REVIEW
OF
LITERATURE
The literature related to the Dietary Habits, Nutritional Status and Supplementary Feeding has been reviewed under the following headings:

1) History of Amravati District.
2) Studies conducted on Dietary Habits.
3) Studies conducted on Nutritional Status.
4) Studies conducted on Supplementary Feeding.

HISTORY OF AMRAVATI DISTRICT:

The name of the District is taken from the name of the district headquarter town. The name Amravati meaning the abode of immortals may be traced from its associated with Lord Krishna. The history of the Amravati district, which contains both the ancient and the modern capitals, which contains both the ancient and the modern capitals, of Berar, is to a great extent that of the province itself.

Berar is first mentioned, under the name of Vidarbha in the Maharashtra, one of the two great epics of the Hindu. The early history of the district is vague and fragmentary. Berar formed part of the empire of Ashoka Maurya who reigned from 272 to 231 B.C. The region experienced Hindu and Muhammadan periods and went
through rules of different dynasties.

In 1833 the district, with the rest of Berar, was assigned to the East India Company in satisfaction of the debt and for the future security. The province was divided into two districts, south Berar (Balaghat) with its headquarters at Ilingoli and North Berar with headquarter at Buldana. North Berar included the present Amravati district, the northern half of Akola and part of Buldana. Subsequently, North Berar was reconstituted into East Berar with headquarters at Amravati and West Berar with headquarters at Akola. A new district of Ellichpur (Achalpur) was created in 1857 by separating three tahsils of Ellichpur, Melghat and Daryapur from East Berar district. In 1905, when the districts of the province were redistributed, Ellichpur (Achalpur) district was again amalgamated with Amravati while the Murtizapur taluka was transferred from Amravati to Akola.

Location:

Amravati district is situated right in the centre of the northern border of the state. It lies mainly in the Tapi basin with only some of its portion on the eastern border lying in the valley of Wardha. Its central part is situated in the drainage system of the river Purna which is an
important tributary of the Tapi which runs for some distance along the North-West boundary of the district. The area of the district is 12212 sq.Km. and its population according to Census of 1981 was 1,861,410 with 1,698 villages and 12 towns. It ranks 12th and 16th in terms of area and population of the state, respectively.

There is only one main system of hills which is the Satpuda and its off-shoots. The Gawilgad hills a part of Satpudas pass through the Melghat tahsil in the North-Western region of this district. The other range is a low line of trap hills rising in the vicinity of Amravati and extending towards east to some distance beyond Chandur railways.

Climate :

The climate of the district is hot and in general dry throughout the year excepting the period of monsoon season. To study the climate of this district, the whole year may be divided into four parts. The winter season from December to February, the summer from March to May, the monsoon from June to September and Post monsoon period to two months viz. October and November. The Mriga Nakshatra starts on the 7th June and rains are generally started in second week of June and lasted up to the end of September. The seasons shows local variations within the district. The
rainfall is more or less uniform in all parts of the district excepting the area of Melghat tahsil. About 90 percent rainfall is received from the South-West monsoons from June-September.

Soil of Amravati District:

Large area of Amravati block consists of rich soil which is very much useful for cultivation of Kharif and Rabbi crops mainly for cotton, jowar, wheat and linseed. The soil in nearby hills becomes shallow and less fertile. The soil of Morshi block is black but somewhat shallower and slightly inferior in quality. Daryapur block is a fertile plan of rich productive soil which is suitable for cultivation of Jowar and Cotton. The soil of the northern part of the block is two shallow which is not useful for Rabbi cultivation. The whole Melghat block is hilly tract and contains very dense forest. In general, the soil of this block is the poorest quality with some small pockets of good soil found in the valleys where Kharif crops are generally grown.

Distribution Of Population
In Rural And Urban Areas:

As per 1981 Census (7) the population of Amravati district is 1,861,410 with the break up of 961,564
males and 899,846 females. This constitutes 2.96 percent of the total population of the state over 3.97 percent of its share of area.

The district and tahsils are divided into two parts viz. rural and urban. The basic unit for rural area is a revenue 'Village' which may be defined as a statutory recognised unit having definite boundary and separate land records.

Population, Growth Density and Sex Ratio:

The Census of 1981\(^{(7)}\) show that Amravati district registered the decadal growth rate (1971-81) of 20.78 percent which was lower than the growth rate of the state (24.54%) as a whole. There was an addition of 320,201 persons in the total population with the break up of 200,385 persons in rural and 199,816 in urban areas in 1981 census over 1971. It is seen that the urban growth rate (28.21%) of 1971-81 was less than the state growth rate (39.99%). Whereas the rural growth rate (17.95%) was slightly more than the state (17.53%). Within the district, the highest growth rate (32.53%) was recorded in Melghat tahsil followed by Morshi (24.07%) and Amravati tahsil (23.87%).
Literacy:

As per Indian census, the definition of Literate is "any person who is able to both read and write with understanding in any language". The Census of 1981 recorded 71.82 percent of the total population of the district as literate which is higher than the state average literacy rate of 47.18 percent. Amravati district ranks 4th in the state in terms of literacy rate. It is also noticed that the villages with more population are having high literacy rate. It means that size of the villages and literacy rate are positively corelated.

