NUTRITIONAL PROFILE OF PRESCHOOL CHILDREN BELONGING TO TRIBAL FAMILIES IN THRISSUR DISTRICT

by

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THESIS

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2016

DECLARATION

I hereby declare that the thesis entitled "**Nutritional profile of preschool children belonging to tribal families in Thrissur district**" is a bonafide record of research work done by me during the course of research and the thesis has not previously formed during 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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INTRODUCTION

INTRODUCTION

"A healthy good child is happiness to parents, eternal joy to the mother, leader of the community, thrill of the society and hope of the nation".

(Maurya and Jaya, 1997)

India resides a variety of tribal population mirroring its great ethnic diversity. The tribal population comprising 8 per cent of the population is scattered along the hills and forest areas of the country. Tribal population is a standout since they live in an exceptional physical, socio- economic and cultural environment (Rao *et al*., 2006).

India is the native of about half of the world's tribal population. Madhya Pradesh is having the highest number of tribals in India. According to 2011 census the scheduled tribe population of Kerala is 4.84 lakhs, which constitutes 1.14 per cent of the total population and is unevenly distributed in the districts. In Kerala, tribal population is found in Idukki, Palakkad, Wayanad and Kasaragod regions. The tribal population of Thrissur district contributes to 0.15 % of the total tribal population of Kerala. Among the 35 tribal communities in the state, the numerically largest are *Paniyans, Kurichians, Kurumans, Maratis, Kanikarans* and *Irulars*. *Kadars* and *Malayans* are the tribal groups seen in Thrissur district (Government of Kerala, 2000).

Tribal population is at a higher risk of under nutrition because of their dependence on primitive agricultural practices, irregularity of food supply, poverty, poor hygiene and unhealthy habits. Apart from this, tribal population also suffers from chronic infections and deficiency disorders. Infant mortality is high in tribal areas. Malnutrition affects the health of children as it lowers the ability to resist infection, leads to chronic illness and sometimes leads to brain impairment.

The children of age 4 – 6 years are the most sensitive section of a population and have a higher rate of morbidity and mortality (Gupta and Shukla, 1992). The period of preschool age requires a foremost importance as this period

establishes the framework for lifetime, health, strength and intellectual vitality. A child, who has failed to grow during this critical period, may not make up the loss in growth even with an excellent diet in later life (Jood *et al.,* 2000). Malnutrition during this period will result in stunted growth which will affect the all round development of the child.

Right nutrition at right time is an essential requirement of all human beings for the proper growth and development. Nutrition constitutes the establishment for human development, by decreasing vulnerability to infections, diminishing morbidity, disability and mortality, enhancing cumulative lifelong learning capacities and adult productivity. Undernutrition causes irreversible cumulative growth and development deficits. It also affects the accomplishment of optimal learning outcomes in education and gender equality. A person, who is deprived of proper nutrition, may face multiple disabilities and his productivity reduces drastically, so it is critical to arrest undernutrition, as early as possible, across the life cycle.

Growth performances of the children are of utmost importance as an index of nutritional status for the community. Proper nutritional status is an important factor which determines the rate of morbidity and mortality. Nutritional status is closely related to the proper physical well being and maintenance of normal health. Slowing or cessation of growth is one of the noticeable reactions of nutritional inadequacy.

Therefore, the present study is proposed

1. To know the socio-economic status and food consumption pattern of tribal families
2. To assess the dietary habits and nutritional status of preschool children belonging to the age group of 4 to 6 years.

REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

The review of literature pertaining to the study **"Nutritional profile of preschool children belonging to tribal families in Thrissur district"** is presented under the following headings:

2.1. Demographic profile of tribes in India
2.2. Socio economic conditions of tribes
2.3. Significance of preschool age
2.4. Prevalence of malnutrition with special reference to preschool children
2.5. Factors influencing the nutritional status of tribal preschool children
2.6. Food consumption pattern of tribal communities and preschool children
2.7. Food security among tribal communities

2.1. Demographic profile of tribes in India

The word 'tribe', according to Basu (2000) is described as "a social division of a people, especially of a barbaric people, defined in terms of common descent, territory, culture, etc". *Adivasi, vanyajati, vanvasi, pahari, adimjati* and *anusuchit jan jati* are the names which are often used to indicate tribals. As described by Kerala Institute for Research, Training and Developmental Studies (KIRTADS, 2001) "a tribe is a collection of families bearing a common name, speaking a common dialect, occupying or professing to occupy a common territory". They follow tribal tradition, beliefs, customs and are illiberal of naturalization of ideas from alien sources. Tribes can be said as "a primary group of individuals living under primitive or barbarous conditions under a headman or a chief" (Vasudevachary, 2006).

India resides a number of tribal communities. More than 100 million people belonging to 698 communities are recognised as scheduled tribes, constituting ten per cent of India's total population and are larger than that of any other country in the world. The total Indian tribal population is

10, 45, 45,716 and that of Kerala is 4, 84,839, which form nearly 8 per cent of the total Indian population (Census of India, 2011). According to Vasudevachary (2006) there are 427 types among the scheduled tribes dwelling all over India.

In Kerala, though all the districts account for some tribal population, they are significantly found in Idukki, Palakkad, Wayanad and Kasaragod districts (Government of Kerala, 2000). Thrissur, the cultural capital of Kerala is residing only 9430 tribal population. The important tribal groups in Thrissur district are *Kadar* and *Malayar* (Census of India, 2011).

Tribals do not have a strong male preference when compared to their non tribal counterparts. The tribal sex ratio is higher than that of the general population (Bhasin, 2007). The sex ratio among tribal preschool children in Kerala was 996 females for 1000 males (Economic Review, 2003).

The average family size of tribals in India is 5.2 (Census of India, 2001). NNMB (2006) reported that majority of the tribals belonged to Hindu religion in Kerala while the proportion of Christians was higher in Orissa, Andhra Pradesh and West Bengal.

2.2.Socio economic conditions of tribes

Tribes are a standout amongst the underprivileged heaps of the state (Government of Kerala, 2000). Even though Kerala is a state having low poverty level, about half of its tribal population is living under poverty conditions (Nithya, 2013).

Tribal groups in Kerala are having low levels of education. Higher dropouts were because of poor working of the tribal schools, poor availability and educating in provincial dialects which is not the same of tribal groups (Sam, 2001). Zaccharia (2002) in his study found that nearly 53 per cent of the tribal population surveyed don't know even the name of the country they live.

Kerala being highly literate state is having only 1.45 per cent of tribal literacy rate (Census of India, 2011). The Kadars of Thrissur have a difficulty in accessing the schools within five kilometres which can affect their education level (Niju, 2013).

Tribals of Kerala own less areas of land. This is because of the land alienation of tribal land to non tribals. Indebtness were more in the tribes earlier, to clear it the land owned were sold (Niju, 2013).

Generally tribes in Kerala do not stick on to any one particular occupation. They usually change their occupation from one to another depending upon the availability of jobs, climatic conditions and variation in seasons (Mercy, 2005).

Tribals were forced to work as agricultural labourers as a result of several policies of the state and intervention of outsiders which caused land alienation process (Bijoy and Raman, 2003). The authors also opined that the land alienation process worsened the socio economic situations of the tribes in Kerala.

In the study conducted by Chandran (2012), the housing conditions of the tribal population were analysed in the period from 2001 to 2011 and was found that there was remarkable progress in the housing and basic amenities such as access to safe drinking water, electricity etc.

2.3. Significance of preschool age

About 15 per cent of the total population of the country are children under the age of five. From the nutritional viewpoint, they are the susceptible group and endure the most astounding rate of morbidity and mortality (Gupta and Shukla, 1992). Many children under five die of malnutrition and also it caused serious physical growth and intellectual performance in the later life (Lloyd and Lederman, 2002).

It is during the first five years, the child grows rapidly, physically and mentally. Malnutrition during this period resulted in stunted growth which affected on his later development (UNICEF, 1990). The period between birth and five years has a crucial influence on further development of the child, it is during these preschool years that foundation of the child's life is laid, and it determines whether a child will grow into a healthy strong adult or not (World Bank, 1995).

Nutrition of the preschool child is of utmost importance, in light of the fact that this period lays the framework for lifetime, health, strength and intellectual vitality. They constitute an important group of a community and are among the most vulnerable section of the population from nutritional standpoint (Vinod *et al.*, 2011). Malnutrition during this period can cause stunting of physical growth as well as to sub optimal intellectual development and poor neuro integrative competence in children (Jood *et al.*, 2000).

The growth of children in a population reflects their nutritional status and indirectly determines their standard of living. Growth is influenced by diet intake, expenditure and general health condition of an individual. Slowing or cessation of growth is one of the first observable responses to nutritional inadequacy (Ali, 2003).

The vital conducive factors for human resource development in the country are nutrition and health (Amirthaveni and Barikor, 2002). The large sections of Indian population suffered from varying degrees of protein energy deficiency (Gopalan, 2002).Yet, undernourishment kept on being a dominant public health problem and is a cause of considerable extent of all child deaths in every years especially in developing countries like India (Black *et al.*, 2003).

The weakest gatherings of the society regarding health and nutritional status was preschool children living in rural and in urban slum areas, in which the tribal preschool children were the main victims of undernourishment (Rao *et al.*, 2006).

Preschool children are the most susceptible group of the society to the vulgaries of malnutrition. Macro and micronutrient deficiencies commonly found among preschool children give rise to a number of nutritional problems. Prabhakaran (2004) estimates that about one billion children will be growing up with impaired physical and mental development by the year 2020.

Malnourished children fail to attain their genetic potential in bodily dimensions and may develop stunting and wasting, besides other deficiency disorders (Singh and Grover, 2003). Malnutrition make children to grow as adults with poor stamina, poor mental and psychomotor competencies and this would inevitably lead to low income, low standard of living and thereby poverty and various kinds of diseases (Damayanthi, 2005).

Malnutrition among children impedes physical and cognitive growth, severe malnutrition influences brain growth and development, which affects mental capacities through damages to the nervous system. It also influences their future capacities by decreasing the energy that the children have for learning, by interfacing with their surroundings such as hindering their motor development (Rode, 2009). Malnutrition is not only influenced by the food intake but also by access to health services, care for child and pregnant mother and hygiene practices (UNICEF, 2009).

2.4. Prevalence of malnutrition with special reference to preschool children

Malnutrition keeps on being profoundly pervasive in India. But it is spurious to say that the underlying cause of all nutritional deficiencies is food shortage. Deviant food habits, food fads and fallacies etc can also contribute to deficiency disorders (Banarjee and Mandal, 2005).

India is having the highest prevalence of child under nutrition in the world, which is double that of Sub – Saharian Africa, with critical outcomes for morbidity, mortality, productivity and economic growth (Gragnolati *et al.*,

2005; NNMB, 2002). Malnutrition was a main health issue among tribal preschool children in India (Mahapatra *et al*., 2000).

WHO (2000) also stated that undernutrition among children is one of the greatest public health problems in developing countries. About 70 per cent of the world's stunted children aged less than 5 years live in Asia. Undernutrition is the factor closely associated with child mortality rates also. Peak prevalence of malnutrition among children according to Rao *et al.* (2000) was associated with wasting but not stunting.

Socioeconomic status of family affects the nutritional status (Harishankar *et al.*, 2004) especially of girls (UNICEF, 2009). Children of poor socioeconomic status had moderate and severe malnourishment (Elankumaran, 2003).

Chopra and Makol (2004) found that the common illnesses seen among children in the tribal community of Bastar district of Madhya Pradesh were anaemia, malnutrition, diarrhoeal disease and skin infections which were because of the lack of infrastructure, inaccessibility to health institutions and affordability.

Poor health and nutritional status among preschool children were noticed in Central Indian tribes like *Gond, Bisonhorn Maria, Bhatra, Abujmaria and Kamar* (Rao *et al.*, 2005).

George *et al.* (2000) conducted a study on the pattern of anaemia and its relation to nutritional status and dietary habits of preschool children and found that prevalence of anaemia was 11.4 per cent. About 46.7 per cent of children were found to be normal. The percentage of anaemic and moderately under nourished children was 16.37 per cent. Ray *et al.* (2000) reported that India is facing human resource wastage of 11 per cent by the age of 5 years. Khosla *et al.* (2000) found that there were moderately anaemic (62 per cent), mildly

anaemic (30 per cent) and severely anaemic (8 per cent) preschool children in Ludhiana district of Punjab.

Laxmaiah *et al.* (2002) documented under nutrition among 50 per cent of rural preschool children of Punjab on the basis of weight for age. The author indicated stunting and wasting respectively among 60 per cent and 12 per cent of children on the basis of height for age and weight for height. The high prevalence of malnutrition was also observed among *Gond* tribal preschool children of Madhya Pradesh (Rao *et al.*, 2005).

Deshmukh *et al.* (2007) observed that the prevalence of underweight was significantly lower when compared with WHO standards than with NCHS reference. Brains and Brar (2008) observed moderate and severe forms of under nutrition among 27 per cent preschool children belonging to farm families of Punjab.

Beck and Mishra (2011) indicated high prevalence of malnutrition among children of tribal farmers of Orissa. Pradhan and Sharma (2011) also reported 69.3 per cent under weight, 63.4 per cent stunting and 58.7 per cent wasting among tribal children of Madhya Pradesh. A study conducted by Kumar *et al.* (2015) among preschool children in Bihar reported under nutrition among 52 per cent of children in which 22 per cent were found to be severely undernourished.

Another major public health problem remains to be vitamin A deficiency which can lead to blindness and can also increases mortality among preschool children (UNICEF, 2009).

2.5. Factors influencing the nutritional status of tribal preschool children

The status of growth of children is considered as an index of the health and well being of a community (Singh and Grover, 2003). The health and nutrition problems of the vast tribal population of India are as varied as the tribal groups

themselves who present a bewildering diversity. The basic cause of malnutrition in our country is the non availability of nutritionally adequate food in the case of children especially the poor and deprived sections (Gopalan, 2002). The prevalence of under-nutrition and its associates amongst children may vary habitation wise in a single tribe (Census of India, 2001).

The high prevalence of malnutrition in tribal children was closely related with poor feeding practices. Poor feeding practices include delayed initiation of breastfeeding, low duration of exclusive breast feeding and improper weaning practices which can contribute to malnourishment in tribal preschool children (Chakrabarty *et al.*, 2006).

Even though tribals practice extended breastfeeding, there is high prevalence of malnutrition among tribal preschool children. This can be due to the ignorance and taboos on food and feeding practices, undernourishment of mothers and other socio economic conditions (Panpanich *et al.*, 2000).

Low parental education (Mikiel *et al.*, 2005) especially low level of educational status in mothers (Bertini *et al.*, 2003) and maternal employment (Dearden *et al.*, 2002) can also contribute to the poor nutritional status in tribal children.

Poor environmental sanitation and unhygienic practices can increase the risk of infections which can result in poor nutritional status of tribal preschool children (Rao *et al.*, 2005).

Sonawal (2010) opines that the seasonal migration in tribal communities can also adversely affect the health and nutritional status of the children. The author adds up that the accessibility to the forest, which was the main source of natural nutrients, was lost by the tribal communities which eventually deprived their nutritional status. Certain perception regarding child rearing practices and child's health among tribal population also have an effect in the higher prevalence of malnutrition.

Under nutrition among the tribes has been closely linked with high food insecurity, low quality of complimentary food and high burden of intestinal parasitic and other infections, low birth weight, intra-uterine growth hindrance (related to maternal malnutrition), despite improvement in economic situations over recent years. The burden of nutritional deprivation is high among poor and marginalised tribal groups (Gangadaran and Kumar, 2014).

The prevalence of diarrhoeal episodes is high in the tribal preschool children of Kerala, which can be considered as a potential predictor of undernutrition in them (Philip *et al.*, 2015).

2.6. Food consumption pattern of tribal communities and preschool children

Food preferences have vital impacts on the dietary patterns of preschool children. Early childhood is a crucial period in the development of food preferences (Skinner *et al.*, 2002). The food consumption pattern of tribal communities is affected by caprices of nature and varies from extreme deprivation in lean season to high levels of intakes of several foods during post harvest period (Laxmaiah *et al.*, 2007). Food habit, food intake and pattern of consumption is different from general population and the quantum of intake depends on the seasonal availability of agriculture and forest products. Tribal eco system and nutritional intake is highly correlated with each other (Gangadaran and Kumar, 2014).

Hari (2008) reported poor nutritional status among preschool children belonging to tribal and non tribal communities of Northern Kerala. The author also indicated that the mean food and nutrient intake of children were significantly lower than the RDA irrespective of gender.

NNMB (2000) in their survey in Integrated Tribal Development Programme (ITDP) areas of the states, found that the bulk of the diet was formed by cereals and millets. The survey also reports that the mean intake of

cereals and millets by the tribal preschool children of Kerala is low and has a considerable intake of roots and tubers and nuts and oilseeds. NNMB opines that the intake of other food stuffs especially protective foods was much lower than the suggested level.

The diet consumed by the rural preschool children of India is inadequate in terms of energy, protein, iron, calcium, vitamin A, vitamin C and vitamin B_{12} (Laxmaiah *et al.,* 2002).

Bhasin (2004) observed that the traditional tribal diet comes from unrefined cereals, such as maize, jowar, bajra and the staple food of *Bhils* is roti. Occasional consumption of pulses (18.5 g/day) was observed among tribes of Meghalaya which was much less than the recommended allowance of 32g/day (Murugar and Pal, 2005). Tribes of Wayanad district of Kerala like *Kattunaikkar, Kurumar* and *Paniyar* preferred consumption of different wild foods like leafy greens, mushrooms, small animals and roots and tubers. Several varieties of fish and crab are the main sources of animal protein in their diet (Narayanan *et al,* 2005).

Khosla *et al.* (2000) reported the inadequate intake of energy by the preschool children (1-4 years) belonging to low income families of Ludhiana, Punjab. Kapil (2001) reported that there is a maximum deficit in the energy intake of children below 6 years. Aswathi *et al.* (2003) also inferred the adequate supply of protein in the diet of preschool children of Uttar Pradesh.

Tribal diets are generally grossly deficient in calcium, vitamin A, vitamin C, riboflavin and animal protein (Basu, 2000). The diet of tribes are purely cereals based which results in higher intake of energy and protein levels, while intake of micronutrient such as iron, calcium, vitamin A, vitamin C and riboflavin was highly deficient (Meshram *et al*., 2014).

2.7. Food security among preschool children and tribal communities

Sustainable food security includes reinforcing the livelihood security of all the individuals in a family by assuring both physical and economic access to balanced diet incorporating the required nutrients, safe drinking water, environmental sanitation, basic health care and primary education (Razi, 2012).

Physical availability, economic and physical access, utilization of food and stability are the four pillars of food security (FAO, 2008).

The three 'A's of food security are availability, accessibility and absorption of food. Availability of food is a component of food production, accessibility to food is an element of purchasing power and employment and absorption of food in the body is impacted by nutritional status, education and health care (Swaminathan, 2010).

George and Daga (2000) in a study conducted among preschool children in Mumbai observed food security in 42.6 per cent households. A study conducted by Nnakwe and Yegammia (2002) indicated food security among 56 per cent of households without children when compared to 43 per cent households with children in Coimbatore.

In a case study conducted in the agricultural labourer families of Kalliyoor panchayath of Trivandrum district of Kerala, Vijayan (2003) noticed food insecurity in all the households.

A higher percentage of food insecurity was reported in the households with children (Lawrence, 2003; Anusha, 2012). Blossom (2013) also reported that there is a higher percentage of food insecurity in the household with children than without children. Subhasree (2012) noticed food security only among 43 per cent families in the coastal region of Cochin and the rest were food insecure with levels of varying form, of no hunger to severe hunger.

