CHAPTER - 1

INTRODUCTION
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"Nutritional Security is a moral minimum. Access for all to food, health and basic services and care is the means for achieving it." – WHO.

Assurance of steady food supply is one of the major achievements of cultural evolution. Food is the fundamental requirement for existence. Man has constantly engaged himself in feud, war or migration to ensure food for the whole group. Food forms a great part of the economy. This aspect has become gradually complicated with evolution of complex societies. Different edible materials are identified as per availability and food value. Some foods are attached more importance and some food items are tabooed (for specific periods or reasons).

Good Nutrition is essential for healthy development of individuals, families and societies. Additionally, there is a growing body of evidence to believe that improving the nutritional status of children and women will contribute to overcoming some of the greatest health challenges like infant mortality, high childhood morbidity, burden of chronic and degenerative diseases, malaria and maternal mortality.

Occasionally, required nutrition is not available to an individual or a group of people or to a population living in extensive area. Such shortage when becomes continuous, diminish vitality of the sufferers. As a result the individual or the population succumb to various illness or cannot deliver best performance. This condition is known as “under nutrition”. Usually under nourishment compels people to accept various foods, which often provide erratic nutrient (eg. fat) and do not maintain balanced requirement of the body. People get obese which invites other ailments. The cycle becomes vicious. This is generally known as “malnutrition” or wrong nutrition. But in common usage, term malnutrition is synonymously used to denote the nutritionally deprived condition.

Malnutrition clearly, is not a simple problem with a simple solution. Instead, it is a cross cutting issue, having its roots in conditions related to household food security, access to health care and a healthy environment and those related to status of women.
and caring practices. Multiple and inter-related determinants of malnutrition underscore a need for intricate series of approaches which are both multifaceted and multisectoral.

The home of the malnourished children is South Asia. Just over 50% of South Asia's children are underweight. In Bangladesh and India, the proportion of children malnourished is very significantly higher than in even the poorest countries of the sub-Saharan.

Measured by absolute numbers, it is presumed that economic poverty is highly manifested in South Asia. As a part of this area, India alone has over 50% people than 47 countries of sub-Saharan Africa put together. But when the proportion affected relates to future generation, as is the case with child malnutrition, then the gravity of the problem becomes more serious.

In all countries and cultures, low birth weight is the best single indicator of malnutrition. Birth weights below 2.5 kilograms have been found to be very closely associated with poor post-natal growth throughout the childhood. (Butte, et al. 1996 and Bavdekar, et al., 1994). And it is when we close in on this subject that we find the first significant clue to the South Asian enigma.

Approximately one third of all babies in India are born with low birth weight, which is an indication that the infant was malnourished in the womb and/or that the mother was malnourished during her own infancy, childhood, adolescence and pregnancy (Gillespie, 1997). The proportion of babies born with low birth weight reflects the condition of women, particularly their health and nutrition, not only during pregnancy but over the whole of their childhood and young lives.

Girls and women in South Asia seem to be generally less cared for by their families, their partners and their societies. It is common for the men to eat the most and the best, leaving the women and children to eat the last and the least. In South Asia, the mother will then feed her sons the best of what is left, at the expense of her own and
daughter's nutritional well-being. This is done due to the preference of 'son' over daughter.

The incidence of low-birth weight is one clear marker of this process. Another is the level of anaemia. About 83% of women suffer from chronic anaemia, in India (WHO, 1992).

For most poor families, the shortage of food is aggravated by the mal-distribution of food items to the members based on social bias. Among the poor families the real food problem is not mere lack of food but the inordinate costs in money, time and energy, of putting it there — meaning that there is too little of any of these resources left over to invest in other aspects of life.

Illness suppresses appetite. It also inhibits the absorption of nutrients, spends calories through fever and in fighting off infection. It drains away nutrients through vomiting and diarrhoea and alters the body's metabolism in ways that are still not entirely understood so that less energy and nutrients are available for growth (Tomkins and Watson, 1989).

Human food is never monotype even within the limit of vegetarianism. Ecological factors are as imposing as cultural factors. Different groups of human population have developed an intricate relationship with food and to part with them is very difficult. Even when such population has to settle in some alien areas, they try to retain old or traditional food habits whenever possible. Food items of plant origin (and to some extent animals also) are normally seasonal. So the consumption pattern varies. Nutritional value of food is of great importance.

Impetus for the Present Study

Nutritional assessment of human populations has been the domain of economists, anthropologists' nutritionists and clinical scientists. Each point of view has its own emphasis. The present study combines the view points of nutritional anthropology. Replacement of traditional pattern of food involves adjustment in cultural sector which is
often not easy. The Bengali migrants from erstwhile East Pakistan (now Bangladesh) came to the Malkangiri area of undivided Koraput district in different batches since mid-sixties or early seventies. After a protected period of unsettled condition, now they have settled down in permanent villages with cultivable land.