Education Facility:

The Census of 1981 shows that education facility is available in 1,311 (77.21 percent) out of every 10 villages and comprises of 96.11 percent rural population of the district.

Staple Food:

Among the food crops of the district jowar and wheat are the most important cereals.

Slum Population:

Amravati city is having some notified slum area.
It is seen from Census of 1981 that the proportion of slum population to the total population of the Amravati city is 10.48 per cent. The density of slum population (population per Sq.Km.) is 105,385.

STUDIES CONDUCTED ON DIETARY HABITS:

Various studies have been undertaken in India regarding the dietary habits of Indians. These studies tell us about the important features of Indian diet. The studies available and related to the present topic are reviewed.

Roy and Roy conducted dietary investigation on the people of Great Nicobar, the Southern most and biggest Island (area 865 square Km.) of the Nicobar group of Islands in the Bay of Bengal. Total population of the Nicobarese in the Island was only 139, out of which 35 per cent covered by diet survey. Foods of the people, rich in variety, were basically different from those in the mainland of India. Pandanus fruit, coconut and some marine animals and fishes were their staple foods. Other foods were yams, papayas, bannans, insect larvae, honey, pork fowls, crocodile meat, wild birds and fruits. Their beverages were fermented coconut toddy and coconut milk (water) which were daily consumed in good quantities.
Their diet was adequate, nutritionally highly satisfactory and remarkably rich in animal protein (103 gms. Per consumption unit daily) and high in fat content of all population groups so far surveyed in the Indian Union. The Nicobarese in the Island, it appears have the best diet.

Rewal (9) studied the protein in oriya diet reveals that the total protein in the diet of oriya's exceeded the Indian Council of Medical Research recommended allowances. However, the diets of one forth of family adequate. Lysine was not a limiting amino acid. The limiting amino acid were methionine, cystine, tryptophan and threonine in that order. Their diet was deficient in calories.

Roy et al (10) studied the diet and body build of the people, in Agathi and Minicoy Island of Lukshadwip. Food of the people consists of rice, tuna fish and coconut. Other foods were sugar, jaggary and small amount of vegetables. In Agathi there were more families getting inadequate calories than in Minicoy and mean calorie consumption in the farmer Island was also lower (2713 and 2918). Mean consumption of protein in the islands (76.4 gm. per consumption unit out of which 41.2 gms. from tuna fish) both in quantity and quality was highly satisfactory.
almost all the families consumed their required amounts of protein, mean consumption of iron and niacin (22.4 mg. per day per consumption unit and 22.4 mg. per consumption unit, respectively) was found to be satisfactory but quite a number of families of the Islands about 25 per cent failed to get even 60 per cent of the mineral. Riboflavin intake was not satisfactory (0.83 mg. per consumption unit) and in respect of vitamin B₁ and calcium, mean consumption (1.11 mg. and 371.0 mg. per day consumption unit, respectively) were moderately inadequate. 7.5% and 25% of the families got less than 60% of vitamin B₁ and calcium, respectively. In respect of Vitamin C intake in Agathi was found to be grossly inadequate but in Minicoy the deficiency in the intake of vitamin was only moderate (7.0 mg. and 36 mg. per day consumption unit, respectively.)

The mean value of Pignet coefficient the adult males both in Agathi (23.8) and Minicoy Island (21.1) shows that people have average body build (range 21.25) but within the range, mean value of the coefficient of the males in Minicoy is definitely superior to that of Agathi males suggesting the males in the farmer Island to have better body build. Superior weight height ratio of the Minicoy women (31.01) in relation to that of Agathi women (29.6) suggests, that like the males, females of Minicoy
Island have somewhat better body build than their counterparts in Agathi Island.

Roy et al. (11) studied the diet of Santals in few villages of Purulia district of West Bengal. Food mainly consists of rice, maize, small millets and vegetables particularly leafy vegetables. Consumption of food of animal origin was insignificant and pulses were consumed in limited amounts. Most glaring nutritional defect of the diet is that it was highly deficient in calories (1850 calories). Forty percent of the families surveyed did not get more than half their requirement of food energy. Low body weight (46.0 Kg.), low weight/height index (29.3), very high pigment's coefficient (29.0), and low measures of skinfold thickness, particularly that of the tricep region (4.3 mm) of the males indicated poor physique and under nourished state of the people brought by high inadequacy in energy consumption.