The study conducted in the tribal areas of Madhya Pradesh by Jain and Shah (2005) revealed that there is a poor outreach of the public distribution system in these areas and insufficient coverage of Antyodaya Anna Yojana which leads to food insecurity in them.

Ravi and Reddy (2006) in their study among the tribal households of the Jenkuruba tribes of Karnataka, found that these tribals live in poverty. The reason for poverty among them may be due to the absence of productive resources and also lack of education. He also found that they are having energy deficit diet with a wide gap between the intake and minimum requirement.

Vijayakumar *et al.* (2007) reported food insecurity with moderate hunger among Adidravidar women of Salem district of Tamil Nadu. A study conducted by Rekha *et al.* (2007) on food and nutritional security of tribal expectant mothers of Jharkhand indicated decreased intake of all food groups except cereals and other vegetables. A study conducted in the three backward tribal dominated districts in Orissa, Panda and Sarangi (2010) observed severe food insecurity and hunger population.

MATERIALS AND METHODS

3. MATERIALS AND METHODS

This chapter includes the materials used and the methods followed in various phases of the research. The details are presented under the following headings:

3.1. Selection of the study area

3.2. Selection of samples

3.3. Research plan

3.4. Methods selected for the study

3.5. Development of tools

3.6. Conduct of the study

3.7. Interpretation of the data

3.1. Selection of the study area

The study was conducted in Thrissur district. A list of panchayats having tribal population was collected and from these, five panchayats were selected randomly for the study. The five panchayats selected were Pananchery, Puthur, Matathoor, Varandarapily and Kodassery.

3.2. Selection of samples

The sample consisted of 75 tribal and 25 non tribal preschool children selected randomly. A detailed investigation in a multifaceted way was carried on the 75 tribes. Data on socio economic status and food consumption pattern were recorded.

A sub sample of 15 (20 per cent of sample) was selected among the tribals for further detailed investigation on the anthropometric measurements, clinical examination, food weighment and haemoglobin estimation. Data on these parameters were also recorded among the 25 selected non tribal families. The subset, constituting 15 tribals and 25 non tribals were used for comparative

evaluation of anthropometric measurements, clinical examination, food weighment and haemoglobin estimation.

3.3. Research plan

1. A pilot survey was conducted to locate families with children in the age group of 4 - 6 years
2. A baseline survey was conducted to elicit information on the socio – economic status of the families and also to collect details regarding the child.
3. A dietary survey of the families to assess the food consumption pattern of the family members especially the dietary habits of the preschool child in the family
4. Assessment of nutritional status were conducted through
    i. Anthropometric measurements of all the selected samples.
    ii. Among the sub sample following studies were conducted
        a. One day food weighment survey
        b. Clinical examination with the help of a qualified physician
        c. Estimation of haemoglobin
5. Analysis of data using statistical methods

3.4. Methods selected for the study

Details on socio economic background, personal information, food consumption pattern and health aspects of the selected families and preschool children were collected by interviewing the women in the family with the help of a schedule.

Krishnaswamy (2004) stated that a survey is a method of research involving collection of data directly from a population or a sample, at a particular time.

Personal interviews are the most reliable method to collect personal information. The method of collecting information through personal interview is

usually more reliable and focused when it is carried out in a structured way (Kothari, 1996).

An interview schedule is a set of structured questions in which the answers are recorded by the interviewer himself. It can be used for literate and illiterate persons (Ahuja, 2005).

Diet is a vital determinant of health and nutritional status of an individual. Dietary enquiries are mainly of two types, one which concentrates on qualitative aspects of foods, i.e. what kind of foods are eaten and the other which attempts to estimate the accounts of food consumed in quantitative terms. *i.e.* how much food is eaten (Thimmayamma and Rau, 1996). Both this types were included in the study to elicit information regarding the dietary habits, food and nutrient intake of preschool children.

Anthropometric indices, presence of clinical deficiency signs, dietary assessment and actual food intake and biochemical estimation were widely used as direct parameters of nutritional status (Swaminathan, 1986).

Anthropometry has been acknowledged as an important strategy for assessment of nutritional status and it is a simple and valuable practical index. Anthropometry can help in the evaluation of subclinical stage of malnutrition and it has been perceived as a solid strategy for identification of nutritionally vulnerable group (Rao and Vijayaraghavan, 1996).

In the present study, anthropometric measurements like height, weight, mid upper arm circumference, head circumference and chest circumference of preschool were recorded using standard methods.

Height deficit is a pointer of long term malnutrition. The degree of height deficit in connection to age when contrasted with regional standards can be viewed as a measure of malnutrition (Gopaldas and Sheshadri, 1987). As indicated by Rao and Vijayaraghavan (1996), the inadequate dietary intake or

Plate 1: Procedure of measuring height

infections, decreases the nutrient availability at cellular level leading to growth retardation and stunting.

Body weight is the most broadly utilised and the simplest anthropometric measurement for the assessment of nutritional status (Rao and Vijayaraghavan, 1996). Measurements of weight at different ages have been used as a record of nutritional status have demonstrated extremely significant when accurately deciphered (Begum, 1991).

Mid upper arm circumference is an indicator of muscle advancement and reflects protein- energy malnutrition (Kamath, 1986). MUAC measurement is the most valuable and practical tool for assessing muscle mass, as this region is easily accessible and measurement requires only a flexible fibre glass tape. MUAC is considered as a simple, useful and more reliable technique to estimate the nutritional status of preschool children (Voorhoea, 1983).

Head circumference relates essentially to size of the brain, which increases quite rapidly during infancy. The chest in a normally nourished child grows faster than the head during the second and third year of life. In a malnourished state, due to poor growth of chest, the head circumference may remain greater than the chest (Rao and Vijayaraghavan, 1996).

Observing anthropometric measurements like weight, height, MUAC, head circumference and chest circumference were considered as the best methods to recognize various degrees of growth retardation, among children. Indeed, even before clinical signs, the growth pattern gives the data with respect to changes in nutritional status (George, 2000). Clinical examination is an important and sound method of assessing the nutritional status of a community (Jelliffee, 1966). Clinical examination provides direct information of signs and symptoms of dietary deficiencies prevalent among people (Swaminathan, 1986). In the present study clinical examination was conducted in a sub sample of 15 tribal and 25 non tribal preschool children.

Plate 2: Procedure of measuring weight

Plate 3: Procedure of measuring head circumference

Plate 4: Procedure of measuring MUAC

Food weighment method is the most reliable method to assess the actual food intake of an individual (Devadas and Eeswaran, 1986). As per Gorre *et al.* (1977), weighment method can give exact estimations of dietary intake. Mari (1995) reported that actual food consumption within the family by one day weighment could be better mentioned in micro samples. Food consumption surveys give information on the type and amount of food consumed by a representative sample of the survey population (Schofield, 1985). Hence, in the study one day food weighment survey was conducted in a sub sample of 15 tribal and 25 non tribal preschool children to assess their actual food and nutrient intake.

3.5. Development of tools

A pretested questionnaire was prepared to elicit the details of socio economic conditions of the family like type of family, family size, distribution of family members according to age and sex, educational and occupational status, source of income, details regarding the index child like birth order, morbidity pattern, immunization etc. The pretested questionnaire is presented in Appendix I.

A dietary survey questionnaire was also framed to elicit the details regarding the food consumption pattern of the families like cooking practices, special foods collected from forests, food fads and fallacies and participation in supplementary feeding programmes, weaning practices etc. The pretested questionnaire is presented in Appendix II.

Separate schedules were framed for one day food weighment survey and is presented in Appendix III.

Clinical examination was carried out to find out the specific deficiency symptoms using a structured schedule and is presented in Appendix IV.

3.6. Conduct of study

3.6.1. Survey of socio economic and dietary pattern of families

Socio- economic status and dietary pattern of families were obtained by interview method with the help of pretested questionnaires. Here the respondents were the mothers of preschool children. The accuracy of the answers were checked by supplementary questions whenever necessary.

3.6.2. Anthropometric survey

Height, weight, head circumference, chest circumference and mid upper arm circumference were measured as part of the anthropometric survey.

Heights of the children and their parents were measured using a fibre glass tape. The subject was asked to stand erect without shoes, with the heels, buttocks, shoulders and occiput against the wall.

Weights of the children and their parents were measured using a platform balance, which was checked by calibration with standard weights.

The head and chest circumferences were measured with a flexible fibre glass tape. The chest circumference was taken at the nipple level preferably in mid inspiration. The measurement was taken at the level of xiphisternum and in a place at right angles to the vertebral column below the inferior angle of the scapula. The head circumference is measured passing the tape around the head over the supra orbital ridges (just above the eyes) of the frontal bone infront and the most protruding point of the occiput on the back of the head (Mayers, 1972).

Mid upper arm circumference was measured using fibre glass tape. It was measured on the left hand on the midpoint between the tip of acromion of the scapula and the tip of the olecranon of the fore arm bone, ulna (Malima, 1972).

3.6.3. Clinical Examination

Clinical examination was conducted with the help of a qualified physician. Clinical examination is an important method for assessing the nutritional status of

Plate 5: Clinical examination by physician

the community. Clinical examination was carried out using a structured questionnaire in 15 tribal and 25 non tribal preschool children.

3.6.4. Estimation of haemoglobin

In this study haemoglobin was estimated to identify the prevalence of anaemia. This was carried out using cyanmethaemoglobin method suggested by National Institute of Nutrition (NIN, 1983). The procedure is given in appendix V.

3.6.5. Food weighment survey

Food weighment method is a relatively more accurate method of calculating the actual food consumption. The food weighment survey was carried out in the sub sample to find the actual food and nutrient intake of the preschool children. The weight of raw ingredients included in the meal for a day and the weight of cooked foods prepared by the family were recorded. Any other extra foods like snacks, biscuits, toffees etc. taken by the child outside the house was also recorded. All these weights were taken with standard measuring cups and spoons and also by means of a food weighing balance. The amount of cooked food consumed by the child was then converted to its raw equivalents. The nutritive value of the foods consumed was then calculated using the food composition tables suggested by Gopalan *et al.* (2010) and compared with the RDA of nutrients suggested for preschool children in the age of four to six years.

3.7. Assessment of food security

To measure the overall food security, the food security core module questionnaire prepared by USDA (2000) was used to collect the relevant information. The food security core module questionnaire covered a full range of severity of food security observed under current condition for the families with children. In order to determine the relative position of the family's scores, the response to each question in the food security core module was coded as either affirmative or negative (1 or 0) and the total was computed. The set of food

security questions included in the core survey module was combined into a single overall measure called food security scale so as to have a continuous, linear scale which measured the degree of severity of food insecurity/ hunger experienced by a family in terms of a single numerical value ranging from 0 to 9.3. The food security values and status level classification were determined using the food security scale values suggested by USDA (2000). Scale value and type of food security were determined by selecting the column corresponding to the total number of affirmative answers given by the family. On the basis of the intensity of food insecurity, the families were grouped into four categories like food secure, food insecure without hunger, food insecure with moderate hunger and food insecure with sever hunger.

3.8. Analysis of data

To interpret the results, the data was analysed using t – test and correlation analysis.

RESULTS

4. RESULTS

The results of the research work entitled "**Nutritional profile of preschool children belonging to tribal families in Thrissur district**" are explained under the following headings:

4.1. Demographic details of the families which included socioeconomic and cultural background of the families and details regarding the index child

4.2. Dietary habits of the family

4.3. Nutritional status of selected preschool children assessed by

a. Anthropometric measurements of the preschool children

b. Clinical examination

c. Food weighment survey

d. Haemoglobin estimation

4.4. Food security of the families

4.1. Demographic details of the families

Table 1. Distribution of tribal families according to religion, type of family and family size

Sl. No	Parameters	Number of families (n = 75)
1.	**Religion**	
	Hindu	75(100)
2.	**Type of family**	
	Nuclear	61(81.33)
	Joint	14(18.67)
3.	**Family size**	
	1 – 4	48(64)
	5– 6	12(16)
	7 – 9	9(12)
	10 – 12	6(8)

(Figures in parentheses indicate percentage)

Distribution of families according to religion, type of family and family size is presented in Table 1. All the tribes surveyed were following Hinduism. Majority of the families (81.33%) were following nuclear family system. Joint family system was observed in 18.67 per cent of the families. Majority of the families (64%) had family size with 1 - 4 members, 16 per cent had 5- 6 members, 12 per cent had 7 to 9 members and 8 per cent had 10 to 12 members.

Table 2. Details regarding the educational status of the parents of tribal families

Educational status	Number of families (n = 75)	
	Mother	Father
Lower primary	40(53.33)	39(52.00)
Upper primary	19(25.33)	20(26.67)
High school	8(10.67)	10(13.33)
Higher secondary	4(5.33)	2(2.67)
College	4(5.33)	4(5.33)

(Figures in parentheses indicate percentage)

Educational status of the parents is furnished in the Table 2. Majority of the mothers (53.33%) and fathers (52%) were having only lower primary education. Upper primary level of education was seen among 25.33 per cent of mothers and 26.67 per cent of fathers. About 5.33 per cent of fathers and mothers had college level of education

Table 3. Details regarding the occupational status of the head of the tribal family

Occupation	Number of families (n = 75)
Daily wages	52 (69.33)
Agricultural labourers	5 (6.67)
Private sector	10 (13.33)
Government jobs	2 (2.67)
Others	6 (8)

(Figures in parentheses indicate percentage)

About 69.33 per cent of tribes were workers with daily wages. The occupational status of 13.33 per cent of the head of the families was in private sector. Remaining 2.67 per cent had government jobs and about eight per cent of them were self employed as collecting and selling medicinal plants and forest products for their livelihood (Table 3).

Table 4. Details regarding the monthly income of the tribal families

Sl. No.	Income	Number of families (n = 75)
1.	<1000	2 (2.67)
2.	1000 – 2000	46(61.33)
3.	2000 – 3000	19 (25.33)
4.	3000 – 4000	1(1.33)
5.	4000 – 5000	4 (5.33)
6.	5000 – 6000	1(1.33)
7.	6000 – 7000	1(1.33)
8.	7000 – 8000	0 (0)
9.	8000 – 9000	0(0)
10.	9000 – 10000	1(1.33)

(Figures in parentheses indicate percentage)

The detail on the monthly income of the families is furnished in Table 4. Majority of the families (61.33%) earned a monthly income of Rs. 1000 – 2000. A monthly income of Rs. 2000 – 3000 was earned by 25.33 per cent of families. Only 1.33 per cent earned a monthly income between Rs. 9000 to 10,000.

Table 5. Details on the housing conditions of the tribal families

Sl. No	Living conditions	Number of families (n = 75)
1.	**Type of house**	
	Own	75(100)
2.	**No of rooms**	
	1	8(10.67)
	2	51(68)
	3	12(16)
	4	4(5.33)
3.	**Wall**	
	Brick	75(100)
4.	**Floor**	
	Cement	21(28)
	Tiled	10(13.33)
	Mud	44(58.67)
5.	**Roof**	
	Tiled	22(29.33)
	Terraced	53(70.67)
6.	**Separate kitchen**	
	Yes	67(89.33)
	No	08(10.67)
7.	**Source of drinking water**	
	Public tap	49(65.33)
	Public well	26(34.67)
8.	**Lavatory facilities**	
	Own	75(100)
9.	**Electricity**	
	Present	65(86.67)
	Absent	10(13.33)
10.	**Waste management**	
	Yes	25(33.33)
	No	50(66.67)

(Figures in parentheses indicate percentage)

Plate 6: Housing conditions of the tribal families

From the Table 5, it is clear that all the families resided in their own houses. Regarding the number of rooms present in the house, 68 per cent of families had two rooms in their house. All the houses were made of brick. Majority of the families had mud floor (58.67%). Terraced roofing was noticed in 70.67 per cent of the houses, while the remaining 29.33 per cent of houses had tiled roofing. The study revealed that 89.33 per cent of families had a separate kitchen whereas the families which possessed only one room do not possess a separate kitchen (10.67%). Public tap and public well was the source of drinking water. All the families had lavatory facilities. Electricity was present only in 86.67 per cent of the families. Proper waste management was practiced only by 33.33 per cent of families. Other families either threw the garbage in the backyard or into the area nearby or combusted the waste materials inside the housing compound itself.

Table 6. Details regarding the possession of land and agriculture of tribal families

Sl. No.	Details	Number of families (n = 75)
1.	**Ownership of land**	
	Own	48(64)
	Doesn't Own	27(36)
2.	**Areas (cents)**	
	< 5 cents	30(62.5)
	> 5 cents	18(37.5)
3.	**Agriculture in land**	
	Yes	40(83.33)
	Crops present within the land	
	Rubber	8(20)
	Vegetables	20(50)
	Coconut	12(30)
4.	**Monthly income from agriculture**	
	< 500	7(17.5)
	500 – 1000	21(52.5)
	1000 – 1500	12(30)

(Figures in parentheses indicate percentage)

Details regarding possession of land and agriculture are given in Table 6. Majority of the families owned land (64%) with an area less than 5 cents (62.5%). Agricultural crops such as rubber, vegetables and coconut were grown

by the families having own land and majority of the families had an earnings of Rs. 500 to 1000 per month from agriculture.

Table 7. Details on saving and indebtness of the tribal families

Sl. No.	Parameters	Number of families (n = 75)
1.	**Savings**	
	Yes	3(4)
	No	72(96)
2.	**Indebtness**	
	Yes	0(0)
	No	75(100)

(Figures in parentheses indicate percentage)

The Table 7 gives the details on the savings and indebtness of the families. The study revealed that there were only few families who had the habit of saving. None of the families had indebtness.

Table 8. Details on possession of livestock by the tribal families

Sl. No.	Livestock	Number of families (n = 75)
1.	**Livestock**	
	Own	18(24)
	Doesn't own	57(76)
2.	**Details of domestic animals**	
	Cow	3(20)
	Hen	12(80)
	Hen and goat	3(20)

(Figures in parentheses indicate percentage)

The Table 8 represents the data on the possession of livestock by the families surveyed. It was found that majority of the families did not possess any

livestock. Whereas 24 per cent of the families possess domestic animals such as cow, hen and goat. Majority of the families possess poultry than other domestic animals. These domestic animals were mainly used for homely purpose rather than for income purpose.

Table 9. Details regarding the unhealthy habits prevalent in tribal families

Sl. No.	Unhealthy habits	Number of families (n = 75)	
1.	Prevalence of unhealthy habits		
	Yes	35(46.67)	
	No	40(53.33)	
2.		Men (n = 25)	Women (n = 10)
	Smoking	3(12)	2(20)
	Chewing tobacco	0(0)	4(40)
	Smoking and chewing tobacco	3(12)	0(0)
	Smoking and chewing betel leaf	4(16)	2(20)
	Chewing betel leaf and tobacco	0(0)	2(20)
	Alcohol consumption	10(40)	0(0)
	Alcohol and smoking	5(20)	0(0)
3.	**Frequency of usage**		
	Daily	20(57.14)	
	Weekly	10(28.57)	
	Occasionally	5(14.29)	

(Figures in parentheses indicate percentage)

Details regarding the unhealthy habits of the family members is given in Table 9. Smoking, chewing tobacco, alcohol consumption, chewing betel leaves were the unhealthy habits that were found in the tribal families (46.67%). Alcohol consumption was prevalent among 40 per cent of the men and chewing tobacco was prevalent among 40 per cent women. It was also found that 57.14 per cent of the families had the habit of daily consumption.

