2. Review of Literature

The literature relevant to the study on "Morbidity rate and nutritional status of tribal and nontribal preschool children in backward districts of Northern Kerala" is reviewed under the following heads:

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2.1 Tribes in India

2.1.1 Definition

Oxford dictionary defines tribes as "a group of people in a primitive or barbarous stage of development, acknowledging the authority of chief and usually regarding themselves as having a common ancestor. Vasudevachary (2006) opined that the word 'tribe' is taken to denote a primary aggregate of people living under primitive or barbarous condition under a headman or chief. He added that tribe is a group of families living as a community under one or more chiefs, united by language and customs. The term 'tribe' according to Biswal (1988) is derived from the Latin word 'tribus'. The popular notions of tribe emerged only with the expansion of colonialism in Asia and Africa.

Gunasekaran and Ramaswamy (1988) defined tribe as a social group usually with a definite area, dialect, and cultural and unifying social organization. As given by Divakar and Yegneshwar (1986) tribes are the groups of people who inhabit the hilly, inaccessible areas of forest. Being isolated from the mainstream of people, the tribes are one of the most under developed and underprivileged lots of the state (Govt. of Kerala, 2000 and Prakash and Kunju, 1988). Tribes are a group of people, who are economically backward, exploited, socially handicapped and have a greater sense of homogeneity (Shah, 1986). Chandrasekhar and Chitra (1990) described tribe as a collection of families bearing a common name, speaking a common dialect, occupying or preferring to occupy a common dialect. As Kurien (1991) pointed out each tribal community functions in a special environment, has its own
values, norms, and kinship ties and accordingly reacts to pressure and pulls from the environment in its own way.

2.1.2 Population

India has perhaps the highest tribal population among the countries whose major population is nontribal (Gunasekaran and Ramaswamy, 1988). The percentage of tribal population in India, according to census 2001 is 8.10 and it was 6.87 in the year 1961 (Vasudevachary, 2006). The variety of tribal communities occupying Indian tribal world is breath-taking. According to Vasudevachary (2006) there are 427 types among the scheduled tribes dwelling all over India. The central Belt region comprising of major states of Indian union – West Bengal, Bihar, Orissa, Madhya Pradesh, Rajastan, Gujarat and Andra Pradesh is the home of 309 tribes of which 41 are major ones; while North- East Region (NER) consisting of seven states- Arunachal Pradesh, Assam, Manipur, Megalaya, Mizoram, Sikkim and Tripura has 133 tribes with seven tribes as major ones. The remaining region accounts for tribal majority states such as Himachal Pradesh, Kerala, Karnataka, Tamil Nadu and Uttar Pradesh has 140 tribes although its share of tribal population is only 3 per cent (Suguna, 2002). Murhekar et al. (2002) reported that the Andaman and Nicobar Islands, Union Territory of India, are home to six primitive tribes. In Madhyapradesh the tribal population ranks the highest score with 8.38 milions, Orissa (5 millions), Bihar (4.95 millions), Maharashtra (58 lacs), Rajastan (42 lacs), West Bengal (31 lacs). In Nagaland out of 6.5 lakh population, 93 per cent is tribes (Rao and Girijasankar, 1986). Bhasin (2004) reported that Bhils of Rajastan constitute
the third largest tribal group of India, next to the Gonds and the Santhals. They constitute 44.5 per cent of the total tribal population. Rao and Girijasankar (1986) has observed that scheduled tribes constitute 7.5 per cent of total population and as the constitution of tribal population is so significant, one must pay due attention and care for the development of tribal areas in order to have a total development in the country.

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). The total tribal population in the state was estimated as 3.21 lakhs in which 20 per cent is Paniyar (Tribal sub plan, 1999-2000). As given by Economic Review (2003) more than 77 per cent of the scheduled tribes of 35 distinct communities are concentrated in Wayanad, Palakkad, Kannur and Idukki districts. Among these 35 groups, the tribe Paniyar come to the forefront in the population of Wayanad (Census, 2001). Maddans and Muthuvans are also the two tribes found in Kerala (Christoph, 1991).

2.1.3 Socioeconomical condition

Many socioeconomical factors are difficult to assess quantitatively but certain ecological factors like occupation, family income, housing, kitchen, family details etc. are essential to be assessed as they bear direct relation with the nutritional status of the individual (Jelliffe and Jelliffe, 1989). Most of the tribal population of India live in remote hilly and forest areas and are at a lower level of technological development because of their relative backwardness, illiteracy...
and poverty and complex problems (Sethia and Joshi, 1990). As pointed out by Ghosal (1986) the inaccessibility of the area and the isolated life led by its inhabitants have given rise to a maze of uninformed opinions and myths about the local tribesmen and their primitive way of life. The tribes have also been suffering from various forms of social discrimination and political isolation (Sharma, 1995). Prasad (1986) emphasised that Articles 15 and 16 explicate rule out discrimination on the ground of religion, race, caste etc but certain provisions for preferential treatment of depressed classes like women, children, SC and ST have been secured in order to mitigate the protective discrimination in favour of backward class of citizens.

Tribals as a class are viewed as poor; they are described as constituting the matrix of Indian poverty. Quite apart from the fact that scantiness in some tribal societies, particularly those living in inaccessible regions, may just represent mode of living in their natural setting, rather than being reflective of their poverty, the approach over simplifies the complex problem of tribal development by making it a purely economic one as reported by Sahu (1995). The tribes depend on the forest and its products like roots, fruits, birds, animals, and being educationally and economically weak and life of comparative exclusiveness, the scheduled tribes find adjustment more difficult in an alien location and to settle on new avocations on a different site of settlement (Alexander et al., 1991). Raha and Coonar (1995) also had the same opinion that the tribals have their own problems of varied types in their original habits as all human beings have but when they are put or forced to a
new situation and environment, they face problems quite new from what they were so long encountering. There are overwhelming incidences to show that the displacement of tribal people, as part of the tribal welfare programmes, have pushed them to lower levels of economic status (Mishra, 2002).