Prasad et al. (3) conducted study on children of both the sexes in classes III and IV of urban model school in Hyderabad city. Data on nutrient intake in relation to income show deficiency of all the nutrients particularly vitamin A and riboflavin. These deficiencies were seen even in the highest income group, suggesting that the income of the class IV employees of the university and government is inadequate to provide optimum nutrition to their children. There was highly significant correlation between the intake
of various nutrients such as calories, protein, iron and riboflavin. More than 75% of the children were anthropometrically normal despite low intake of calories and other nutrients. This may be due to the fact that in Waterlow’s classification adopted here, the cut-off point for weight deficit is 80% of standard and majority of the children had weight between 80-90% of the standard. The incidence of anaemia was quite high and only 32% of the children had haemoglobin value above 12 mg%. The rest suffered from mild or moderate grades of anaemia. There was no correlation between income or diet or anthropometry and haemoglobin status. Only 16 children had clinical lesions of B-complex vitamin deficiency such as angular stomatitis and glossitis.

Rao and Sastry (12) stated that National Nutrition Monitoring Bureau conducted study on food consumption pattern of people of Andhra Pradesh, Gujrat, Karnataka, Kerala, Maharashtra and Tamil Nadu from 1975 to 1980. The results revealed that the cereals, rice and wheat formed the major staple in the diets. Especially rice showed an increasing level of consumption. The millets (jowar, ragi, maize and bajra) as a group which constitute an important ingredient in the dietaries, particularly of low income
group, did not show any increase. In fact they decreased from about 160 gm in 1975 to 107 gm in 1980. The consumption of pulses, which constitute an important source of protein in the dietaries, has not shown any perceptible change. Milk, which forms an important item in daily life of an average Indian household, also showed an inconsistent trend with an over all intake of about 85 ml per capita per day, indicating lack of expected benefit of "White Revolution" on its consumption level in rural households of these states. Consumption of fats and oils and sugar which are the sources of "refined calories" did not show any perceptible trend. The consumption of vegetables, as a whole by the rural population registered an increase of about 25 gm during 1975-80. The contribution of green leafy vegetables, a rich and less costly source of provitamin- A, iron and to some extent calcium to the dietaries has been very low.

Khanum and Umapathy studied the food habits of pregnant and lactating mothers in Mysore city. The foods which were reported to be consumed daily or frequently by considerable number of mothers are rice, ragi, wheat, pulses, vegetables including green leafy vegetables and butter milk whereas, food either occasionally or never consumed by a majority of women are jowar, beaten rice, sprouted grams,
groundnuts, fruits, milk, curds, egg and flesh foods. Thus, the consumption pattern is in accordance with the typical South Indian dietary pattern with the exception of green leafy vegetables.

Papaya was found to be the most important food item which was avoided during pregnancy. Other important foods which are avoided during pregnancy are egg, jambu fruit and sesame. The most important reason given for not consuming papaya and sesame is that they are hot foods and abortive. Egg and jambu fruit were avoided since they were believed to cause red and purple patches on the child's face and body. The percentage of mother avoiding papaya, jambu fruit and sesame during pregnancy is highest among the middle income group.

Milk with saffron as a special food taken during pregnancy could be mostly seen among the middle and high income groups. The proportion of mothers avoiding fruits, pumpkin, egg, and fish during lactation is significantly different among four income groups considered.

The proportion of mother specially consuming the various food items during lactation with the exception of papper and motton, is significantly different among the four income groups. It is interesting to note that the greater
percentage of mothers belonging to middle and high income groups specially take expensive food items such as ghee, milk and dry coconut during lactation. Garlic and shepu (Peucedanum graveolens), a green leafy vegetable are believed to increase milk secretion during lactation.

Umapathy (1) conducted a survey on food habits of post graduate students of "Manasa Gangotri". The result on food consumption pattern indicated that 98% of students take rice daily, other cereals were also consumed. Frequent consumption of raw sprouted grams in the form of salad is beneficial as a source of vitamin - C and protein. Vegetable specially, green leafy vegetables are liked and consumed very frequently. However raw vegetables are consumed occasionally, consumption of fruits is fairly good and since they are expensive, their need can be reduced by including green leafy vegetables in the diet. Egg and meat were consumed more frequently than other flesh foods.

Chaudhari et al (13) conducted study on food habits of Non-Bengali Muslim mother during pregnancy and lactation of Calcutta. It was observed that mothers specially preferred those foods for inclusion in their diet, which were considered "hot" by them with the attitude for maintaining health during pregnancy and lactation, for proper growth
and development of foetus and baby and for augmenting breast milk secretion. Majority were in view to avoid the foods considered abortive in nature and to produce congenital malformations, "cough & cold" "sore-throat" to mothers and their breast fed babies. It was observed that there was wide gap between mother's attitude towards foods to be consumed and actual practice of consuming them, the main reason being the inability to buy those foods in extra amounts due to poverty. In comparison to consumption pattern, avoidance of certain foods during pregnancy was considerable with the belief that these were abortive in nature and might cause developmental defects to babies or gastric upsets to mother. In addition to leafy vegetables (96 percent), some mother (42 percent) also avoid brinjal, cauliflower and cabbage for fear or gastric upset. Pineapple and Papaya was avoided mostly (75 percent) among the fruits. Fish was avoided by (50 percent) since it was believed to cause scaly patches on child's face and body like the scales of fish.