Table 10. Details regarding health care facilities in the locality

Sl. No.	Details	Number of families (n = 75)
1.	**Provision for health facility**	75(100)
2.	**Health facility available**	
	Primary health centre	75(100)
3.	**Distance to the nearest health centre**	
	0 – 5 km	0(0)
	6 – 10 km	0(0)
	10 – 15 km	45(60)
	15 – 20 km	35(40)
4.	**Utilization of local health facility**	
	Properly utilized	63(84)
	Not utilized	12(16)
5.	**Reason for not utilizing the health facility**	(n = 12)
	Too far away	4(33.33)
	Not good	8(66.67)

(Figures in parentheses indicate percentage)

Details on the health care facilities available (Table 10) in the locality were surveyed in the families. All the tribal families had the provision for health care facilities in their locality. The average distance to the health centres was 10 – 15 km for 60 per cent of the families and for the remaining 40 per cent it was 15 – 20 km. Majority of the families (84%) properly utilized the facility but 16 per cent did not utilize. Those families who were not utilizing the health care facility (66.67%) had an opinion that the facility provided was not good.

4.1.1. Details regarding the selected children

Table 11 gives the details regarding the age and sex of the preschool children selected for the study.

Table 11. Distribution of tribal preschool children according to age and sex

Sl. No.	Parameters	Number of children (n = 75)
1.	**Gender**	
	Boys	28(37.33)
	Girls	47(62.67)
2.	**Age**	
	4	20(26.67)
	5	22(29.33)
	6	33(44)

(Figures in parentheses indicate percentage)

Preschool children aged four to six were selected. Majority (44%) of the students were of the age 6, rest 29.33 per cent of 5 years and 26.67 per cent of 4 years.

Table 12. gives the distribution of preschool children according to the birth order, birth spacing and birth weight.

Table 12. Distribution of tribal preschool children according to birth order, birth spacing and birth weight

Sl. No.	Parameters	Number of families (n = 75)
1.	**Birth order**	
	1	62(82.67)
	2	12(16)
	3	1(1.33)
2.	**Birth spacing (years)**	
	1-2	45(60)
	2-3	11(14.67)
	3-4	6(8)
	>4	13(17.33)
3.	**Birth weight (kg)**	
	1.0 – 2.0	27(36)
	2.0 – 2.5	42(56)
	2.5 – 2.8	6(8)

(Figures in parentheses indicate percentage)

Majority of the children (82.67%) were of first birth order whereas 16 per cent in the second birth order and 1.33 per cent in the third birth order.

Sixty per cent of children were born with a birth spacing of one to two years. About 14.67 per cent of children were with 2 to 3 years of birth spacing and

the remaining 17.33 per cent had above 4 years of birth spacing (8 % had 3 to 4 years of birth spacing).

Normal birth weight was found in only eight per cent of children whereas 56 per cent had a birth weight of 2 – 2.5kg and yet lower birth weight of 1 – 2 kg were seen in 36 per cent of the children.

Table 13. Details regarding the immunization coverage among tribal children

Immunization status	Number of families (n = 75)
Complete	73(97.33)
Partially complete	2(2.67)

(Figures in parentheses indicate percentage)

Immunization coverage was also enquired (Table 13) and was found that it was appreciable. Majority of the children (97.33%) were completely immunized.

Table 14. Details regarding the prevalence of serious illnesses among tribal children

Sl. No.	Illness	Number of families (n = 75)
1.	Kidney problems	1(1.33)
2.	Heart problems	1(1.33)
3.	High grade with seizure	1(1.33)
4.	No illness	72(96)

(Figures in parentheses indicate percentage)

It was found that 3.99 per cent of preschool children were suffering from various serious illnesses such as kidney problems, heart problems and frequent high grade fever with seizures (Table 14).

The children were given proper treatment from the time being diagnosed and are continuing the regular follow up.

Table 15. Details regarding the morbidity pattern of the tribal families

Sl. No.	Parameters	Number of families (n = 75)
1.	Suffered from illness during the last one year	48(64)
	No disease	27(36)
2.	**Name of the disease**	
	Fever	12(25)
	Cough	10(20.83)
	Cough and cold	14(29.17)
	Diarrhea	8(16.67)
	Dysentery	4(8.33)
3.	**Deworming treatment (in the last one year)**	
	Taken	62(86.67)
	Not taken	13(17.33)

(Figures in parentheses indicate percentage)

Regarding the morbidity pattern of the families, 64 per cent of the families had suffered from illness during the last year. Majority of the families (29.17%) suffered from cough and cold. Deworming was done regularly in 86.67 per cent of the families.

Table 16. Distribution of tribal families according to the type of treatment

Type of treatment	Number of families (n = 75)
Allopathy	69(92)
Ayurvedic	4(5.33)
Homeopathy	2(2.67)
Indigenous methods	75(100)

(Figures in parentheses indicate percentage)

Table 16 reveals the data on the type of treatment preferred by the families. All the families practiced indigenous methods. Majority of the families (92%) preferred allopathic treatment while the remaining 5.33 per cent of families preferred ayurveda and 2.67 per cent of families follow homeopathic treatment.

4.2. Dietary habits of the family

Table 17 reveals the information on families according to food habits.

Table 17. Distribution of families according to the food habits

Food habit	Number of families (n = 75)
Vegetarian	0(0)
Non vegetarian	75(100)

(Figures in parentheses indicate percentage)

All the families surveyed were found to be non vegetarians.

Table 18. Distribution of tribal families according to the meal pattern

Sl. No.	Parameters	Number of families (n = 75)
1.	**Planning meal in advance**	
	Planning meal in advance	51(68)
	No meal planning	24(32)
2.	**Time schedule for taking meal**	
	Kept regular time schedule	41(54.67)
	No regular time schedule	7(9.33)
	Partially kept time schedule	27(36)

(Figures in parentheses indicate percentage)

Pre planning of meal was found in 68 per cent of the families. Majority of the families (54.67%) had their meals at regular timings.

Table 19. Frequency of consumption of food items by the tribal families

Foods	Frequency of consumption						
	Daily	Weekly				Occasionally	Never
		Once	Twice	Thrice	Four times		
Cereals	75(100)	-	-	-	-	-	-
Pulses	21(28)	4(5.33)	45(60)	5(6.67)	-	-	-
Green leafy vegetables	4(5.33)	18(24)	28(37.33)	-	-	20(26.67)	5(6.67)
Roots and tubers	12(16)	-	6(8)	20(26.67)	36(48)	1(1.33)	-
Other vegetables	41(54.67)	-	-	24(32)	10(13.33)	-	-
Fruits	-	30(40)	-	-	-	42(56)	3(4)
Milk and milk product	1(1.33)	-	-	-	-	72(96)	2(2.67)
Meat	-	66(88)	-	-	-	9(12)	-
Fish	8(10.67)	5(6.67)	7(9.33)	28(37.33)	-	27(36)	-
Egg	3(4)	8(10.67)	4(5.33)	-	-	24(32)	36(48)
Fats and oils	75(100)	-	-	-	-	-	-
Sugar and jaggery	75(100)	-	-	-	-	-	-
Bakery items	-	4(5.33)	-	-	-	39(52)	32(42.67)

(Figures in parentheses indicate percentage)

Details regarding the frequency of consumption of food items by the families were enquired and are given in Table 19. Rice was the cereal used in their daily diet. Pulses were used twice in a week by 60 per cent of families. Twenty eight per cent of families included pulses in their daily diet. The usage of green leafy vegetables was found to be occasional in 26.67 per cent of families. Majority of the families (54.67%) included other vegetables in their daily diet and the rest of the families included vegetables thrice (32%) or four times (13.33%) in a week. Occasional consumption of fruits was observed in 56 per cent of tribal families. Daily consumption of milk and milk products was seen only in 1.33 per cent whereas occasional consumption was observed in 96 per cent of families. Majority of families (88%) used meat and meat products once in a week. Fish was used thrice in a week by 37.33 per cent of the families. Fats and oils and sugar and jaggery were used daily by all the families. The use of bakery items was seen less in the families. Majority of the families (52%) consumed bakery items occasionally, 42.67 per cent never consumed while 5.33 per cent consumed once in a week.

Table 20. Frequency of purchase of food items by the tribal families

Foods	Frequency of purchase							
	Daily	Weekly				Monthly	Occasionally	Never
		Once	Twice	Thrice	Four times			
Cereals	-	60(80)	-	-	-	15(20)	-	-
Pulses	-	46(61.33)	-	-	-	29(38.67)	-	-
Green leafy vegetables	-	18(24)	28(37.33)	4(5.33)	-	-	20(26.67)	5(6.67)
Roots and tubers	-	47(62.67)	21(28)	-	-	6(8)	1(1.33)	-
Other vegetables	-	23(30.67)	42(56)	10(13.33)	-	-	-	-
Fruits	-	12(16)	-	-	-	18(24)	42(56)	3(4)
Milk and milk product	1(1.33)	-	-	-	-	-	72(90)	2(2.67)
Fleshy foods	-	69(92)	5(6.67)	-	-	-	1(1.3)	-
Nuts and oils seeds	-	-	-	-	-	10(13.33)	65(86.67)	-
Spices and condiments	-	-	-	-	-	75(100)	-	-
Bakery items	-	4(5.33)	-	-	-	-	39(52)	32(42.67)

(Figures in parentheses indicate percentage)

Details regarding the frequency of purchase of food items by the families is depicted in Table 20. The table clearly reveals that majority of the families (80%) purchased cereals weekly once and the rest 20 of the families purchased monthly. In case of pulses also the same trend was seen; majority of them (61.33%) purchased weekly and the remaining (38.67%) purchased monthly. Majority of the families (37.33%) purchased green leafy vegetables twice in a week, 26.67 per cent purchased occasionally and 6.67 per cent never purchased. Majority of the families (62.67%) purchased roots and tubers weekly twice (28%). About 56 per cent of the families purchased twice, 30.67 per cent purchased once in a week. In case of fruits (56%) and milk and milk products (90%), majority purchased occasionally. About 92 per cent of the families purchased fleshy foods like meat, fish and egg weekly once. Nuts and oilseeds are purchased occasionally by 86.67 per cent of the families. All the families purchased spices and condiments once in a month and bakery items were purchased occasionally by 52 per cent of the families while 42.67 per cent never purchased such items.

Table 21. Monthly food expenditure pattern of the tribal families

Foods	Percentage of expenditure (%)			
	< 5	5-10	10-20	20-30
Cereals	-	-	-	-
Pulses	-	-	-	-
Green leafy vegetables	50(66.67)	25(33.33)	-	-
Roots and tubers	43(57.33)	27(36)	5(6.67)	-
Other vegetables	40(53.33)	15(20)	20(26.67)	-
Fruits	75(100)	-	-	-
Milk and milk products	-	-	-	-
Fleshy foods	-	46(61.33)	29(38.67)	-
Nuts and oils seeds	-	75(100)	-	-
Spices and condiments	-	75(100)	-	-
Bakery items	75(100)	-	-	-

(Figures in parentheses indicate percentage)

The expenditure of the families on various food items were also enquired (Table 21). None of the families purchase cereals and pulses as it was supplied through Public Distribution System. Majority of the families spent less than five per cent of their income to purchase green leafy vegetables (66.67%), roots and tubers (57.33%), other vegetables (53.33%) and fruits (100%). A monthly expenditure of 5 -10 per cent was spent for the purchase of fleshy foods by 61.33 per cent of the families

Table 22. Details regarding the foods collected from forests by the tribal families

Sl. No.	Parameters	Number of families (n = 75)
1.	**Foods collected from forest**	
	Honey	49(65.3)
2.	**Person who collects**	
	Head of the family	32(65.31)
	Others	17(34.69)
3.	**Season for collection**	
	All season	10
	Winter	34
	Summer	39
4.	**Use of collected foods**	
	Household use	12(24.5)
	Sale	37(75.5)

(Figures in parentheses indicate percentage)

Foods were collected from forest by the families and the details are presented in Table 22. Honey was collected by 65.33 per cent of tribal families. Head of the family used to collect honey from the forest, occasionally it was collected by other family members also. Even though honey was collected in all season; mainly it was collected during winter and summer. The collected honey was sold to the nearby stores by 75.5 per cent of families whereas 24.5 per cent of families used it at household level.

Table 23. Frequency of cooking and consumption of food in a day by the tribal families

Frequency	Number of families (n = 75)	
	Cooking	Consumption
Once	41(54.67)	0(0)
Twice	34(45.33)	29(38.67)
Thrice	0(0)	46(61.33)

(Figures in parentheses indicate percentage)

Details on the frequency of cooking and consumption in a day are tabulated in Table 23. Majority of the families (54.67 %) cooked once and consumed thrice (61.33 %) in a day.

Table 24. Details regarding the cooking practices of dry food articles by the tribal families

Practices	Number of families (n = 75)	
Washing just before cooking	43(57.33)	
Cleaning, winnowing and then washing	32(42.67)	
No. of times food articles washed	Cereals	Pulses
1	0(0)	39(52)
2	5(6.67)	36(48)
3	54(72)	0(0)
Till water is clear	16(21.33)	0(0)

(Figures in parentheses indicate percentage)

Details on the cooking practices are depicted in Table 24. Dry food articles such as cereals and pulses were washed by all the families before cooking Majority of the families (57.33%) washed just before cooking, but 42.67 per cent of families cleaned, winnowed and then washed the dry food articles.

Cereals were washed thrice by 72 per cent of the families while 21.33 per cent of the families washed it till the water is clear. Pulses were washed only once by 52 per cent of the families but 48 per cent of them washed twice. Pulses were soaked by all the families. Bengal gram and black gram was soaked by all the families whereas 20 per cent of families also soaked pulses such as green gram, green peas and horse gram. Most of the families (86%) soaked overnight and the rest 14 per cent of the families soaked for about two to four hours.

Table 25. Details on the preparation of vegetables for cooking by the tribal families

Particulars	Number of families (n = 75)		
	Green leafy vegetables	Roots and tubers	Other vegetables
Washed before cutting	51(68)	57(76)	10(13.33)
Washed after cutting	24(32)	18(24)	65(86.67)
Cutting of vegetables			
Into very small pieces	2(2.66)		
Large pieces	30(40)		
According to the type of preparation	36(48)		
No criteria	7(9.33)		

(Figures in parentheses indicate percentage)

Table 25 reveals the details regarding the preparation of vegetable for cooking. Green leafy vegetables were washed before cutting by 68 per cent of families while 32 per cent of families washed after cutting. Roots and tubers were washed before cutting by majority of the families (76%). Washing of other vegetables was done after cutting by 86.67 per cent of the families. Regarding the cutting of the vegetables adopted by the families, 48 per cent of them cut vegetables according to the type of preparations, 40 per cent cut into large pieces

and remaining 9.33 per cent have no such criteria and 2.66 per cent cut into very small pieces.

Majority of the families (94.67%) cut vegetables just before cooking and 5.33 per cent of the families used to cut vegetables in the previous day. The use of raw foods is found to be rare in between families (12.67%).

Table 26. Cooking methods adopted by the tribal families

Food items	Number of families (n = 75)					
	Absorption	**Boiling and straining**	**Steaming**	**Frying**	**Shallow frying**	**Others**
Cereals	24 (32)	51 (68)	-	-	-	-
Pulses	7 (9.33)	68 (90.67)	-	-	-	-
Green leafy vegetables	-	30 (40)	-	-	33 (44)	12 (16)
Roots and tubers	24 (32)	17 (22.67)	12 (16)	-	-	22 (29.33)
Other vegetables	19 (25.33)	23 (30.67)	13 (17.33)	-	20 (26.67)	-
Meat	-	29 (38.67)	24 (32)	22 (29.33)	-	-
Fish	-	-	23 (30.67)	45 (60)	7 (9.33)	-
Egg	-	54 (72)	-	21 (28)	-	10 (40)

(Figures in parentheses indicate percentage)

Various cooking methods adopted by the families are depicted in Table 26. Boiling and straining the extra water was the method commonly utilized by the families to cook all types of food items. Boiling and straining method was utilized by 68 per cent of the families to cook cereals and 90.67 per cent to cook pulses. Green leafy vegetables were cooked using boiling and straining method by 40 per cent families and shallow frying was done by 44 per cent of the families. Roots and tubers were cooked until the water added dries by 32 per cent of the families. About 29.33 per cent of the families did pressure cooking. Meat (29.33%) and fish (60%) were fried by the families. Boiling and straining was used to cook egg. Milk was used after boiling by all the families.

Table 27. Details regarding the reuse of excess after used for cooking by the tribal families

Details	Number of families (n = 75)
Reuse of excess water used for cooking	26(34.67)
Purpose of use	
Drinking	23(88.46)
Cooking pulses and meat	3(11.54)

(Figures in parentheses indicate percentage)

Table 27 gives the details on the reuse of excess water used for cooking. Out of 75 families, the use of excess water used for cooking was found only in 34.67 per cent of the families. In 34.67 per cent of families, 88.46 per cent used the water for drinking and 11.54 per cent used for cooking pulses and meat.

None of the families adopted food storage and preservation techniques.

Table 28. Serving pattern adopted by the tribal families

Serving pattern	Number of families (n = 75)
Meals taken by male members and then by females	17(22.67)
Meals taken by head of the family and then by others	11(14.67)
Meals taken by children and then by others	19(25.33)
Meals taken together	20(26.66)
No criteria	8 (10.67)

(Figures in parentheses indicate percentage)

Hierarchy of serving of meals (Table 28) revealed more or less the same. The frequency to the head of the family in the hierarchy was not much evident (14.67%).

Leftover food was utilized by the families. Some of the families (12%) stored the leftover food in refrigerator after boiling and used the same the next day again after thawing and then heating.

Table 29. Foods prepared by the tribal families during special occasions

Occasions	Preparation	Number of families (n = 75)
Birthday	Vegetarian food	18(24)
	Non Vegetarian food	57(76)
Marriage	Vegetarian food	12(16)
	Non Vegetarian food	63(84)
Death	Vegetarian food	75(100)
	Non Vegetarian food	-
Festivals	Vegetarian food	29(38.67)
	Non Vegetarian food	46(61.33)

(Figures in parentheses indicate percentage)

Foods specific to specific occasions were prepared by the families (Table 29). The families preferred non vegetarian food items during birthday (76%), marriages (84%) and during festivals (61.33%). They strictly followed vegetarian foods during death and funeral occasions.

Storage of food items was not prevalent in the families. The families purchased the required food items from the ration shops. The families did not prepare any processed foods. Preservation techniques were also seen rarely. Some of the families (8%) prepared salted fishes. Purchase of processed foods was also not prominent in these families. Majority of the families (54.67%) bought small processed pickle packets from the local shops.

Table 30. Foods prepared by the tribal families during illness

Details	Number of families (n = 75)
Diet modification during illness	75(100)
Foods included	
Tender coconut water	63(84)
Rice soup	75(100)
Food excluded	
Spicy food items	75(100)
Non vegetarian foods	75(100)
Diet modification suggested by doctor	
Yes	35(46.67)
No	40(53.33)

(Figures in parentheses indicate percentage)

Majority of the families included tender coconut water (84%), as also rice soup (100%) in their diet during illness. Families avoided spicy and non vegetarian foods during fever and diarrhoea and also included rice water

frequently by adding salt. Suggestions provided by doctors during illness were taken into consideration by 44.67 per cent of the families.

