667
115	2669	140	2412	165	2517	190	2564
116	2627	141	2647	166	2525	191	2586
117	2614	142	2547	167	2525	192	2573
118	2602	143	2601	168	2531	193	2496
119	2410	144	2578	169	2539	194	2672
120	2637	145	2570	170	2721	195	2657
121	2415	146	2532	171	2510	196	2724
122	2617	147	2582	172	2545	197	2634
123	2609	148	2499	173	2488	198	2593
124	2664	149	2603	174	2473	199	2607
125	2498	150	2556	175	2550	200	2631

APPENDIX - XII

HEIGHT, WEIGHT AND BODY MASS INDEX (BMI) OF THE WOMEN (200)

Sl No	Height (cm)	Weight (kg)	BMI	Sl No	Height (cm)	Weight (kg)	BMI
1	154	37	15 60	26	145	33	16 88
2	130	37	15 14	27	146	30	19 17
3	154	40	21 89	28	153	44	15 61
4	152	39	18 55	29	151	39	17 33
5	153	46	15 64	30	145	36	19 28
6	150	38	17 36	31	143	32	20 54
7	151	42	16 86	32	155	46	18.61
8	157	45	16 88	33	153	34	17 35
9	152	39	16 44	34	144	32	19 47
10	156	38	19 65	35	147	39	19 14
11	136	38	16 88	36	148	35	17 34
12	146	37	20 31	37	145	33	15 14
13	148	37	14 07	38	153	35	19 53
14	159	48	18 66	39	151	40	16 89
15	147	33	20 24	40	159	48	18 98
16	153	45	18 42				
17	152	43	17 80	41	152	35	23 07
18	147	35	18 61	42	154	44	18 36
19	152	35	15 69	43	143	32	15 27
20	154	40	15 58	44	144	36	18 98
21	143	36	18 36	45	152	38	19 22
22	147	36	15 80	46	160	52	16 19
23	141	34	18 25	47	146	30	18 61
24	145	31	17 70	48	157	46	16 19
25	148	32	18 42	49	137	38	15 14
				50	148	39	16 86

S1 No	Height (cm)	Weight (kg)	BMI	S1 No	Height (cm)	Weight (kg)	BMI
51	152	43	17 60	76	150	36	20 07
52	145	33	19 22	77	156	49	16 88
53	152	36	19 02	78	151	40	18 98
54	153	43	16 88	79	153	34	18 90
55	153	37	15 64	80	158	48	22 98
56	154	42	16 65	81	145	35	19 04
57	158	46	16 00	82	130	37	19 29
58	148	42	20 13	83	148	39	19 22
59	150	39	17 54	84	155	46	14 95
60	161	50	14 52	85	152	46	18 54
61	152	43	19 22	86	159	48	18 17
62	152	45	16 64	87	153	35	19 11
63	160	49	21 89	88	149	38	15 60
64	148	38	17 80	89	148	35	18 61
65	152	35	19 14	90	153	34	18 36
66	160	50	19 90	91	157	40	17 10
67	130	39	18 98	92	150	36	18 82
68	153	43	16 65	93	144	29	17 06
69	159	48	14 95	94	153	47	14 74
70	147	35	17 11	95	150	38	14 60
71	153	45	15 97	96	159	48	15 69
72	145	40	14 52	97	156	46	17 10
73	152	39	16 22	98	130	38	14 07
74	143	32	16 00	99	152	44	18 79
75	147	36	13 98	100	151	44	17 10

S1 No	Height (cm)	Weight (kg)	BMI	S1 No	Height (cm)	Weight (kg)	BMI
101	158	48	16 44	126	151	37	18 55
102	153	35	15 95	127	152	36	18 90
103	145	39	19 65	128	150	35	21 30
104	152	42	18 42	129	153	43	19 29
105	150	43	18 36	130	145	35	20 07
106	154	37	15 97	131	148	39	19 04
107	152	43	18 25	132	152	43	15 43
108	153	43	22 48	133	154	44	19 17
109	158	47	18 61	134	156	46	21 89
110	155	41	15 30	135	150	48	18 91
111	151	39	17 12	136	151	44	14 52
112	152	38	15 64	137	153	47	19 22
113	146	34	18 36	138	152	44	18 26
114	153	46	21 33	139	148	42	19 28
115	158	46	20 13	140	130	37	13 98
116	153	43	16 65	141	149	42	19 65
117	148	35	19 14	142	153	34	16 65
118	157	45	16 22	143	158	48	15 69
119	130	38	14 52	144	148	40	17 11
120	152	43	15 58	145	153	45	13 69
121	140	30	15 55	146	144	29	18 82
122	153	43	18 36	147	153	46	15 15
123	150	48	16 64	148	147	36	18 79
124	156	49	17 80	149	145	33	18 10
125	147	36	18 61	150	149	38	17 28