These people were forced to negotiate with unaccustomed environment and ensure their existence. They had to face many adversaries and also supported by the government for a long time. Out of multifaceted adjustments, food adjustment is important. They are quite distinct from the local tribal (Koya) and non-tribal communities. Their food processing technology is more elaborate unlike the local people yet not very useful in this type of rugged naturally irrigated terrain. A Preliminary study (Ghoshmaulik, 1992) shows some interesting differences between the Koya tribes and Bengali settlers in terms of nutrition. Thus, the present study is designed to make an in-depth investigation into the intricate food system and its nutritional input. The fact derived from such study will be immensely helpful in sorting out the problem of nutritional deficiencies and show ways for human welfare.

Nutrition research of the past was mostly concerned with problems related to poverty and nutrition. Many nutritional deficiency diseases, which accounted for considerable morbidity and mortality over three decades ago, have now been either eliminated or controlled. There are however, still, nutritional problems related to poverty and undernutrition, which are of such magnitude as to demand public health importance. These problems constitute, as it were, the "unfinished task" – the remaining part of our "old burden" and it seems that we will have to continue to grapple with these problems at least for the next decade.

WHO estimates that about one-third of the world's children are affected by protein-energy malnutrition; 76% of these children live in Asia (mainly Southern Asia), 21% in Africa and 3% in Latin America. As many as 206 million children in developing countries are stunted (stunting is associated with poor developmental attainment in children and functional impairment in adults). Efforts to accelerate economic development significantly
will be unsuccessful until optimal child growth and development are ensured (WHO, 1998).

High incidence of low birth weights in infants have been one of the chief problems related to nutrition. Recent studies have served to further highlight the serious long-term implications of intra-uterine growth-retardation as reflected in low birth weights. A study from Sweden (Proos, 1992) on Indian orphans born in India and adopted by Swedish parents showed that even after two years on a good diet in a healthy environment, infants who had started with the initial disadvantage of low birth weights continued to grow in a substandard growth trajectory thus showing that the damage suffered by intra-uterine growth retardation is not wholly reversible.

Studies in Preston (Barker, et al., 1992) also showed that subjects who had low birth weights in relation to period of gestation, were significantly more prone to develop in later life, "Syndrome X" – a combination of hypertension, impaired glucose tolerance, non-insulin dependent diabetes, low HDL levels, hyperinsulinanemia, increased plasma fibrinogen and factor VII concentrations, and abdominal obesity leading to cardiovascular disease. The authors postulate that maternal under-nutrition and consequent intra-uterine growth retardation could "program body structure, physiology and metabolism" in a manner that increases the individual's susceptibility to degenerative cardio-vascular disease in later life.

More than 85% of India's poor children are still growth retarded and fail to find full expression to their growth/development potential. A significant secular trend indicative of even the beginning of a progressive ascent to normalcy in growth and development has yet to emerge among the poorest sections of India's child-population (Gopalan, 1994).

In the transitional phase of development, it will be important to look for possible changes in the precise pathogenesis of growth retardation. It is possible that a stage may be reached when for instance, the further dietary improvement that may be needed to promote better growth may not necessarily be the augmentation of calorie / protein intake but the inclusion in the diet of green-leafy vegetables which may provide an optimal mix
It is a well-known fact that there are ethnic differences in the patterns of adolescent growth. It was for this reason, that the WHO group (1993), while advising the adoption of the National Centre For Health Statistics (NCHS) standard as an international standard for children upto 10 years, cautioned against such adoption for children beyond the 10th year of age. Studies in India have shown that adolescent girls belonging even to the most affluent sections of the population gained less height and weight during the adolescent phase of growth than children of US (NCHS). It is not clear, whether this is a genetic difference or whether it is an indication that cereal based diets are unable to provide calcium and/or zinc at levels adequate to cover the enhanced need for growth during adolescence (Ghosh, et al, 1993).

Anaemia was identified as a very common nutritional problem. While girls lose more iron through menstruation, boys may need more iron per kilogram of weight gained as they develop relatively more muscle during adolescence. It is possible that anaemia is responsible for the higher thinness rates in boys, although iron status does improve for boys as growth slows, and it deteriorates for girls, especially if they become pregnant. The consequences of iron deficiency are more serious for women, and they can include reduced levels of energy and productivity, impaired immune function, and increased maternal morbidity and mortality (WHO, 1998).

Anaemia is probably the most widespread nutritional deficiency disorder in the country today. There is a national programme for the control of anaemia which largely consists of the distribution of iron/folate tablets to pregnant women in the last 100 days of pregnancy, but the impact has been poor partly because of poor outreach of antenatal services and partly because most girls in poor communities are anaemic even at the start of pregnancy and a programme of iron/folate distribution limited to the last 100 days of pregnancy is clearly inadequate (ICMR, 1992).
Iodine deficiency has been described as the world's single most significant cause of preventable brain damage and mental retardation. Iodine deficiency disorders affect about 14% of the world population, and 834 million people are affected by goitre (WHO, 1998).

Report of Working Group on Fortification of Salt (1982) had shown that among girls under 15 years of age, 65% in Hyderabad, 69% in Delhi and 91% in Calcutta had haemoglobin levels less than 11g%. A recent ICMR study (1992) had shown that 17% of pregnant women in the country had haemoglobin levels less than 9g% at the commencement of pregnancy. Indeed, in some regions of the country as in Rajasthan, this percentage of women was as high as 47%.