Mohankumar (1990) observed that tribes in India were neglected a lot, vastly discriminated in terms of income distribution and social status. Small hilly fragmentated infertile land holdings devoid of irrigation facilities are the basic assets and the forests, which were the main source of their food, fodder and fuel are rapidly depleting (Narayanan et al. 2005 and Bhasin, 2004). Rao and Girijasankar (1986) opined that indebtedness is also one of the important problems connected to the economic life of tribes and the deficit economy in turn is the main cause for their indebtedness. Economic status is therefore considered as the prime factor determining the purchasing power, thereby household food security and the nutritional status of a community (Jothilekshmi and Prakash, 2004). Ghoshal (1986) was also of the opinion that though sociocultural factors do affect tribal farmers' rate of adoption of new practices, the most important constraint is economic. The tribal income, as stated by Prasad (1988) is determined by natural conditions, seasonal changes, and scope of governmental activities in the forest area, and to a great extent, the proximity of plain villages and weekly markets. Singh (2002) observed that with the steady increase in the level of education, more and more persons in India are likely to opt for white collar jobs releasing the pressure on land and preferences of educated young men of village for such
jobs is conspicuous even today and it is a common observation that educated younger generation feels shy in inheriting traditional vocation of their forefathers.

Barter system still prevailing among the tribal economy, is yet another factor which contribute to the backwardness of their economical state. Saxena (1996) emphasizes that one salient feature of the economic life of tribes is, the Barter system which involves exchange of goods between two parties without the use of currency. Shashi (1995) found that middlemen lure the Uralies and Cheruvetans of Kerala with promise of high price and exchange of items in lieu of the articles which they sell. Since tribes are not aware of the values of the articles which they sell or which they get in return, they are exploited a lot. Prasad (1988) reported that among tribes, the payment towards food articles is given not only in cash and kind, but also feasts and services, the borrowing of ploughs, bullocks and the materials is to be repaid with a service of a corresponding number of days. The tribal economy especially in the interior areas, as reported by Vasudevachary (2006), largely nonmonetised and the center of exchange is the weekly market place or hats where a major portion of the transactions is carried out by barter and they are exploited in this process mercilessly by the traders, merchants and the money lenders. Swaminathan (1995) also stressed that the absence of cash economy and barter system leaves wide scope for exploitation of the tribals by outsiders. The work of the labourers, which was often measured in terms of days without considering the out put was also a type of exploitation observed by Prasad (1988).
Rampant illiteracy and poverty are some of the reasons for the exploitation of tribes (Saxena, 1996). Narayanan et al. (2005) reported that almost 80 per cent of the members of the tribal community in Wayanad district of Kerala are illiterate and the community's main source of income comes from the collection of minor forest produce. So poverty as reported by Swaminathan (1996) is the primary cause of hunger and of chronic food insecurity and these in turn are caused by iniquitous asset distribution. Whereas Alderman and Gracia (1992) observed that rising of the household food consumption had less impact on nutritional status than increasing the educational status of mothers. Because as given by Gupta (1995) the illiterate mothers have very little idea about how much food a child needs for adequate growth and nutrition.

Exploitation of forest, landlessness, barter system, ignorance and social discrimination are some of the factors, which corroded the input of welfare programme in the tribal areas. Singh (1994) observed that due to landlessness, there was a raise in the number of daily wage agricultural and industrial labourers among them. Moreover the decline in levels of nutrition, reduction in quantity of food, fewer opportunities for employment and reduced bargaining power within the household all these adversely affected the position of tribal women in the family and community which in turn affected the nutritional status of their children as well (Narayan et al., 2005).

The fundamental aim of tribal development programme is to raise the economic standard of tribals by providing them with the basic minimum needs. Gunasekaran and Ramaswamy (1988) reported that prior to 1950, the Government of India had no direct programme for the education of tribals.
With the adoption of the constitution, the promotion of education of scheduled tribes has become a special responsibility of the central and state governments. Since independence, a number of child welfare programme have been formulated and implemented by the government. The government has initiated special schemes for the development of tribal areas to supplement the benefits accruing from general programmes of development in different fields. Vasudevachary (2006) reported that these programmes can be grouped broadly under four headings – i) Communications ii) Education and culture iii) Development of tribal economy and iv) Health, housing and water supply. The organisations like Central Social Welfare Board (CSWB), National Institute for Public Cooperation and Child Development (NIPCCD) etc. help the government in this endeavour (Mahanti, 1992). Government of India has introduced Integrated Rural Development Programme (IRDP), Integrated Tribal Development Programme (ITDP), Integrated Child Development Services (ICDS) that aim at percolating down to the grass root level and cater to the needs of poorer segments of rural and tribal population. Besides, for the benefit of the rural poor, there are various programme for reducing poverty, unemployment and underemployment such as National Rural Employment Programme (NREP), Rural Landless Employment Programme (RLEP), Training of Rural Youth for Self Employment (TRYSEM), Self Employment to Educated Unemployed Youth (SEEUY), Special Livestock Production Programme (SLPP) and Minimum Needs Programme (MNP). The major ongoing nutrition intervention programmes are the Integrated Child Development Services (ICDS), nutritious Noon Meal Programme (NMP), anaemia and vitamin A prophylaxis and goitre control (Devadas, 2001).
Murari (1988) reported that Integrated Rural Development Programme (IRDP) based on micro level planning offers a package of action programmes covering marginal and small farmers, landless labourers, sustenance farmers, sharecroppers, artisans, scheduled castes and scheduled tribes, women, unemployed youths and ex-servicemen. The provisions of Indira Awaas Yojana was utilised to construct pucca residential houses for the tribals in Wayanad (Karthikeyan, 1998). In 1992-93, a programme called child survival and safe motherhood (CSSM) was launched inorder to improve health status of women and children and to reduce maternal, infant and child mortality (Mathu, 2005). Moved by the miserable conditions of Wayanad tribals, Swami Vivekananda Medical Mission has established a hospital for tribals at Muttil in Wayanad and it is the only hospital for the tribals in Kerala, functioning since 1972 (Devan, 1988).