Sl No	Height (cm)	Weight (kg)	BMI	Sl No	Height (cm)	Weight (kg)	BMI
151	143	28	15 95	176	151	37	19 22
152	158	47	18 98	177	160	52	18 13
153	143	31	18 04	178	137	38	19 53
154	153	44	18 79	179	153	45	17 34
155	141	36	17.11	180	154	43	18 61
156	154	41	19 14	181	160	50	17 36
157	146	34	16 19	182	148	38	18 19
158	159	48	16 00	183	152	43	18 98
159	153	44	18 54	184	144	36	17 54
160	149	38	15 97	185	149	42	19 90
161	155	46	16 22	186	159	48	18 98
162	147	35	15 76	187	151	40	17 54
163	150	36	15 95	188	152	46	14 75
164	145	39	17 11	189	159	48	20 07
165	157	40	16 00	190	151	40	16 02
166	149	35	19 53	191	154	35	18 17
167	146	34	18 22	192	153	47	14 95
168	149	38	17 48	193	154	38	15 69
169	150	36	17 59	194	152	42	18 82
170	160	50	20 54	195	145	33	20 13
171	150	41	15 97	196	158	47	17 10
172	155	42	16 22	197	156	49	16 88
173	145	37	20 31	198	151	39	17 54
174	136	38	15 69	199	152	39	18 98
175	148	35	20 24	200	153	44	18 79

APPENDIX - XIII

WAIST CIRCUMFERENCE, HIP CIRCUMFERENCE AND WAIST-HIP RATIO (WHR)
OF THE WOMEN (200)

Sl No	Waist (inch)	HIP (inch)	WHR	Sl No	Waist (inch)	HIP (inch)	WHR
1	24	29	0 82	26	25	34	0 73
2	21	24	0 87	27	23	31	0 74
3	24	30	0 80	28	28	32	0 87
4	24	29	0 82	29	25	35	0 71
5	26	33	0 78	30	22	27	0 81
6	24	30	0 80	31	21	26	0 80
7	26	30	0 86	32	28	33	0 84
8	27	32	0 84	33	24	33	0 72
9	24	29	0 82	34	28	33	0 84
10	24	28	0 85	35	24	32	0 75
11	20	27	0 74	36	23	27	0 85
12	21	26	0 80	37	23	27	0 85
13	23	28	0 82	38	24	29	0 82
14	29	33	0 87	39	23	32	0 71
15	29	34	0 85	40	29	33	0 87
16	27	32	0 84				
17	27	31	0 87	41	25	30	0 83
18	24	29	0 82	42	27	32	0 84
19	25	31	0 80	43	21	26	0 80
20	24	30	0 80	44	20	25	0 80
21	22	26	0 84	45	25	35	0 71
22	22	27	0 81	46	29	33	0 87
23	22	27	0 81	47	30	31	0 64
24	22	28	0 78	48	27	32	0 84
25	24	33	0 72	49	22	29	0 75
				50	25	33	0 75

Sl No	Waist (inch)	HIP (inch)	WHR	Sl No	Waist (inch)	HIP (inch)	WHR
51	30	35	0 85	76	25	30	0 83
52	23	27	0 85	77	28	34	0 82
53	22	27	0 81	78	23	32	0 71
54	29	33	0 87	79	24	33	0 72
55	26	32	0 81	80	28	32	0 87
56	25	32	0 78	81	24	32	0 75
57	28	34	0 82	82	23	26	0 88
58	29	34	0 85	83	25	33	0 75
59	25	30	0 83	84	28	33	0 84
60	28	32	0 87	85	27	33	0 81
61	26	30	0 86	86	29	34	0 85
62	28	34	0 82	87	24	29	0 82
63	29	35	0 82	88	25	29	0 86
64	26	34	0 76	89	25	28	0 89
65	25	31	0 80	90	26	34	0 76
66	28	31	0 90	91	25	29	0 86
67	21	26	0 80	92	23	78	0 82
68	29	33	0 87	93	24	31	0 77
69	29	33	0 87	94	28	34	0 82
70	21	25	0 84	95	24	30	0 80
71	27	32	0 84	96	29	33	0 87
72	23	30	0 76	97	28	33	0 84
73	24	29	0 82	98	21	25	0 84
74	21	26	0 80	99	29	34	0 85
75	22	27	0 81	100	26	33	0 78