It has also been claimed that damage to the foetal brain arising from maternal anaemia takes place in early pregnancy (Agarwal and Agarwal, 1992). It is not wise to depend entirely on the medicinal approach of iron/folate distribution. There is a need for dietary improvement. It is true that intake of meat and other expensive iron-rich foods will be beyond the reach of poor communities. However, green leafy vegetables, because of their folate and mineral content and most importantly because of their vitamin C content, could make important contributions to iron nutrition status. Unfortunately, attempts to promote the intake of green leafy vegetables have been neglected. Iron deficiency anaemia can only be successfully controlled through a programme of dietary improvement supported by such adjuncts as iron/folate tablet distribution and fortification of food with iron. Also, there are disturbing indications of iodine deficiency and of the emergence of goiter - endemity in the irrigated plains. There is suggestive evidence (Report of Working Group on Fortification of Salt, 1982) that 'conditioned' rather than 'primary' iodine deficiency may be involved in the emergence of new goiter-endemity.

Apart from deficiency of iron and iodine, it is now becoming clear that deficiency of some other micronutrients may also need consideration. Massive doses of synthetic vitamin A had been resorted to as an approach for the prevention of Keratomalacia – the most serious form of vitamin A deficiency. Green leafy vegetables are not only rich sources of carotenoids but also of vitamin C, folic acid, iron, zinc and calcium and other
micronutrients. India, like many other countries of South East Asia is blessed with a rich array of green leafy vegetables and fruits. The adaptive behaviour necessary to survive chronic dietary energy deficiency has significant consequences that may affect a fifth to a quarter of the world’s population, to some degree and, judging by the prevalence of low body mass indices, nearly half of the population of India (Scrimshaw, 1994).

If the food energy deficit is more than that can be compensated by reduced physical activity, then lean body mass is lost as well. Loss of body cell mass lowers overall energy requirements and may permit a new metabolic equilibrium. Children are particularly susceptible to the effects of chronic energy deficiency because their requirements per unit of body weight are higher. INCAP researchers observed the results of experimentally reducing the dietary energy intake of preschool children in a convalescent home (Torun, 1990). These children were previously growing well on an adlibitum diet with adequate protein. During the following month, their activity decreased sufficiently to compensate for the 10% reduction in energy intake, and they continued to grow as before. When energy intake was reduced by another 10%, maintaining the same amount of dietary protein and other nutrients,(a further reduction in activity was not sufficient) growth was affected.

These observations carried out under controlled conditions, are representative of the impact of chronic energy deficiency on millions of children.

Dietary intake, physical activity pattern, nutritional status and disease profile of 150 adult women aged 45 to 58 years, belonging to affluent (n=75) and middle income class (n=75) were assessed. A clear income related difference was seen in the dietary intake. The mean intakes compared with RDA showed iron inadequacy (45% of RDA) in both the groups. Prevalence of obesity/overweight (on the basis of BMI) was higher in the affluent and this was partly supported by their dietary patterns and life styles (Patel, et. al., 1992).

A study conducted on the nutritional status of adolescent girls belonging to low-income group revealed a low calorie intake as compared to the RDA. Their diets were
also found to be inadequate in protein, calcium, iron, thiamin, niacin and riboflavin. Heights and weights were found to be comparable with the ICMR standards. Almost all the subjects were found to be anaemic (Goyle, et. al., 1992).

The assessment of nutritional status based on anthropometry and influence of other factors on it was carried out on tribals of Junnar and Dhule tribal areas of Maharashtra (Kulkarni, 1992). The study revealed that poverty, low economic status and thereby low buying power of essential commodities were factors responsible, in stereotype diet lacking in essential nutrients. Besides these direct factors, the indirect ones such as the deforestation of the area and/or low availability of cultivable land restrictions by the various Government agencies on the use of land, different kinds of pollution (such as water, sound, air), invasion of non-tribals traditions, customs, beliefs, fashions, communications etc, influenced more on the tribe’s way of life. These soft-core cultural factors may be responsible for gross malnutrition.

Seventy children equally representing nuclear families with working and non-working mothers in the middle-income group were studied to determine the impact of the maternal employment on the nutritional status of the pre-school children (3-6 years). Anthropometric data revealed normal growth in all children; values were comparable to ICMR but below NCHS values. Intakes of energy, iron and niacin were lower than the RDA for the children, although the intakes of other nutrients were comparable. However, the nutrient intakes were higher for girls but were not significantly different. Incidences of dental caries, measles, chicken pox and diarrhoea were reported. (Mathur, 1992).

Nutritional deficiency diseases was studied in 600 school going children (6-12 years) in Agra. These children were examined for clinical symptoms of nutritional deficiencies. The signs of PEM like hair changes; muscle wasting and oedema were seen in 18.3%, 10.4% and 1.8% respectively. Signs associated with eyes and skin (3.8% and 6.2% respectively) were due to Vitamin A deficiency. The prevalence of Bitot’s spot was higher i.e. 3%. The signs associated with vitamin B complex like cheilosis and cheilosis with stomatitis were only in 0.5%, while glossitis, red raw and fissures in the tongue were found in 1.2% of the children. The signs associated with vitamin deficiency were bleeding
gums and hemorrhage under skin, found in 0.5% and 0.8% of children respectively. The signs related to vitamin D deficiency were bowed legs (31%) and Harrison suclus (0.5%). The signs associated with iron deficiency like Koilonychia (4%) of nails, atrophic lingual papillae (23.3%), pale conjunctiva (52.7%) and pale palm (48.5%) was observed (Mehrotra, et al., 1992).