Table 31. Details regarding food fads and fallacies

Details	**Number of families (n = 75)**
Food fads and fallacies	
Yes	54(72)
No	21(28)
	Number of families (n = 54)
Avoidance of beef	9(16.67)
Avoidance of beef and modification during pregnancy and lactation	45(83.33)
	Number of families (n = 45)
Horse gram (pregnancy and lactation)	9(20)
Papaya (pregnancy)	13(28.89)
Horse gram and papaya (pregnancy)	10(22.22)
Water (lactation)	8(17.78)
Horse gram and water (lactation)	5(11.11)

(Figures in parentheses indicate percentage)

Foods and fallacies were prevalent in 72 per cent of the families (Table 31). Beef was avoided by all the families while 83.33 per cent of the families avoided beef and also had diet modifications during pregnancy and lactation. Avoidance of horse gram during pregnancy and lactation was seen in 20 per cent of the families. Papaya was avoided by 28.89 per cent pregnant mothers and horse gram and papaya together was avoided by 22.22 per cent of the mothers. Lactating mothers avoided water for the first 45 days of birth (17.78%). About 11.11 per cent avoided water and horse gram during the lactation period.

Table 32. Details regarding the supplementary feeding programmes

Details	Number of families (n = 75)
Children visiting anganwadi	15(20)
Children visiting schools	60(80)
Egg and milk	6(10)
Mid day meal programme , Egg and milk	54(90)

(Figures in parentheses indicate percentage)

All the families surveyed were participating in one or other supplementary feeding programmes. About 80 per cent of children attend school and 20 per cent visited anganwadi. All the students were attending schools, received mid day meal, egg and milk but 10 per cent of the children attending school did not utilize the mid day meal programme since these students have more personal likes and dislikes or was suffering from some serious illness. Anganwadi were also played a major role. In anganwadi, children were provided food for a whole day. They are provided with breakfast mainly uppuma, a pulse dish for lunch and peanut candy for tea time.

Table 33. Details regarding the breast feeding practices

Duration (years)	Number of families (n = 75)
Initiation of breast feeding	
Soon after birth	12(16)
3- 6 hours after birth	56(74.67)
7-12 hours after birth	7(9.33)
Duration of breast feeding	
<1	19(25.33)
1-2	50(66.67)
>3	6(8)

(Figures in parentheses indicate percentage)

Table 33 gives the details regarding the initiation and duration of breast feeding. Breast feeding was initiated soon after the birth only in 16 per cent of babies. Breast feeding was initiated after three to six hours of child birth in majority (74.67%) of the babies. Majority of the mothers (66.67%) breast fed their babies for about one to two years, whereas mothers expanded the feeding above three years by eight per cent.

Table 34. Details of the age of introducing weaning foods

Age	Number of children (n = 75)
3rd month	3(4)
4th month	31(41.33)
5th month	18(24)
6th month	23(30.67)

(Figures in parentheses indicate percentage)

Details on age of introduction of weaning food are furnished in Table 34. The information reveals that 41.33 per cent of the mothers introduced weaning food in the fourth month. Weaning food was introduced to the babies after sixth month by 30.67 per cent of the mothers.

4.3.Nutritional status of selected tribal preschool children assessed by

4.3.1. Anthropometric measurements of the preschool children

Height, weight, head circumference, chest circumference and mid upper arm circumference of children were recorded and was compared with standards (Tables 35 and 36).

Table 35. Comparison of height and weight of tribal preschool children with ICMR standards (2010)

Height (cm)	Mean height ±SD		't' value		ICMR standards	
	Boys	Girls	Boys	Girls	Boys	Girls
	102.7±11.1	101.4±9.3	3.06*	5.01*	109.1	108.2
Weight (kg)	**Mean weight ±SD**		**'t' value**		**ICMR standards**	
	Boys	Girls	Boys	Girls	Boys	Girls
	15.2±2.4	14.2±2.3	6.21*	11.63*	18	18

Significance - *1% level

The result reveals that boys were taller and heavier than girls. Mean height and weight was significantly lower than the ICMR (2010) standards.

Table 36. Comparison of head circumference, chest circumference and MUAC of tribal preschool children with NFI standards (1991)

	Mean value		't' value		NFI standards	
	Boys	Girls	Boys	Girls	Boys	Girls
Mean head circumference (cm)	49.2	47.74	1.82**	2***	50	49.1
Chest circumference (cm)	51.5	50.0	2.53*	4.31*	53.1	52.1
MUAC (cm)	15.0	14.8	4.26*	6.19*	16	16

Significance - *1% level, ** 5% level, *** 10% level

Mean head circumference, chest circumference and MUAC were compared with NFI standards (Table 36) and were found below the standard level.

Another anthropometric measurement taken was height, which was compared with classification given by Waterlow, Visweswara Rao and McLaren.

Table 37. Distribution of tribal preschool children as per height for age

Classification	Category	Boys (n = 28)	Girls (n = 47)
Waterlow's Classification (1972)	<95% of standard (normal)	10(35.7)	13(27.7)
	90-95% of standard (marginal malnutrition)	8(28.6)	15(31.9)
	85-90% of standard (moderate malnutrition)	6(21.4)	12(25.5)
	>85% of standard (severe malnutrition)	4(14.3)	7(14.9)
Visweswara Rao classification (1980)	91-100 % of standard (normal)	15(53.6)	28(59.6)
	80-90 % of standard (mild malnutrition)	11(39.3)	18(38.3)
	< 80% of standard (poor nutrition)	2(7.1)	1(2.1)
McLaren's classification (1982)	93-105% of standard – normal	11(39.3)	20(42.6)
	80-93% of standard – short	15(53.6)	26(55.3)
	< 80% of standard - dwarf	2(7.1)	1(2.1)

(Figures in parentheses indicate percentage)

According to Waterlow's classification 35.7 per cent of boys are having normal height for age but 31.9 per cent of girls are having marginal malnutrition. But the Visweswara Rao's classification reveals that both boys (53.6%) and girls (59.6%) are having adequate height for age. Apart from these, McLaren's classification says that 53.6 per cent of boys and 55.3 percent of boys are short.

Table 38. Distribution of tribal preschool children as per weight for age

Classification	Category	Boys (n = 28)	Girls (n = 47)
Gomez classification (1956)	<60 % of standard (Severe malnutrition)	0 (0)	0(0)
	60-75% of standard (Moderate malnutrition)	8(28.6)	14(29.8)
	75-90 % of standard (Mild malnutrition)	14(50.0)	27((57.4)
	>90% of standard (Normal malnutrition)	6(21.4)	6(12.8)
IAP (1972)	<50% of standard(Grade IV malnutrition)	0(0)	0(0)
	50-60% of standard(Grade III malnutrition)	0(0)	0(0)
	60-70% of standard(Grade II malnutrition)	6(21.4)	8(17.0)
	70-80% of standard(Grade I malnutrition)	9(32.1)	22(46.8)
	>80% of standard(Normal)	13(46.4)	17(36.2)

(Figures in parentheses indicate percentage)

Table 38 reveals the nutritional status of preschool children according to weight for age classification given by Gomez *et al.* (1956) and IAP (1972). Distribution of children as per weight for age classification (Gomez *et al.*, 1956) revealed majority of the children (boys – 50% and girls – 57.4%) were mildly malnourished. Prevalence of moderate and mild malnourishment was found to be more among girls when compared to boys. Only 12.8 per cent girls had normal weight for their age, where as 21.4 per cent of boys had normal weight for age. The IAP classification (1972) shows that majority of boys and girls had grade I and grade II malnutrition. Only 46.4 per cent of boys and 36.2 per cent of girls had normal weight for age.

Table 39. Distribution of tribal preschool children according to MUAC (Gopaldas, 1987)

MUAC (cm)	Number of children	
	Boys (n = 28)	Girls (n = 47)
>13.5 (Normal)	26(92.86)	40(85.11)
12.5 – 13.5 (Moderate)	2(7.14)	7(14.89)
<12.5 (Severe)	0(0)	0(0)

(Figures in parentheses indicate percentage)

Result of the present study revealed that 92.86% of boys and 85.11% of girls were normal and 7.14%, 14.89% of boys and girls respectively were having moderate malnutrition. Girls were having higher malnutrition compared with boys.

Table 40. Distribution of tribal preschool children based on head and chest circumference ratio (Gopaldas, 1987)

Head / chest circumference	Number of children	
	Boys (n = 28)	Girls (n = 47)
<1 normal	20 (71.43)	30 (63.83)
≥ 1 malnourished	8 (28.57)	17 (36.17)

(Figures in parentheses indicate percentage)

The head and chest circumference ratio as suggested by Gopaldas (1987) was also calculated to assess malnutrition. The classification affirms that even though 71.4 per cent of boys and 63.8 per cent of girls were having normal ratio, 28.6 per cent of boys and 36.2 percent girls are malnourished.

Table 41. Distribution of tribal preschool children based on weight/ height^2 (Rao and Singh, 1970)

Weight/ height^2 (kg/cm^2)	Nutritional status	Number of children	
		Boys (n = 28)	Girls (n = 47)
>0.0015	Normal	6 (21.43)	7 (14.89)
0.0013 – 0.0015	Moderate malnutrition	17 (60.71)	28 (59.57)
<0.0013	Undernourished	5 (17.86)	12 (25.53)

(Figures in parentheses indicate percentage)

Prevalence of malnutrition was found by calculating the weight / height^2 ratio according to the classification given by Rao and Singh (1970). The data proclaim that 60.71 per cent of boys as well as 59.57 per cent of girls are said to have moderate malnutrition and 17.86 per cent boys as well as 25.53 per cent girls are undernourished. The percentage of undernourished girls was much higher than boys.

Table 42. Distribution of tribal preschool children according to Waterlow's classification for malnutrition

% weight for age	% height for age	Category	Number of children	
Cut off levels as % of ICMR standards			Boys (n = 28)	Girls (n = 47)
< 90	< 80	Normal	6 (21.43)	6 (12.77)
< 90	>80 (wasted)	Short duration malnutrition	0 (0)	0 (0)
>90	< 80 (stunted)	Long duration malnutrition (nutrient dwarf)	20 (71.43)	41 (87.23)
> 90	>80 (stunted & wasted)	Current and long duration malnutrition	2 (7.14)	0 (0)

(Figures in parentheses indicate percentage)

Table 42 represents Waterlow's classification for malnutrition. Waterlow classified the height for age and weight for age to understand the type and duration of malnutrition. Distribution of children as per Waterlow's classification revealed that 71.4 per cent of boys and 87.4 per cent girls were stunted and was having long duration malnutrition.

Table 43. Correlation between the height and weight of child with parents (Tribes)

		Height of the child	Weight		Weight of the child
			Mother	Father	
Height of the child		-	-	-	-
Weight	Mother	-0.238*	-	-	-
	Father	-0.185	-	-	-0.080
Weight of the child		-	-0.241*	-	-

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation analysis of the height and weight of the mother and father with that of the child revealed a negative relationship between the weight of the mother and height of the child and weight of the mother and weight of the child.

4.3.2. Nutritional status of tribal vs. non tribal children

The comparison was made based on

a. Anthropometric measurements
b. Clinical examination
c. Food weighment
d. Haemoglobin estimation

a. Anthropometric measurements

Table 44. Comparison of anthropometric measurements of tribal and non tribal preschool children

	Boys		't' value	Girls		't' value
	Tribals	Non tribal		Tribals	Non tribals	
Height (cm)	93.7	101.5	1.75^{NS}	92.3	92.9	0.14^{NS}
Weight (kg)	13.31	14.8	1.92^{NS}	12.21	15.5	3.80^{**}
Head circumference (cm)	47.6	47.8	0.30^{NS}	46.5	47.7	1.89^{NS}
Chest circumference(cm)	50	53.8	3.52^{**}	49.5	52.3	2.45^{*}
MUAC	14.6	14.9	0.89^{NS}	14.3	14.8	1.25^{NS}

** 1 % significance * 5 % significance NS Not significant

The difference between the chest circumference of boys and girls of tribals and non tribals and the weight of the girls of tribal and non tribals were significant and were lower in the tribals.

Table 45. Comparison of tribal and non tribal preschool children based on height for age classifications

Sl. No.	Classification	Category	Tribes		Non tribes	
			Boys n = 8	Girls n =7	Boys n = 13	Girls n =12
1.	Waterlow's Calssification (1972)	>95% of standard (normal)	0 (0)	0 (0)	7 (53.85)	1 (8.33)
		90-95% of standard (marginal malnutrition)	1 (12.5)	0 (0)	3 (23.07)	5 (41.67)
		85-90% of standard (moderate malnutrition)	3 (37.5)	1 (14.29)	3 (23.07)	6 (50)
		<85% of standard (severe malnutrition)	4 (50)	6 (85.71)	0 (0)	0 (0)
2.	Visweswara Rao classification (1980)	91-100 % of standard (normal)	0 (0)	0 (0)	10 (76.92)	6 (50)
		80-90 % of standard (mild malnutrition)	6 (75)	6 (85.71)	2 (15.38)	3 (25)
		< 80% of standard (poor nutrition)	2 (25)	1 (14.29)	1 (7.69)	3 (25)
3.	McLaren's classification (1982)	93-105% of standard (normal)	0 (0)	0 (0)	7 (53.85)	2 (16.67)
		80-93% of standard (short)	6 (75)	6 (85.71)	5 (38.46)	7 (58.33)
		< 80% of standard (dwarf)	2 (25)	1 (14.29)	1 (7.69)	3 (25)

(Figures in parentheses indicate percentage)

When comparing selected tribal and non tribal preschool children according to the classification for height for age, we can affirm that the tribal children are more malnourished than non tribal counterparts (Table 45). According to Waterlow's classification, 50 per cent of tribal boys and 85.71 per cent of tribal girls were severely malnourished while none of the non tribal preschool children were severely malnourished. As per Visweswara Rao's classification, 76.92 per cent of non tribal boys and 50 per cent of non tribal girls were normal while 75 per cent of tribal boys and 85.71 per cent of tribal girls were mildly malnourished. Distributing the children according to McLaren's classification reveals that none of tribals were normal when 53.85 per cent of boys and 16.67 per cent of girls in non tribals were normal. About 25 per cent of tribal boys, 14.29 per cent tribal girls and 7.69 per cent non tribal boys, 25 per cent of non tribal girls were dwarf.

Table 46. Comparison of tribal and non tribal preschool children based on weight for age classifications

Classification	Cut off level as % of ICMR standards	Tribes		Non tribes	
		Boys (n = 8)	Girls (n = 7)	Boys (n = 13)	Girls (n = 12)
Gomez classification (Gomez *et al.*, 1956)	<60 % of standard (Severe malnutrition)	0 (0)	0 (0)	0 (0)	0 (0)
	60-75% of standard (Moderate malnutrition)	3 (37.5)	3 (42.86)	3 (23.08)	2 (16.67)
	75-90 % of standard (Mild malnutrition)	5 (62.5)	4 (57.14)	6 (46.15)	6 (50)
	>90% of standard (Normal malnutrition)	0 (0)	0 (0)	4 (30.77)	4 (33.33)
Indian Academy of Pediatrics (1972)	<50% of standard (Grade IV malnutrition)	0 (0)	0 (0)	0 (0)	0 (0)
	50-60% of standard (Grade III malnutrition)	0 (0)	0 (0)	0 (0)	0 (0)
	60-70% of standard (Grade II malnutrition)	3 (37.5)	4 (57.14)	2 (15.38)	2 (16.67)
	70-80% of standard (Grade I malnutrition)	4 (50)	2 (28.57)	3 (23)	1 (8.33)
	>80% of standard (Normal)	1 (12.5)	1 (14.29)	8 (61.54)	9 (75)

(Figures in parentheses indicate percentage)

Gomez classification and IAP classification was adopted to compare the nutritional status of tribal and non tribal preschool children as per weight for age classification (Table 46). As per Gomez classification, 30.77 per cent of non tribal boys and 33.33 per cent of non tribal girls were having normal weight for age but none of the tribal children possessed normal weight for age. Majority of tribal boys (62.5%) were mildly malnourished whereas the tribal girls (57.14%) were moderately malnourished while majority of the non tribal boys (46.15%) and girls (50%) were only mildly malnourished. As per IAP classification, majority of the non tribal children (boys – 61.54% and girls – 75%) were normal but majority of the tribal boys (50%) were having grade I malnourishment, with the tribal girls (57.14%) were having Grade II malnourishment.

Table 47. Comparison of tribal and non tribal preschool children based on MUAC (Gopaldas, 1987)

MUAC (cm)	Number of children			
	Tribes		Non tribes	
	Boys (n = 8)	Girls (n = 7)	Boys (n = 13)	Girls (n = 12)
>13.5 (Normal)	7 (87.5)	6 (85.71)	13 (100)	12 (100)
12.5 – 13.5 (Moderate)	1 (12.5)	1 (14.29)	0 (0)	0 (0)
<12.5 (Severe)	0 (0)	0 (0)	0 (0)	0 (0)

(Figures in parentheses indicate percentage)

Table 47 distributes the preschool children according to MUAC. It was found that all the non tribal children were normal while only 87.5 per cent of tribal boys and 85.71 per cent of tribal girls were normal. The rest of the tribal boys (12.5%) and girls (14.29%) were having moderate malnourishment.

Table 48. Comparison of tribal and non tribal preschool children based on head /chest circumference (Gopaldas, 1987)

Head / chest circumference Ratio	Number of children			
	Tribes		Non tribes	
	Boys (n = 8)	Girls (n = 7)	Boys (n = 13)	Girls (n = 12)
<1 normal	6 (75)	3 (42.88)	9 (69.23)	8 (66.67)
≥ 1 malnourished	2 (25)	4 (57.14)	4 (30.77)	4 (33.33)

(Figures in parentheses indicate percentage)

The head / chest circumference ratio of majority of the tribal boys (75%), as also the non tribal children (boys – 69.23%; girls – 66.67%) were normal. Malnourishment was observed in only tribal girls.

Table 49. Comparison of tribal and non tribal preschool children based on Quetelet index (weight/ height^2) (Rao and Singh, 1970)

Weight/ height^2 (Kg/cm^2)	Nutritional status	Tribes		Non tribes	
		Boys (n = 8)	Girls (n = 7)	Boys (n = 13)	Girls (n = 12)
>0.0015	Normal	2 (25)	1 (14 29)	3 (23.08)	2 (16.67)
0.0013 – 0.0015	Moderate malnutrition	5 (62.5)	5 (71.43)	6 (46.15)	8 (66.66)
<0.0013	Undernourished	1 (12.5)	1 (14.29)	4 (30.77)	2 (16.67)

(Figures in parentheses indicate percentage)

Prevalence of malnutrition among tribal and non tribal children was also found using the Quetelet index. The data affirms that majority of tribal (boys – 62.5% and girls – 71.43%) and non tribal (boys – 46.15% and girls – 66.66%) children were moderately malnourished.

b. Clinical examination

The clinical manifestations observed among preschool children are given in Table 50. The general appearance was good in 66.67 per cent tribes and 80 per cent non tribes.

Table 50. Details of clinical symptom observed among preschool children

Sl. No.	Details	Number of families	
		Tribes (n = 15)	Non tribes (n = 25)
1.	**General appearance**		
	Good	10(66.67)	20(80)
	Fair	5(33.33)	5(20)
2.	**Eyes**		
	Normal appearance without xerosis	15(100)	25(100)
3.	**Mouth**		
	Pale tongue	3(20)	0(0)
	Normal	12(80)	25(100)
4.	**Teeth**		
	Pitting of teeth	3(20)	0(0)
	Dental caries	9(60)	15(60)
	Normal	3(20)	10(40)
5.	**Hair**		
	Normal	15(100)	25(100)

6.	**Skin** Diminished elasticity Normal	 3(20) 12(80)	 0(00) 25(100)
7.	**Face** Normal without any paleness	15(100)	25(100)

(Figures in parentheses indicate percentage)

The important clinical manifestations such as pale tongue and dental caries were observed among the tribal preschool children. Dental caries was seen in 60 per cent of tribal and non tribal children. Pitting teeth was seen in 20 per cent of tribal children. The skin was found to be normal for 80 per cent of tribes and 100 per cent of non tribes.

c. Food weighment survey

Actual food and nutrient intake of preschool children was assessed by conducting one day food weighment survey in a sub sample of 15 tribal and 25 non tribal preschool children and the results are presented in the following Tables 51 and 52.