S1 No	Waist (inch)	HIP (inch)	WHR	S1 No	Waist (inch)	HIP (inch)	WHR
101	28	32	0 87	126	26	31	0 84
102	25	30	0 83	127	22	26	0 85
103	24	30	0 80	128	23	27	0 87
104	30	35	0 85	129	29	22	0 75
105	30	34	0 88	130	24	32	0 75
106	24	29	0 82	131	25	33	0 87
107	28	32	0 87	132	27	31	0 84
108	29	33	0 87	133	27	32	0 84
109	29	34	0 85	134	22	33	0 88
110	23	31	0 74	135	30	34	0 78
111	24	32	0 75	136	26	33	0 82
112	24	35	0 71	137	28	34	0 85
113	23	27	0 85	138	29	34	0 85
114	26	33	0 78	139	29	34	0 84
115	28	34	0 82	140	22	26	0 85
116	29	33	0 87	141	29	34	0 72
117	25	28	0 89	142	24	33	0 87
118	27	32	0 84	143	28	32	0 93
119	21	25	0 84	144	30	32	0 84
120	30	35	0 85	145	27	32	0 83
121	22	25	0 88	146	24	31	0 77
122	29	33	0 87	147	26	33	0 78
123	32	33	0 96	148	22	27	0 81
124	28	34	0 82	149	29	34	0 85
125	22	25	0 88	150	25	29	0 86

Sl No	Waist (inch)	HIP (inch)	WHR	Sl No	Waist (inch)	HIP (inch)	WHR
151	23	30	0 76	176	26	31	0 83
152	29	34	0 85	177	30	33	0 90
153	23	32	0 71	178	22	29	0 75
154	28	32	0 87	179	27	32	0 84
155	22	28	0 78	180	24	35	0 68
156	24	33	0 72	181	28	31	0 90
157	20	24	0 83	182	26	34	0 74
158	29	34	0 85	183	27	31	0 87
159	23	30	0 76	184	20	25	0 80
160	25	29	0 86	185	29	34	0 85
161	28	33	0 84	186	29	33	0 87
162	21	25	0 84	187	24	32	0 75
163	23	28	0 82	188	27	33	0 81
164	24	30	0 80	189	29	33	0 87
165	24	29	0 82	190	24	33	0 72
166	22	27	0 81	191	25	34	0 73
167	24	28	0 85	192	28	34	0 82
168	25	29	0 86	193	24	29	0 82
169	25	30	0 83	194	30	35	0 85
170	28	31	0 90	195	25	34	0 73
171	23	27	0 85	196	29	34	0 85
172	24	31	0 77	197	28	34	0 82
173	20	26	0 76	198	24	32	0 75
174	20	28	0 71	199	26	35	0 74
175	23	29	0 79	200	28	33	0 84

APPENDIX - XIV

MID-UPPER ARM CIRCUMFERENCE (MUAC) AND TRICEPS SKINFOLD (TSF)
THICKNESS OF THE WOMEN (200)

Sl No	MUAC (cm)	TSF (mm)	Sl No	MUAC (cm)	TSF (mm)
1	22	8	26	23	10
2	21	6	27	22	8
3	25	10	28	25	11
4	23	8	29	24	10
5	25	12	30	22	6
6	24	9	31	21	6
7	24	11	32	26	11
8	24	12	33	22	9
9	23	8	34	23	9
10	22	8	35	22	9
11	22	6	36	29	6
12	20	6	37	21	7
13	23	7	38	22	9
14	25	12	39	22	8
15	23	9	40	25	12
16	25	12			
17	25	11	41	22	8
18	24	8	42	23	11
19	22	9	43	21	6
20	25	10	44	20	6
21	21	6	45	24	10
22	23	6	46	26	13
23	22	6	47	21	8
24	20	5	48	25	12
25	23	9	49	23	6
			50	24	9