The MUAC and HC of the same children in Agra were measured according to methods given by Jelliffe. The results revealed that 40.3% children showed mild or moderate malnutrition (MUAC/HC < .31 to .25) and only 0.5% showed severe malnutrition (MUAC/HC < .25). The prevalence of malnutrition was higher in slum areas (Mehrotra, et al., 1992).

A diet survey conducted on adults (male and female) to study their intake of nutrients and anti nutrients was carried out on three groups belonging to low, middle and high-income groups in Ludhiana. The results revealed that diets of low-income men and women were deficient in all the nutrients. The adults of middle and high-income families consumed more than adequate amount of nutrients except the consumption of iron (13.9 to 18.0 mgs/day). The riboflavin intake was marginally adequate for the adults belonging to high-income group, but was less in the middle-income group. The consumption of anti-nutrients, namely phytate, oxalate, polypherol and dietary fibre decreased with decrease in family income (Grewal and Hira, 1992).

Sahoo and Mohanty, (1993) among 564 boys and girls between the age group of 8-15 years, observed growth differential by gender to study the adolescent growth trend. Peak gain in weight was found to have occurred earlier in girls at an age of 10 years, whereas gain in height was found to have occurred at the age of 11 years. Among the boys peak gain in weight was found to have occurred at the age of 12 years whereas peak gain in height was found to have occurred at 11 years of age.

A nutritional survey of preschoolers in 2 villages of North-east Thailand was conducted to study factors affecting nutritional status of preschoolers. Clinical observations and anthropometric assessment were done in children aged 0-5 years,
while mother and heads of household were interviewed about socio-economics and hygienic habits. The results show that 56% of preschoolers in the first village and 32% in the second have weight for height (W/H) less than 90% of USNAS (United States National Academy of Science) standards. Weaning age in both the villages is 13-24 months, 59% of which has W/H less than 90%. This could be attributed to inadequate food supplement. (Rathakette, et al., 1983).

A study was conducted to explore the risk factors of pre-school malnutrition in low socio-economic status in the slum areas in Bangkok. About 182 pre-school children participated in the study. Analysis of the risk factors among normal and malnourished children revealed that among the biological factors, birth weight, illness, infection, parasitic infestation and maternal age between normal and malnourished children were significantly different at P<0.01. However, among the environmental factors, infant feeding practices, age at weaning, maternal occupation and education among normal and malnourished children were significantly different at P<0.05 as well (Pupongsak and Durongdej, 1983).

A total of 300 children aged 6 months to 14 years were randomly selected and investigated in an urban slum of Jakarta. Of these, 77% of children were anaemic with no significant differences between girls and boys. The haemoglobin level increases with increasing age, even though the prevalence of anaemia is the same. The causes of anaemia appear primarily due to poor nutrition and sanitation (Pudjiadi, et al, 1983).

The relationship between nutritional status and caloric intake was established with 50 % of study population of 1981-82 nutrition surveys. The individual food intakes of the 2000 population were obtained through intra-family food distribution survey. The heights, weights, skin fold thickness and arm circumference of the sample population were recorded through anthropometric survey. The result suggests that the increase in the caloric intake leads to an increase in the average height, weight and arm circumference of children of different age groups. Positive correlation was also calculated between caloric intake and anthropometric measurements with respect to different age groups (Hassan and Ahmad, 1983).
NNMB (National Nutrition Monitoring Bureau) studies have shown intra-State variations in the nutritional status of the population and it had no correlation with food consumption levels, suggesting that there are other factors influencing the nutritional status. The results showed that the prevalence of under nutrition ranged from 67-78% among adult women and 61-88% in adult men. The proportion of normal was around 25%. The factors that differentiated normals from the malnourished were per capita income, literacy status, possession of poultry and nuclear family system. With respect to patterns of food consumption, the order of variables that differentiated the normals from the undernourished was different from state to state. (NIN, 1994). This indicates that the social, cultural and economic factors are still very powerful agents causing misery of malnutrition to the people in varying degrees.

A study on the dietary habits, food consumption and nutrient intake among the Sugali, a tribal population of Andhra Pradesh was carried out, in order to know their food consumption and dietary intake. The 24 hours diet recall survey revealed that the mean consumption pattern of different food stuffs by persons of different age groups compared to the RDA (Recommended Dietary Allowance) was grossly inadequate. During pre-school ages, Sugali boys and girls showed larger deficiencies in their nutrient intake. Inadequacy in protein and calories is high (47%) in males and females (41.6%). Caloric deficiency is higher in Sugali males (66.9%) and females (59.3%) than protein deficiency, which is 48.2% in males and 43.5% in females (Reddy and Rao, 2000).