The mean food intake of the preschool children of both tribal and non tribal communities was found to be lower than the recommended dietary intake. It was also found that the tribal children had a lower food intake than non tribal children. A statistically significant difference in the intake of foods was observed among tribal and non tribal children for all the food items when compared with the RDA.

Table 51. Mean food intake in comparison with RDA

Food item	RDA	Mean intake				't' value^{+++}
		Tribes	't' value $^{+}$	Non tribes	't' value^{++}	
Cereals	120	100.7	17.82*	104.6	13.61*	2.33**
Pulses	30	17.6	38.66*	21	27.99*	7.02**
Roots and tubers	100	79.5	14.70*	77.3	22.48*	1.36^{NS}
Green leafy vegetables	50	17.3	61.46*	19.7	46.81*	2.56**
Other vegetables	100	75.9	40.29*	80.3	22.21*	3.51**
Fruits	100	19.3	69.31*	36.9	102.82*	14.74**
Milk and milk products	500	57	39.94*	60	47.04*	0.20^{NS}
Non vegetarian foods	50	17.6	23.79*	24.92	49.86*	5.94**
Fats and oils	25	13.8	31.59*	17.4	19.62*	6.30**
Sugar and jaggery	20	10.5	21.39*	13	21.43*	4.65**

** 1% significance,
^{NS} Not Significant
't' value^{+} tribes vs. RDA $^{++}$non tribes vs. RDA
$^{+++}$tribes vs. non tribes
(Figures in parentheses indicate percentage)

The per cent intake of RDA of each food items was calculated and was found that none of the food groups met 100 per cent of RDA (Figure 1)

Above 50 per cent of RDA were noticed in the mean intake of cereals, pulses, roots and tubers, other vegetables, fats and oils and sugar/jaggery in both tribal and non tribal children.

The mean intake of green leafy vegetables, fruits and milk and milk products were below 50 per cent of RDA. The intake was lower in the tribal children than the non tribal children.

The cereal consumption was 83.9 per cent of RDA in tribes and 87.2 per cent of RDA in non tribes.

The mean intake of pulses was found to be only 58.7 per cent of RDA among the tribal children while 70 per cent of RDA was met in non tribal preschool children.

The consumption of fruits was only 19.3 per cent of RDA in tribes compared to 36.9 per cent of RDA in non tribes. Consumption rate of milk and milk products were very low in both tribes and non tribes. Only 11.4 per cent of RDA, 12 per cent of RDA was consumed by tribes and non tribes respectively.

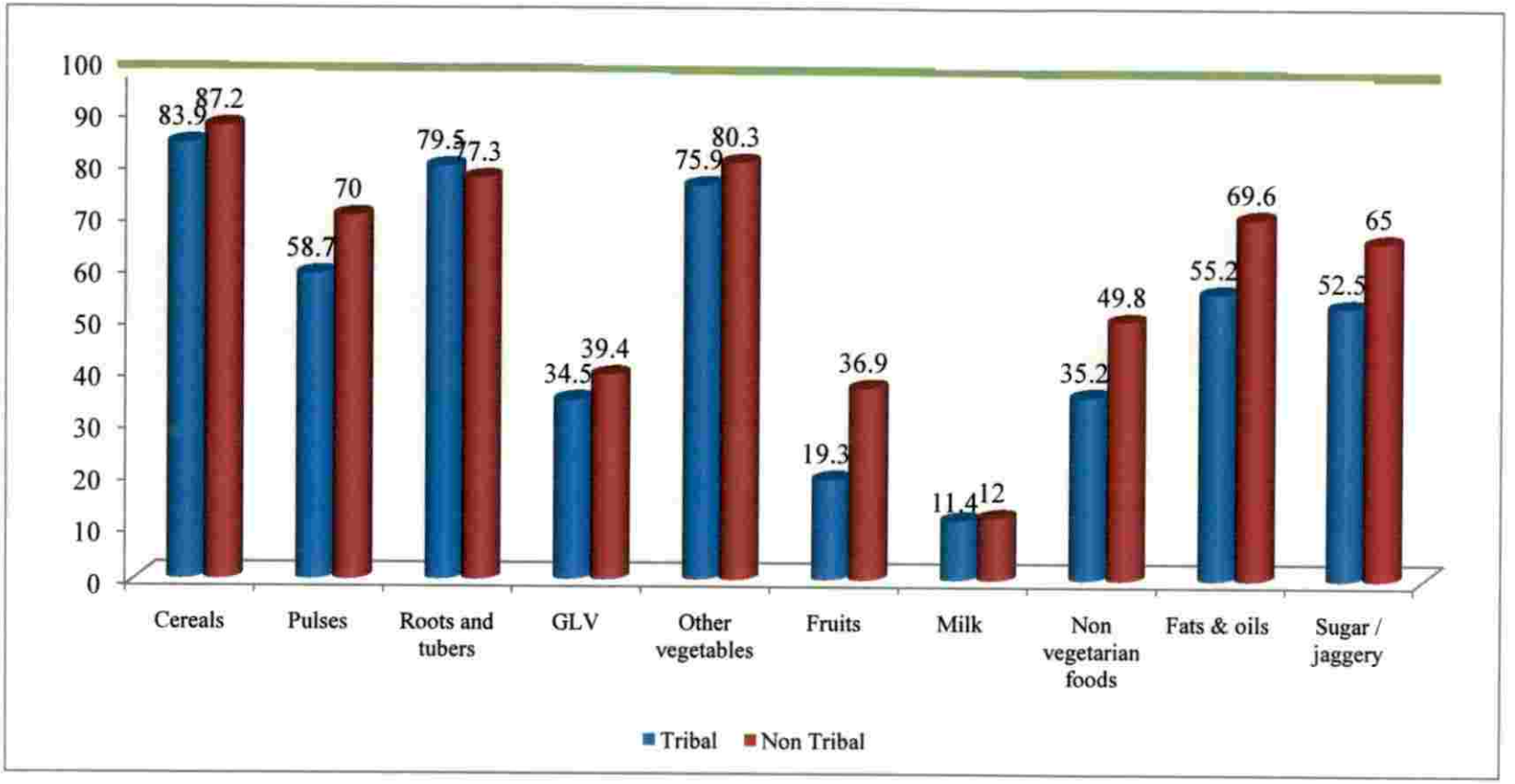


Figure 1: Percentage of RDA of food intake

The mean nutrient intake was calculated and was compared with the RDA. The mean intake of all the nutrients was lower than the RDA and the tribals had lower intake compared to the non tribal counterparts.

Statistical difference was noticed in the intake of all the nutrients when comparing the mean intake and RDA in both tribal and non tribal communities.

A statistically significant difference in the intake of nutrients was observed among tribal and non tribal children for all the nutrients except thiamine and niacin.

Table 52. Mean nutrient intake in comparison with RDA

Nutrients	RDA	Mean intake				't' value^{+++}
		Tribes	't' value^{+}	Non tribes	't' value^{++}	
Energy (Kcal)	1350	1000	31.57*	1047	55.73*	3.94**
Protein(g)	20.1	15.6	8.41*	17.5	6.55*	2.62**
Fat (g)	40	16.1	26.39*	18.4	41.82*	10.93**
Calcium (mg)	600	178.5	38.40*	207	25.75*	3.65**
Iron (mg)	13	4.1	35.06*	5.1	23.77*	1.99**
Carotene (µg)	3200	201.7	270.38*	256.1	153.25*	2.02**
Thiamine (mg)	0.7	0.47	7.67*	0.52	6.81*	1.01^{NS}
Riboflavin (mg)	0.8	0.57	4.64*	0.67	5.81*	1.68**
Niacin (mg)	11	4.42	42.04*	4.59	79.79*	1.08^{NS}
Vitamin C (mg)	40	9.3	203.4*	12.6	34.74*	2.50**

** 1% significance, * 5% significance, ^{NS} Not Significant 't' value^{+} tribes vs. RDA $^{++}$non tribes vs. RDA^{+++}tribes vs. non tribes

(Figures in parentheses indicate percentage)

The per cent of RDA met by the tribal and non tribal children were plotted in the Figure 2. The figure clearly shows that none of the nutrients met 100 per cent of RDA.

Above 70 per cent of RDA was met in the mean intake of only energy, protein, thiamine and riboflavin.

Protein was not adequately met by tribal and non tribal preschool children but there were 71.1 per cent of RDA was met by tribal children and 78.1 per cent of RDA was met by non tribal children.

Fat was also not met adequately; only 34.3 per cent of RDA and 43.3 per cent of RDA were met by tribal and non tribal children respectively. Only 24.3 per cent of RDA and 26.6 per cent of RDA for calcium were met by tribal and non tribal children respectively

The intake of iron was also low. The intake of carotene was only 5.6 per cent of RDA in tribal children and 6.2 per cent of RDA in non tribal children.

Thiamine intake was found to be 74.3 per cent of RDA in tribal children and 85.7 per cent in non tribal children and riboflavin intake was 71.3 per cent of RDA in tribal children and 88.8 per cent of RDA in non tribal children.

The intake of niacin was below 50 per cent in both tribal and non tribal children. The vitamin C intake met only 20 per cent of RDA in tribal children and 21.5 per cent of RDA in non tribal children.

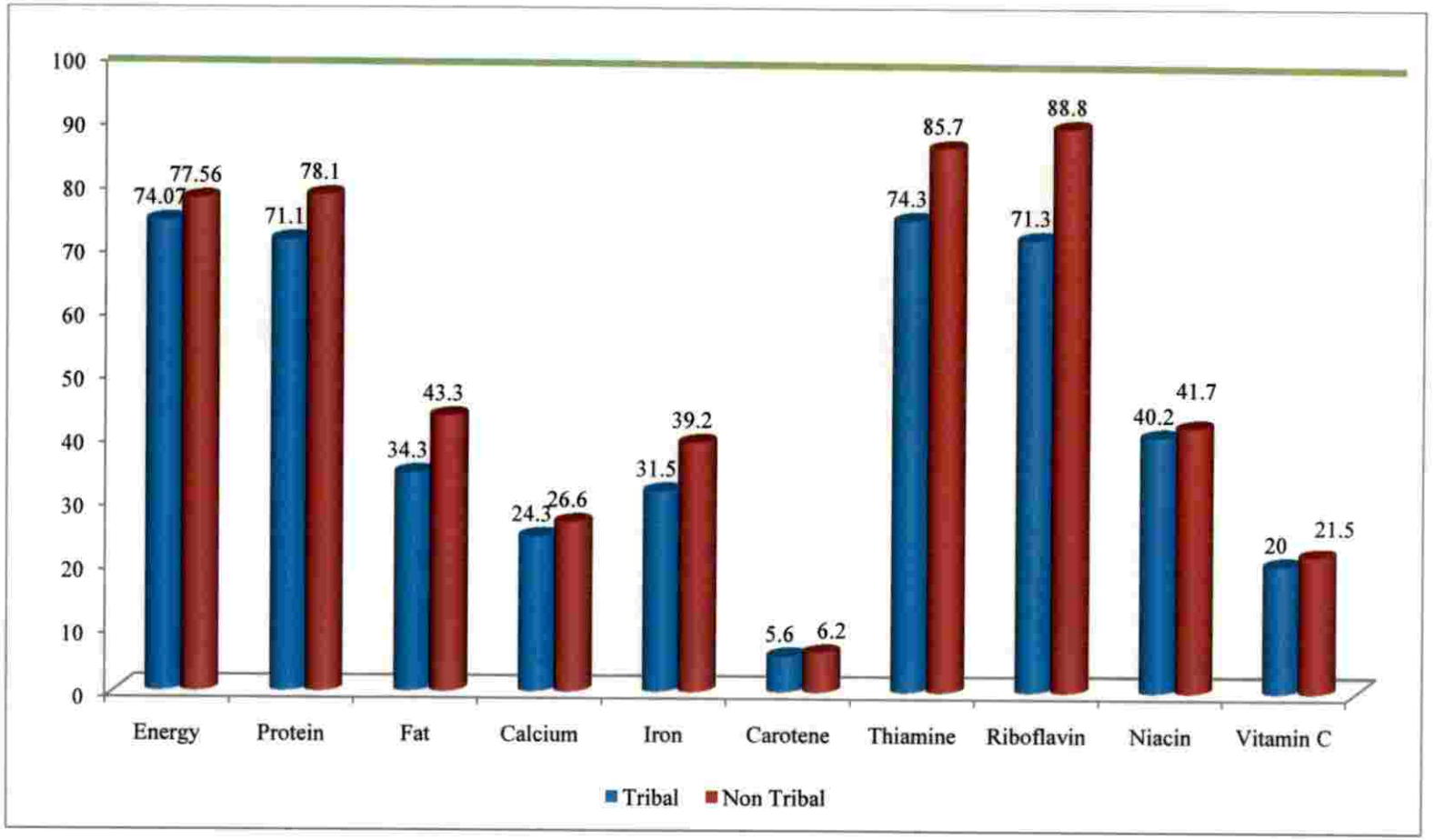


Figure 2: Percentage of RDA of nutrient intake

d. Haemoglobin estimation

The percentage prevalence of anaemia among preschool children was determined on the basis of haemoglobin level of blood and the results are given in Table 53.

Table 53. Classification of preschool children based on the haemoglobin levels (WHO, 2001)

Category	Hb level (g/dl)	Tribal (N = 15)	Non tribal (N = 25)
Moderate aneamia	7 – 9.9	0(0)	0(0)
Mild aneamia	10 – 10.9	10(66.67)	10(40)
Normal	≥11	05(33.3)	15(60)

(Figures in parentheses indicate percentage)

The haemoglobin levels of 15 tribal and 25 non tribal preschool were estimated. The data was distributed according to the classification given by WHO (2001). The results revealed that the tribal children are anaemic than non tribal children. Prevalence of mild anaemia was found in 66.67 per cent of the tribal children which was much less in non tribal children (40%). Sixty per cent of the non tribal children had normal haemoglobin level while only 33.3 per cent of the children had normal haemoglobin level of >11g/dl.

4.4.Food security

Table 54. Distribution of families on the basis of affirmative responses

Raw score	**No of families With children (n = 75)**
0	6 (8)
1	17(22.67)
2	25(33.33)
3	0(0)
4	9(12)
5	4(5.33)
6	7(9.33)
7	4(5.33)
8	3(4)
9	0(0)
10	0(0)
11	0(0)
12	0(0)
13	0(0)
14	0(0)
15	0(0)
16	0(0)
17	0(0)
18	0(0)

(Figures in parentheses indicate percentage)

Table 55. Food security status of tribal households

Food security status	Code no	No of families
Food secure	0	48(64)
Food insecure without hunger	1	24(32)
Food insecure with moderate hunger	2	3(4)
Food insecure with severe hunger	3	0(0)

(Figures in parentheses indicate percentage)

From Table 47 and 48, it was observed that 64 per cent of the families with children did not indicate any problems in meeting their food needs. They were given a score from 0 to 2 and were coded as 0, i.e. food secure. Raw score from 3 to 7 which was coded as 1, food insecure without hunger was seen in 32 per cent of the families surveyed. There were moderate hunger in 4 per cent of the families with a raw score 8 and coded as 2.

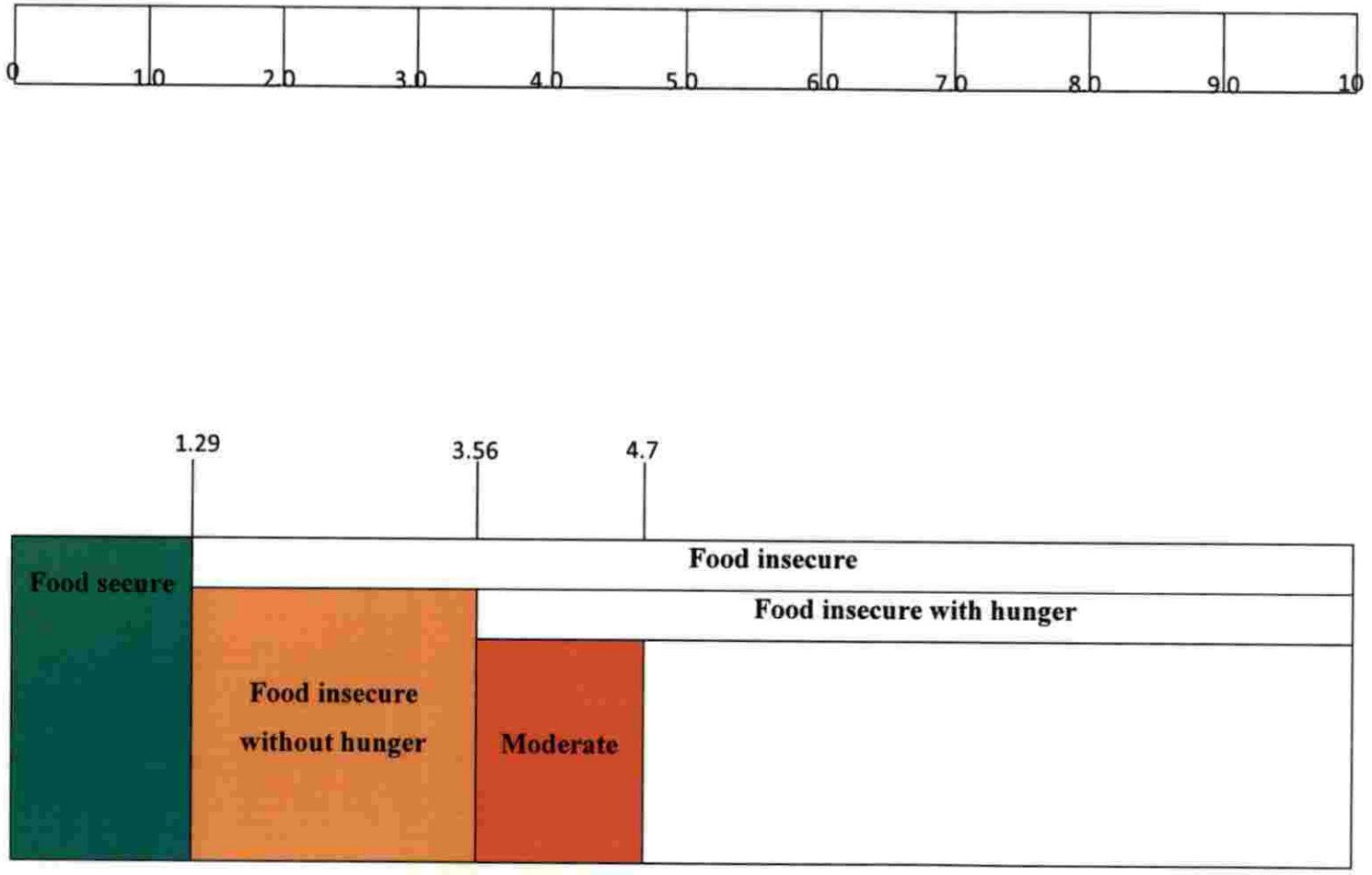


Figure 3. Food security in the tribal households

DISCUSSION

5. DISCUSSION

The results of the research work entitled "**Nutritional profile of preschool children belonging to tribal families in Thrissur district**" are discussed in this chapter.

5.1.Demographic details of the families

All the families surveyed belonged to Hindu religion. NNMB (2009) also reported that majority of the tribals belonged to Hindu religion in Kerala while the proportion of Christians was higher in Orissa, Andhra Pradesh and West Bengal.