Now the problem of tribal welfare has escalated and acquired added urgency. Nutriview reports (1999) stressed that improving the public health especially that of tribes must remain one of the key priorities; especially in developing countries. Mehanti (1992) reported that non-implementation of new programmes, lack of penetration of the agencies into the rural and tribal areas, lack of extension services, rampant corruption by the staffs, lack of community participation, influence of politicians and fragmentation within the population in the name of caste and region are some of the factors which corroded the impact of welfare programme in the tribal areas. Exploitation of forest, Barter system, ignorance and social discrimination are some of the factors, which corroded the input of welfare programme in the tribal areas (Singh and
Mehanti, 1995). As a result tribal villages remain at the periphery and are devoid of facilities. Mathu (2005), Sharma (1995) and Nair (1990) were also of the opinion that all these programmes, by and large, have produced only a marginal impact on the rural and tribal life and have not been able to lead to the overall development for rural areas.

Hence the tribal development programmes need an urgent overhauling and a bottom-up administrative pattern, which caters to the real needs of the tribal people (Das, 1986):

2.1.4 Habits and practices

**Food beliefs and Personal habits**

Nutritionally negative beliefs and habits that have a valid basis in a society must also be recognised. Hurlock (1985) opined that malnutrition may be caused by poverty but it more often stems from faulty eating habits due to parental ignorance about what constitutes good nutrition, food likes and dislikes resulting from rebellion against the authoritarian “clean plate” training of childhood and snacking between meals. She also opined that emotional stress would also keep the children away from getting proper nutrition from even the most balanced diets. Scrimshaw (1995) indicated that dietary habits based on ignorance or food prejudices and nutritional relative beliefs that have a valid basis in society often leads to malnutrition. He further added that food faddism coupled with faulty food habits is one of the most common causes of malnutrition.
Food faddism is one of the most common causes of malnutrition (Scrimshaw, 1995). Reports of NIN (1986) stated that women of Koya and Konda caste were not allowed to eat eggs, meat and monkey's meat. Irulas think Chillies, condiments, legumes and wheat as undesirable for mothers and children. All type of practices such as cooking practices, food preservation and hygienic practices are also seem to be different among different tribes. The Onge tribes of Andaman has simple culinary practice like boiling the pork without any spices and consuming it as such. Nicobarese prepare ‘ladap’ from ripened fruit and preserved it in the form of balls and hung above the fireplace in the hut (NIN, 1986). The habit of chewing betel leaves with salted lime is a practice quite common in India can increase calcium intake (Gopalan et al., 2004).

Like negative beliefs, undesirable habits such as smoking and alcohol consumption and drug abuse are also prevalent among tribes. When a drug is taken for reasons other than medical, in such quantity or strength or frequently or manner which damages the physical or mental functioning of an individual, it becomes an abuse (Dwarakanath, 2005). Some of the tribes in sub Himalayan region take saltish tea and alcohol consumption and smoking are also common among the tribes (Singh and Mehanthi, 1995). A very high prevalence of tobacco use was reported among the rural people by Sinha et al. (2003), Gupta et al. (2001) and Mohan et al. (1994) and among tribes by Mehanthi and Singh (1995) and Nair (1995).

Tobacco smoking is the most important etiological factors leading to lung cancer in Trivandrum and Madras (Gajalakshmi et al. 2003), oral submucous
fibrosis of the people in Kerala (Hashibe et al., 2002), prevalence of asthma among the children (Gupta et al., 2001) and higher morbidity and mortality rate (Gupta and Mehta, 2000). Ghose and Parida (1995) detected cancer in buccal mucosa cells of tribes in Orissa state where all the tribes are active tobacco and alcohol users. Chaturvedi et al. (1998) were of the opinion that age and occupation had significant association with tobacco use but influence of education was very low. Family pressure and traditions are important factors influencing the habit of smoking in children (Yunus and Khan, 1997). Anantha et al. (1995) observed that anti-tobacco education of the community showed a decline in the prevalence of tobacco use.

**Cooking practices**

Even the cooking practices and cooking utensils may influence the concentration and bioavailability of nutrients from a diet. Effect of cooking practices on the nutritional status of children need to be consider because of its probable effects on the availability of nutrients and the risk of introducing intestinal infections (Jelliffe and Jelliffe, 1989). Ali (1983) reported that Bhuinyas of Orissa, did not wash rice before cooking and never discarded the surplus water and consumed it either after meals or was added to dal or meat curry. The same was followed by Lakhers (Eshwariah, 1986). Thirty per cent loss of iron during the washing of green leafy vegetables and other vegetables prior to cooking was reported by the National Council for Applied Economics Research (NCAER) and National Nutrition Monitoring Bureau (NCAER-NNMB, 1994). They also stated that the presence of phytate and tannins present in the diet interfere with iron absorption.
Boiling was found as the common method of cooking among the tribes of Pottumavu (Prema, 1983). Gupta and Rajput (1983) observed that the cooking methods familiar to the tribes of Mandala block were boiling and shallow frying. Yadav (1983) reported that the Adivasis of Madhya pradesh cooked food normally by boiling, frying or baking. Cooking utensils made of bamboo used by Cholanaickans of Nilambur valley were being replaced by earthen pots and Aluminium utensils while only earthen pots were used for cooking by the kurumbas of Attapady (Mathur, 1977). The adivasis of Madhya pradesh use earthen and wooden utensils for cooking and these tribes use leaf plates and cups for serving meals (Yadav, 1983).