S1 No	MUAC (cm)	TSF (mm)	S1 No	MUAC (cm)	TSF (mm)
51	27	11	76	22	8
52	21	7	77	23	10
53	22	6	78	22	8
54	23	11	79	22	9
55	23	8	80	25	11
56	24	10	81	23	8
57	25	13	82	21	6
58	24	10	83	24	9
59	24	9	84	26	11
60	27	12	85	24	10
61	24	11	86	25	12
62	26	12	87	22	9
63	26	12	88	24	8
64	23	10	89	22	9
65	22	9	90	22	8
66	27	12	91	24	8
67	20	5	92	22	10
68	23	12	93	22	8
69	25	12	94	25	10
70	21	6	95	24	9
71	25	12	96	25	12
72	22	9	97	26	12
73	23	8	98	20	5
74	21	6	99	26	12
75	22	6	100	24	11

S1 No	MUAC (cm)	TSF (mm)	S1 No	MUAC (cm)	TSF (mm)
101	25	10	126	22	9
102	23	9	127	23	6
103	22	8	128	22	7
104	27	11	129	24	12
105	26	11	130	24	8
106	22	8	131	24	9
107	23	11	132	24	11
108	23	12	133	23	11
109	26	12	134	26	12
110	25	9	135	26	10
111	22	9	136	24	11
112	24	10	137	25	10
113	21	8	138	26	12
114	25	12	139	24	10
115	25	13	140	21	6
116	23	11	141	24	11
117	22	9	142	22	9
118	24	12	143	25	11
119	20	5	144	23	9
120	27	11	145	25	12
121	20	5	146	22	8
122	23	11	147	25	12
123	26	9	148	23	6
124	23	10	149	24	10
125	21	8	150	24	8

S1 No	MUAC (cm)	TSF (mm)	S1 No	MUAC (cm)	TSF (mm)
151	22	7	176	22	9
152	26	12	177	26	13
153	22	7	178	23	6
154	23	11	179	25	12
155	22	8	180	23	10
156	23	8	181	26	12
157	20	6	182	23	10
158	25	12	183	24	11
159	24	9	184	20	6
160	24	8	185	24	11
161	26	11	186	25	12
162	22	6	187	21	8
163	22	8	188	24	10
164	23	8	189	25	12
165	24	8	190	23	8
166	21	8	191	21	9
167	21	9	192	25	10
168	24	8	193	23	8
169	22	8	194	27	11
170	27	12	195	23	10
171	24	10	196	26	12
172	22	9	197	24	10
173	21	6	198	21	9
174	21	6	199	24	9
175	22	8	200	25	11

APPENDIX - XV

HAEMOGLOBIN LEVEL (gms/100ml) OF THE RESPONDENTS (200)

Sl No	Sl No	Sl No	Sl No
1	13 34	26	9 86
2	11 47	27	11 47
3	13 54	28	8 92
4	13 34	29	11 28
5	10 58	30	8 87
6	12 51	31	10 47
7	12 53	32	10 51
8	10 51	33	11 31
9	12 86	34	12 51
10	9 01	35	8 81
11	9 58	36	10 05
12	9 96	37	12 82
13	9 58	38	8 92
14	13 52	39	12 86
15	9 57	40	10 83
16	9 46	-----	66
17	13 34	41	10 52
18	11 31	42	11 76
19	13 34	43	10 20
20	10 58	44	11 48
21	12 00	45	8 88
22	11 32	46	11 48
23	10 58	47	8 00
24	9 56	48	12 62
25	12 81	49	9 20
		50	12 00

Sl No	Sl No	Sl No	Sl No	Sl No	Sl No	Sl No	Sl No
101	12 72	126	13 20	151	10 52	176	15 00
102	9 88	127	13 28	152	10 58	177	11 20
103	12 00	128	11 48	153	11 02	178	10 00
104	11 42	129	13 44	154	12 88	179	13 20
105	11 46	130	10 58	155	10 20	180	10 20
106	10 58	131	10 52	156	13 20	181	13 16
107	11 20	132	12 96	157	9 14	182	10.58
108	14 00	133	11 46	158	11 42	183	13 16
109	12 86	134	12 96	159	12 00	184	7 12
110	13 62	135	11 48	160	11 46	185	12 92
111	10 58	136	13 16	161	10 58	186	10 52
112	12 62	137	12 88	162	9 82	187	11 48
113	10 52	138	12 88	163	15 00	188	13 16
114	11 20	139	13 16	164	11 48	189	11 00
115	10 62	140	6 16	165	10 58	190	13 20
116	12 62	141	11 48	166	10 88	191	11 20
117	15 00	142	11 42	167	10 58	192	10 58
118	10.58	143	11 20	168	11 00	193	10.20
119	6 88	144	10 58	169	11 42	194	12 88
120	13 28	145	11 46	170	14 00	195	15 00
121	8 92	146	10 88	171	10 56	196	15 88
122	10 58	147	10 58	172	11 42	197	12 88
123	11 20	148	11 42	173	9 92	198	13 16
124	14 00	149	11 48	174	11 20	199	11 48
125	10 88	150	12 88	175	11 42	200	11 46