The tribal communities of India had also transformed leaving the traditional characteristics and had acquired the features of the non tribal communities. Joint family system which was predominant in the tribal societies had transformed to the nuclear family system. This change may be because of the changes in social values and urbanization. This transformation was noticed among the tribals in the present study also with 81.33 per cent following nuclear family system. The result is backed up by various other studies on the tribal population of India. Kakkoth (2004) in a study conducted in the *Aranadan* tribes of Kerala has also reported the predominance of nuclear family system. Majority of the *Saharias* – the primitive tribes of Rajasthan, resided in nuclear families while some lived in joint and extended joint families (Rao *et al.*, 2006). NNMB (2009) also reports that about 87 per cent of tribal families in Kerala were nuclear families and the rest lived in joint and extended joint families. This family pattern was also noticed among the non tribal communities of different socio economic conditions in the state (Aneena, 2003; Jyothi, 2003; Lawrence, 2003; Anusha, 2012; Blossom, 2013)

Availability of medical facilities, educational facilities and the constant exposure to small family norm through media may be the reasons for the prevalence of small families in Kerala (Indira, 1993). The average family size was 4 in the present study which is in line with Census reports (2011). According to the Census of India (2011) the average family size of tribal families in India is 5.2

and of Kerala is 3.9. The result of the study is in line with these results. Since nuclear system was observed among the families in Kerala, the family size was limited to four. Kakkoth (2005) reports that family planning was done among the primitive tribes of Kerala to limit the family size.

Educational advancement is considered as the main factor for the social development. The educational status of the tribes was found to be low since the number of dropouts was high (KIRTADS, 2001). Kerala, the highly literate state, has readily increased the literacy rate of the tribals by implementing various policies for education. Kerala government have started Model Residential Schools, Ashram Schools, Tribal schools to improve the educational status of tribals. The policies such as District Primary Education Programme, Alternative and Innovation Education centres have assured the elementary education for all the tribal children of Kerala (Suresh *et al.*, 2015). This development in the educational sector was readily observed in the present study. About 5.33 per cent each of father and mother had college education and 53.33 per cent of fathers and 52 per cent of mothers had atleast lower primary level of education. The present study reveals that the education status of men was better than women. In study conducted among the *Irular* tribes of Kerala, Indira (1993) had found that as the age decreases the educational status increased.

Tribals are engaged in various types of occupation. In the present study 69.33 per cent of them were workers with daily wages and 61.33 per cent had an income of Rs. 1000 to 2000 per month. The families were employed on the Mahatma Gandhi National Rural Employment Guarantee Act from the year 2005. As per this act, a person should work atleast 100 days in a year and the daily wage was Rs. 240. Since the government fulfilled the basic needs of the tribal population and so the need for an occupation and earning income was not thought to be necessary by them. *Sahariya* tribes of Madhya Pradesh were also reported to be daily wage workers in non agricultural areas (Jerath *et al.*, 2013). The tribes of Jharkhand (Roy, 2012), tribes of Andhra Pradesh (Kumar *et al.*, 2013) and *Irular* tribes of Tamil Nadu (Dhevi and Mani, 2014) were also daily wage

workers. Rekha *et al.* (2007) stated that the average monthly income of tribal families of Ranchi were only 1000 to 2000 rupees per month, which is in line with the result of the present study. Several studies has pointed out that the tribes were engaged in various occupations as non tribal population, but they are not given the same wage as of the non tribal population (MSSRF, 2000).

All the families owned their own houses. Regarding the number of rooms present in the house, 68 per cent families had two rooms in their house.

The tribal Sub plan of Kerala had renovated all the tribal houses with basic amenities. Houses with brick walls (100%), mud floor (58.67%) and terraced roof (70.67%) were found in the study. About 89.33 per cent had separate kitchen and 65.33 per cent used public tap as the source of drinking water. Chandran (2012) has opined that the housing condition of tribal families in Kerala has improved drastically, which is clearly revealed from the preset study. In a study conducted by Chakma *et al.* (2012) in the Baiga tribes of Baihar, it was found that majority of them lived in *kaccha* houses, used hand pump for assessing drinking water and do not have proper sanitary latrine, separate kitchen and electrification. Lavatory facilities and drainage facilities were present in the localities surveyed. In contrast to this, the drainage and lavatory facilities were found to be poor by various authors in their studies (Balgir *et al.*, 2002; Trehan, 2004; Rao *et al.*, 2005). Lakshmi and Priya (2004) also reported about the lack of sanitation and drainage facilities in the tribal communities. Lack of drainage facilities may lead to the mosquito breeding which may increase the disease incidences in the society (Trehan, 2004).

Electricity was present only in 86.67 per cent of the families. Electricity was not present in the rest of the houses since they were under renovation at the time of the study. Proper waste management is practiced only by 33.33 per cent of families. The families had a common pit and they disposed the wastes in them which are a proper method of waste management.

The tribal families in the present study do not have indebtness and majority of the families (96%) do not have savings. Tribals had the habit of using the income for their daily expenditure and so did not save the money for the future. Since the government is supporting them for all their needs, debts were not seen in tribes of Thrissur district. The situation is different in the case of tribes of Andhra Pradesh; they had indebtness as well as savings (Kumar *et al.*, 2013). Regarding the land holdings and agriculture in the land, 62.5 per cent of the families owned less than 5 cents of land and agriculture was practiced by 83.33 per cent of the families. About 40 per cent of the tribals of Maharashtra were landless or owned land of one acre (Tribhuvan and Sherry, 2004). Abraham (2005) in his study in the tribal areas of Udayagiri panchayath of Kannur, reveals that the tribals possess only less areas of land and the agricultural crops grown in their land were coconut, rubber and vegetables. This finding is in tune with the result of the present study. The tribal families of Thrissur district also had rubber (20%), coconut (30%) and vegetables (50%) as their agricultural crops. All the tribal families were provided with poultry and livestock by the government under the Tribal Sub plan for their living. From the survey, it was observed that the tribals sell them for purchasing alcoholic beverages. Other reasons commonly stated for not possessing poultry and livestock was the death of the animals because of the attack of disease and wild animals. At present, rearing of domestic animals was prevalent among 24 per cent of the families in the present study. This is supported by the study conducted by Dhevi and Mani (2014) in the *Irular* tribes of Tamil Nadu.

About 46.67 per cent of the families had unhealthy habits such as smoking, chewing tobacco, alcohol consumption and chewing betel leaf. Similarly Murugar and Pal (2005) also found that there is use of fermented beetel nuts, tobacco and alcohol. Use of tobacco is highly prevalent in India says Gupta *et al.* (2001). Alcohol and drugs have seductive action on the parts of central nervous system and relives anxiety and worry says Nair and Pejavar (2000) and Dwarakanth (2005). Tobacco smoking increases the prevalence of asthma in

children (Gupta *et al.*, 2001) and increases the mortality and morbidity rate (Gupta and Mehta, 2000).

Over 2,700 Primary health centres are situated around the state. The present study reveals that all the tribes surveyed had access to health care facilities within a distance of 10 to 15 kms. The tribes of Tamil Nadu also had Primary Health Centres at a distance of 10 – 15kms (Dhevi and Mani, 2014). But the Paraja tribes of Orissa had no proper health care facilities (Behera *et al.*, 2008). The authors also found that the PHC available is about 70 kms away from the village, which deviates from the result of the present study. In the present study PHC facility was utilized by majority (100%) of the families. The result is in tune with the result of the study done in tribal community in Bastar District (Chopra and Makol, 2004).

5.1.1. Details regarding the selected children

About 82.67 per cent of children were of first order, 16 per cent in the second order and 1.33 per cent in the third order. Sixty per cent of children were having a birth spacing of one to two years and 14.67 per cent with two to three years.

The normal birth weight for a child is above 2.5 kg (ICMR, 2010), which is found in only 8 per cent of the children. A very low birth weight of one to two kilogram was observed in 36 per cent of the children. The result was backed by Paul (2013), in her study in the tribal areas of Kerala. In the case of Primitive tribes of Kerala, their food fads and fallacies, certain religious beliefs and practices also contributes to the lower birth weight of the children (Kakkoth, 2005). A study conducted by Sinha (2014) in the tribal areas of Jharkhand has found that the pregnant women reduce food intake in the fear of vomiting and also to ensure that the baby remains small which helps in easy delivery.

The immunization coverage was 97.33 per cent and 2.67 per cent did partial immunization. UNICEF (2002) reports that there is an increase in the

immunization rates in India which decreases the morbidity rate. Similar finding was done by Renuka *et al.* (2011) in Karnataka and found that complete immunization was done in 85 per cent of tribal children which was more than the non tribal children (76.7%).

Regarding the morbidity pattern of the families, 64 per cent of the families had suffered from various illnesses during the last year. Cough and cold was the major illness. This finding is supported by Lakshmi and Priya (2004). Prevalence of diarrhoeal episodes was found in 16.67 per cent of the families which is similar to the findings of Ray *et al.* (2000) and Vaahtera *et al.* (2000). The reason for the prevalence of diarrhoea and dysentery may be the impure water utilised for drinking and cooking. Deworming was done regularly in 86.67 per cent of the families. Serious illness such as kidney problems, heart problems and frequent high grade fever with seizures was seen among 3.99 per cent of children.

Majority of the families (92%) preferred allopathic treatment while the remaining 5.33 per cent of families preferred ayurveda and 2.67 per cent of families follow homeopathic treatment. The easy availability of the allopathic treatment had made them use it than the indigenous practices.

5.2.Dietary habits of the family

All the families surveyed were found to be habitual non vegetarians. Pre planning of meal was found in 68 per cent of the families. Majority of the families (54.67%) had their meals at regular timings.

The Public distribution system of Kerala is efficiently working in the tribal communities. The families are provided with cereals such as rice and wheat and also pulses. The information regarding the frequency of consumption of food items reveals that the families used cereals in the form of rice in their daily diet and pulses were used twice in a week by 60 per cent of the families. Green leafy vegetables were used occasionally by 26.67 per cent of the families and 54.67 per

cent of the families included vegetables daily. Fruits (56%) and milk (96%) were consumed occasionally by the families.

Regarding the purchase of food items, the present study reveals that roots and tubers were purchased regularly by majority of the families. This finding is in line with the findings of NNMB (2000) and Hari (2008). Hari (2008) also opines that the use of rice may be due to the easy availability and also as it is the staple food of Kerala. Murugar and Pal (2005) reported that the tribals consume more ready to eat foods and beverages available in the market and the consumption of traditional foods are lowered. The result of the present study is in contrast to this, consumption of ready to eat food items and beverages were consumed occasionally by majority of the families.

Honey was collected from forest by 65.33 per cent of the families. The collected honey was sold to the nearby stores by 75.5 per cent of families whereas 24.5 per cent of families used it at household level.

Majority of the families (54.67%) cooked once and consumed thrice (61.33%) in a day.

Preparation methods are important factors which determine the nutrient content of the food items. The results of the present study reveal that the washing of other vegetables after cutting was done by 86.67 per cent of the families. The vegetables were cut according to the type of preparation by 48 per cent of the families. Washing of vegetables after cutting may cause loss of water soluble nutrients. Cutting into smaller pieces can increase the surface area exposed to water which may increase the loss of nutrients (Srilakshmi, 2015).

The methods utilized for food preparation was of high importance, as they determine the nutrient content of the food, which reflects in the nutritional status of the individuals. The common method of cooking was reported to be boiling and straining in the present study. Hari (2008) also reported the same. The Bhil tribes of Madhya Pradesh adopted the boiling and roasting practices (Qamra *et al.*,

2006). Similar findings were reported among the *Oraon* tribes of West Bengal (Mittal and Srivastava, 2006), tribes of Madhya Pradesh (NNMB, 2000). In the present study, boiled water was used by majority of the families for drinking. Hari (2008) has also reported that tribal families used boiled water for drinking but Neetima and Sehgal (2004) reported that technique of boiling water for purification was not utilized by the people. The use of boiled water for drinking decreases the risk of water borne diseases (Trehan, 2004).

Majority of the families served to children and then to other members while some opted to have food together. Such practices were also reported by Ray *et al.* (2000). Narayanan *et al.* (2005) have opined that children and women were not given a good share of food irrespective of the communities in India. The improper intra household distribution may be the reason for continuing cycle of malnutrition among women and children.

Use of leftover food was observed in the present study which is supported by the findings of Hari (2008). This may be because of the modern facilities available such as refrigerators. Refrigerators were seen in 12 per cent of the families.

The families preferred non vegetarian food items during birthday (76%), marriages (84%) and during festivals (61.33%). They strictly followed vegetarian foods during death and funeral occasions. This finding is also supported by the study done in the *Irular* tribes of Kerala (Indira, 1993)

Storage of food items was not prevalent in the families. The families purchased the required food items from the ration shops. The families did not prepare any processed foods. Preservation techniques were also seen rarely. Some of the families (8%) prepared salted fishes. Purchase of processed foods was also not prominent in these families. Majority of the families (54.67%) purchased pickle packets from the local shops.

Diet modifications during illness were prevalent among all the families. The use of spicy foods and non vegetarian foods were reported in the present study

which is supported by the study conducted by Murugesan and Ananthalakshmi (1991).

Food fads and fallacies were present among the tribal families all over India. Various types of food fads were prevalent among 54 per cent of the families in the study. Green and ripe papaya was avoided by the pregnant mothers in the present study. Such food fads and fallacies were also reported by Upadhyay (1995) and Hari (2008) also supported this view in tribal families. Vijayaraghavan (2003) comments that due to the food fads, foods like colostrums, green leafy vegetables, papaya which are the rich sources of vitamin A were avoided which in turn may increase the vitamin A deficiency diseases. In contradiction with this, the studies on the *Bhil* tribes, reports that no fads and fallacies were seen during pregnancy (Qamra *et al.*, 2006). Mishra *et al.* (2001) also reported the same finding. During illness, the *Bhil* tribes first starved and then had liquid foods but in the present study there were only certain modifications in the diet. The diet modifications based on the taboos have been reduced among the tribes of Kerala, with the help of nutrition education classes. The tribal development programs also improve the situation.

All the children were beneficiaries of supplementary feeding programs. Egg and milk was provided weekly once, which was discarded by majority of the families which resulted in poor nutritional status. The Government of Kerala, had given special attention to reduce the malnourishment among the children and so the supplementary feeding programmes were initiated (Government of Kerala, 2000). A study conducted on the *Sahariya* tribes of Madhya Pradesh, found that 60 per cent of the families participated in supplementary feeding programs and 30 per cent availed food daily and 25.5 per cent availed 2 to 3 times in a week (Jerath *et al.*, 2013).

Breast feeding was initiated after 3 to 4 hours in 74.67 per cent of the children. It was observed that 66.67 per cent fed their children with breast milk for 1 to 2 years. But *Toda* mothers of Nilgiri initiated breast feeding soon after birth

but *Kotas, Irulas* and *Kurumbas* discarded colostrum and initiated breastfeeding only after third day of birth (Rao *et al.*, 2005). Rao *et al.* (2006) in their study on *Saharias* also revealed that majority of the mothers initiated breastfeeding on the third day of delivery and 80 per cent discarded colostrums. Jerath *et al.* (2013) reported the mothers in *Sahari*a tribal community of Madhya Pradesh, initiated breastfeeding within 1 hour of birth and practiced exclusive breastfeeding until 6 months. Authors also reported that they introduced complementary feeding after 6 months which was in tune with the present study.

5.3. Nutritional status of selected preschool children

5.3.1. Anthropometric measurements of the tribal preschool children

Anthropometric measurements such as height, weight, head circumference, chest circumference and MUAC were recorded. The mean height and weight of the children were lower than the ICMR standards (2010). The boys are slightly taller and heavier than girls in the present study which is backed up by the findings of several studies in the tribal preschool children in India (Aswathy *et al.*, 2003; Rao *et al.*, 2005; Bisai *et al.*, 2014; Philip *et al.*, 2015).

The mean height of tribal preschool children in Kerala according to NNMB (2000) was determined as 94.6 cm to 109.3 cm which is clearly pictured in the present study also. The mean weight of the children was 15.2 cm and 14.2 cm for boys and girls respectively which were lower than the ICMR standards (2010). The mean MUAC was lower than the NFI standards (1991) for both girls and boys. Studies showed that under conditions of reduced food intake, lower levels of subcutaneous fat and muscle mass in human arms tend to correspond to a decrease in the MUAC (WHO, 2009). The mean MUAC in the present study was 15 cm in boys and 14.8 cm in girls which is in line with mean values (14.6 to 14.9 cm respectively) determined by the NNMB report (2000). The mean MUAC of boys were higher than that of the girls in the present study which is in line with the results of a study conducted by Singh and Mukherjee (2015). The rate of undernourishment based on MUAC was less prevalent in the

present study. Majority of the boys (92.86%) and girls (85.11%) were having normal MUAC. In contrast to the present study, the rate of under nutrition by using MUAC was 58 per cent among the pre-school children from Central Orissa (Mishra and Mishra, 2007). The mean chest circumference and head circumference was also found to be lower than that of NFI (1991) standards.

Height of an individual is influenced by genetic and environmental factors and it is considered as an index of chronic or long duration malnutrition. The height of the children was classified according to the height for age classification given by Waterlow (1972), Visweswara Rao (1980) and McLaren (1982). Waterlows classification revealed only 35.7 per cent of boys and 27.7 per cent of girls were having normal height for age. The rest of the children were having different forms of malnutrition. Visweswara Rao classification revealed that 46.4 per cent of boys and 40.4 per cent of girls were malnourished. As per McLaren's classification, 7.1 per cent of boys and 2.1 per cent girls had nutritional dwarfing. It has been reported that children who have survived from protein energy malnutrition or continuous infection may show nutritional dwarfing (Ara, 2005).

Weight of an individual is a sensitive indicator of changes in the nutritional status and it indicates the present nutritional status of the child. Weight for age classification given by Gomez *et al.* (1956) and IAP (1972) was calculated. Gomez classification reveals that the 78.6 per cent of boys and 87.2 per cent of girls were malnourished. The IAP classification for weight for age showed that majority of boys and girls had Grade I and Grade II malnutrition. The result is backed by the report of Meena (2004) on her study on the tribal preschool children of Nadurbar district of Maharashtra. Kapil (2001) also reports that there was prevalence of severe form of malnutrition among the preschool children of ICDS project. The weight deficit may be more prevalent due to multiple factors such as poor nutrition, continuous episodes of infection, improper infant feeding practices etc.

MUAC is an index which indicates the muscle development in the children. Based on MUAC the result of the present study reveals that 92.86 per cent of boys and 85.11 per cent of girls are normal and 7.14 per cent, 14.89 per cent of boys and girls respectively are having moderate malnutrition.

The head size relates mainly to the size of the brain and chest in a normally nourished child grows faster than the head from the second year of life onwards. The chest circumference should overtake the head circumference by about one year of age. Low Head and chest circumference ratio also is an indicator of protein energy malnutrition. The head and chest circumference ratio affirms that even though 71.4 per cent of boys and 63.8 per cent of girls where having normal ratio, 28.6 per cent of boys and 36.2 per cent girls are malnourished.

The data on the weight/ height^2 ratio classification proclaim that 60.7 per cent of boys as well as 59.6 per cent of girls are said to have moderate malnutrition and 17.9 per cent boys as well as 25.5 per cent girls are undernourished.