Food expenditure pattern is also an important factor which influences the nutrient intake of children in all countries. As reported by several investigators like Narayanan et al. (2005), Mishra (2002), Yasoda and Geervani (1993), and Indira (1993) among various socioeconomical factors, income from land and the expenditure spent on purchasing of food items can be used as a good indicator of a child’s nutrition. Sharma (1995) observed that about 61 to 70 per cent of total monthly income was spent on buying food items only among the tribes in Gujarat. As given by Indira (1993) upto 10 per cent of the total food expenditure was incurred for the purchase of pulses, vegetables, fats and oils, flesh foods, sugar, spices and beverages like tea or coffee by majority of the tribal families in palakad district of Northern Kerala.
Feeding practices

Breast feeding and weaning practices in the early childhood proved to have a lasting impact on the health and nutritional status of preschool children. So World Health Organisation (WHO) and World Alliance for Breast-feeding Action (WABA) initiated a scheme to protect, promote and support breast-feeding as natural and inherent right of all newborn babies and mothers. A study by Breast Feeding Promotion Network of India (BPNI) showed that there was a decline in breast-feeding during the last decade, especially during first four months of child’s life.

Breast milk according to Cherian (1992) is the natural and perfect food for normal growth and healthy development of infants and it should be fed to infants from the moment of birth. Breast milk contain just the correct combination of nutrients for growth, but it also offers protection against common illnesses such as diarrhoea and respiratory infection. It also enhances cognitive development of the baby, augments mother–baby bonding and also happens to be economical and convenient (Krishnaswami, 2002).

Rao et al. (2005) reported that 60 per cent of the Toda mothers of Nilgiris started breast-feeding soon after delivery; while kotas, Irulas and Kurumbas discarded colostrum and started breast feeding after the third day. Colostrum is discarded by a number of tribes of Rajasthan, Maharashtra, Madhya Pradesh, Bihar and Uttar Pradesh (Nutrition Foundation of India, 1988). The tribes of Maharashtra adopted the practice of prolonged breast feeding (Mane...
and Bantey, 1987). The mean period of breast feeding among Tharu tribes is 30 months ranging from 15 months to four and a half years (Usha, 1983). Gupta and Rajput (1983) observed that tribes of Mandla block breast fed their infants at least up to six months and sometimes even up to two years. The infants are permitted to suckle till the next pregnancy among the Bhunyas of Orissa (Ali, 1983), tribes of Udaipur (Dave, 1985) and Kanikkars of Amboori area (Thomas, 1989).

Percentage of malnourished babies was found decreasing when breast-fed for a longer time (Dualeh and Henry, 1989) and immunises the child against common infections (Grant, 1991). Rehamathullah et al. (1997) reported that the first peak in keratomalacia incidence, in early infancy, is presumed to reflect poor maternal nutrition and its effect on breast feeding. All the children with keratomalacia had low birth weight, and were from poor families, under one year of age, and were not breast-fed at all primarily because of lack of milk secretion.

Weaning

Weaning is a process in which an infant is gradually introduced to a variety of liquid, semi-solid and solid foods to effect a smooth shift to the adult or family food pattern (Geertvani, 1983). The process of weaning should normally begin by third and fourth month and completely weaned by the 10th and 11th month (Vijayakhader, 1990). But as reported by Chandrasekhar et al. (1990) the infant feeding and weaning practices are strictly associated with the culture of a society.
Swain (1985) reported that santhal tribes started supplementary feeding after seventh month and used soft rice, gruel and pulses as a major supplementary food. A study on the infant feeding practices of Dubla and Kokni tribes of Gujarat indicated that Dubla tribes introduced soft rice gruel to the infants after six months while Kokni infants were weaned with biscuit powder, fruits and rice by 10 months and were introduced with rice gruel at the age of one year (Bhattacharya et al., 1983). Kazimi and Kazimi (1979) had reported that 80 per cent of mothers of Nigerian Igbo tribe gave supplementary foods to their babies between three to seven months of age.

2.2 Morbidity pattern of preschoolers - tribes and nontribes

Deen and Sharon (1999) reported that though disease patterns have been changing in recent decade because of socioeconomical developments, infection, prenatal and nutritional disorders continue to predominate in many countries with very low income, where, however, injuries and non-communicable diseases are already presenting considerable public health problems. They also opined that among children aged zero to four years, infections, maternal, prenatal and nutritional conditions predominate. The adverse effect of infection and parasitic diseases of a population on the growth and health of the children has also been highlighted by Swaminathan (1995).

Tribals are subjected to certain diseases caused primarily due to the ecological degradation (Saxena, 1996). Even if tribals suffer from various ailments, sickle cell anaemia, tuberculosis, vitamin A deficiency, anaemia, worm
infestation, scabies etc. are seen plaguing in each and every corner of tribals of Wayanad at present (Mohandas, 1995). UNICEF (1996) figures nearly 750 children in India are affected by poliomyelitis and every two minutes in India there is a child death directly related to measles (i.e. out of every 100), about 250,000 infants die each year of neonatal tetanus. A quarter of the children born every year - about 34 million infants - are still not protected against preventable diseases. Measles alone claimed over 770,000 lives in 2001 since children were not immunised (UNICEF, 2002). Tuberculosis and whooping cough ravage the respiratory systems of hundreds of thousands infants and children. So immunization against six diseases is a must viz. diphtheria, tetanus, whooping cough, poliomyelitis, tuberculosis and measles (Panda, 1990). As per UNICEF (2002) reports Immunisation has saved over 20 million lives in the last two decades. Immunisation rates for the six major vaccine - preventable diseases like pertusis, childhood tuberculosis, tetanus, poliomyelitis, measles and diptheria - have risen from under 10 per cent in the 1970s to nearly 75 per cent today.