Dietary pattern of the tribals of Melghat of Maharashtra revealed 57% men and 77% women were illiterate, 74% tribals cultivated their own land from which they received a meager income, 16% were landless labourers and 10% had jobs other than agriculture. The average monthly income was below Rs.600/- from which 90% was spent on food. 100% of Korkus (tribals) were non-vegetarian. Jowar (Sorghum) was the staple food. Mean daily cereal intake was 552 gms. as against 650 gms, pulses intake was 46gms, as against 67 gms as per RDA. Intake of green leafy and other vegetables, meat, milk and milk products were 16 gms, 15 gms, 11 gms and 21 gms as against 125 gms, 100 gms, 60 gms and 100 gms respectively. Consumption of alcohol has significant role in Korku's life. Anaemia, diarrhoea, tuberculosis and deficiencies of Vit. A, Vit. B and Calcium were
Amongst them. Illiteracy, ignorance, exploitation, unemployment, superstitions, alcoholism, lack of nutrition education are the main causes of poverty which has resulted in poor diet and nutritional status (Bijwe et al., 1991).

A study on Boro (tribal) expectant mothers of Assam revealed that 80% were anaemic (Hb 10gms/100ml of blood). No significant correlation (r = 0.02) between mean iron intake (18.26 mgs) and mean Hb content (8.37g/100 ml. of blood) was observed. Low iron intake and poor absorption of iron from habitually consumed cereal based phytate and fibre rich diet were considered as major factors causing iron-deficiency anaemia among the tribal mothers studied (Boro and Baroova, 1991).

Diets of Kamar tribe are low in calories and also inadequate in proteins. The diet is deficient in vitamin A, which is almost entirely obtained from leafy vegetables. But in respect of iron, calcium and other vitamins, the average intake is satisfactory. During the lean months, Kamars subsist mainly on roots, tubers and Mahua flowers (apart from cereals) collected from the jungles. Though they are rich in calories, protein intake falls to a very low level (Vijay Kumar, et al., 1989).

In Orissa, a study was conducted in the Mayurbhanj district, which has a high density of tribal population. The findings revealed a smaller family size when compared to the non-scheduled castes. The sex ratio was found to be much lower among the tribals. A large percentage of the population depended entirely on wells, ponds and rivers for water. Since, in tribal communities, no social stigma is attached to alcohol consumption, the use of alcohol and of tobacco was observed to be much higher among them. Energy intakes of both men and women were found to be lower than the RDA for the group. Protein intakes were also less than 80% of the RDA, indicating that protein deficiency was a result of low overall intake of food and energy. Most children had weights less than 75% of the standard. Anaemia and angular stomatitis were found highly prevalent in the population. Bitot's spots, night blindness and bowed legs were also seen in a small percentage of the population. The dental hygiene of the population appeared to be very poor with nearly a fifth of the population suffering from dental caries and unhealthy gums. The nutritional status of both groups was poor and the diet in a high percentage of the
population were inadequate. The slight economic advantage the non-tribals had, in this respect apparently had no striking beneficial effect on their food intake (NFT, 1995).

Nutrition of the Elderly

The elderly are rapidly becoming a substantial proportion of the population in both, the developed and developing countries. Increased life expectancy and reduced fertility worldwide are combining to alter significantly the population age structure. By the year 2000, it was expected that about 10% of the world's population (an about 700 million) would have been over 65 years of age. Society is facing new challenges in the provision of care for the elderly as both their numbers and proportion of the population increase.

Proper nutrition plays an important role in preventing or postponing the development of chronic diseases. Systems of care should encourage the elderly to follow sound nutritional practices. With age, the body's capacity to adapt is diminishing even as challenges to health posed by a changing social and physical environment, as well as changes in diet, are increasing. Inadequate intake of some vitamins and minerals are also particularly liable to occur among the elderly as they adopt more limited diets, and cause specific nutritional diseases or disorders among the elderly (FAO, WHO, 1992).

Increasing poverty among the elderly also increases the risk of nutritional deficiencies among this group. Decreased energy intake is closely associated with a lower intake of essential micronutrients. Age-related physiological changes such as a progressive decline in the functioning of the bodily organs that influence the absorption, transport, metabolism and/or excretion of nutrients, can affect both nutritional needs and nutritional status.

The Rotterdam study (Education and Nutrient Intake in Dutch Elderly People) aimed at differences in dietary intake in older subjects by socio-economic status, as indicated by educational level. In general, the dietary differences between socio-economic groups were small, lower educated subjects had a higher intake of almost all macronutrients compared with higher educated subjects. The total energy intake was higher in the lowest educational level that derived more energy from the saturated fat.
The higher educated used relatively more lean meat and low-fat milk products (Rossum et al., 2000).

**Parasitic Load and Infection**

The interaction between nutrition and infection has been described as the malnutrition – infection complex meaning a situation where nutritional status influences the outcome of exposure to infection at the same time as infection contributes to a deterioration in nutritional status. This accounts for the severity of many infections and the high mortality rates associated with diarrhoea and respiratory infections, especially measles. It also contributes to increased incidence of growth faltering, protein-energy malnutrition, low birth weight and micronutrient deficiencies especially of Vitamin A and Iron.