ACTUAL FOOD INTAKE OF THE RESPONDENTS (40)

Food item (in grams)	Details of women																																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
Cereals	320	328	325	315	326	306	316	328	279	330	325	339	300	348	300	205	308	314	330	350	320	305	316	300	319	323	320	325	332	317	300	317	280	310	325	320	325	305	316	-	
Pulses	-	-	-	25	-	-	-	-	10	-	-	10	-	-	10	-	-	-	-	-	-	-	25	-	-	-	-	20	-	-	20	15	-	-	15	-	-	20	-	-	
Green leaf vegetables	-	-	-	-	-	-	15	-	-	-	-	-	-	-	-	-	18	-	-	20	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	20	-	-	
Other vegetables	20	-	-	-	-	-	-	-	30	-	-	-	-	-	20	-	-	-	-	-	-	15	-	-	15	-	-	-	-	-	-	20	-	-	-	-	-	-	15	-	
Roots/tuber	-	50	-	-	-	50	-	-	-	20	-	-	25	-	35	-	-	-	-	-	40	-	-	-	-	-	-	-	-	25	-	-	40	-	-	-	-	-	-	80	
Milk (ml)	110	105	100	100	85	110	100	120	100	110	130	130	125	100	105	110	115	120	120	100	120	110	150	100	130	120	115	110	90	100	100	105	120	100	110	90	105	100	115	100	
Oilseeds	33	25	40	40	30	25	31	30	28	25	31	20	26	25	20	28	30	25	30	30	25	35	30	25	32	30	29	25	31	25	32	33	30	32	30	28	25	28	25	30	
Oil	10	-	10	15	15	10	10	-	15	15	-	10	-	-	15	15	10	5	10	10	15	10	10	10	15	10	15	10	10	10	10	-	10	10	10	10	15	10	10	-	
Fish	60	60	62	-	56	45	43	60	61	65	61	65	60	63	62	60	60	65	64	65	65	68	60	60	63	70	73	-	75	75	74	40	30	20	25	50	30	40	60	50	
Sugar / Jaggery	35	30	40	25	20	30	20	15	20	20	42	25	35	20	40	20	35	30	35	25	40	20	25	20	40	20	30	20	15	50	40	30	20	35	15	35	25	15	35	35	
Fruits	-	-	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-

APPENDIX - IVII

ACTUAL NUTRIENT INTAKE OF THE RESPONDENTS (40)