Stunting was more prevalent among the children surveyed in the present study. About 71.43 per cent of boys and 87.23 per cent of girls were stunted or were nutritional dwarf. Bisai and Mallick (2011) reported that Kerala has the lowest proportion of children with underweight (23%), stunting (25%) and wasting (16%). They also suggested that, a much higher prevalence was seen in Koramudi tribal children with a prevalence of 52.9% underweight, 49.6% stunting and 22.7% wasting. Overall prevalence of underweight (38.6%), stunting (36.8%) and wasting (18.6%) was reported in a study conducted by Renuka *et al.* (2011). Studies conducted in tribal area near Jabalpur have an underweight prevalence of 33.9 per cent, stunting in 21.5 per cent and wasting in 26.4 per cent of children (Rao and Yadav, 2011). A much higher prevalence of under nutrition among Bhil tribal children was observed with underweight (69.3%), stunting (63.4%) and wasting (58.7%). In girls, prevalence of underweight (72.7%) and wasting

(61.1%) was higher when compared to boys (66.2% underweight and 56.4% wasting).

Undernutrition was prevalent among the tribal children based on all the anthropometric measurements. The prevalence of undernutrition was high in Bangladesh children (Roy, 2000). Per cent prevalence of undernutrition was more among the children of Central Orissa (Mishra and Mishra, 2007) and also Shabar children of Orissa (Chakraborty *et al.*, 2006).

The height and weight of the father and mother were correlated with the height and weight of the children and was found that there is no positive correlation between them.

5.3.2. Nutritional status of tribal vs. Non tribal children

a. Anthropometric measurements

The height and weight of tribal children were less than that of the non tribal preschool children. This finding is in tune with Philip *et al.* (2015), who reported the same trend in a study conducted in tribal areas of Wayanad district. In the case of non tribal preschool children also, the mean height and weight of both boys and girls were found to be significantly low when compared with ICMR standards (Aneena, 2003). Philip *et al.* (2015) also confirms with the result, that the tribals are having lower height and weight than non tribal counterparts.

The head circumference, chest circumference and MUAC of tribals were lower than non tribals but the difference was statistically different only in chest circumference. The height for age classification given by Waterlow (1972), Visweswara Rao (1980) and McLaren (1982) was studied. According to Waterlow's classification, 50 per cent of tribal boys and 85.71 per cent of tribal girls are severely malnourished while none of the non tribal preschool children are severely malnourished. As per Visweswara Rao's classification, 76.92 per cent of

non tribal boys and 50 per cent of non tribal girls are normal while 75 per cent of tribal boys and 85.71 per cent of tribal girls are mildly malnourished. Distributing the children according to McLaren's classification reveals that none of tribals are normal when 53.85 per cent of boys and 16.67 per cent of girls in non tribals are normal.

Gomez classification and IAP classification was used to determine the prevalence of malnutrition based on weight for age. Gomez classification for weight for age indicates that mild and moderate malnourishment is prevalent among tribes and non tribes. The results on the studies conducted by Blossom (2013), Anusha (2012) in the non tribal preschool children affirms with the same pattern of undernourishment. In regard to the tribal preschool children also several studies have showed the same trend of malnourishment. On comparing with the per cent prevalence of malnourishment according to weight for age classification of tribal and non tribal preschool children, we can conclude that the tribal children are having higher prevalence than non tribal children which is also reported in the present study. Hari (2008) has also reported a prevalence of 60 per cent and 80 per cent of mild and moderate malnourishment.

The MUAC of the tribal and non tribal children was classified as per Gopaldas (1987) and was found that all the non tribal children are normal while only 87.5 per cent of tribal boys and 85.71 per cent of tribal girls are normal. The rest of the tribal boys (12.5%) and girls (14.29%) are having moderate malnourishment. The head and chest circumference ratio was calculated and the data results that the majority of boys and girls in the tribal and non tribals are normal while 57.14 per cent of tribals girls are malnourished.

Quetelet's index was calculated for the preschool children and was classified. The result reveals that the majority of tribes and non tribes suffered from moderate malnourishment. Similar findings were found in studies conducted in the nontribal preschool children in Thrissur district (Shyna, 1996; Mathen, 1998; Jose, 1998; Aneena, 2003).

b. Clinical examination

Nutritional deficiencies are effectively diagnosed with the help of clinical examination. Dental caries was reported in both tribal (60%) and non tribal (60%) preschool children. Pitting of teeth (20%) and pale tongue (20%) was seen in tribal children. Dental caries was found to be the major clinical manifestation among preschool children by Jose (1998), Mathen (1998), Aneena (2003), NNMB (2006), Anusha (2012) and Blossom (2013). NNMB (2006) found that various deficiency symptoms like night blindness, conjuctival xerosis, bitot's spot, angular stomatitis, cheilosis, glossitis, koilonychia, bleeding gums and fluorosis were not noticed among preschool children in Kerala. Diet and nutritional factors also ensure a role in the prevalence of dental caries (Sachithananthan and Chandrasekhar, 2005). Dental diseases are also caused due to malnutrition, unhygienic habits, bacterial infection (Bhasin, 2004) and low socio economic status (Jose and King, 2003).

c. Actual food and nutrient intake of preschool children

The mean food intake was calculated and was found that none of the food groups met the RDA and was statistically significant. Aneena (2003) in a study conducted among the preschool children belonging to fisherman community of Kerala found that all the food groups did not meet the RDA. Same trend as seen in the present study regarding the consumption of food items were noticed by Sobha and Sheela (2004) Anusha (2012) and Blossom (2013) in non tribal preschool children. The food intake of tribal is found to lower than non tribal preschool children. The difference was found to statistically significant. The intake of cereals, pulses and roots and tubers met more than 50 per cent of their RDA. The dietary adequacy of rural preschool children were studied by Jyothilakshmi *et al.* (2003) and determined that the diet was purely cereal based and was devoid of protective foods. Parimalavalli (2012) have found out that the consumption of cereals and pulses were inadequate, Milk and meat was less than RDI and tribals rarely consumed fruits, vegetables, fats, sugars and fish. The consumption of

pulses, green leafy vegetables, roots and tubers, sugar and jaggery, fats and oils, milk and milk products were found to be low in the children of Bhil tribes of Madhya Pradesh (Pradhan and Sharma, 2011). The result revealed that there is inadequacy in the intake of green leafy vegetables, fruits and milk. There is total lacking of green leafy vegetables as well as fish among the preschool children of Kerala (Sandhya, 2001). Even though the government is providing supplementary feeding programs in which the children are benefited with egg and milk, 85.33 per cent of the families discard it after taking it to home. The consumption of leafy vegetables, oils and fats, fish and meat was lower in rural preschool children of Bihar, which may attribute to their poor purchasing power says Veenakumari (2006).

The mean nutrient intake was found to be lower than the RDA for both tribes and non tribes. Nutrient intake of tribes and non tribes is significantly lower for all the nutrients except thiamine and niacin. Mean nutrient intake were more than 50 per cent in energy, protein, thiamine and riboflavin but the intake of calcium, iron, vitamin A and vitamin C were lower in both tribals and non tribals. The intake of nutrients was lower than the RDA in the tribal preschool children of Madhya Pradesh (Rao *et al.* 1994). The diets of tribes, rarely meet the RDA (NNMB, 2000). The diets of *Khawar* tribes of Uttar Pradesh (Mishra *et al.*, 2002), tribes of *Bastar* (Singh and Palta, 2004), *Bhils* (Qamra *et al.*, 2006), *Oraon* tribes of West Bengal (Mittal and Srivastava, 2006) are deficient in all the nutrients. There were adequate intake of protein, thiamine and niacin while there were deficiencies in the intake of fat, calcium, iron, carotene and vitamin C among preschool children of *Gond* and *Kawar* tribal communities (Mitra *et al.*, 2007). Nutritional inadequacy in the non tribal preschool children was observed by Blossom (2013). The inadequacy among non tribal preschool were also reported by Udaya (1996), Smitha (1999), Aneena (2003), Jyothi (2003), Lawrence (2003), Narayana and Sathiya (2004), Yenagi *et al.*(2007).

d. Haemoglobin estimation

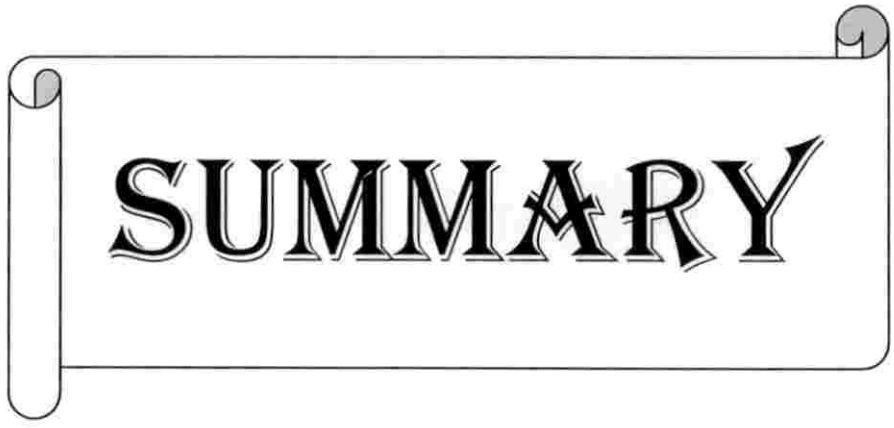
The present study reveals that majority of the tribal children (66%) were suffering from mild anaemia but the per cent prevalence in non tribal children (40%) was low. The result is in line with the findings of Behere *et al.* (2008) in his study among the *Paraja* tribes of Orissa. A study conducted in Scheduled caste preschool children, 92.4 per cent of the children studied were anaemic (Sidhu and Uppal, 2003). Vyas and Choudhary (2005) in their study to find the prevalence of anaemia among preschool children of Rajasthan, found that majority of the children were having different grades of anaemia. Rao *et al.* (2005) also accede with the present study that the anaemia prevalence rate among tribal preschool children is high. Elizabeth and Raj (2008) in a study in Kerala reported that 88 per cent of the preschool children were anaemic, 74 per cent mildly anaemic and 14 per cent moderately anaemic. Majority of the respondents of the study done by Udaya (1996) among the farm women of Thrissur district also reports the prevalence of mild anaemia. Blossom (2013) supports the view that prevalence of anaemia was found to be less in the non tribal preschool children in Kerala.

5.4. Food security

The present study showed that majority of the families (64%) were food secure and food insecurity was noticed in 36 per cent of the families. XaXa (2014) in her study have reported that food security is a major issue in all the tribal areas in India. Sinha (2014) reports that the lack of safe drinking water, lack of awareness on the development programs of Government can contribute to the food insecurity of the tribals. The situation in Kerala is different from other states in India, since the development model of Kerala has vast improved in the tribal areas which is evident through Public Distribution System (Chandran, 2012).

Food insecurity was also noticed in the other communities of the society. A study conducted among the agricultural labourers in Thrissur district, indicated

that there were food insecurity without hunger (Lawrence, 2003). The results of the study among the paddy cultivators of Kalliyoor panchayat of Thiruvananthapuram revealed that only 9% were food secure, 16% moderately food secure and 75% food insecure (Latheef, 2011). The study conducted by Blossom (2013) on the BPL families in the districts of central Kerala also reported that only 15.5 per cent of the families were food secure.


SUMMARY

SUMMARY

The present study entitled "**Nutritional profile of preschool children belonging to tribal families in Thrissur district**" was conducted among 75 preschool children of 4 – 6 years of age in the tribal areas of Thrissur district. The subset of tribal and non tribal families constituting 15 tribals and 25 non tribals were used for comparative evaluation of anthropometric measurements, clinical examination, food weighment and haemoglobin estimation

The socio economic survey revealed that the families surveyed were following Hinduism, majority of the families lived in nuclear families (81.33%) and majority of them (64%) had a family size with 1 to 4 members. All families owned their houses and majority (68%) had 2 rooms. All the houses were with brick walls and majority were with mud floor (58.67%) and terraced roof (70.67%). Public tap (65.33%) was the source of drinking water and 89.33 per cent had separate kitchen. Proper waste management was not adopted by majority of the families.

All the parents were literate but majority had only lower primary level of education. Majority of the head of the family were working as coolies with daily wages and had an average income of about Rs. 1000 to 2000. About 64 per cent of the families owned land with an area of less than 5 cents. Agriculture was practiced in 83.33 per cent in which the major crops were vegetables (50%) and had a monthly income of Rs. 500 to 1000. Majority of the families did not have any savings (96%) and all were free from debts.

Regarding the unhealthy habits prevailed in the families; alcohol consumption was prevalent among men (40%) and chewing tobacco among women (40%). Primary Health Centre was the major health facility available in the localities within a distance of 10 to 20 kms.

Majority of the children were of the first birth order, 60 per cent were with 1 to 2 years of birth spacing. A very low birth weight of one to two kilogram was

noticed among 36 per cent of children. About 97.33 per cent of the children merely completely immunized.

The major illness suffered by 29.17 per cent was cold and cough. Deworming was done regularly in 86.67 per cent of the families. Majority of the families (92%) preferred allopathy for treatment.

Information on the dietary habits of the families revealed that all were non vegetarians. Planning meal in advance was practiced by 68 per cent of the families and 54.67 per cent had their meals at regular timings. Majority of the families had a three meal pattern and cooked food once in a day. The diet of the families was based on cereals and pulses. The consumption of green leafy vegetables was found occasional in 26.67 per cent of the families. Milk and fruits were consumed rarely by the families.

Honey was collected from forests by 65.31 per cent of the families. Cereals and pulses were washed by all the families, in which 57.33 per cent washed before cooking and 42.67 per cent cleaned, winnowed and washed. Majority of the families washed cereals thrice and pulses once. Regarding the washing and cutting of vegetables, green leafy vegetables and roots and tubers were cleaned before cutting and other vegetables were cleaned after cutting. Cutting of vegetables was according to the type of preparation by 48 per cent of the families.

Various cooking methods were utilised by the families in which boiling and straining method was popular. About 34.67 per cent of the families reused the excess water after cooking. Among these families, 88.46 per cent utilised this for drinking and 11.54 per cent utilised for cooking pulses and meat. Meals were served to children and then to other family members in 25.33 per cent of the families.

Special foods were prepared in special occasions by the families. Majority of the families preferred non vegetarian food items during birthday (76%), marriages (84%) and during festivals (61.33%). They strictly followed vegetarian

foods during death and funeral occasions. Diet modification during illness was seen in all the families. Tender coconut water and rice soup were included in the diet while spicy food items and non vegetarians foods were avoided during illness.

Food fads and fallacies were prevalent in 72 per cent of the families. All the families avoided beef and 83.33 per cent also had modifications in the diet during pregnancy and lactation. All the families participated in the supplementary feeding programmes.

Breast feeding was initiated 3 to 6 hours after birth and was fed for 1 to 2 years by 66.67 per cent of the families. Weaning was introduced by the fourth month by 41.33 per cent of the mothers.

The anthropometric measurements of the preschool children revealed the prevalence of malnutrition. The deviation of height and weight from the standard height and weight (ICMR, 2010) was computed and compared. When comparing the height and weight of preschool children with ICMR standards (2010), the boys were taller and heavier than girls. Mean head circumference, chest circumference and MUAC were compared with NFI standards (1991) and were found that all the parameters were lower than the standards.

Different standards for height for age classification such as Waterlow's classification, Visweswara Rao classification and McLaren's classification were computed. Waterlow's classification reveals that 28.6 per cent of boys and 31. 9 per cent of girls suffered from marginal malnutrition; Visweswara Rao classification reveals that 39.3 per cent of boys and 38.3 per cent of girls were mildly malnourished; McLaren's classification reveals that 53.6 per cent of boys and 55.3 per cent of girls were short according to height for age. Gomez classification and IAP classification was computed for weight for age. It was found that as per Gomez classification, 50 per cent of boys and 57.4 per cent of girls were having mild malnourishment and as per IAP classification, 32.1 per cent of boys and 46.8 per cent of boys were having grade I malnutrition.

The prevalence of malnourishment according to MUAC shows that the majority of boys (92.86%) and girls (85.11%) were normal. The head and chest circumference ratio reveals that 71.43 per cent of boys and 63.83 per cent of girls were normal. Moderate malnutrition was seen in 60.71 per cent of boys and 59.57 per cent of girls based on weight/ height^2 classification. When distributing the preschool children according to Waterlow's classification for malnourishment, 71.43 per cent of boys and 87.23 per cent of girls were nutrient dwarfs. Children who have survived from protein energy malnutrition or continuous infection may show nutritional dwarfing (Ara, 2005).

The nutritional status of the preschool children of 15 tribal was compared with 25 non tribal children on the aspects such as anthropometric measurements, clinical examination, food weighment and haemoglobin estimation. Height, weight, head circumference, chest circumference and MUAC of the tribal preschool children were lower than the non tribal preschool children.

When comparing selected tribal and non tribal preschool children according to the classification for height for age, we can affirm that the tribal children are more malnourished than non tribal counterparts. According to Waterlow's classification, majority of the tribes were severely malnourished whereas non tribes were moderately malnourished. The Visweswara Rao classification reveals that majority of tribes were mildly malnourished while non tribes were normal. McLaren's classification shows that tribes (boys -75% and girls – 85.71%) and non tribes (boys – 38.46% and girls – 58.33%) were short for age.

Gomez classification and IAP classification is adopted to compare the nutritional status of tribal and non tribal preschool children as per weight for age classification. Mild malnutrition was prevalent among tribes (62.5% and 57.14% respectively) while 30.77 per cent of boys and 33.33 per cent of girls were normal in non tribes as per Gomez classification. IAP classification also reveals that majority of tribes were having Grade I malnutrition while non tribes were normal.

On comparing the tribal and non tribal children based on MUAC, it is found that there is moderate malnutrition in tribes while all the non tribals are normal.

The head and chest ratio of tribal and non tribal preschool children were compared and the result revealed that the 25 per cent of boys and 57.14 per cent of girls in tribal communities are malnourished while majority of the non tribal boys (69.23%) and girls (66.67%) were normal. Comparison based on the Quetelet index of tribal and non tribal preschool children showed that the majority of the tribes and non tribes are moderately malnourished.

Clinical examination was conducted in 15 tribal and 25 non tribal preschool children, by which we could find that dental caries is prevalent in both sector. Food weighment survey was also carried out to know the actual food and nutrient intake. The calculation of actual food intake reveals that both tribal and non tribal children did not meet the RDA of any food groups. The food intake of tribal children is lower than the non tribal children. The RDA of tribals and non tribals were significantly different for all the food groups except roots and tubers and milk and milk products. Low intake of green leafy vegetables, fruits resulted in the low intake of nutrients such as iron, vitamin A and vitamin C in both the communities.

Haemoglobin estimation was also carried out to check the prevalence of anaemia. The result affirms that 66.67 per cent of the tribal children and 40 per cent of the non tribal children were having mild anaemia, whereas 33.33 per cent of tribal children and 60 per cent of non tribal children were normal.

Food security among the tribal families was also recorded as per USDA (2000). On the basis of affirmative responses, we could find that 64 per cent of the families were food secure. About 32 per cent of the families were food insecure without hunger and 4 per cent were food insecure with moderate hunger. The food insecurity in the families may be because of low income and low purchasing power of the families.

The results of the present study assure the fact that there malnutrition is still prevalent among the tribal preschool children. The tribal preschool children are more malnourished compared to the non tribal counterparts. The delayed growth could be due to low economic status and low food and nutrient intake. Hence an integrated approach is necessary to overcome these problems. Nutrition education and short term appropriately planned nutritional intervention programmes may also be beneficial for improving the nutritional status.