It should be well understood that disorders in tribal physical systems are not merely medical manifestation but connected to environmental also. Further we do not have adequate and reliable data in respect of their mortality and morbidity (Singh and Mehanti, 1995). Rao et al. (2000) noticed that gastrointestinal illness and fever contributed 50 per cent of total morbidity days throughout the preschool age. He further observed that higher morbidity in younger children led to deterioration of nutritional status. Victora (1996) suggested that even the introduction of water or herbal teas to a previously exclusively breast-fed infant
increases the risk of morbidity and mortality. Kazimi and Kazimi (1979) reported that prevalence of diarrhoea, malnutrition and death among Nigerian Igbo tribe could be attributed to their early introduction of supplementary foods under insanitary conditions and ignorance of the mothers about weaning food. Balgir et al. (2002) stressed prevalence of scabies in preschool children of low socioeconomical group mainly because of the unhygienic condition they live. Lakshmi and Priya (2004) observed a high prevalence of cold, cough, diarrhoea, mumps, chicken pox and fever among preschool children of low income group. Ray et al. (2000) noticed that high percentage of rural preschool children were suffered from diarrhoeal episodes and respiratory tract infections.

Pelletier (1995) pointed out that morbidity pattern was well connected with the malnutrition in the sense, that malnutrition adversely affects an individual’s ability to resist and respond to infection and infection adversely affects the individual’s ability to use energy and nutrients from the diet. As reported by Foot steps (2002) good food is important for good health and children who are well fed during the first two years of life are more likely to stay healthy for the rest of their childhood and common infections like diarrhoea last longer and are more severe in malnourished children. Often a child has poor appetite when he is sick which leads to a cycle of ever worsening malnutrition and repeated infections, and nearly two - thirds of all deaths in children aged zero to four years are associated with malnutrition. According to Gopalan et al. (2004) although daily deficiencies of nutrients are the primary cause of deficiency diseases, they are aggravated by infective morbidity among the poor, due to
bad environmental and poor personal hygiene. He further pointed out that measles aggravate vitamin A deficiency and contribute to nutritional blindness.

The effect of iron deficiency anaemia on morbidity and mortality of women and children was highlighted in the Nutrview reports (1999). As per the reports the fertile women, infants and preschool children in developing countries, are the groups most vulnerable to iron deficiency which retards mental and psychomotor development, causes tiredness and reduces work capacity, diminishes effectiveness of the immune system, and may increase morbidity and mortality among women and children. Thus malnutrition is directly or indirectly responsible for 20-25 per cent of the global disease burden in children (Sachithananthan and Chandrasekhar, 2005 and Feldon et al., 2005). According to Rehamathullah et al. (1997) morbidity pattern in preschool age group is possibly related to inadequate weaning practices. Inadequate weaning practice as a causative factor for tuberculosis and rheumatic fever has been emphasized by Eva et al. (1980).

Bhasin (2004) observed that dental diseases are caused by malnutrition, unhygienic habits and bacterial infection. The clinical manifestations of nutritional deficiencies (B vitamin deficiencies) found in association with oral diseases were glossitis, angular stomatitis, spongy to bleeding gums and mottled enamel. A clinical survey on prevalence of dental caries among preschool children of South India including Kerala, showed that poor oral hygiene and low socioeconomical status were the major reasons for their dental problems (Jose and King, 2003). Childhood dental caries according to Deen and Sharon (1999)
can be prevented through education in oral health and hygiene, reducing the amount of dieting sugars and fluoridation.

The increased morbidity among preschoolers may be attributed to the fact emphasized by Singh (2001). He opined that Women has less access to and use of basic health resources including primary health services for prevention and treatment of childhood diseases, malnutrition, anaemia, diarrhoeal disease and Tuberculosis. As an alternative Lambrechts and Orinda (1999) suggested that child mortality and morbidity in developing countries can be reduced by improving the family and community practices, by improving the skills of health workers and improving the health system.

2.3 Nutritional profile of preschoolers—tribes and nontribes

Nutritional profile of preschoolers is a clear indication of the extent of prevalence and severity of malnutrition among them. Malnutrition, in fact is a man made disaster. It is an avoidable tragedy with enormous social and economic costs in wasted human potential. It affects growth and reproduction and undermines health, learning and working capacity and overall activity of life and well being (FAO, 1992). WHO (1993) described malnutrition as a biological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients. According to Swaminathan (1998) if health is considered as an important part of development and progress, and if nutrition is considered as a measure of health, it is necessary for planners to understand the situation regarding food and nutrition and health among tribal people. More than the
health of any other community, tribal health should be viewed holistically and in the over all perspective.

Eva et al. (1980) stated that the problem of under nutrition results from shortage of food, inadequacy of certain nutrients, or from an ill-functioning of body that fails to utilize the nutrients supplied to it, efficiently. They further observed that the most important factor in the environment is nutrition and that the normal resiliency of the body to stress is reduced in the severely under nourished person, they are more susceptible to cold, manifesting a subnormal body temperature, subnormal body pressure and to oedema. Nutritional status of children are assessed by examining their growth pattern, clinical signs for deficiency and by biochemical diagnosis (Bamji et al., 2003).

2.3.1 Growth pattern

Preschool period is the age in which growth is generally slower than that of the first year of life, but continues gradually (Srilakshmi, 2002). It is the most important period in the life of an individual because almost all the areas of development occur in this period (Swaminathan, 1996). Preschool children are the most vulnerable group of the community to the vulgaries of malnutrition. Macro and micronutrient deficiencies commonly found among preschool children give rise to a number of nutritional problems; and it has been estimated that by the year 2020 there will be about one billion children growing up with impaired physical and mental development (Prabhakaran, 2004). 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). Therefore adequate intake of nutrients and maintenance of good health must be ensured during childhood (Rohini et al., 1990).