The poor particularly, are at a serious disadvantage so far infection is concerned, because of their frequently limited access to health care and inability to pay for needed medications and services.

It is estimated that 80 % of diarrhoea related cases are acute watery diarrhoea, 10% acute dysentry and 10% persistent diarrhoea. During such episodes, children's dietary intake may be sustained by frequent feeding while rehydration is maintained (NRC, 1985 and UNICEF / WHO, 1989).

Intestinal parasites such as *Schistosoma*, *Giardia lamblia*, *Ascaris lumbricoides* (round worm), hookworm, *Trichuris trichiura* (whip worm) and *strongyloides stercoralis* are all associated with malnutrition (Stephenson, 1987). People who live in communities with a high level of parasitic infections are often short of food and are, therefore, under nourished. *Ascaris* infection is associated with growth faltering and a deficiency of Vitamin A and Zinc. *Trichuris* is associated with stunting and, in some communities, with frank clinical protein – energy malnutrition. *Giardia lamblia* is a common protozoal parasite, which could have an impact on nutritional status. It causes growth faltering, in cases of severe protein energy malnutrition and AIDS. Hookworm can also contribute significantly to nutritional anaemia among pregnant women.
**Schistosoma haematobium** is associated with thinness, and with anaemia as a result of blood loss in the urine. Elimination of these parasites is linked to improved appetite and weight gain in children and young adults (FAO / WHO, 1992)

A study investigating the prevalence of intestinal parasites and their relationship to anaemia and nutritional status among school children aged 6-11 years in the Gaza strip, indicated the overall prevalence of 24.5% of intestinal parasites. *Giardia lamblia* was the most common parasite, particularly in the age group of 6-7 years, followed by *Ascaris lumbricoides* (20%) and *Entamoeba histolytica* (18%). Overall prevalence tended to decline with age in both sexes (Shubair, et.al., 2000).

**Study on Refugees**

The number of refugees dependent on international assistance is increasing rapidly, of the world’s 17 million international refugees; approximately 13 million are living in camps in remote areas of Africa, the Middle East and South-West Asia. Resources available for refugees and displaced persons, at national and international levels, are grossly inadequate.

Acute under nutrition prevalence rates have been elevated in many displaced and refugee populations. Refugees suffer from the same type of diseases as other vulnerable groups, but often more so due to their increased concentration in shelter areas. Survey of refugee populations has demonstrated wide variation in both early nutritional status and in the rate of improvement that has resulted from international food assistance. Malnutrition, infectious diseases and mental / emotional illness are some of the more common consequences of being displaced (WHO / FAO, 1992).

High incidences of survey and pellegra have also been reported in refugee populations during the past decade. Refugees, like other vulnerable groups, should not be seen as helpless and as permanently dependent. They need resources to help themselves cope better with adversities. Obviously it needs to reach them, in the right form at the right time. Their needs are to sustain their livelihoods as well as to meet their immediate needs (FAO/WHO, 1992).
Relief to meet their nutritional needs, if properly targeted, implemented and monitored can lead to long-term improvement in the level of their livelihoods. Dietary diversification can be promoted by actively supporting vegetable cultivation, small animal raising and fish farming in refugee settlements as a routine component of assistance programmes.

Brief Background of Rehabilitation

A massive project was launched in the vast forest area, with a network of offices, hospitals, schools, etc. which benefited the Bengali migrants. The state managed health centers, schools and other development agencies, were meant for local non-tribal and tribal people. Comparatively, the former institutions were better functioning and the new settlers were provided special facilities which created a rift between the local Koyas and the refugees. With the interference of some politically motivated activists in the locality as well as in West Bengal, there was a large-scale movement of the refugees from Dandakaranya areas, to the lower gangetic basin of West Bengal around 1978-79. The major resentment of the immigrants were that they should be settled in West Bengal for linguistic benefit and in soft marshy areas befitting their occupational expertise like fishing, cultivation etc. It led to a lot of upheaval and the rehabilitation programme was likely to stop. The situation was brought under control due to efforts by the Tagore Society, led by a legendary revolutionist-turned social activist, late Pannalal Dasgupta, who spent a lot of time in the Malkanagiri area. With passage of time, the Bengalis have settled down with amicable neighbourhood relations with the Koyas and other locals after withdrawal of the supportive DDA programmes.

The target population of this study are the Bengali refugees and their settlement amidst the Koya territory. This has resulted in infringement on natural resources so far solely exploited by the Koya with primitive technology. A nutritional assessment of the neighbouring Koya people will enable us to have an idea on nutritional intake of well adapted people in that environment where these migrant people are settled.
Hence, the present study is confined only to the settled Bengali villages and the adjoining Koya village, in the Malkangiri district, where the preliminary studies have been made for feasibility of the work. The precise objectives of the study are -

1) To make a list of edible materials ‘as available’ in contrast to ‘as desirable’.
2) Which type of local food items has replaced their traditional food.
3) To measure quantitatively, the actual consumption of food items, segregating into useful and less useful items for all ages.
4) To assess cooking procedure to ensure whether the methods are nutrient protective.
5) To assess the nutritional status of children and mothers.
6) To identify nutritionally deficient cases especially of children below five years of age.

