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AN APPRAISAL OF SUPPLEMENTARY NUTRITION COMPONENT FOR PRE-SCHOOL CHILDREN UNDER INTEGRATED CHILD DEVELOPMENT SERVICE SCHEME

By

Seema Kohli

(L-86-H.Sc.-179-M)

Thesis

SUBMITTED TO THE PUNJAB AGRICULTURAL UNIVERSITY
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF SCIENCE

in

FOODS & NUTRITION

(Minor : Food Science & Technology)

College of Home Science
PUNJAB AGRICULTURAL UNIVERSITY
LUDHIANA-141 004
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DEDICATED TO

MY RESPECTED PARENTS

AND

ADVISOR

CERTIFICATE I

This is to certify that this thesis entitled, "An appraisal of supplementary nutrition component for pre-school children under Integrated Child Development Service Scheme" submitted to Punjab Agricultural University, Ludhiana, is a bonafide research work carried out by Ms Seema Kohli (L-86-H.Sc-179-M) under my supervision and that no part of this thesis has been submitted for any other degree.

The assistance and help received during the course of investigation have been fully acknowledged.

Dated: 25.1.89

MAJOR ADVISOR
(Dr(Mrs) K.K. Sharma)

CERTIFICATE II

This is to certify that the thesis entitled "An appraisal of supplementary nutrition component for pre-school children under Integrated Child Development Service Scheme" submitted by Ms Seema Kohli (L-86-H.Sc-179-M) to the Punjab Agricultural University, Ludhiana, in partial fulfilment of the requirements for the degree of M.Sc. in the subject of Foods and Nutrition, has been approved by the student's Advisory Committee after an oral examination on the same, in collaboration with an External Examiner.

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Seema Kohli

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L-86-H.Sc-179-M

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CHAPTER I

INTRODUCTION

Nutrition plays a vital role in the physical, mental and emotional development of a child. It is well documented that a vast majority of children, pregnant and nursing mothers especially belonging to low socio-economic group, live on diets which are inadequate. So successive Five Year Plans have laid special emphasis on providing good nutrition to the women and children (Alva, 1987).

Recognising the abject poverty conditions in which a large section of population live and because young children suffer the worst impact of poverty and ignorance by deprivation of their essential nutritional intake, the Government of India took up 33 experimental projects under Integrated Child Development Service (ICDS) Scheme on 2nd October, 1975 (NIPCCD, 1984). The scheme aims at providing health, nutrition and education services to children below 6 years of age, pregnant and lactating women and those between 15 to 45 years of age through a co-ordinated approach.

The objectives of ICDS are to:

i) improve the nutritional and health status of children between 0-6 years,

ii) lay foundation for proper psychological, physical and social development of the child,

iii) reduce the incidence of mortality, morbidity, mal-nutrition and school dropouts,

iv) achieve effective co-ordination of policy and implementation amongst various departments to promote child health,

v) enhance the capability of mothers to look after the normal health and nutritional needs of the child through proper nutrition and health education (NIPCCD, 1984).

Prior to ICDS scheme, to provide nutrition to children, programmes like Applied Nutrition Programme (ANP), Supplementary Nutrition Programme (SNP) and Balwadi Nutrition Programme (BNP) were there. These are still working in some parts of the country, but ICDS was introduced because it provides package of services. Nutrition is an important component of this. Other components are Health, Sanitation, Immunization and other Referral Services.

Supplementary Nutrition under ICDS is given to the children below 6 years of age and to expectant and nursing mothers from low income families. Generally speaking the aim is to supplement the nutritional intake by about 300 calories and 8-10 g of protein for children below 6 years of age and

about 500 calories and 20-25 g of protein for pregnant women and nursing mothers. The supplementary nutrition is provided for 300 days in a year. The average cost of food is estimated as 45 paisa per child and 75 paisa for pregnant women and nursing mother per day.

Severely malnourished children are given extra attention under this programme. They are enlisted for therapeutic nutrition, i.e., greater amount of supplementary nutrition providing about 600 calories and 18-20 g protein at the cost of 90 paisa.

The type of food depends on local availability, type of beneficiaries, location and project administrative feasibility. CARE and WFP food commodities are also being provided in some ICDS projects. The cost of supplementary nutrition has to be met from the provision made for the SNP in the state sector under Minimum Need Programme (NIPCCD, 1984).

The scheme provides sufficient flexibility in selection of nutritious food, with emphasis on selection of menus prepared from the locally available food materials. The meals could consist of cereal-pulse, cereal-pulse-oilseed or cereal-pulse-jaggery mixture and so on. Foods selected should be palatable, acceptable, easily digestible, nutritious and inexpensive.

Two lakh international units of vit.A whichorally are also given to these children after six months, along with 60 mg of iron and 5 mg of folic acid.

All over the country there are 1605 such projects out of which about 400 are in early stages of operation. At end of September, 1986 as per reports from 1231 projects, 9.1 millions children and mothers were receiving supplementary nutrition (INDIA, 1986). In Punjab State also ICDS programme is going on in many blocks but the information regarding contribution of the nutritional supplements given under ICDS to the child's diet is not available. Therefore, the study was planned with the following objectives:

1) To conduct dietary survey in order to find out the nutrient intake of pre-school children and compare it with recommended allowances of dietary intake.

2) To find out the type and quantity of supplementary foods given to children in order to calculate and compare the nutritive value of the supplements prescribed under the ICDS.

3) To find out that whether supplements fed under ICDS actually act as supplement to or replacement of home diets.

4) To assess the nutritional status of pre-school children usirg anthropometric and clinical methods.

CHAPTER II

REVIEW OF LITERATURE

Literature is reviewed under the following headings and sub-headings:

2.1 Aetiology of malnutrition

2.2 Nutritional status of pre-school children

- 2.2.1 Anthropometry
- 2.2.2 Clinical status
- 2.2.3 Dietary intake
- 2.2.4 Vital statistics

2.3 Nutrition Improvement Programmes

- 2.3.1 ICDS
- 2.3.2 Supplementary Nutrition Programme
- 2.3.3 School Lunch Programme
- 2.3.4 Feed on Site Programme
- 2.3.5 Indian Council of Child Welfare Operating Balwadi Programme
- 2.3.6 Applied Nutrition Programme
- 2.3.7 Tamil Nadu's Chief Minister's Nutritious Noon meal programme for children
- 2.3.8 Foreign Supplementary Nutrition Programme

2.1 Aetiology of Malnutrition: Protein Energy Malnutrition (PEM) occurred in the young children due to many factors. An inadequate diet was one basic condition always present either due to lack of suitable protein foods or a failure to make use of the available resources. Due to high cost of protein rich foods such as milk, meat, fish, egg, etc., people with low income group cannot buy these foods (Van Schaik, 1961).