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APPENDICES

Appendix I

INTERVIEW SCHEDULE TO ELICIT THE SOCIO ECONOMIC STATUS OF THE FAMILIES

1. General information

a. Category : tribal / non tribal
b. Name of the head of the family :
c. Address :
d. Place :
e. Block :
f. Panchayath :
g. Tribal unit :
h. Religion / caste :

2. Demographic details of the family

Sl. No	Name of the person	Relation to the head of the family	Age	Educational qualification	Educational institution	Occupation	Monthly income

3. Socio economic background

a) Type of family : nuclear / joint
b) Do you have own land : yes/no

If yes, total areas of land: ---------

c) Do you have any agricultural crops with the land? : yes/ no

d) If yes which are the agricultural crops? :

e) Income earned from agriculture :

f) Do you have any debts : yes/ no

g) Do you have any savings : yes/ no

h) Do you have any other source of income : Poultry / cattle wealth / house rent /

Others specify: ----------

i) Total income of the family : ----------Rs/month

j) Do you practice barter system : yes/ no

If yes, explain

4. Living conditions

a) Type of house : own/ rented

b) No of rooms : 1/2/3/4/more

c) Wall : brick/mud/thatched

d) Floor : cement/tiled/mud

e) Roof : thatched/tiled/terraced

f) Separate kitchen : yes/no

g) Source of drinking water : own well / public tap/ public well

Others, specify

h) Lavatory facilities : yes/ no Own/ Public/ open area/pit

i) Drainage facilities : yes/ no

j) Electricity facilities : yes/ no

k) Mode of waste disposal : Properly disposed at home/ improperly disposed at hom
/improper disposal at outer surroundings

5. Personal habits

1. Do you or any of the family members have the following habits :

   a. Smoking – yes/ no

      If yes, who:

      Material used:

      Availability:

      Frequency of use: daily/ occasionally

   b. Use of alcohol – yes/no

      If yes, who:

      Material used:

      Availability:

      Frequency of use: daily/ occasionally

   c. Use of narcotics/drug – yes/no

      If yes, who :

      Material used:

      Availability :

      Frequency of use : daily/ occasionally

   d. Use of tobacco – yes/no

      If yes, who :

      Material used:

      Availability :

      Frequency of use : daily/ occasionally

   e. Use of betel leaves – yes/no

      If yes, who :

      Material used:

      Availability :

Frequency of use : daily/ occasionally

2. Does anybody in your family have any health problems related to unhealthy habits : yes/ no

   If yes, give the details in the table given below

Sl no	Name	Health problem	Age at which started	Treatment

2. Health aspects

a) Do you have any health facilities in your locality : yes/no

   If yes, specify: PHC/ government hospital/ private hospital

b) Average distance to the nearest hospital : ------kms

c) Do you make use of the health facilities in the locality : yes/no

   If no, give reasons: Lack of money/ too far away/ family members do not allow/ poor facilities/ others

3. Details on morbidity and mortality pattern

a) Have you or any member suffered from any illness during the last one year : Yes/no

   Specify the illness: Fever/cough/cold/diarrhoea/dysentery/ other conditions

b) Epidemic prevalent in the locality in the past one year: Measles/chicken pox/ typhoid/ whooping cough

c) Do you or any member used any de-worming treatment during the past one year : yes/ no

d) Is there any child death occurred during last one year in the family : yes/ no

If yes, reason for death:

6. Details regarding the index child

a) Gender : male/female

b) Age :

c) Details of children in the family

Birth order	Name	Age
1.		
2.		
3.		
4.		

d) Birth order of the index child : 1/2/3/4/5

e) Birth weight of the index child : ----------Kgs

f) Immunization details of the index child : completed / partially/ not taken

Give details

Immunization	Whether given or not	At what age it was given
B.C.G		
Hepatitis B Vaccine- 1st dose		
Oral Polio Vaccine - 1 (dose)		
D.P.T. - 1st dose		
Oral Polio Vaccine- 2 (dose)		

Hepatitis B Vaccine- 2nd dose		
Hemophylis Influenza B (HIB) - 1st dose		
D.P.T. - 2nd dose		
Oral Polio Vaccine- 3 (dose)		
Hemophylis Influenza B (HIB) - 2nd dose		
D.P.T. - 3rd dose		
Oral Polio Vaccine- 4 (dose)		
Hemophylis Influenza B (HIB) - 3rd dose		
Oral Polio Vaccine - 5 (dose)		
Hepatitis B Vaccine- 3rd dose		
Measles Vaccine		
MMR- 1st Dose		
D.P.T.- I Booster		
Hemophylis Influenza B (HIB) – Booster		
MMR - 2nd Dose		
D.P.T. - II Booster		
Oral Polio Vaccine 6 (Dose)		

If not taken or partial give reasons:

g) Did your child get any serious illness : yes/ no

If yes, give details:

Disease :

Age at which diseased :

Treatment : yes/ no

Home treated/ PHC/ health centre/ others

h) Did the illness occur frequently : yes/ no

If yes, frequency of occurrence:

i) Morbidity of the child :

(Details of epidemic that had affected during past years)

Disease	Duration	Treatment
1. Fever		
2. Diarrhoea & vomiting		
3. Chicken pox		
4. Measles		
5. Mumps		
6. Jaundice		
7. Respiratory disease		
8. Others		

j) Type of treatment : ayurvedic/ homeopathy/ allopathy /

Appendix II

INTERVIEW SCHEDULE TO ELICIT THE INFORMATION OF FOOD CONSUMPTION, EXPENDITURE AND DIETARY PATTERN OF THE FAMILY

1. Name of the respondent
2. Place of survey
3. Food habit : vegetarian/ non vegetarian
4. Details regarding the food expenditure

Sl no	Item	Frequency of purchase			
		Daily	Weekly	Monthly	Occasionally
1	Cereals				
2	Pulses				
3	Green leafy vegetables				
4	Roots and tubers				
5	Other vegetables				
6	Fruits				
7	Milk and milk products				
8	Fleshy foods				
9	Nuts and oilseeds				
10	Spices and condiments				
11	Others				

5. **Food pattern of the family**
   a) Name of the staple food :
   b) From where did u get it
   c) Is it available throughout the year : yes/ no
   d) If no, what is the staple food during that time :
   e) Do you collect any foods from the forest : yes/ no
      If yes, what type of foods do you collect: fruits/ roots/ leaves/honey/meat

Give details:

Name	Season of availability	When used	How consumed	The person responsible for collection

f) If the food grains are available in sufficient quantity, would you resort to collect these foods from forest : yes/ no

g) What is done with food collected from forest:

h) Do you catch/ hunt fishes, birds or animals : yes/ no

If yes, specify the items

i) Do you use bow and arrow for hunting and fishing : yes/no

j) Do you use poison in the arrows: yes/ no

If yes, name of the poison

Is the poison available in the locality?

How is the poison prepared?

6. Frequency of use of food items

Item	Frequency of purchase				
	Daily	Weekly	Monthly	Occasionally	Never
Cereals					
Pulses					
Green leafy vegetables					
Roots and tubers					
Other vegetables					
Fruits					
Milk and milk products					
Fleshy foods					
Nuts and oilseeds					
Spices and condiments					
Bakery items					

7. **Details regarding meal planning**

a) Do you plan your meals in advance: Yes/ no

If yes, what is the basis for planning: Total family requirement/ Money available/Likes and dislikes of the family/ Others (specify)

b) Meal pattern of the family : >3/3/2/1

c) Do you have the habit of taking food at regular time everyday : often/ sometimes/ never

d) Do you eat any food in between the main meals :yes/ no

If yes, specify: Name of the food

When

e) Do you use boiled water or water without boiling for drinking?

f) Have you changed your food pattern because of any religious reason : yes/no

If yes, specify

g) Do you believe that your family diet pattern has been changed from that of your ancestors :yes/no

If yes,

- Can you specify the food habits that your parents and grandparents had followed
- What are the changes that you have adopted in your food habit

Year	Food pattern of ancestors	Changes occurred

h) Do you change your food habits according to the availability of foods during different seasons: Yes/no

If yes, give details

Season	Changes adopted
Summer	
Winter	
Rainy	

8. Cooking practices of the family

a) Methods of preparing food before cooking

1) Dry food articles (like cereals and pulses):

Washing and drying/ washing just before cooking/clearing bar winnowing and then washing /without washing /others specify

- If washing is adopted state as to how many times the following food articles are washed

Name of the food articles	Once	Twice	Thrice more than thrice	Wash till water is clear
Cereals				
Pulses				

- Do you soak pulses before cooking: yes/no

If yes,

Name of the pulses

Time for soaking

Reason for soaking

2) Fresh food items

- When do you wash fruits and vegetable

Name of food	Before cutting	After cutting
Fruits		
Green leafy vegetables		
Roots and tubers		
Other vegetables		

- How do you cut vegetables :

  Into very small pieces like grating /small pieces/into big pieces/according to the type of preparation/no such criteria followed

- When do you cut vegetables: long before cooking /just prior to cooking

- Do you eat any food raw: yes/no

  If yes, specify

Name of foods	No of time that you consume them daily

b) Methods employed for cooking

Foods	Boiling		Steaming	Frying	Baking	Shallow frying	Any others
	Absorption	Straining water					
Cereals							
Pulses							
GLV							
Roots and tubers							
Other vegetable							
Meat							
Fish							
Egg							
Milk and milk products							

- Do you throw away the excess water of the cooked foods : yes/ no

  If no, how do you use this later: drinking / for cooking dhal or meat

Others specify

- How many times do you cook meals in a day :1,2,3 >3
- Who does the cooking
- What are the type of cooking vessel used:

  Copper/ aluminium/ iron/ brass/ earthen pots/steel/stone/wooden/bronze/others

- What is the type of hearth or stove used at home?
- Fuel used :

c) Serving pattern in the family

- How do you serve the meals after cooking
  - Meals taken by the male members first and then by the female members
  - Meals taken by the head of the family and then by others
  - Meals taken by the children first and then by other members
  - Meals taken together by all members
  - No such criteria followed

D) Use of leftover foods

- Do you use leftover foods: yes/no

  If yes, specify

Item leftover and reused	How is it reused

e) Methods used for storage of foods

- Do you store any foods in your house : yes/ no

  If yes, specify

Sl.no	Name of food	Method of storage	Period of storage	Season	Whether it is used by family or sold	Containers for storage	Reason
1	Cereals						
2	Pulses						
3	Green leafy vegetables						
4	Other vegetables						
5	Roots and tubers						
6	Fruits						
7	Milk						
8	Meat						
9	Egg						
10	Fish						
11	Other specify						

- Do you employ any specific treatment before storing the food stuffs : yes/no

  If yes, specify the treatment

f) Methods used for preservation of foods

- Do you preserve any foods in your house : yes/no

  If yes, specify

Sl.no	Food preserved	Methods used	Season	Period over which preserved	Containers for preservation	Reason
1	Cereals					
2	Pulses					
3	Green leafy vegetables					
4	Other vegetables					
5	Roots and tubers					
6	Fruits					
7	Milk					
8	Meat					
9	Egg					
10	Fish					

- How do you use the preserved foods
- Do you purchase preserved foods from outside : yes/ no

  If yes, specify the items

g) Delicacies prepared during special occasions

Occasions	Type of preparation	Ingredients used
Birthday		
Wedding		
Death		
Festivals		
Others		

9. Food fads and fallacies

a) Do you have any belief regarding the consumption of certain foods : yes/ no

If yes, give details

Name of the foods	Reason to avoid	Reason for including in the diet

b) Do you avoid any foods in any season because of certain beliefs : yes/ no

If yes give details

Name of the foods	Season when avoided	Reason of avoiding

c) Do you include / avoid any foods in special conditions : yes/ no

If yes, give details

Sl no	Condition	Foods given	Reason	Foods avoided	Reason
1	Infancy				
2	Preschool				
3	Adolescent				
4	Pregnancy				
5	Lactation				
6	Old age				

10. <u>Infant feeding practices</u>

a) When do you start breastfeeding the newborn baby

First day				Second day	Third day
Soon after birth	6hrs after birth	7-12 hrs after birth	After 12 hours		

b) i. What is the first item of food given to the baby

ii. When it is given

iii. Reasons for giving

c) How long do you breastfeed the infants :

Until next pregnancy/less than 6 months/ one year/ two year/ more than two years

d) What is the interval between breastfeeding :

Every three hours/ when the mother feels that the child is hungry/ when the child cries/ others specify

e) Do you give any other food item in between breastfeeding : yes/no

f) i. What is the age of weaning the infant

ii. Specify the reasons for weaning at that age:

Mothers' pregnancy / mother's illness / others

iii. What are the foods included during weaning

Foods included	Quantity

iv. Do you prepare any special weaning food: yes/no

If yes, give the details of preparation and quantity given

Preparation	Quantity

v. Details regarding supplementary feeding

Supplement	Age at which introduced	Quantity given at a time	No. of feeds	Interval between feeds	Reasons for introducing the food
Liquids other than breast milk					
Semisolid foods					
Solid foods					

vi. Details regarding supplementary feeding programmes Yes/ no/don't know

a) Is there any supplementary feeding programmes in the locality :

b) If yes, name of the programme: 1. ICDS

2. School lunch

3.

4.

c) What type of food your child is getting from the programme

: Egg/ milk/ others

d) Frequency of receiving the food :

e) Does the child like the food : yes/ no

f) Are you satisfied with the programme : yes/no

g) What is your opinion about the programme:

h) Do the index child go to anganwadi : yes/ no

i) How many hours a day the child spend in anganwadi :

j) Does the child have any food from anganwadi :

vii. Details of dietary pattern during illness

Illness	Foods given	Reason	Foods avoided	Reasons
Cold				
Fever				
Diarrhoea				
Chicken pox				
Measles				
Others (specify)				

Appendix III

INDIVIDUAL FOOD CONSUMPTION SURVEY - WEIGHMENT METHOD

Name of the investigator

Name of the head of the family

Name of the subject

Serial no.

Address

Date

Food consumption:

Name of the meal	Ingredients	Weight of total raw ingredients used by the family (g)	Weight of the total food consumed by the family (g)	Amount of cooked food consumed by the individual (g)	Raw equivalents used by the individual

Appendix IV

SCHEDULE FOR CLINICAL ASSESSMENT

1. Sex
2. Age
3. Height
4. Weight
5. General appearance :
   1. Good
   2. Fair
   3. Poor
   4. Very poor
6. Eyes
   a) Conjunctiva
      i. Xerosis :
         1. Absent
         2. Slightly dry on exposure for a minute / lack of luster
         3. Conjunctiva dry and wrinkled
         4. Conjunctiva very dry and bitot's spots present

      ii. Pigmentation :
         1. Normal colour
         2. Slight discolouration
         3. Moderate browning in patches
         4. Severe earthy discolouration

      iii. Discharge :
         1. Absent
         2. Watery, excessive larchymation

   b) Cornea
      i. Xerosis :
         1. Absent
         2. Slightly dryness and diminished sensibility
         3. Haziness and diminished transparency
         4. Ulceration

      ii. Vascularisation :
         1. Absent
         2. Corneal infection
         3. Vascularisation of cornea

iii. Folliculosis :
1. Absent
2. A few granules
3. Lids covered with extensive granules
4. hypertrophy

c) Functional

i. Night blindness
1. Absent
2. Present

7. Mouth

a) Lips

i. Condition
1. Normal
2. Angular stomatitis , mild
3. Angular stomatitis , marked

b) Tongue

i. Colour
1. Normal
2. Pale but coated
3. Red
4. Red and raw

ii. Surface
1. Normal
2. Fissured
3. Ulceration
4. Glazed and atropic

c) Buccal mucosa

i. Condition
1. Normal
2. Bleeding and/or gingivitis
3. Pyorrhoea
4. Retracted

d) Gums conditions
1. Normal
2. Bleeding

e) Teeth

i. Fluorosis
1. Absent
2. Chalky teeth
3. Pitting of teeth
4. Mottled and discoloured teeth

ii. Caries
1. Absent
2. slight
3. marked

8. Hair

i. Condition
1. Absent
2. Loss of lustre
3. Discoloured and dry
4. Spares and brittle

9. Skin

i. General appearance :
1. Absent normal
2. Loss of lustre
3. Dry and rough or crazy pavement
4. Hyperkeratosis, phrynoderma

ii. Elasticity
1. Normal
2. Diminished
3. Wrinkled skin

10. Face
1. Normal
2. Nasolabial seborrhoea
3. Symmetrical suborbit pigmentation
4. Moon face

11. Oedema

i. Condition
1. Absent
2. Oedema on dependent parts
3. Oedema on face and dependent parts

12. Bones

i. Condition :
1. Normal
2. Stigmata of past rickets

13. Alimentary

i. Appetite
1. Normal
2. Anorexia

ii. Stools
1. Normal evacuation
2. Diarrhoea

iii. Liver
1. Not palpable
2. Palpable

iv. Spleen
1. Not palpable
2. Palpable

NUTRITIONAL PROFILE OF PRESCHOOL CHILDREN BELONGING TO TRIBAL FAMILIES IN THRISSUR DISTRICT

by

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(2014-16-101)

ABSTRACT

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ABSTRACT

The study entitled **"Nutritional profile of preschool children belonging to tribal families in Thrissur district"** was conducted to know the socio-economic status and food consumption pattern of the tribal families. The study also assessed the dietary habits and nutritional status of preschool children belonging to the age group of 4 to 6 years. Sample consisted of 75 preschool children of 4 to 6 years in the tribal areas of Thrissur district. The subset of tribal and non tribal families constituting 15 tribals and 25 non tribals were used for comparative evaluation of anthropometric measurements, clinical examination, food weighment and haemoglobin estimation.

Nuclear family system was found in most of the families. All the families were literate. All the families lived in their own houses and majority had 2 rooms (68.00 %) with mud flooring (58.67 %) and terraced roofing (70.67%). Majority of the families earned a monthly income between Rs. 1000 – 2000. Majority of the children had low birth weight of less than 2.5 kg. Sixty four per cent of the children suffered from various types of diseases during the last one year. Immunization of the children was ascertained.

Food consumption survey revealed that all of them were habitual non vegetarians with rice as their staple food. Pulses, roots and tubers and other vegetables were included frequently in their daily diet and the use of green leafy vegetables, milk and milk products and fruits were occasional.

Different grades of malnutrition were identified among the children using anthropometric indicators. The mean height and weight of the preschool children were lower than the ICMR standards and the deviations were statistically significant. It was also found that the boys were taller and heavier than the girls. Mean head circumference, chest circumference and MUAC in comparison with NFI standards were significantly lower in boys as well as girls. Height for age which reflects the past nutritional status was normal only in 35.70 per cent boys and 27.70 per cent girls. The present nutritional status of the child represented by the weight for age showed mild and moderate malnourishment in 78.60 per cent boys and 87.20 per cent girls. The Quetelet index also showed prevalence of malnutrition in 60.71 per cent boys and 59.57 per cent girls.

The nutritional status of the tribal preschool children was compared with the non tribal children and the tribal children were found to be more malnourished than the non tribal children. The mean height, weight, head circumference, chest circumference and MUAC were lower in all the children, with the tribes having lower measurements than the non tribals. The height for age, weight for age and Quetelet index showed higher level of malnutrition in tribal children as against the non tribal children.

Food weighment survey was also carried out to know the actual food and nutrient intake. The actual food and nutrient intake asserted that all the children had an intake lesser than the RDA. Gross deficit in the intake of certain food groups such as milk and fruits and nutrients such as iron, vitamin A and vitamin C were noticed among all the preschool children. The food and nutrient intake of tribal children were lower than that of the non tribal children. Mild anaemia was noticed among 66.67 per cent of tribal and 40 per cent of non tribal children.

Food security among the tribal families recorded as per USDA module revealed 64 per cent of the families as food secure and 32 per cent of the families as food insecure without hunger and 4 per cent as food insecure with moderate hunger.

The present study thus assure the fact that malnourishment is still a major concern among the tribal preschool children.