METHODS OF STUDY

The methods used for "A Study on Food Habits and Nutrition of Bengali Migrants of Malkangiri, Orissa", consisted of the following steps:

A) Selection of the area and sample
B) Formulation of the Schedule
C) Conduct of Socio-economic survey
D) Assessment of the nutritional status
E) Estimation of Haemoglobin of all the members (16 years and above).

A) Selection of the Area and Sample

The area selected for the study was Malkangiri Villages in and around the District Headquarters of Malkangiri and the adjoining Koya villages. The reasons for selecting this area were:

1) Concentration of Bengali Migrants (Refugees) housed by the Dandakaranya Project.
2) Adaptation to this locality by displacing the Koya tribes.
A sample of 276 households was taken from the Malkangiri villages of No.11, 49, 19. Also, a sample of 159 households was taken from the adjoining Koya village of Bhoiguda. Since the investigator's aim was to study the food habits and nutrition of Bengali Migrants, the Koyas were taken in order to show a comparison between the locals and the migrated inhabitants.

All the members in each of the selected families served as the sample for the study. The total number of members in the Malkangiri Villages was 1,351, and in the Koya Village was 729.

B) Formulation of the Schedule

The method used for the data collection was by direct interview method using a structured schedule, as they are the most frequently used methods of socio-economic and dietary assessment (Bingham, 1985). Direct interview method was used, as most of the population selected was illiterates.

The schedule was designed to elicit information on the aspects like type of family, family size, education, expenditure pattern, occupation, income, etc.

Before administering the questionnaire to the selected sample, a pilot study was conducted among ten families in order to list the efficacy of the Schedule (Appendix I-A).

C) Conduct of Socio-Economic Survey

The investigator with the help of the local leaders, Aanganwadi workers and the village level workers established a good rapport with the families before proceeding with the study. The information was gathered from the individual families through personal interviews by door-to-door visits, and by meeting them in groups at their work places.

D) Assessment of the Nutritional Status

The nutritional status of the selected families was assessed by the following methods.
1) Anthropometric Measurements

Nutritional anthropometry capitalizes on the connection between the nutritional history of an individual and his or her body morphology (size, shape, composition). Long term disparities between energy nutrient intake and energy nutrient requirements are "registered" in the morphology of the body. The greater the disparity between intake and requirement (output), the greater the morphological alteration from wasting and stunted growth to obesity. Commonly measured anthropometric parameters used to assess human body composition are weight, height, skinfold thickness, mid-arm muscle circumference and mid-arm circumference.

Body weight, the most commonly measured anthropometric parameter, is considered to include body fat plus fat-free mass (water, protein, glycogen minerals). The state of the body hydration can have profound effects on body weight with dehydration being associated with lower body weights, and over-hydration (odema) associated with higher body weights.

Weight and height must be considered together in order for weight to be meaningful. Height is influenced by genetic and nutritional factors, as well as by age. Undernutrition during childhood may prevent an individual from attaining his/her genetically determined potential for height at maturity.

Anthropometric measurements have become increasingly employed as indicators of nutritional status at both the individual level and the population level (Mclaren, 1976). These measurements are economical, safe, non-invasive and effective when used appropriately (Johnston and Lampl, 1984). Neyzi et al., (1978) stresses that height and weight are the best yardsticks to determine the growth pattern of a population.
a) **Height**

Measurements of height are particularly important because they provide a rough indication of a person's long-term health and nutritional status (Marotz et al., 1985). The height of an individual is made up of the sum of four components: legs, pelvis, spine and skull (Jelliffe, 1966).

To measure the height accurately, an anthropometer was used. The subject was barefoot with minimum clothes, standing with feet together and with head, shoulders, buttocks and heels touching the rod of the anthropometer. The place of the ear, mid-point of the hip bone and ankle should be parallel, i.e. he should be standing at attention. When the subject was positioned properly, height was read off the measuring stick.

The heights of all the members belonging to the migrant families and Koya families were taken.

b) **Weight**

Weighing is the key anthropometric measurement (Jelliffe, 1966). Serial measurements of weight help to establish the pattern of growth during childhood. For healthy adults, increase in body weight, usually but not always indicates an increase in body fatness (Robinson and Lawler, 1982).

The weights were taken using a bathroom type weighing machine with the subjects wearing light clothings and without any foot-wear. The weighing balance was capable of reading up to a weight of 100 kilograms. The accuracy of the instrument was checked frequently, by keeping a standard weight. The weights were taken accurately up to the nearest 0.5 Kg. The weights of the infants were taken using a Salter’s scale.

The weights of all the available subjects were taken.
c) *Mid-arm Circumference*

Arm circumference is a useful proxy for weight, when for practical reasons; weight cannot be measured (Dowler et al., 1982). It is also said to be independent of age up to about 4 years and is therefore useful, when age is not known.

Measurements of the mid-upper arm appear to be most useful in practice. The arm circumference was measured using a fibreglass tape, which must be placed gently, but firmly, round the limb to avoid compression of the soft tissues.