Swaminathan et al. (1964) reported that lack of early supplementation with protein rich foods was the main cause of PEM between ages of 1-3 years in Indian children.

According to McCance (1971) causes of malnutrition were faulty weaning practices, tribal customs, taboos and broken homes. Ignorance was a major cause. Nutritional factors also played a greater role than the genetic factors in influencing the growth rate of children. Growth of under-previleged group children was retarded mainly due to poor nutrient intake (Banik, 1972).

Swaminathan (1973) reported that large percentage of poorly nourished children belonged to nuclear families. PEM was observed due to low food intake, poor environmental hygiene and ignorance about the nutritional needs of vulnerable section.

Poverty, ignorance, superstition, poor-hygiene, infection infestations, illiteracy, food taboos, large family size were the main causes of malnutrition in rural Punjab (CARE, 1974).

Vijaylakshmi et al.(1975) observed low intake of nutrients as a cause for malnutrition in Coimbatore. Size, composition and income of the family, education level of parent, their attitude and dietary were also factors contributing towards malnutrition.

Ajit et al.(1976) stressed a definite inverse relationship between inter-pregnancy period and prevalence of malnutrition among children.

Shah and Seshadri (1979) stated that malnutrition was not merely due to poverty but socio-cultural and economic factors were also responsible. Devadas et al.(1980) also emphasised about the same points besides educational status of parents, poor hygiene, infection, infestation and low dietary intake to be responsible for cause of malnutrition.

Hussain et al.(1980) showed in their studies carried out in Pakistan villages that subsistence farming, poverty, poor sanitation, mass illiteracy, qualitative and quantitative deficiency in food intake were the main causes for malnutrition.

Luwang et al.(1981) emphasised that in second year of life, PEM was prevalent (60%) due to infections.

The factors responsible for malnutrition were poverty, poor environmental sanitation, personal hygiene, prevailing ignorance and prejudices in making best use of locally available foods, repeated infections, worm infestations, diarrhoea and

respiratory diseases (NNMB, 1981).

Kusin et al.(1984) found in Indonesia that lack of quantity and quality of weaning foods caused growth retardation from 3 months of age and high incidence of wasting among 1 to 3 years old children.

Shah et al.(1984) concluded that low availability of adequate total iron was responsible for high incidence of anaemia in poor pre-school children of Baroda.

Mishra et al.(1986) revealed that age, low dietary intake, especially calorie and protein, were major factors responsible for malnutrition in pre-school children of a backward community. Peak prevalence of malnutrition in pre-school children of a backward community was observed in second or third year of life.

2.2 Nutritional Status of Pre-School Children: A survey of nutritional status of Punjabi children revealed that they lag slightly when compared to Indian standards (Neuman and Indra, 1969).

Gupta et al.(1973) discovered that nutritional deficiency signs were present among 30.4% rural pre-school children.

The study detected clinical evidence of anaemia in 17% of children, vitamin A deficiency in 0.18%, whereas, deficiencies

in vitamin B complex and vitamin C were in very small number. Punjabi children from rural area had better nutritional status than average Indian children (CARE, 1974).

Lina and Reddy (1984) revealed yearly prevalence of nutritional deficiency diseases like PEM, nutritional anemia and vitamin deficiency among pre-schoolers of low income groups of Kerala and showed that during 18 to 24 months age, mean daily protein intake was marginal, whereas energy deficit intake was around 200 to 300 Kcal.

Sawaya et al.(1988) observed that Saudi Arabian infants and pre-school children (0-6 years) had low intake of energy, vitamin-A, and thiamine, but adequate intake of protein and vitamin-C.

Yeung (1988) stated that in China many infants were weaned after 3 months and given low-nutritional value foods. Nutritional problems such as PEM, deficiencies of vitamin-A and B-vitamins were very much prevalent among infants and young children.

2.2.1 Anthropometry: Punjabi children were found to be lighter and shorter than their American counter parts when compared with Harvard standards. When compared to the All-India standards they were found to lag only slightly for height and weight. Females were found to be shorter and lighter than males (Neumann et al.,1969).

The growth rate of the infants in India run parallel to that of American infants in first four to six months, but after that the growth rate of Indian infants falls off because of poor nutrition (Gopalan and Raghvan 1971).

A study done by Vijay Kumar (1975) on rural pre-school children from the NCH center showed that children did not gain weights adequately after 6 months of age. Only 27% of children between 1 to 2 year were well nourished belonging to upper socio-economic status in Chandigarh and continued to be well nourished during 3 years of study period.

Devadas et al.(1977) did research on infants and found that there was significant association for weights and income and height and income.

Gore et al.(1977) found that around 40% of children were underweight while practically no one was below the critical limit for height.

Mishra and Gupta (1978) found that pre-school children of Bhopal in the age group of3-5 year had physical measurements lower than ICMR values.

Rao et al.(1978) found that percentage difference in weight between children of low socio-economic status was of greater order than difference in arm-circumference, suggesting thereby that body weight is more affected than in arm

circumference due to severe or milk PEM.

Devadas et al.(1980) found that the mean anthropometric measurements of the children were below the all India - ICMR standards and only at the age of 48 to 60 months, both the chest and head circumference were equal.

Devadas et al.(1983) revealed that when the mean height, weight and arm circumference of the children were compared with the standards, all the children were found to be below the standard measurements.

Anthropometric measurements of the pre-school children with regard to height, weight and arm circumference were markedly higher than National Nutrition Monitoring Bureau(NNMB) and All India Standard Values (Anne and Begum, 1985).

Bhat and Dahiya (1985) revealed that boys were taller and heavier than the girls in all age groups in the pre-school children of Hissar district. The average value for weight, height, chest and head circumference of children were more than ICMR and Ludhiana studies. There was positive relation between age and head and chest circumferences in their ages and in both sexes.