The foods specially consumed or avoided during lactation were same as during pregnancy, but the pattern was a bit different. A considerably number mothers (76 percent) irrespective of their level of education or economic-status were consuming sago, barley, garlic and turmeric with the erroneous belief of augmenting breast milk
secretion. Garlic and turmeric were also believed to improve baby's complexion and protect the baby and mother from "Cough & Cold" common food items avoided by mothers during lactation were vegetables (93 percent) fruits (81 percent), pulses (59 percent) roots and tubers (54 percent).

THE STUDIES CONDUCTED ON NUTRITIONAL STATUS:

Shah and Junnarkar (14) conducted a longitudinal study at the WHO-aided project in the 23 villages around Palghar, very interesting and useful information was gathered on the changes in the nutritional status of the under fives. All the children in the villages were covered as followed up. It was observed that 50.6% of the children who had weight about 80%, in June, 1973, deteriorated in their nutritional status in May, 1974, on further analysis it was found that a majority of these who lost weight were a children in the age group of one to two years. During the previous year, they had been breast fed and had normal nutrition. Delayed introduction of semisolids and solids was the factor causing malnutrition. Moreover, their mother started going to work five to six months after delivery and the infants were looked after by young mother substitute who did not feed them well enough and which lead to deterioration in the weight of 6 to 24 months old children.
Mudkedkar and Shah studied the impact of family size on child nutrition and health. He found that there was a significant relationship between size of family and nutritional status of young children. The percentage of children weighting 70% in small and 62.5% in large families in rural community and 12.5% and 20.0% respectively in urban families.

Mudkedkar and Shah further studied the effect of spacing of children on the nutrition and mortality and under five. He found an inverse relationship between the period of spacing of children was one year or less, there were 1.9 times as many moderate and severely malnourished children as when the period between births was three to four years in urban as well as rural group.

Devadas et al studied the socio-economic condition of the families, food habits, health status and clinical picture of the 0-6 years old children registered in the selected three medical centres. It was found that their socio-economic conditions were poor, and the educational status of the parents was also poor. The food intake of the children was imbalanced, and often breast milk was not supplemented. The personal hygiene and habits were poor and the general nutritional status of the children was below the All India Standard. The major causes of morbidity were
infection of upper and lower respiratory and gastrointestinal origin. Among the nutritional disorders kwashiorkar, marasmus anaemia and vitamin -A deficiency topped the list.

Tondon et al (18) surveyed on 1070 family members and 157 school children of Kumaon hills in Uttar Pradesh. It was found that 33.3 per cent of male and 32.9 per cent of female children under 6 years of age were below ICMR weight for age levels, 38.6 per cent of children below 4 years were lower in weight for head circumference, 33 per cent of males between 6-20 years and 37 per cent of females were below weight for age, 30-37 per cent of both sexes were below weight for height and measured by skin fold (triceps for age of the children between 5-14 years) 39 per cent of males and 74.5 per cent females were below standard.

Adams and Shresta conducted a survey of 52 adult inhabitants of Tibetan ancestry in a village located at 12,000 feet in the Nepal Himalayas, revealed lower haemoglobin levels than that reported for populations living at similar attitudes elsewhere in the world. However, serum B₁₂ serum and red cell folate, and mean corpuscular haemoglobin concentrations gave no evidence for megaloblastosis or iron
deficiency as a cause of anaemia.

Satyanarayana et al (20) investigated 1060 rural persons of Andaman and Nicobar, showed that the South Andaman had the highest prevalence of anaemia (77.8%) followed by Nicobar (72.6%) and North and Middle Andamans (51.8%). Women and children were highly anaemic but men were least affected. Their intake of dietary iron was inadequate. A large incidence of malaria also resulted in high prevalence of anaemia among them.

Karmarkar et al (21) studied on goiter prevalence and iodine metabolism in areas of endemic goitre in the Himalayas of India and Nepal. Similar studies were also made in Ceylon. The results are compatible with the hypothesis that severe environmental deficiency of iodine is a primary factor responsible for endemic goiter in these area. The endemicty was less severe in Ceylon than in India and Nepal. The thyroid glands of persons living in endemic areas show an interesting adaptive response to maintain internal homeostasis in the face of severe iodine deficiency.