Mid-arm circumference was taken for children between one month and six years. It is usually measured for this age group because poor muscle development or muscle wasting are cardinal features of all forms of protein calorie malnutrition to especially those of early childhood (Jelliffe, 1966).

The mid point was located by marking mid point between the tip of olecrenon process of the ulna and the tip of acromion of the scapula with the arm in flexed position at the elbow. The left arm was kept hanging loosely on the side and the circumference of the arm was measured by passing a fibre glass tape around the arm at the mid point. The tape was applied firmly without disturbing the contours of the arm.

d) *Chest and Head Ratio*

A Chest / Head circumference ratio of less than one may be due to failure to develop or to wasting of the muscle and fat of the chest wall, and can be used as community indicator of protein – calorie malnutrition of early childhood between zero to two years (Habicht, 1980).

The measurement of head circumference has been shown to be associated with nutritional adequacy in the first two years of life, the period of rapid postnatal brain growth (Brozek and Schurch, 1984). Hence, the head and chest circumferences were measured using a non-elastic tape for children, between the ages of zero and two years in order to classify them according to the chest / head circumference ratio.
2) **Clinical Assessment**

Clinical examination is an important practical method for assessing the nutritional status of any community, as we get direct information of the signs and symptoms of dietary deficiencies prevalent among the people. (Swaminathan, 1990).

A schedule (Appendix-II) was formulated by the investigator based on the schedule as given by ICMR (1981), Jelliffe (1966) and Pennington (1986), to clinically assess the deficiency diseases of all the members of each of the families.

A qualified physician assisting the investigator did clinical examination of all the members, belonging to the Koya and Bengali Migrant families.

3) **Bio-Chemical Assessment**

Bio-chemical methods yield a reliable data regarding the nutritional status of the individual with respect to the nutrient estimated (Swaminathan, 1990). Estimation of haemoglobin is the best indicator for iron nutriture (Jelliffee, 1978).

Estimation of haemoglobin was done for all the members (16 years and above) belonging to Bengali Migrants and Koya families.

Blood was collected by finger prick method and haemoglobin was estimated using haematinic method.

4) **Dietary Survey**

All the methods that can be used for the assessment of the nutritional status of a community are individually imperfect, inaccurate and subject to their own technical errors. Although, valuable information can certainly be obtained with less than the complete range of methods, the probability of obtaining a valid picture of the nutritional condition of the community in its widest sense-increases, if various approaches can be employed in conjunction (Krehl and Hodgen, 1965).
Dietary assessment is one component of the individual nutritional assessment. Deviations in a person's dietary intake represent an earlier stage in the onset of malnutrition than changes in anthropometric, clinical and bio-chemical indices. It is important to assess dietary intake because a considerable length of time may elapse before problems associated with dietary deficiencies or excesses can be detected by the other components of the nutritional assessment.

The relationship between dietary intake and the nutritional status of an individual is influenced by factors other than the diet itself. Factors that may compromise the ingestion, absorption, utilization, storage or excretion of nutrients by a person include the health of the individual (illness, malabsorption syndromes, nutrient status) and qualities of the food consumed (freshness, method of preparation, nutrient content of food).

Methods of dietary assessment can be characterized as retrospective and prospective. The major type of the retrospective method is the 24 hrs. Dietary recall. In this method, the subject is asked to recall all the foods and beverages consumed in the previous 24 hours. Since retrospective methods rely on the subject's memory, errors due to forgetting are the major limitation to the validity of these methods.

The major type of prospective method is the food (or diet) record, where in the investigator records all the foods taken in by the subject, throughout the day, over a period of seven days. The investigator also records the amount of food taken by each member of a family and also the number of times of consumption.

The investigator, with the help of the schedule (Appendix I-B), collected information on the dietary pattern of the migrants and the Koya tribes. Data regarding details of food expenditure, daily meal pattern, methods of cooking, breast feeding and weaning practices, opinions of the mothers concerning breast feeding, foods given under special conditions, diet during illness, food fads and fallacies and diet restrictions were obtained from the home makers of all the families.
5) **Food Consumption Survey**

Food consumption surveys constitute an essential part of any complete study of the nutritional status of individuals or groups, providing essential information on nutrient intake levels, sources of nutrients, food habits and attitudes (Swaminathan, 1990).

For the food consumption survey, around 30 families from the Bengali Migrant villages and 10 families from Koya tribes were selected on the basis of their willingness to co-operate with the investigator.

Weighment method involves weighing the foods before and after cooking and also the quantity of the foods consumed by the individuals. The quantity of raw foods used for the family in the various preparations and volumes of cooked quantities of such preparations are recorded in terms of standardized cups, and hanging spring balances. The homemaker, in presence of the investigator is asked to measure the quantities of different cooked items before serving to her family members, using the standardized cups. The amount of raw foods consumed by the individual members is calculated as follows:

\[
\text{Quantity of Raw Food Consumed By the Individual Member for Each Item} = \frac{\text{Total Quantity of Raw Food used for Each Item} \times \text{Volume of Cooked Food Consumed by the Individual Member}}{\text{Total Volume of the Cooked Food Item}}
\]

The nutrient intake was then calculated for each individual using the nutritive value of Indian Foods by ICMR (2000).