According to Venkateswarlu et al. (2004) the pattern of growth although genetically determined may be influenced by a number of environmental and socioeconomical conditions including diet. Swaminathan (1995) reported that malnutrition and under nutrition affect adversely the growth and health of children, and the health and physical efficiency of adults. Peak prevalence of malnutrition among children according to Rao et al. (2000), was associated with wasting but not stunting. Height velocities were significantly low up to three years of age but there appeared no scope for catch-up growth, as velocities remained similar thereafter.

Among tribal children, Sarupriya and Mathew (1987) observed that only 4.2 per cent of them acquired normal growth. According to the reports of Kerala Institute for Research, Training and Development Studies for Scheduled Tribes and Scheduled Casts (KIRTADS, 2003), the southern Parayas (sambavas) are the tallest among the tribes in Kerala because of the dry healthy climate and high nutritive content of their food. Dwarfing, which produces general reduction in body size, is said to be the result of unfavourable conditions or general inhibition to growth. The effect of a scanty and uncertain food supply is seen in the low status of Kanikkar, the Malavedor, the Pulaya and the Nayadi, because they cease to grow early. Ray (1997) observed that growth faltering is reported to be intimately associated
with the perils of weaning because of prolonged breast-feeding with delayed inappropriate supplementation. He further observed an overall prevalence of stunting, which was about 60 per cent, and underweight about 55 per cent and was comparable in boys and girls. Permanent growth retardation in preschool children of rural areas may be because of dietary inadequacies, delayed weaning practices, PEM and frequent occurrence of infectious diseases (Ara, 2005). According to Sachdeva et al. (2003) low income, illiteracy, family size, inadequate nutrients intake and poor nutritional status were the major factors responsible for the chronically undernourished state of children in India.

India is one of the few countries with a long-standing National Nutrition policy since 1993, yet millions of children suffer from varying degrees of malnutrition (Damayanthi, 2005). Rao et al. (1994) observed that tribal children in Jhabua district were smaller and weighed less than the NCHS standard. Weight for age being the most sensitive indicator, was used by Sen (1994) to classify children into various grades using Indian Academy of Pediatrics (IAP) classification. From this it was evident that half of the under five children of low income group were undernourished with 27.7 per cent having grade I malnutrition, 16.8 per cent with grade II malnutrition, 5.3 per cent with grade III and 1.8 per cent with grade IV malnutrition. NNMB (2000) reported that prevalence of stunting was 63.3 per cent, which ranged from 45.3 per cent in Karnataka to 76 per cent in Maharashtra. About 37.5 per cent of boys and 36.2 per cent of girls were suffering from severe stunting. Their proportion ranged from 20.9 per cent in Karnataka to 53.6 per cent in Madhya Pradesh. As per UNICEF reports
167 million preschool children are underweight in the world of which half are from South Asia (Gillespie, 1997). Country wide survey revealed that more than a half of the Indian preschool children suffer from sub-clinical under nutrition and 65 per cent of them are stunted, indicating the fact that under nutrition is of long duration (Rahman and Rao, 2000).

2.3.2 Dietary Pattern

Dietary Pattern includes the food consumption pattern as influenced by food preferences, food beliefs, food availability, food expenditure pattern etc. Dietary pattern of tribes are not specific and is the result of the interrelationship between the environment and extent of exploitation of the available resources (Swaminathan, 1995). Man has exhibited much thought and foresight in cultivating a variety of grains, fruits, vegetables, nuts and oilseeds and in rearing birds and animals for use as food (Swaminathan, 2003). But there is no instinct to guide man in the proper selection of his diet (Panda, 1990).

Relatively high cost of protective foods and the limited purchasing power are the major factors in the appearance of malnutrition in developing countries (Scrimshaw, 1995). Among preschool children, as Rao et al. (2004) stressed, apart from poverty and other socioeconomical and environmental factors, inadequate and faulty diets might also cause major nutrition problem, by aggravating the dietary deficiencies and precipitating nutritional disorders. According to Mc.Laren and Burman (1982) a diet balanced in nutrient sources
but severely limited in amount leads to wasting and stunting resembling marasmus.

Dietary pattern of tribes are not specific and is the result of the interrelationship between the environment and extent of exploitation of the available resources (Narayanan et al., 2005). The Gonds take three meals in a day and the meal consists of boiled rice, dal or chutney or aran (soup) and Ambil (traditional dish). No special food was recommended among the tribal people in any special physiological condition (Chaudari and Mane, 1987). Bidinger and Nag (1987) observed that among the rural people in South Indian villages available food resources were allocated with a bias against children under six.

Food Intake

Environmental influences especially diet are of greater importance than genetic background or other biological factors which influences the nutritional status of children (Rao et al., 2004). Cereals and millets formed the bulk of the diets of the tribals surveyed in Integrated Tribal Development Programme (ITDP) areas of the states (NNMB, 2000). In Orissa cereals and millets form the major staple diet of tribes (Ali, 1980). Whereas a comparatively higher intake of millets was reported among the tribes in the states of Maharashtra, Gujarat and Andra Pradesh (NNNB, 2000). Bhasin (2004) observed that the traditional tribal diet comes from unrefined cereals, such as maize, jowar, bajara and the staple food of Bhils is roti. Singh (1994) found that rice and tapioca are the staple food of the tribes of Kerala especially among the Kanikkar tribes of Trivandrum district.
The mean intake of cereals and millets by tribal children of four to six years was reported as 230g per day with the lowest intake found in Kerala. The intake of other food stuffs especially protective foods was much below the suggested level (NNMB, 2000). The mean intake of all food groups except cereals, among tribal preschool children of both sexes was significantly lower than the recommended levels (Indira, 1993). The tribal groups in Kerala and Tamil Nadu included tapioca, tubers, milk and milk product in their diet (NIN, 1986). Considerable intake of roots and tubers (Tapioca) nuts and oil seeds (Coconut) by tribes of Kerala has also reported by NNMB, (2000).