Geetha et al.(1986) showed that height and weight of all the children were below the standards of ICMR. Female children of five to six years recorded higher mean weight than male children of same age.

2.2.2 Clinical Status: Anaemia was wide spread among rural children of Udaipur. The incidences of vitamin-A deficiencies was the highest and that of vitamin-B complex was lowest (Srivastava et al.,1970).

Ghai et al.(1970) from Haryana reported that out of 803 children studied, 51 showed mosaic dermanosis, 36 frank marasmus, 80 sparse and discoloured hair, 17 had B complex deficiency and 15 had vitamin A deficiency.

Gupta and Agarwal (1972) revealed that conjuctival xerosis was most prominent i.e. 23.5 per cent in rural and poor socio-economic group of Delhi.

CARE (1974) found that in Punjab, 2.4% infants were suffering from marasmus, 0.70% from apathy, 0.30% showed Odema, 0.10% skin changes, 1.0% showed easy pluckability of hair, 17% anaemia and 0.18% vitamin-A deficiency and 0.72% from mottling of teeth.

Mangotra and Phadke (1975) reported that incidences of severe anaemia was 17.3% in Poona.

Rajalakshmi (1976) showed that 90% of the children had symptoms of nutritional deficiencies and practically all the children were anaemic.

Rao (1978) found that there was high prevalence of various forms of nutritional deficiency signs among rural pre-school children. Prominent among them were protein and energy

malnutrition by hypovitaminosis A and vitamin-B complex deficiency signs.

Vitamin-A deficiency like conjuctival xerosis and Bitot's spots, vitamin-B deficiency like angular sfomatitis, vitamin C deficiency and signs of active and healed rickets had been observed in pre-school children in Punjab (FNB 1980).

Devadas et al.(1983) found that clinical signs were pre-dominant in the nutritionally deficient children than their counter group. Thirty-three per cent showed lethargy and the signs of vitamin-A deficiency as conjuctival dryness and xero-phthalmia in 12% and 2% of children, respectively. The other symptoms like pot-belly, oedema and bone tenderness were each present in 9% of the children.

Anandan et al.(1985) found all the signs of nutritional deficiency disease and predominantly angular stomatitis in Tamil Nadu's 0-5 years of pre-school children.

Bhat and Dahiya (1985) found that 77.5% pre-school children of a village in Hissar district showed signs of nutritional deficiencies. Forty per cent had vitamin-A deficiency, 20% vitamin-B complex deficiency, and 15% third degree of malnutrition, symptoms present were mainly xerosis, Bitot's spot, angular stomatitis and glossitis, rickets and dental caries.

Glossitis, Bitot's spots, xerosis, angular stomatitis,

amaciation and night blindness had shown higher prevalence among harijan and tribal pre-school children (Mishra et al., 1986).

2.2.3 Dietary intake: ICMR (1974) carried out research on food habits of poor children in six centres of the country- Hyderabad, Vellore, Pune, Bombay, Delhi and Calcutta. It was found that daily protein intake of these children varied from 2.8 gm/kg to 1.7 gm/kg body weight levels, which on the basis of national and international recommendations could be considered adequate. While, daily calorie intake was very low as 70-75 Kcal/kg body weight against the recommended figure of 100 Kcal/ kg body weight.

In Punjab about 50% of pre-school children were receiving more than 75% of their daily calorie requirements, with jaggery being an important source. Regarding protein, 85% children received more than 75% of their requirements with pulses being the main protein contributor. The diet was predominantly a cereal based diet and milk was the second most important food. Intake of vitamins C and A was generally low, while calcium and vitamin-B intake was sufficient (CARE, 1974).

It was found that no special food was given to pre-school children in Coimbatore in Tamil Nadu. The diets were deficient with respect to all the nutrients. Intake of protective foods was negligible and diet was similar to that of adults (Vijayalakshmi et al. 1975).

The dietary pattern of 58% pre-school children showed large quantity of cereals relatively negligible quantity of pulses. Only 13% included all the essential food groups in their diets, although protective foods were found in meagre quantities. The intake of calories and proteins in the diets of children were far below the recommended allowances by ICMR (Devadas et al. 1977).

Dietary survey of pre-school children in village Habowal, Punjab revealed that the diets were adequate in protein and iron, but deficient in calories and vitamin C (Paramjit and Bhatt, 1979).

According to FNB (1980) reports, the consumption of various foodstuffs by pre-school children was below the recommended level, particularly with respect to pulses, vegetables, fats and oils, flesh foods and fruits. They were deficient in calories and vitamin C but adequate in protein, calcium, iron and vitamin A.

Devadas et al. (1983) found that the intake of all the foods were less than the ICMR recommended allowances, the consumption of green leafy vegetables fats, oils, sugar and jaggery was less than half of the requirements.

Anne and Begum (1985) revealed that the dietary intake of protein and calorie were adequate, but not of iron. The consumption of green leafy vegetable was rare vegetable, fruits,

meat, fish and eggs were consumed often whereas milk, cereals and pulses were the major food items routinely consumed.

2.2.4 Vital statistics: Chaudhary et al.(1962) revealed that mortality rate of children under 5 years of age is 37.5%. During this age period severe malnutrition was also common.

Whereas Rao and Gopalan (1969) found that besides high mortality, the nutritional status of children who survived was most unsatisfactory. Records of pediatric hospital showed that 15% of hospital beds were taken by cases of malnutrition mainly PEM, hypovitaminosis A and anaemia.

Srivastava et al.(1970) reported that overall morbidity rate in Jabalpur was found to be 70% and incidence of malnutrition was 3.9%.

CARE (1974) stated that one-third of infants were moderately and severely malhourished in 1-2 years old children, severe and moderate malnourishment was 38% whereas in pre-school children (3-4 years) severe malnutrition was 5.5%. It was more among female children than among male children.

In Tamil Nadu the height and weight were below ICMR standards of pre-school children - Hypovitamin A, PEM, Vitamin B complex deficiency and anaemia were major nutritional deficiencies (Ganpathy and Murgan 1975).

Kuwang (1981) found that protein energy malnutrition was 76.67% among Manipur tribal pre-school children. About 28%, 10.67% and 4% children had mild, moderate and severe forms of disease respectively.