Bhattacharya et al (22) from Dept. of PSM, MLN Medical college of Allahabad conducted study on 986 pregnant women at 38 weeks of pregnancy. The pregnant women were
examined and followed up till delivery. Details of their socio-economic variables and clinical examination were recorded in a pre-coded schedule. The mean birth weight of the baby was observed to be lowest in women below 19 years with husbands unemployed and illiterate, primipara, less than 39 Kg. weight at 38 weeks, less than 145 cm in height with Hb % between 8-9 gm% and blood pressure levels of systolic above 130 mm of Hg. and diastolic between 80-90 mm of Hg. Significant association was found between birth weight and literacy status and occupation of the husband. Mother's weight height and haemoglobin level were observed to be significantly correlated. Multiple regression analysis has been carried out to predict the birth weight based on these variables.

Singh et al (23) conducted a study in Sunderpur Urban slum of Varansi which also forms a field practice area of the department. The under five clinic registration was 98.8 percent in this area. Death records of two years (1986 and 1987) were analysed for the purpose of this paper. Infant mortality rate, neonatal mortality rate and post neonatal mortality rate were found to be 113.5, 48.0 and 65.5 per thousand live births respectively. Age specific mortality rate was found to be 14.5 among 1-4 years old children child
mortality (0-4 year) constituted 45.2 percent of all the deaths. Out of the 38 deaths 68.5% occurred during infancy. Gastroenteritis and respiratory disease were responsible for 34.2 and 21.0 percent mortalities, respectively. Maximum mortalities occurred when the birth order as five or more (47.4%) followed by one (21.1%). 63.4 percent children who died had birth spacing of less than 2 years 87.5% children presented with different grades of malnutrition at the time of death and 48.4% were low birth weight babies.

Parmar et al (24) conducted study on the anthropometric measurements and prevalence of Low Birth Weight in Himachal Pradesh. The study was based on the data collected on antenatal mother and their children attending the Kamla Nehru Hospital and H.P. Medical college, Simla. The mean birth weight, length and head and chest circumferences at 40 weeks of gestation were 2910 ± 750 g, 49.2 ± 4.2 cm, 33.9 ± 3.2 cm and 31.9 ± 3.8 cm, respectively. The incidence of prematurity was 66% and that of low birth weight babies 34.6 and 11.1% (weights less than 2500 and 2000 g, respectively). The incidence of small data was only 4.6%, but that of term low birth weight babies was 80.0 and 56.1 %, respectively.
Agarwal et al. (25) conducted study in the nutritional status in rural pregnant women of Bihar and Utter Pradesh. The assessment was carried out by anthropometric measurements, i.e. weight, height, circumferences of mid arm, skull and triceps skin fold thickness. Only 40% women were weighing >45 Kg. surprisingly in the third trimester 18.8 and 12.6 % were < 40 Kg. in Bihar and Utter Pradesh, respectively. The percentage of women weighing less than 45 Kg. and height less than 145 cm was 13.9% and 20.8% in Bihar and U.P., respectively. Midarm circumference less than 23 cm was seen in 89% and 81% in both states, respectively. The mean for skinfold thickness, height and skull circumference were 8.8 and 8.5 mm, 148.4 and 148.7 cm, 51.5 and 52.9 cm respectively. The mean for weight, midarm circumference and triceps skin-fold thickness were similar in all the three trimesters.

In addition haemoglobin was also estimated 81% of women in Bihar and 87% in Uttar Pradesh were anaemic (haemoglobin level < 11.0 g/dl). Out of these 30% in Bihar and 36% in Utter Pradesh were moderate to severely anaemic. Thus, under nutrition as well as anaemia are a public health problem during pregnancy in these states.
Bhattacharya et al (4) conducted a cross-sectional study on Nutritional Status of the children in the age group of 1-4 years. It was carried out in the slum areas of Chetla, Calcutta by following the criteria of Indian Academy of paediatrics. Amongst them 68.9% had different grades of malnutrition, of which 37.4% was in grade I, 25.8% in grade II, and 5.7% in III and IV. 80% of the malnourished children was observed in 3-4 years age group. Economic status, family size, birth order and mother's education were found significantly associated with the prevalence of Protein Energy Malnutrition. 44.2% of children were nutritionally dwarfs of different degrees. A synergism between infection and malnutrition was also significantly observed in the present study.

Ray and Reddy (26) conducted a study to identify the feeding and weaning pattern in preschool children in Sunderpur urban slum of Varanasi city. This study examined the current trends in feeding, introduction of top milk, semisolid and solid food and their adequacy with respect to age and processing involve in food preparation in the study community. Interview technique by using a pre-designed, pretested, semistructured schedule was followed with 24 hours recall method of diet survey. It also examines
the role of some of the socio-economic variables in relation to breast feeding practices.