In Andaman Nicobar islands tribes depend on roots and tubers, fruits, fish and pork (NIN, 1986). Roots and tubers, Kernels of mango seeds, leaves of wild species and pulses were some of the foods consumed by the tribes of Orissa. The intake of green leafy vegetables by this group was reported to be 48g per head per day, while it was nil or negligible in all the other states. Tribes of Meghalaya, as observed by Murugkar and Pal (2005) consumed pulses only occasionally (18.5 g/day). So the intake was much less than the recommended allowance (32g/day). Chaudhari and Mane (1987) observed that the Gonds consumed Mahua flower, rice, black gram dal, Lathyrus sativus, mushrooms and Mahua oil. 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 (Narayanan et al., 2005).

Among the nontribal preschoolers in the non ICDS areas of Trivandrum Districts the mean intake of food except cereals was significantly
lower than the RDA for both girls and boys (Ukkuru, 1993). She further reported that the average cereal consumption of preschoolers were 81 per cent of RDA for boys and 73 per cent for girls, pulses (57% in boys and 68% in girls), green leafy vegetables (28% and 16% respectively in boys and girls), other vegetables (30% and 10%), fish (130% and 120%), milk and milk products (19% and 14%). Consumption of nuts and oil seeds and fruits were found to be nil in females while it was 20 per cent in male children. Sandhya (2001) reported a total lacking of green leafy vegetables (4.17%) and fish (66.67%) among preschoolers in Kerala.

**Nutrient intake**

Life cannot be sustained without adequate nourishment. During the first six months of a child's life all the nutrients are needed for healthy growth, as well as for immune factors that protect against common childhood infections. In most of the tribes in India, the RDA for different nutrients was rarely met (NNMB, 2000). Studies on nutritional adequacy of the diets of tribes reported absolute deficiency of many nutrients. Rao et al. (2004) reported that the diets of Konda Reddis, Jenu Kurubas, Maria Gonda and Lanjia Saoras were inadequate in many nutrients. Ingle et al. (1983) revealed that the average daily intake of protein and calories per consumption unit were less by 4.4 per cent and 10.60 per cent respectively as compared to recommended daily allowances among the Kinwat tribes. An analysis of 24 hour dietary intake recall data on a sub sample of 225 children revealed that the underweight, wasted, and stunted children had significantly lower energy
and protein intakes than normal children (Saxena, 1996). The major sources of animal protein in the diet of the tribes of Wayanad were several varieties of fish and crabs (Narayanan et al., 2005). Among the Kutia Kondhas of Orissa, Ali (1980) found a very low intake of vitamin A and iron.

Khandait et al. (1999) reported that children with a dietary intake represented by a Usual Pattern of Food consumption (UPF) score of less than 120 were at high risk of developing xerophthalmia, whereas, those consuming vitamin A equal to a UPF score greater than 120 were at comparatively less risk despite being below the recommended levels.

The pattern of nutrient intake of nontribal counterparts of low income population is also not to any appreciable extent. A low intake of almost all nutrients among all the people disregard of their age in low income group was reported by Rao et al. (2005). Devadas (2001) stated that a diet consisting of proper amounts of different food groups- cereals, millets, pulses, vegetables and fruits, milk, oils and nuts, egg and fleshy foods – provide the required nutrients. But as reported by Laxmaiah et al. (2002) despite, the reported high rates of economic growth and food production in India a higher proportion of rural preschool children were consuming diets, which are inadequate with respect to energy, fat, iron, riboflavin, vitamin A and vitamin C. An intake of energy, protein, iron, calcium, vitamin A, ascorbic acid and vitamin B_{12} lower than the recommended levels in the diet of rural people including preschool children was also emphasized by Gulathi and Mann (1987).
Several researchers, Alderman and Gracia (1992), Verma (1995) and Rao et al. (2004) reported similar observations on the occurrence of dietary deficiency of the nutrients, namely, energy, vitamin and calcium, riboflavin, iron, more frequently and to a greater degree among children, pregnant and lactating women whose requirements of nutrients are higher than others. In general, about 70 per cent of children, were consuming inadequate amounts of energy, the highest proportion being in Kerala and lowest in Andra Pradesh. As per NNMB (2000) reports about 30 per cent of preschool children (4-6 years) were consuming varying amounts of proteins and calories. The proportion of which ranged from nine per cent in the state of Kerala to about 80 per cent in West Bengal (NNMB, 2000). Protein intake, which was broadly in line with RDA in all age groups of children, was reported by Yadav and Singh (1999). However the average intake of energy and other nutrients was lower in all age groups (Saxena et al., 1997).

2.3.3 Clinical Manifestations of malnutrition

Dietary deficiencies in turn leads to the widespread prevalence of diseases like anaemia, PEM and vitamin A and B complex deficiency (Rao et al., 2004; Verma, 1995 and Alderman and Gracia, 1992). Jelliffe and Jelliffe (1989) stressed the importance of examining clinical signs. They pointed out that the fact most clinical signs are nonspecific does not preclude their selective use in nutritional assessment. Instead the frequent occurrence of one particular sign may give a lead to further investigations and its association with other related signs increase the likelihood of its nutritional significance, both in an individual and in a community. Sankhila (1987) reported that deficiency of
vitamin D, Calcium, iron, B-complex and vitamin A in children cause slow widespread of clinical symptoms. In a study conducted among the children in Tirupathi, Srinivasan and Prabhu (2004) reported that 78.4 per cent children were malnourished of which 82 per cent were boys and 74 per cent were girls; 82 per cent were anaemic. Through clinical investigation Lakshmi and Priya (2000) observed that 36.7 per cent of preschoolers in Coimbatore city were anaemic, 20 per cent had discoloured/dry/sparse/brittle hair. Other clinical signs like conjunctival xerosis, Bitot's spot and Glossitis, chelosis, angular stomatitis, discoloured teeth, dental caries and bleeding gums were also more prevalent. Srinivasan and Prabhu (2004) also reported very low haemoglobin content in the blood samples of preschool children. They opined that it might be because of the wide prevalence of worm infestations and the major type of worms found in the stools of children were hookworm, roundworm and Pinworm. Indira (1993) also found a low haemoglobin content in the blood of tribal preschool children of Attapady and also a wide prevalence of worm infestation.