Devadas et al.(1983) showed that 16% children were affected by severe forms of PEM. The incidence was found to be higher in age group 1-2 years than in any other age group. PEM incidence was lower among the 3-4 years old children.

Chowdhry and Rao (1983) revealed that prevalence rate of severe forms of malnutrition were more in female and rural children than in males and urban children.

Mishra et al.(1986) found higher prevalence of third degree malnutrition (35%) and lower prevalence of grade one malnutrition (20.8%). They alsorevealed that onset of malnutrition in majority of pre-school children was during the first year of life and reached the peak and became severe in 2nd and 3rd year.

In India, young children remain the most vulnerable group in the population, with 40% of the death's occurring in 0-4 years age group. Nearly 13% of one eighth of Indian children die before they reach their first birthday (UNICEF 1984). Infant mortality rate in India is about 100 per thousand live births. India's under five mortality rate stood 152 per thousand live births. Thirty-three per cent of children suffer from mild to moderate malnutrition, 5% suffered

from severe malnutrition in year 1988 (UNICEF, 1989).

Thora et al.(1986) revealed that overall infant mortality and perinatal mortality rates were 128.7/1000 and 88.5/1000 respectively in urban slums under ICDS scheme. Common cause of infant deaths were prematurity, respiratory distress syndrome, birth asphyxia, bronchopneumonia, diarrhea, dehydration and malnutrition.

Steinhoff et al.(1986) found that in Tamil Nadu 45% of the children were underweight, 51% were stunted and 21% were wasted.

Devadas and Jaya (1986) illustrated the pattern of malnutrition among pre-schoolers in Coimbatore and found that 49% had PEM, 7.5% had vitamin A deficiency, 15.9% had respiratory infections and 15.6% had gastroenteritis.

2.3 Nutrition Improvement Programmes

2.3.1 ICDS: Indira et al.(1979) found that difference of weight was remarkable when rural primary school children of ICDS was compared to children of public schools of New Delhi. Vitamin A deficiency, Riboflavin deficiency and anaemia were highly prevalent among the primary school children in rural A.P.

Bhandari et al.(1981) observed that there was not much improvement in the status of nutrition and immunization in children under 6 year in ICDS block of Rajasthan, when they again evaluated this programme in same block in 1985 they found

that impact was favourable with increasing duration of project.

Gopaldas (1982) revealed inadequate cover for children of 3 years age under ICDS scheme and this was main cause of concern. The type and content of nutrition and health education were also inadequate. According to Kushwaha et al.(1983), there was little improvement in PEM grades. Sixtyfour out of 84 malnourished children gained weight under ICDS scheme.

Anandan et al.(1985) illustrated that 73.76% of the children from Anganwadi were suffering from parasitic infestation. Angular stomatitis was also observed. The coverage of children below 3 years of age which was found to be low, had started improving (Seventh Five Year Plan, 1985-90).

Patel in Bombay (1986) found two ICDS projects in slums of Bombay to be very encouraging. Severe malnutrition was brought down to 4.6% from 15.7%. Weight had also shown remarkable improvement alongwith feeding pattern.

Natarajan (1986) surveyed to see the impact of ICDS in the nutritional status of children and found that 50% of the children in total population were benefited by this programme.

2.3.2 Supplementary Nutrition Programme: Devadas et al.(1977) illustrated that the children receiving supplements under SNP, Coimbatore, showed the maximum increment in height 3.8 cm and weight 1.5 kg during 6 months period. Improvement in the clinical picture was also observed.

Lal et al.(1979) surveyed to see the effect of SNP on nutritional status of children in urban slums and found that children got 8 to 10 g protein and 200 Kcal. Incidence of malnutrition fell from 73% in 1971 to 45.25% in 1977, severe degree of malnutrition declined from 14.25 to 3.6%. Shortcomings observed in the programme included low immunization coverage and lack of community participation.

Devadas et al.(1984) observed that clinical picture of children getting supplementary nutrition was better than their control counterparts. They were also able to reap the benefits of immunization at proper age.

2.3.3 School Lunch Programme: Devadas and Radharukmni(1964) stated that nutritionally balanced school lunch programme had positive effect on the growth and nutritional status of school children.

Devadas et al.(1975) found that school lunch programme had similar nutrients as that of home diets, except protein. There was noticeable improvement in clinical picture of children of experimental group, but no significant difference in height and weight.

Chandrasekhar (1976) revealed that children participating in School Lunch Programme had significantly higher physical development, greater mental ability and better behavioural aspect.

Rewal (1981) conducted survey to see the result of school Lunch Programme in India and stated that the meal provided 359 Kcal of energy and 19 g protein to the children. Seventynine per cent ate the food in the school premises. Most of the children who did not eat all the food at school, shared it with their siblings. Increase in height and weight were also significant.

2.3.4 Feed on Site Programme: Devadas et al.(1977) revealed that children having spot feeding grew better than the group taking the supplements at home. Children took the supplements home and shared it with siblings. Growth of children not given the supplements were poor.

Mehta et al.(1977) found that on the spot feeding of 3-6 yr old had beneficial effect on the dietary intake of calories, vitamins and minerals. Morbidity was also lower in the children.

Srinivasan et al.(1978) observed that beneficiary group of children showed an improvement in weight over their control counterparts. The efficiency of the 'Feed on Site' Programme was higher than the take-home programme.

2.3.5 ICCW Operating Balwadi Programme: Chawla and Puri (1983) and Puri et al.(1983) conducted research on supplementary feeding programme for pre-school children operating under

auspices of ICCW, Chandigarh and found that consumption of all food groups was lower than the recommended daily allowances. The diet was inadequate with respect to all nutrients. Supplements provided 180 Kcal energy, 7.5 g protein, 20 mg retinol and 1.7 g iron/child. They also revealed that diet supplementation was not enough to produce statistically significant differences in the growth of experimental and control group children.

Puri et al.(1984) found that the supplementation in its present form was inadequate to produce the desired beneficial results of improving the nutritional status of the children.

2.3.6 Applied Nutrition Programme: In 1972, Devadas et al. concluded that although ANP supplements in School A and School Lunch in School B, had increased the calorie and nutrient intake, the diets of the children in both groups were still inadequate. Mean height and weight of children of both the groups increased.