Nutrient	Details of women																																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Energy (Kcal)	1695	1632	1940	1662	1711	1684	1626	1529	1550	1719	1678	1681	1498	1666	1720	1141	1666	1468	1765	1763	1688	1637	1753	1446	1736	1660	1663	1600	1635	1779	1721	1595	1539	1586	1667	1682	1716	1621	1543	580
Protein (gm)	58	60	98	38	60	61	62	56	57	61	65	75	54	62	60	23	63	33	63	66	59	58	63	61	63	54	59	37	63	59	64	56	57	54	62	63	60	64	55	37
Fat (gm)	15	19	17	28	16	20	14	12	15	14	13	17	17	18	12	12	12	13	12	12	15	18	13	19	13	16	18	13	19	21	14	18	12	21	20	18	18	18	16	17
Calcium (mg)	293	299	2392	189	788	324	292	281	772	301	332	449	294	280	310	160	311	261	310	296	318	284	353	290	325	274	293	194	311	263	295	655	318	257	300	282	325	292	278	290
Iron (mg)	13	14	27	11	17	13	13	13	15	13	14	21	12	14	13	8	13	10	14	14	13	13	15	13	13	12	13	11	14	13	14	15	12	12	14	13	13	14	12	5
Carotene (ug)	231	251	203	222	197	219	220	238	231	221	255	334	264	205	219	216	228	1457	258	205	293	219	333	201	255	249	229	239	202	198	227	225	249	202	235	185	1335	227	228	236
Thiamine (mg)	0.94	0.98	0.94	1.33	0.95	1.17	0.92	0.96	0.87	0.96	0.95	1.78	0.9	1.00	0.93	0.63	0.90	0.93	0.97	1.01	0.97	0.89	1.07	0.87	0.94	0.95	0.93	1.30	0.93	0.96	0.97	0.99	0.85	0.90	1.01	0.92	0.96	0.98	0.92	0.12
Niacin (mg)	12.4	10.1	10.4	10.5	12.8	10.4	10.7	10.3	10.0	10.0	14.2	16.3	10.3	15.6	13.9	8.5	8.5	10.0	5.3	12.2	10.7	10.9	10.5	6.2	6.8	6.0	6.5	10.7	10.0	10.9	10.4	11.5	10.2	8.8	13.9	5.01	3.0	3.6	3.8	4.8
Riboflavin (mg)	0.64	0.61	0.62	0.67	0.60	0.65	0.61	0.65	0.61	0.65	0.66	0.87	0.61	0.63	0.64	0.48	0.61	0.63	0.67	0.84	0.65	0.61	0.78	0.57	0.66	0.66	0.63	0.67	0.62	0.57	0.61	0.65	0.65	0.59	0.66	0.58	0.69	0.62	0.62	0.22
Vitamin C	5.1	2.3	2.4	2.4	3.7	14.9	20.9	2.7	5.8	7.4	2.9	2.8	2.7	2.2	11.0	7.2	2.6	4.2	4.4	2.3	27	2.5	20.9	2.2	2.9	4.5	2.5	2.4	72.1	14.5	2.5	2.4	15.1	2.3	2.5	2.08	23.1	2.4	2.5	2.3

APPENDIX - XVIII

CELLULAR CONSTITUENTS (RBC, PCV, DC, TIBC) PRESENT IN
BLOOD COLLECTED FROM THE WOMEN (40)

Sl No	RBC (million per cu mm) Red Blood cell	PCV (%) Packed cell volume	Differential count (DC) of leucocytes (%)			TIBC (UG/100 ml) (Total iron Binding capacity)
			Neutrophil polymorphs	Lymphocytes	Eosinophils	
1	3 6	34	48	51	1	327
2	4 2	39	78	44	8	355
3	4 3	39	53	33	14	366
4	4 7	38	56	26	18	380
5	3 4	31	85	30	5	349
6	4 9	39	52	34	14	355
7	4 0	38	66	26	8	261
8	3 2	28	44	46	10	427
9	3 4	31	65	30	5	349
10	4 8	38	56	26	18	383
11	3 1	27	78	52	10	450
12	3 1	29	53	40	7	427
13	3 9	29	40	54	6	372
14	3 4	31	65	30	5	349
15	3 1	32	62	30	8	494
16	3 2	37	51	40	9	450
17	4 3	39	53	33	14	366
18	4 7	38	56	26	18	380
19	4 6	37	56	26	18	383
20	3 4	32	76	40	14	411

Sl No	RBC (million per cu mm) Red Blood cell	PCV (%) Packed cell volume	Differential count (DC) of leucocytes (%)			TIBC (UG/100 ml) (Total iron Binding capacity)
			Neutrophil polymorphs	Lymphocytes	Eosinophils	
21	2 9	27	50	34	16	472
22	2 8	26	60	36	4	411
23	2 9	29	40	54	6	372
24	3 1	29	53	40	7	449
25	4 8	40	50	38	12	366
26	4 8	38	56	26	18	383
27	4 6	37	56	26	18	382
28	3 7	34	44	36	10	483
29	4 1	37	52	42	6	266
30	3 1	26	70	24	6	477
31	2 9	27	50	34	16	472
32	3 1	30	55	38	7	466
33	3 8	31	38	54	8	227
34	3 5	33	82	40	8	355
35	3 8	31	60	22	18	411
36	2 8	27	40	55	15	494
37	3 4	29	36	52	12	427
38	3 7	34	44	46	10	483
39	3 4	32	76	40	14	411
40	4 0	38	66	26	8	261

APPENDIX - XIX

NUTRITIONAL STATUS INDEX (NSI) OF THE RESPONDENTS (200)