Even among tribal children the clinical examination conducted by Sarupriya and Mathew (1987) found that more than 90 per cent of them had one or other visible signs of deficiency diseases related to poor intake of nutrients. In tribal areas of Udaipur district Goyal and Mathew (1987) observed 70 per cent of the tribal children were suffering from one or other nutritional problems in which, Bitot's spot, xerophthalmia, nightblindness, growth retardation, anaemia, Scurvy and fluorosis were the major clinical problems. Anaemia and vitamin A deficiency were reported to be very high among tribal and rural preschool children.
children as reported by Rao et al. (2005) and (NNMB, 2000). As per the clinical examinations conducted by Pandharikar and Bhatkule (1987) among the rural children in selected areas of Nagpur district, 18.13 per cent were suffering from protein-energy malnutrition (PEM), 12.09 per cent had conjunctival pallor, 10.73 per cent children had vitamin B complex deficiency. As given by UNICEF (2002) vitamin A deficiency is a major cause of blindness and a contributing factor to childhood death from measles and diarrhoea. They further pointed out that vitamin A deficiency causes more than 250,000 children to go blind in Asia each year; 52,500 such cases per year in India. The prevalence of Bitot's spots, a sign of vitamin A deficiency was 0.5 per cent among preschool age group ranging from nil in the state of Gujarat to a high of about one per cent in Tamil Nadu and West Bengal.

Incidence of vitamin A deficiency signs, according to ICMR (2002), is high and serum vitamin A levels are generally low among preschool children whose dietary intake of vitamin A is less than 100 microgram. Severe forms of Vitamin A deficiency as keratomalacia, which is common among preschool age groups, shows two peaks - one in early infancy (< 6 months) and the other in the preschool age group - the first peak is probably related to maternal nutrition and decreased breast-feeding while the second peak is possibly related to poor weaning practices (Rahmathullah et al., 1997). Recommendations to prevent keratomalacia in infants and young children is synthetic vitamin A (1-2 lakh IU) supplementation within one month of delivery or a lower dose (6000 IU) for pregnant women from 20 weeks onwards. Since inadequate diets and high rates
of illnesses such as diarrhoea are well-recognized causes of vitamin A deficiency among young children in developing countries, promoting of dietary changes to improve vitamin A intakes has been recommended as a feasible long-term strategy in combating vitamin A deficiency among young children by WHO (1995).

The malnutrition due to iron deficiency in vulnerable groups in developing countries is widespread. High prevalence of anaemia even among healthy urban children of higher socioeconomical classes has also been reported by Verma et al. (1998).

In the development of any deficiency disease, biochemical changes can be expected to occur prior to clinical manifestations (Bamji et al., 2003). Therefore biochemical tests, which can be conducted easily accessible body fluids such as blood, urine etc. can help to diagnose disease at the subclinical stage, and confirm clinical diagnosis at the disease stage. They further emphasized that biochemical tests are powerful tools not only for assessing nutrition status but also for deriving estimates of nutrient requirements. Swaminathan (1996) opined that the haemoglobin level of blood is a reliable index of the overall status of nutrition in addition to its diagnostic importance in anaemia.

The causes of malnutrition among children are many and varied. Some of which are uncontrollable and some are definitely controllable. The uncontrollable factors such as age, sex, domicile and birth order further make it favourable for the onset of malnutrition. Socioeconomical factors, mother’s nutritional status and knowledge on nutrition also contribute to a child’s nutritional
status to a large extent, and these factors are definitely controllable (WHO, 1993). The statistically significant relationship between age groups and nutritional status of under five children has been reported by Ray et al. (2001). They also observed that the influence of variables like age, sex, religion, literacy status of parents and morbidity of the children were significantly associated with malnutrition. The literacy level of the family head also had an impact on the malnutrition (Chandrasekaran and Aswathy, 1982). Their studies among tribal, Urban and rural preschool children of Udaipur district revealed the fact that an increase in family size and reduction in per capita income increases the prevalence of malnutrition.

The generally low standards of housing and hygiene of tribes also had an important impact on nutritional standards, especially in infants and young children among whom malnutrition is widespread (Gracy, 1986). Devan (1988) observed that the contributory factors for malnutrition, gastro-enteritis and scabies among the adivasis of Waynad of Kerala were due to unhygienic condition such as lack of pure drinking water and untidy premises. Infections due to poor hygiene reported to have a significant influence on the causation of protein-energy malnutrition among the under fives of tribal population in Manipur (Luwang and Singh, 1981). Due to potentiating infection as stated by Pelletier (1995), malnutrition accounts for 56 per cent of child deaths, 83 per cent of which are due to MMM (Mild to Moderate Malnutrition).

According to De-walt (1993) the nature of the crop, the control of production and income, the allocation of household labour, the maintenance of
subsidy, pricing policies of both cash crop and food crop appears to have a crucial role in the nutritional status of rural people. The role of environmental factors especially diet on the nutritional status of children was highlighted by Venkateswarlu et al. (2004) over the genetic background or biological factors. Practice of exclusive breast-feeding, introduction of timely complementary feeding, education for maintaining personal hygiene, proper implementation of immunization, periodic deworming, standard case management of diarrhoea as well as continuation of feeding during illness may reduce malnutrition of under five children.

Thus the health nutritional status of preschoolers especially the ones in tribal setup is a product of a number of genetical and environmental factors.