Devadas et al.(1972) revealed that although ANP supplements had increased the nutrient intake, the diets of the selected children were still inadequate and did not meet the recommended allowances of ICMR. The height, weight and clinical symptoms revealed an improvement.

Lal et al.(1978)emphasized that ANP programme did not incluence the nutritional status of vulnerable children. Immunization programme was yet to make a real dent.

Srikantia (1980) evaluated ANP and the National Prophylaxis Programme and reported that incidences of Bitot spots were more at 4 primary health centres. Massive programme of treatment with vitamin A was biologically effective, when properly implemented.

2.3.7. Tamil Nadu's Chief Minister's Nutritious Noon Meal Programme for Children (CMNNMPC)

Devadas (1986) conducted research on nutritional outcomes of CMNNMPC and found that all the children showed an increase in their height and weight measurements. On the start of programme, only 32% children were healthy and free from deficiency signs. At the end of 2 year, 78% were free from deficiency signs.

Gnanasundaram and Sunthanakrishnan(1986) revealed that CMNNMPC provides 1/3 of RDA (1981) and advised this programme to be more effectively implemented during pre-school period.

2.3.8 Foreign Supplementary Nutrition Programme: Hakim and Soliman (1976) concluded that distribution of milk, as a nutrition intervention, reached only 70% of its eligible beneficiaries. Coverage was higher in larger cities than rural areas.

Rveda et al.(1979) studied TMCH (Targeted Maternal Child Health) impact on nutritional status of participants and concluded that programme succeeded for pre-school children but

the prevention of malnutrition among infants ought to be given more emphasis.

Weiler et al.(1979) found that under WIC programme Hb values of 27 infants increased, 3 decreased and no change in 2 out of 32 infants.

Coyne et al.(1979) evaluated pre-school feeding programme. Body weight and height gain was there, but there was no consistent effect on blood biochemistry.

Edozien et al.(1979) studied food supplements under the supplemental food programme for women, infants and children (WIC). The supplements were iron fortified milk-feed for infants, iron fortified cereal, egg and fruit jucies. There was increase in weight and reduction of anaemia rate in all participants.

Harner et al.(1981) stated that there was greater deficiency of energy than protein in the diets of 0-5 yr age group children. Food was supplied by international aid programme. The intake of calcium was 26% of the WHO recommended dietary allowances.

Chang (1982) investigated 132,000 pre-school children getting supplementary feeding programme in Taiwan, 50% children had caries and mean Hb level increased from 10.74g/100 ml to 14.39 g/100 ml.

Dunlop et al.(1982) observed the effect of breakfast oriented nutrition education programme on food intake pattern and alertness of school children and result showed that at the end of 7 weeks the experimental group scored more than control group in digit copying test.

Chiomba (1983) evaluated maternal and child health services and nutritional status of under five in Mwanza district and found that 6.7% were above the mean of Harvard standards, 42.0% between 60% and 80% of standards, 1.7% were below 60% of the mean.

Harbert and Scandizzo (1985) analysed impact of Chile's complementary feeding programme and revealed that poorest sector of community needed more benefits.

Miller et al.(1985) found the haematological status of infants in pre-school children who were enrolled in the WIC programme to be better than the other children.

Jansen et al.(1986) studied mothers and children getting supplementary food under Joint Project Machakos (JPM) in Kenya. Authors revealed that there was no significant difference between the children who received supplementary food from the control group.

Gonzalez and Naranyobanda (1986) stated the positive effect of the programme in improving the overall nutritional

status of children. Significant difference was observed in the height and weight of control and experimental group.

Smith et al.(1986) conducted research to see the effectiveness of nutrition programme for mothers and their anaemic children under 5 yr of age in USA. Results showed a 1.8 g increase in Hb values of experimental group and 1.1 g increase in control group.

CHAPTER III

MATERIALS AND METHODS

The principal objective of the present investigation was to make an appraisal of supplementary nutrition component for preschool children under Integrated Child Development Service Scheme. For this purpose the following procedure was followed:

Procedure

3.1 Locale of the Study

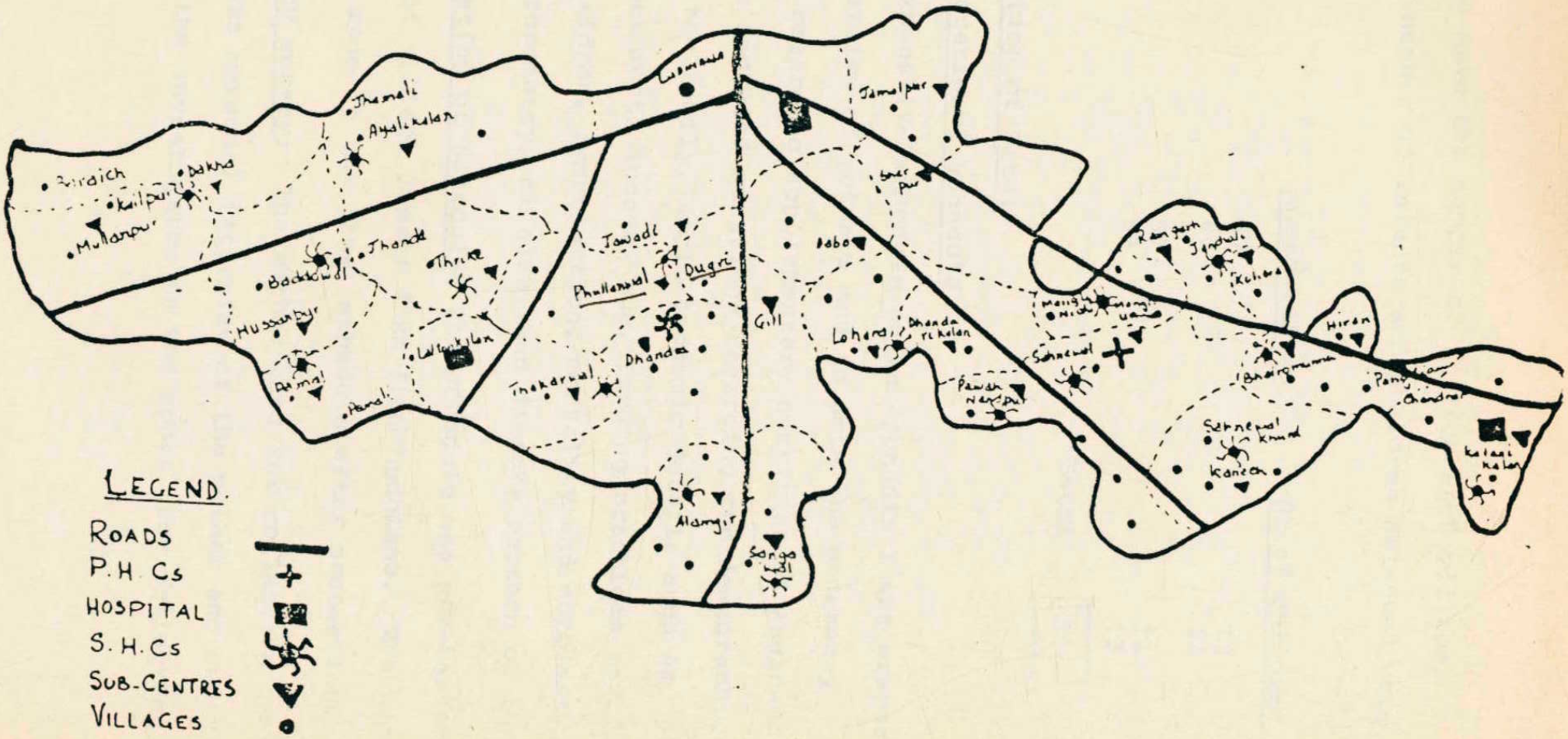
Four anganwadis from the villages namely Phullanwal and Dugri, which are 7 km and 6 km from Ludhiana respectively of Punjab state, were purposively selected for the present study. These anganwadis were selected because:

1. The study being a one person project, it was not possible for the investigator to do an extensive research in distant Anganwadis.
2. The villages were easily accessible to the investigator by bus or investigator's own conveyance.
3. No such study has been conducted previously on these lines in these villages/anganwadis.

3.2 Collection of the sample

A list of total subjects of each anganwadi was obtained from the anganwadi worker. Then every 3rd child was selected

LUDHIANA BLOCK.



LEGEND.

ROADS
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VILLAGES

randomly to have the sample of 25 from each village.

The number of infants and children selected were as follows:

Village	Anganwadi No.	No.of children selected
Phullanwal	67	13
	68	12
Dugri	57	12
	58	13
	Total	50

3.3 Collection of Data:

3.3.1 Preparationof schedule

An exhaustive schedule as in Appendix 1 was prepared to conduct interview of mothers and to note the necessary information regarding supplementary nutrition at Anganwadi. The schedule included questions regarding the demographical features of the family, socio-economic details such as total per capita per month income, age, feeding practices and food habits of children, immunization, mortality and morbidity record, Anthropometry, clinical and dietary pattern of the child.

3.3.2 Pretesting of Schedule: The schedule was pre-tested on 15 children of village Jawadi 4 km from Ludhiana. The necessary changes were made in the final schedule after pretesting.

3.3.3 Dietary survey: The method used for collecting general information was personal interview of the mother and questionnaire wasfilled by the investigator on the spot. For collecting

information regarding the dietary intake of the children, recall method was used. In order to obtain the correct information, the mothers of the children selected were contacted one day in advance and advised to keep track of whatever their children will eat daily in the next 7 days. The consumption of food by the children for all the meals was recorded daily in household measure as informed by mother and by personal presence. The investigator measured liquids like milk, tea etc. and weighed the chapaties and servings of dal, vegs and miscellaneous foods like sweets and snacks etc. for conversion of household measurements to exact weights. The nutrient content of the food consumed by the children was calculated using the book "Nutritive Value of Indian Foods" (1984).

Foods provided to the children in the anganwadi under supplementary nutrition was also noted by the investigator. The data was collected from Dec.87 to March, 1988.

3.3.4 Anthropometry Record: The nutritional status of the subjects was assessed according to the procedure prescribed by Jelliffee (1966).

a) Height - The fibre glass tape was used for measuring stadding height of the children. The child was requested to stand straight bare footed with heels together. The height was recorded by levelling with hard board on the top of the head.

b) Weight - Rod type weighing machine provided by UNICEF to the Anganwadi centres was used to weigh the children.

c) Head circumference - The head circumference was measured by passing fibre glass tape over the supra ciliary ridges in front and occipital protruberance behind in such a way to get the maximum circumference.

d) Chest circumference - Measurement was made without the upper garment with tape passing over the nipple line, with the child in mid inspiration.

e) Arm circumference - Tape was placed gently but firmly around the mid upper arm to avoid compression of the soft tissues. The left arm was measured while hanging freely.

Comparison with standards - Energy, protein, vitamin A and iron was compared with the recommended allowances of ICMR(1981). Height, weight, head, chest circumference were compared with the ICMR standards (1968). As ICMR standards of arm circumference was not available so it was compared with measurements given by Wolanski (1964), O'Brien, Girshik and Hink (1941).

3.3.5 Clinical assessment: A clinical examination of the children was carried out with the help of a doctor of village dispensary using clinical schedule prescribed by Jelliffe (1966).

3.3.6 Statistical analysis of Data: Analysis of data was done with the help of computer. To compare it with standards 'T-test' was used.

CHAPTER IV

RESULTS AND DISCUSSION

The results have been discussed under the following headings and sub-headings:

4.1 Socio-economic survey of the families

4.2 General food consumption pattern

4.3 Morbidity

4.4 Immunization and administration of vit.A massive doses

4.5 Anthropometric measurement

4.6 Clinicalsymptoms

4.7 Effect of various factors on nutritional status

4.1 Socio-economic survey of the families

Following background information was observed by the socio-economic survey of the families whose children were selected as subjects.

4.1.1 Caste: The caste pattern is shown in Table 4.1.

Table 4.1. Distribution of families according to caste

Caste	No.	%
Backward	31	62
Scheduled	18	36
Jat	1	2

Most of the children i.e. 62% belonged to backward caste, 36% to scheduled caste and 2% were Jat. Country's 23.51% population is comprised of the scheduled caste and tribes, out of these about 60% scheduled castes are living in villages (NIRD, 1985). So it shows that low caste poor people take the maximum benefit of facilities which government is providing free of cost.