Kulkarni and Rao conducted a field study including clinical survey, some biochemical investigations and environmental assays in five villages in Bhandara district during April to July 1986 to determine the prevalence and endemicity and also the estimate the possible factors contributing to the occurrences of iodine deficiency disorders. Of the 2245 persons surveyed, enlarged thyroid was observed in 33.36% of the population (range 29.68% to 54.77%). The highest prevalence rate was found in the age group of 6-10 years. Females above the age of 16 years have 1.85 times greater prevalence than the males particularly grade III and grade IV types. A familiar aggregation was observed. The goitrous persons in majority were euthyroid but presented with difficulty in hearing, swelling over the neck, pain in neck, difficulty in swallowing and constipation off and on. An assessment of serum PBI, urinary of iodine per gram of creatinine, iodine content of water and soil and heamoglobin was done. All the findings were below the normal range. Bacteriologically contaminated water was observed in three of the five villages, though chemically it was satisfactory. Distribution of iodated common salt is suggested.
National Institute of Nutrition (28), Hyderabad investigated the effect of measles on the growth and nutritional status of 390 slum children. Weight loss ranging from 2 to 12% of the initial body weight was observed during measles. The post measles weight gain was lower in all the children compared to that of matched controls living under the same socio-economic conditions. There was significant deterioration in nutritional status of the children after measles and 4% of them developed severe Protein Energy Malnutrition manifesting as kwashiorkar and marasmus within six months of the post measles period. Eighteen percent of the well nourished children shifted to lower nutritional grades after measles, but none of them manifested severe Protein Energy Malnutrition. However, all the children in whom Kwashiorkar or marasmus was precipitated were undernourished initially.

Gower and Roy (29) studied the anthropometric profile of 493 slum children under six years of age was studied in Kalkaji slum of South Delhi. The 19% of sample was selected randomly. 274 (55.5%) were males and 219 (44.5%) were female children. Their weight, height and midarm circumference were recorded and compared with Indian council of Medical Research estimates. Surprisingly all the
anthropometric parameters of the slum children of both the sexes were found below the All India average, which clearly indicates the strong role of environmental factors over the genetics.

Ray et al (5) conducted study on families of urban slum community in Baburbag. Result showed that prevalence of under nutrition was 57.95%, 40.91%, 14.77% and 2.27% under fives belonged to grade I, II and III respectively. Females under five had 68.88% prevalence of undernutrition. Both the parents illiteracy (64.71%) was more in under nourished group of children than among the well nourished counterpart, (51.35%) under nutrition was observed to be maximum (70%).

Suguna Bai et al (30) conducted study on 574 male infants and 543 female infants belonging to higher socio-economic group in Trivandrum city. Measurements of their weight, crown heel lengths, head circumference and chest circumference were done. The infants were divided into 13 age groups with an interval of one month each. The mean measurements were found to compare favourably with American standards. This suggests that the growth of children were determined mainly by environmental and
nutritional factors rather than attributing it to racial or genetic factors alone. Thus improving the standards of living can improve growth velocity of our children.

Singh (31) conducted study on anthropometric measurements (weight, height, head, chest, midarm and calf circumference and skin fold thickness) were recorded in 154 children (77 boys and 77 girls) aged 3½-5 years belonging to the high socio-economic strata of Delhi. Children with chronic illness were excluded from the study. Weight exhibited a steady increase with age from 14.6 ± 0.36 to 17.1 ± 0.05 Kg. in boys and 14.7 ± 0.58 to 17.00 ± 0.58 Kg in girls. Similar findings were observed for height. No statistically significant inter-sex difference was observed for these two measurements. Chest circumference in both boys and girls showed an increase with age (56.7 ± 0.3 to 53.0 ± 17.1 cm and 48.01 ± 1.25 to 51.9 ± 2.39 cm respectively). Other circumferential measurements had a minimal increase. Most of these measurements had higher values in boys as compared to girls but the differences were not statistically significant. Skinfold measurement taken at biceps, triceps, subscapular and suprailiac sites, were higher in girls at all the sites than in boys. The difference was statistically significant only in age group above 40 years (t = 2.32,
$p < 0.05$) comparable body weight and height in boys and girls showed a higher mean circumferential value and a lower skinfold thickness amongst boys suggests presence of more lean mass in boys and more fat mass in girls even in the prepubertal period.

Bhalla et al (32) studied one hundred and fifty four Punjabi infants (86 males and 68 females) of Nehru Hospital, Chandigarh. In general, male infants were found heavier and longer than their female counterparts throughout infancy. Male showed higher means for the body dimensions, than the females of the same age throughout the first year of life. However, females at birth weighted heavier than their male counterparts by 50 gm. Sex differences for the two body measurements were found to be statistically significant ($P < 0.05$) at most of the age levels. A total of 204.4% of growth for body weight occurred between birth and 12 months among male infants, while the corresponding percent gain for females measured 191.6%. Crown heel length in both male and female infants was found to be increased by about 49% over a period of one year.