Sl No	Score	Sl No	Score	Sl No	Score	Sl No	Score
1	22 55	25	24 19	51	25 23	76	23 87
2	20 86	26	24 48	52	21 65	77	25 65
3	25 49	27	24 05	53	22 01	78	23 51
4	24 16	28	24 40	54	24 88	79	24 13
5	24 25	29	24 61	55	22 75	80	26 85
6	23 89	30	21 53	56	23 57	81	23 44
7	24 64	31	21 42	57	26 14	82	20 04
8	24 46	32	24 82	58	26 43	83	24 41
9	22 54	33	23 18	59	23 26	84	24 11
10	24 43	34	24 22	60	25 40	85	24 88
11	20 35	35	23 87	61	25 30	86	26 39
12	21 85	36	21 31	62	26 10	87	24 21
13	20 94	37	20 79	63	27 13	88	23 05
14	25 74	38	23 87	64	24 12	89	23 31
15	24 74	39	22 87	65	24 53	90	24 56
16	25 29	40	26 66	66	27 76	91	23 02
17	25 09	41	24 54	67	20 70	92	23 58
18	23 90	42	25 20	68	24 93	93	24 01
19	23 86	43	20 36	69	25 61	94	24 25
20	22 94	44	21 82	70	20 85	95	22 38
21	21 06	45	24 00	71	25 16	96	25 87
22	20 51	46	25 75	72	22 28	97	25 95
23	21 37	47	21 47	73	22 47	98	19 99
24	21 00	48	25 27	74	21 97	99	25 88
		49	20 50	75	20 13	100	25 42
		50	23 92				

Sl No	Score	Sl No	Score	Sl No	Score	Sl No	Score
101	25 14	126	24 74	151	21 51	176	25- 59
102	22 51	127	23 05	152	25 89	177	26 34
103	23 92	128	23 47	153	22 65	178	22 06
104	25 72	129	26 63	154	25 83	179	25 67
105	25 47	130	23 62	155	21 81	180	24 41
106	22 39	131	24 00	156	24 89	181	26 03
107	25 00	132	24 58	157	20 02	182	24 44
108	27 75	133	25 32	158	25 39	183	25 68
109	26 62	134	27 26	159	24 09	184	19 81
110	23 82	135	25 69	160	22 74	185	26 36
111	23 30	136	24 51	161	24 50	186	25 81
112	24 34	137	26.07	162	20 46	187	23 56
113	22 36	138	26 25	163	23 61	188	24 58
114	26 11	139	25 99	164	22 99	189	26 30
115	26 30	140	18 47	165	22 58	190	23 87
116	25 34	141	25 76	166	22 82	191	24 15
117	24 93	142	23 48	167	22 83	192	24 00
118	24 49	143	24 60	168	23 00	193	22 20
119	18 44	144	24 03	169	23 27	194	26 37
120	25 62	145	23 98	170	27 25	195	26 02
121	19 61	146	23 01	171	22 50	196	27 29
122	25 08	147	24 10	172	23 44	197	25 55
123	24 84	148	22 32	173	21 81	198	24 37
124	26 23	149	24 67	174	20 99	199	24 82
125	22 29	150	23 64	175	23 57	200	25 44

APPENDIX - XX

WORK OUTPUT OF THE RESPONDENTS (40)

(Work output = Metre of yarn produced during observedn hour)

1	560	21	560
2	509	22	525
3	560	23	509
4	560	24	467
5	509	25	560
6	525	26	494
7	509	27	525
8	495	28	467
9	525	29	525
10	467	30	467
11	467	31	509
12	495	32	509
13	495	33	525
14	560	34	560
15	467	35	467
16	467	36	509
17	560	37	560
18	525	38	467
19	560	39	560
20	509	40	509

APPENDIX - XXI

INITIAL AND FINAL PULSE RATE OF THE RESPONDENTS (40)

Sl No	Pulse Rate		Sl No	Pulse rate	
	Initial	Final		Initial	Final
1	76	80	21	70	74
2	76	82	22	74	82
3	72	78	23	78	84
4	76	82	24	80	84
5	74	80	25	76	80
6	74	78	26	80	86
7	72	82	27	74	82
8	78	84	28	80	86
9	76	82	29	76	82
10	82	88	30	82	88
11	82	88	31	78	86
12	78	84	32	78	84
13	78	84	33	72	78
14	70	76	34	74	78
15	80	86	35	82	88
16	82	88	36	78	86
17	76	80	37	76	82
18	76	84	38	84	88
19	76	80	39	76	80
20	76	84	40	78	84