4.1.2 Type and size of the family: Sixty-eight % of the families were nuclear and 32% were joint. The joint families included only old aged widow grandmother, widower grandfather or both. Complex joint family pattern was not observed. Same findings were observed by Sukhinderjit (1977) and Parmar (1985) in rural areas of Ludhiana that %age of nuclear families were 62.8 and 66.5 respectively.

Most of the families i.e. 56% consisted of 5-6 members, 28% had 7-8 members, only 2% had more than 10 members(Table 4.2).

Table 4.2. Distribution of families according to family size

Total no. of family members	No.	%
3-4	4	8
5-6	28	56
7-8	14	28
9-10	3	6
More than 10	1	2

Gupta (1986) was also of the view that 59% rural labours had medium sized families consisting of 5-8 family members. Similar findings have also been reported by Foods Nutrition Bureau (1980), according to this report in Punjab and Ludhiana average family size is 6-7 persons.

4.1.3 Parents' education

Table 4.3. Distribution of the parents according to the level of education

Level of education	Parents' education			
	Father		Mother	
	N-50	%	N-50	%
Illiterate	21	42	36	72
Primary	11	22	9	18
Middle	12	24	2	4
Matric	6	12	3	6
Graduate	x	Nil	x	Nil

Majority of mothers and fathers i.e. 72% and 42% respectively were illiterate. Twentyfour % fathers received their education upto middle, 22% upto primary, 12% upto matric.

Eighteen % mothers were educated upto primary, only 4% received upto middle and 6% upto matric. Neither any father nor any mother was graduate.

Gupta (1986) also revealed that 3/4 of the labour class in villages was illiterate.

4.1.4 Occupation: Mostly head of the family worked as field worker, serviceman, farmer and businessman i.e. 78%, 18%, 2% and 2% respectively (Table 4.4). Mothers did household chores only.

Table 4.4. Distribution of the heads of the family according to occupation

Occupation	No.	%
Field worker	39	78
Service	9	18
Farmer	1	2
Business	1	2

4.1.5 Income: Majority of the families i.e. 40% had a monthly income of Rs.701 to Rs.900, only 8% had income more than Rs.1100 (Table 4.5).

Table 4.5. Distribution of the families according to income/ month

Income/month(Rs.)	No.	%
300 - 500	6	12
501 - 700	15	30
701 - 900	20	40
901 - 1100	5	10
More than 1100	4	8

According to per capita income, 24% families had Rs.81 to 100; 22% had Rs.101 to 120 while only 8% had per capita income more than Rs.180(Table 4.6). These results are in agreement with Jindal (1979) who revealed that agricultural labour is most poor and deprived class among all occupational categories of villages of Ludhiana. Bhat and Dahiya (1985) revealed that 55% middle income group (Rs.200-500 per capita income) families were sending their children to have supplementary nutrition.

Table 4.6. Distribution of families according to per capita income

Per capita income(Rs.)	No.	%
60 - 80	3	6
81 - 100	12	24
101 - 120	11	22
121 - 140	10	20
141 - 160	4	8
161 - 180	6	12
More than 180	4	8

Food and Nutrition Bureau (FNB), 1980 surveyed that 49% families of Ludhiana had per capita income above Rs.75/-.

4.1.6 Number of days children attended Anganwadi: About 56% children attended anganwadi for 5 days, 24% for 6 days, 16% for 4 days and 4% for 2-3 days.

4.2 General Food Consumption Pattern

4.2.1 Meal pattern and menu: General meal pattern observed was as follows:

Early morning	-	Tea
Breakfast	-	Chapati-curd/Rusk-Tea
Mid-Morning (under ICDS)	-	Milk/Porridge/Panjiri*/Sugar
Lunch	-	Chapati, veg/pulse/salt/sugar/pickle
Evening Tea	-	Tea
Dinner	-	Chapati, veg/pulse/salt/sugar/pickle

Besides this some of the children had toffees and biscuits in between the meals. Children preferred these because of sweet taste. Moreover, these were also easily available in the petty shops in the village. Rao et al.(1969) reported that cheap biscuits sold in the village shops appeared to be most popular with the village children around Hyderabad city. Malkiat (1974) reported that pre-school children of Barewal village of District Ludhiana in Punjab followed a dietary pattern similar to that of adults. There was no special preparations for the pre-schooler. The children preferred sweet snacks, which were readily available in the village shops.

In the present study, the snacks given to children were different at both the anganwadis. At one, only Panjiri milk or sugar

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*Panjiri - Mixture of roasted coarse wheat flour, fat and sugar in the ratio of 2:1:1, respectively.

and at another Panjiri or porridge was served to children. General supplements prescribed by ICDS is Kheer*, Porridge, Panjiri, Rice, Khichri** or Milk whereas the supplements provided by anganwadi usually depend upon the ration available as generally some or the other item of the ration remained out of stock.

4.2.2 Duration and frequency of breast feeding: Fiftyfour % mothers breastfed their children between 1-2 yrs and 28% from 2-3 yrs, only 2% mothers continued breast feeding even after 4 yrs (Table 4.7). ICMR (1974) reported likewise that prolonged breastfeeding was the rule in many regions of India. According to Thaman et al.(1964) 84% Kashmiri women breastfed their children from 6-12 months, 70% for 12-24 months and 31% over one year.

All the mothers studied, breastfed their children 'on demand' only. Majority of mothers (70%) breastfed their children 5 to 8 times a day, the rest fed only 3-4 times a day.

Table 4.7. Distribution of the children according to duration of breast-feeding

Duration of breast-feeding	No.	%
0-1	4	8
1-2	27	54
2-3	14	28
3-4	4	8
More than 4	1	2

*Kheer - Preparation of milk, rice and sugar

**Khichri - Preparation of rice, green gram dal and salt.

Walia (1975) also reported that in Punjab villages, breast-feeding was continued upto one year and it was "on demand".

4.2.3 Age of weaning and type of supplement: All the mothers (100%) started giving milk and water to the infant from the very first day of birth but age of giving semi-solid and solid-supplements varied. Maximum mothers (44%) started giving supplements to children from 6 to 12 months of age. Many others (34%) did not give any semi-solid or solid supplements and gave only breast milk, buffalo milk to infants (Table 4.8).