Kumar and Jain (33) conducted study on growth pattern of sitting height, skull and chest circumference of
Varanasi school children of upper socio-economic group aged 5 to 10 years. The total gain in sitting height was 10.88 and 12.18 cm in boys and girls respectively. The boys were found to have greater sitting height than girls between 5 to 9 years and there after, girls took over the boys. However, the values were statistically significant in 2 out of 10 groups indicating that the difference might be due to chance variation. The skull and chest circumference increased by 1.29 and 7.74 cm in boys and 1.86 and 9.0 cm in girls, respectively. The skull circumference was greater upto 8 years of age as compared to girls.

Kapil and Bali (34) conducted study on nutritional status of pre-school children of Urban slum communities in Delhi. Nutritional status of 486 preschool children residing in urban slum was assessed by making domiciliary visits. The overall prevalence of Protein Energy Malnutrition (PEM) was found to be 81.8% while 31.8, 44.1, 5.7 and 0.2% of children had grades I, II, III and IV Protein Energy Malnutrition respectively. Age, sex and education had a significant association with Protein Energy Malnutrition.

Gupta (35) conducted study on the health status of rural children in Mosaboni mines and surrounding
villages of Chatsila subdivision in Singhbhum district of Bihar. Family size had a significant relationship with disease prevalence. In the nutritional status, only 15.4% boys and 19% girls had weight about 80% of 50th percentile of Harvard standard. 76.4% boys and 71.7% girls had weight between 61.80% of it while in 8.1% boys and 9.1% girls weight was less than 60% of it. Irrespective of sex, mean height was between 90-94% of the Harvard Standard but 20% boys and girls showed features of stunting, deficiencies of B-Complex and Vitamin - A as well as clinical anaemia were common while old rickets and scurvy were rare.

Choudhary et al (36) studied the nutritional status of children of working mothers in Udaipur city. Malnutrition was more prevalent among the children of working mother. According to type of family, children of nuclear families were more malnourished than the children of joint families. The nutritional status of children of joint families was better (P < 0.05) than the children of nuclear families among the working mothers. Simple as well as composite anthropometry revealed the higher prevalence of malnutrition in children of working mother than the non-working mothers. The children of working mothers
in nuclear families had significantly poor nutritional status than the children of joint families, but the difference in nutritional status was not significant in the children of non-working mothers.

Hayat et al (37) conducted study on iodine deficiency disorders in Community Development Block, Sarojini Nagar of Lucknow district. The prevalence of goitre was higher in social class V (24.5%) and lower in social class I (10.5%) but this difference was statistically not significant. But prevalence of goitre was less in educated group. The prevalence of goitre did not differ much in persons who were taking water from hand pumps (21.7%) and those using wells (20.1%) and the difference was not significant statistically.

Katiyar et al (38) conducted survey on 999 rural children under five from seven villages of Kashi Vidyapeeth Block, Varanasi to study the epidemiological determinates of Protein Energy Malnutrition. The prevalence of PEM was higher in children below one year and between 25-35 months of age as compared to other age groups. The prevalence of PEM was found to be more in boys (93.1%) as compared to girls (88.5%). Grade I PEM was found in 45.4% girls as
against 28.9% in boys. Boys were predominantly affected by PEM of grade 2, 3 and 4. Prevalence of severe degree of malnutrition was more in children with birth order between 3 to 4 (27.5%) as compared to those with birth order 2 (17.2%).

Yaima and Narendra studied the height and weight of urban school going children of Imphal. The boys as well as girls of urban school going children of Imphal were taller than that of their counterpart of Indian Council of Medical Research standards. This may be due to urban sample and under reporting of age in the school record. The increasing weight trends of both sexes of the study with respect of age seemed to differ from Indian Council of Medical Research pattern. There exists a strong positive relationship between mean weight of the both the sexes and their ages. The simple correlations coefficients of weight for both the cases were found to be positive and highly significant.

STUDIES CONDUCTED ON SUPPLEMENTARY FEEDING:

Undernutrition and malnutrition are major health problems among young children in developing countries of the world. In India children between the age of one and four
years consistute more than 15 per cent to total population and they are the most vulnerable to malnutrition. The mortality rate in children below four years is as high as 40 per cent. Malnutrition during critical phases of early growth can lead not only to the stunting of physical growth, but also to suboptimal intellectual development and poor neurointegrative competence in children. Apart from Protein Energy Malnutrition, vitamin-A deficiency and iodine deficiency are major nutritional problems.