APPENDIX - XXII

INITIAL AND FINAL BLOOD PRESSURE OF THE RESPONDENTS (40)

Sl No	Blood pressure			
	Systole		Diastole	
	Initial	Final	Initial	Final
1	102	110	72	76
2	102	112	72	76
3	114	120	64	68
4	120	128	70	74
5	112	116	80	82
6	114	120	72	76
7	112	120	82	84
8	120	128	80	82
9	110	116	74	78
10	126	132	80	82
11	122	130	84	86
12	124	128	82	86
13	130	140	84	86
14	116	122	70	74
15	132	146	88	90
16	130	138	80	84
17	110	120	72	76
18	120	130	70	74
19	112	120	72	74
20	112	120	82	84

Sl No	Blood plessure			
	Systole		Diastole	
	Initial	Final	Initial	Final
21	116	122	74	76
22	118	126	80	82
23	112	120	70	74
24	142	146	84	86
25	114	118	76	78
26	128	134	84	86
27	104	110	72	76
28	132	136	80	82
29	102	118	78	82
30	136	242	84	86
31	126	132	80	82
32	128	136	80	82
33	118	126	70	72
34	112	116	70	74
35	142	146	94	96
36	132	136	80	82
37	104	108	72	76
38	140	144	90	92
39	118	124	70	72
40	124	130	82	84

NUTRITIONAL STATUS OF WOMEN ENGAGED IN THE COIR INDUSTRY

BY

LOVELY RANGANATH

**ABSTRACT OF THE THESIS SUBMITTED
IN PARTIAL FULFILMENT OF THE REQUIREMENT
FOR THE DEGREE OF
MASTER OF SCIENCE IN HOME SCIENCE
(FOOD SCIENCE AND NUTRITION)
FACULTY OF AGRICULTURE
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**DEPARTMENT OF HOME SCIENCE
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1996

ABSTRACT

The study entitled **Nutritional status of women engaged in the coir industry** was carried out to assess the nutritional status of women engaged in the spinning of coir yarn and to find out its influence on the work output, which in turn could affect their socio-economic status

For the evaluation of nutritional status, the study was conducted in two levels - on a macro sample of 200 coir workers and on a microsample of 40 women coir workers

Details of the socio-economic survey showed that the majority of families were small nuclear type, headed by male members following Hinduism

The main occupation of the community was coir work and in all the families at least one woman was employed in a coir co-operative society in the vicinity. Many of the families had a monthly income that ranged between Rs 1000 to 2000

Lack of permanent and full time employment, high cost of living, inability to educate their children, problems related to economic burdens imposed by repayment of loans and medical expenses, lack of housing facilities and absence of male earning members in the family were the important economic problems, in the order of priority, as felt by the families, which have led them to a life of miserable existence

Their poor socio-economic background is reflected in the fact that the physical amenities available to the coir worker's households left much to be desired

All the families were found to be poverty stricken when the Rural Quality of Life Index (RQLI) was calculated

The families suffered from household food insecurity that their diets were ill balanced and were deficient with respect to pulses, egg, meat, green leafy vegetables and fruits

The poverty and poor food intake by the families were reflected in the socio-economic characteristics and low nutritional status of the women coir workers though they were wage earners

The poor nutritional status is reflected in their poor stature which was suggestive of low food intake and dual responsibilities of the household as well as of the work site

Apart from this the dietary inadequacy was reflected in wide prevalence of anaemia among 85.00 per cent of the respondents, from the microsample, which was found to influence their work output

The work output and nutritional status which are inter-related seemed to be further influenced by the poor working conditions, absence of physical amenities, poor food intake,

insanitary conditions and consequent parasitic infections and infestations

However, it is gratifying to note that occupational disorders were not prevalent to an extent that merits mention

The coir workers, when spin the 'golden yarns' of the economic and social fabric of the State of Kerala, the land of palms, are found to be treading through a path of poverty and food insecurity leading them to poor nutritional and health status. This makes them a vulnerable lot needing economical social support from the rest of the population and from the Government, through a multidimensional approach, so that they may have better health and nutritional status so as to become the torch bearers of our heritage, who may boost our economy paving way to healthy descendants