Prasad and Rao\(^{(40)}\) conducted a study which deals with the results of a follow up programme with therapeutic nutrition for severely malnourished children (grade III and IV) in Sathyavedu ICDSS project in Chittor District. A total of 65 children with severe malnutrition (grade III and IV) were put on therapeutic nutrition and were followed up for a period of 12 weeks. During this period their weekly weights and occurrence of any sickness were recorded. At the end of first 6 weeks period, 19 (28.8\%) of children showed improvement one child dropped out and one child died. The remaining 45 children were followed up for a further period of 6 weeks. Out of these 45 children could be followed and 18 out of 44 children (40.9\%) have shown improvement. One child deteriorated on the whole at the end of 12 weeks period 56.1\% of children showed improvement.
Agarwal et al. (41) conducted study on the effect of mid day meal programme on physical growth in rural primary school children. Children (140) received, 450-500 calories with 10-12 gm. of protein for an average of 172 days a year for 2 years (1984 to 1986). It was found that initially in the non-supplemented group more children were in normal or grade I nutritional status as compared to those in the supplemented group (P < 0.05). After two years, in both the groups percentage age of children in normal grade decreased. It was also found for grade I nutrition in the non-supplemented children. In contrast the percentage of children in the supplemented group in grade I increased as compared to the initial distribution further the percentage of children in grade II in the non-supplemented group increased and the reverse was found for the supplemented group. The annual increments in height were similar for both the groups in both sexes. Weight was higher for both boys and girls by 0.63 and 0.79 Kg., respectively, however this marginal difference was significant as compared to non-supplemented group.

Manjrokar et al. (42) made an attempt to evaluate longitudinally the special nutrition programme which is meant to supply approximately 300 Kcal to pre-school
children, in Mysore city. The supplement consisted of bread and either a ground based milk substitute or milk. Among the observations of over two years in three feeding centres those of 1½ years were evaluated. The children were categorised according to age groups, parameters assessed were height and weight and the nutritional status was assessed. The progress of height and weight of the supplemented children did not differ significantly from the control group compared with the Harvard standard. The weight gap ranged between 5-6 Kg, and the height between 10-15 cm. Assessment the nutritional status revealed a high incidence of Protein Calorie Malnutrition without tendency to decrease. However, none of the children had a severe degree of Protein Calorie Malnutrition whereas in a control group, 2 children developed kwashiorkar.

Khajuria et al (43) conducted study on "Effect of Nutritional Supplementation on Growth of Infants with congenital Heart Diseases". Several hundred patients registering in Chandigarh Pediatric cardiology clinic, at PGIMER, between July, 1987 and November 1987 formed the population from which the study group was drawn. Twenty successive children with milder forms of congenital Heart Diseases were enrolled, they divided into four groups.
were informed about the purpose of study. They were given advice about the dietary intake which was planned according to patient's weight. Investigator aimed at giving 20% more calories than the usual recommended allowance for that weight. High caloric concentrate which could be prepared at home were advised for three months. Ten out of the initial twenty infants maintained regular follow up after entry and were considered for final analysis. Six out of the ten infants showed a trend towards improvement in their body weight after 3 months.

With increase in caloric intake. Those infants who were given inadequate calories failed to show similar increase in body weight. This study suggested that nutritional advice and compliance on the party of parents lead to favourably growth in infants with milder form of congenital heart diseases.

Devadas and Saroja (44) conducted study on supplementation of the diets (of carrots, amaranth and papaya) of preschool children in selected villages of Coimbatore district was attempted to suggest long term intervention programmes in preventing vitamin-A deficiency. An attempt was also made to determine the bioavailability of
B-carotene from amarnath, papaya fruits and carrot on selected groups of pre-school children by studying the changes in their surum vitamin-A level.

Bhat and Dahiya carried out a nutrition survey in Gangwa village of Hisar district. The study was conducted on 200 preschool children of one to five years to study the feeding practices, collect anthropometric measurements and identify, the extent of prevalence of nutritional deficiencies among the results indicated that breast feeding was continued.

Upto three years food supplements like dalia, khicheri, biscuits were given along with breast milk to the children upto three years. From third year, the children were given ordinary home diet and all the children of four and five years of age were given ordinary home diet. The diet of the children was deficient in protective nutrients. Boys were slightly taller and heavier than the girls in all age groups. The average value of head, chest and arm circumference were also more in males than in females in all age groups. The relationship of age with height, weight, head and chest circumference was positive. The average values of height, weight, head and chest circumference obtained in the present study were found to be slightly more in both sexes and in all ages than those reported by Indian
Council of Medical Research, Hyderabad and Ludhina studies. The boys and girls in the high income group were the tallest and the heaviest than those in low and middle income groups. There was positive and significant correlation between income and height and weight of the subjects (P < 0.01).

About 77.5 percent children showed symptoms of nutritional deficiencies. Vitamin-A deficiency was found to be widely prevalent among all age groups (40 percent). About 15 percent children were found to suffer from third degree malnutrition on the basis of body weight deficit for age, and showed sign of severe Protein Energy Malnutrition. The haemoglobin level in blood was found to be lower than the normal in children which was an index of prevalence of anaemia among them.

Khan et al (47) conducted study on meal programme, which was launched in Andhra Pradesh for 6 to 11 years old school children and meal was served on all the working days to all beneficiaries attending the school. The composition of the food supplement constituting the mid day meal was rice 100 gm, dhal 15 gfm and oil 5 gm. The preparation was usually cooked rice-sambar or cooked rice-dhal.