Table 4.8. Distribution of children according to the age of weaning

Age of weaning	No.	%
No supplement feeding besides milk and water	17	34
1-6 m	8	16
6-12 m	22	44
More than 12 m	3	6

Type of supplements were more or less similar. All the mothers confessed that they made nothing special for infants but gave little quantity of the same food, they ate in daily routine. The type of supplements were milk, curd, tea, biscuit, rice, chapati, rusk, bread, panjiri, vegetable like boiled potatoes, pulses, banana and porridge, etc.

The findings of the present study are similar to those of Thaman and Manchanda (1968) and Walia (1975). Former observed that bread, chapati and biscuit were the usual initial solid foods given to Punjabi children, whereas the latter found that non-milk foods like sag (green leafy vegetables), chapati, rice served after 6 months of age.

Bhat and Dahiya (1985) were also of the same view that dietary supplements usually given to the children include khichri, porridge, biscuit, chapati, cooked vegetables, pulses, milk or butter milk.

4.2.4 Food Habits: Sixty % of the children were non-vegetarian, thirty eight % vegetabarian and only 2% were ova vegetarian (Table 4.9). Non-vegetarians formed the majority but actually they consumed a very small amonnt of flesh foods being very expensive.

Table 4.9. Distribution of children according to food habits

Food habits	No.	%
Vegetarian	19	38
Non-vegetarian	30	60
Ova-vegetarian	1	2

Rani (1977) also reported that rural children percentage belonging to vegetarian, non-vegetarian and ova-vegetarian was 35.5%, 63.8% and 0.8% respectively. Kaur (1977) also observed

similar results and revealed that 61%, 35% and 4% were non-vegetarian, vegetarian and ova-vegetarian respectively.

4.2.5 Food consumption: Average quantities of different foods consumed per day; with supplementary nutrition(WSN) i.e. for the days, when child ate at anganwadi and without supplementary nutrition (WOSN) i.e. when child did not eat an Anganwadi is given in Table 4.10 and 4.11.(Fig 1-2)

The main cereal consumed was wheat. Maize chapatis and rice were also consumed but to a lesser extent. The average quantity of cereals consumed at home (WOSN) were 42 g in 1-4 yrs age group and 68.7 g in the older age group (4-6 yrs). This was 76% and 74.6% below the recommended intake of ICMR (1981). The intake of cereals with supplementary nutrition was 55 g and 81.8 g i.e. 68.6 and 69.7% below the recommendations for age group 1-4 yrs and 4-6 yrs respectively. It was seen that anganwadi provided 9 g cereal to 1-4 yrs old children and 11 g to 4-6 yr old children.

Commonly consumed pulses and legumes were green gram dal, Black gram, Moth beans and soybean. Wide variations were observed in the quantities consumed amongst all the children of all age groups. Per cent adequacy was 18.3 and 25.1 for the home diet (WOSN) for the 1-4 yrs and 4-6 yrs old children respectively. With supplementary nutrition from the anganwadi % adequacy of pulses increased to 21.43 in 1-4 yrs children but decreased to 20.3% in 4-6 yrs children.

Table 4.10. Average daily food intake in comparison with ICMR(1981) recommended intake (RI) for 1-4 yrs age group children

Foods	RI, g	With supplementary nutrition		Without supplementary nutrition	
		Mean, g	% Adequacy	Mean, g	% Adequacy
Cereals	175	55±28.4	31.43	42±23.9	24
Pulses & legumes	35	7.5±2.8	21.43	6.4±5.9	18.3
Green leafy vegetables	40	16.6±15	41.5	12.5±12	31.25
Other vegetables	20	6.8±2.7	44	7.5±7.2	37.5
Roots and tubers	10	25±6	250	22±6	220
Milk and milk product	300	96.8±70	32.27	102±84	34
Fats and oils	15	11.5±6.2	76.67	12.5±6.4	83.33
Sugar and Jaggery	30	27±7.8	90	20.8±11.7	69.33

Table 4.11. Average daily food intake in comparison with ICMR (1981). Recommended intake (RI) for 4-6 yrs age group children

Foods	RI, g	With supplementary nutrition		Without supplementary nutrition	
		Mean, g	% Adequacy	Mean, g	% Adequacy
Cereals	270	81.8±38.5	30.8	68.7±34.5	25.4
Pulses & legumes	35	7.1±2.6	20.3	8.8±8	25.1
Green leafy vegetables	50	22±14.8	44	17.4±14.6	34.8
Other vegetables	50	18.08±7.2	36.2	12.2±7	24.4
Roots and tubers	30	39±8	130	36.8±8	122.6
Milk and milk product	250	116.6±107	46.6	112.17±110	44.9
Fats and oils	40	15.6±6.3	39	13±6.8	32.5
Sugar and jaggery	45	35.4±7	78	27.5±15.9	61.1

Mustard leaves was very common among green leafy vegetables because its easy availability in the villages. Other green leafy vegetables consumed were spinach, fenugreek leaves and cabbage, even then the % adequacy was below recommended intake i.e. 68.75% and 65.2% (WOSN), 58.75% and 56% (WSN) below recommendations for 1-4 yrs and 4-6 yrs old children respectively.

Consumption of vegetable and fruits was also low i.e. 56%and 63.8% (WSN) and 62.5% and 75.6% (WOSN) below standards for 1-4 yrs and 4-6 yrs old children. Although many fruits were available in winter when the study was conducted, yet the consumption of fruits was negligible, this was due to high cost of fruit. Consumption of vegetables was also low as children disliked these and ate food with salt, pickle, sugar or gur. Roots and tubers were liked the maximum so they were above standards in each group. These included onion, potatok carrot, raddish, turnip etc.

Consumption of milk was also much below the standards, as the families did not purchase it because of high cost. Milk was consumed in tea by all the children, but in the form of curd and milk as such, to a very limited extent. ICDS supplemented the diet of the children with only 1.8 g for 1-4 yrs and 1.6 g for 4-6 yrs age group, which was not adequate for children. Per cent adequacy was 32.27 and 46.64 (WSN), 34 and 44.9 (WOSN) for 1-4 yrs age group and 4-6 yrs age group children respectively.

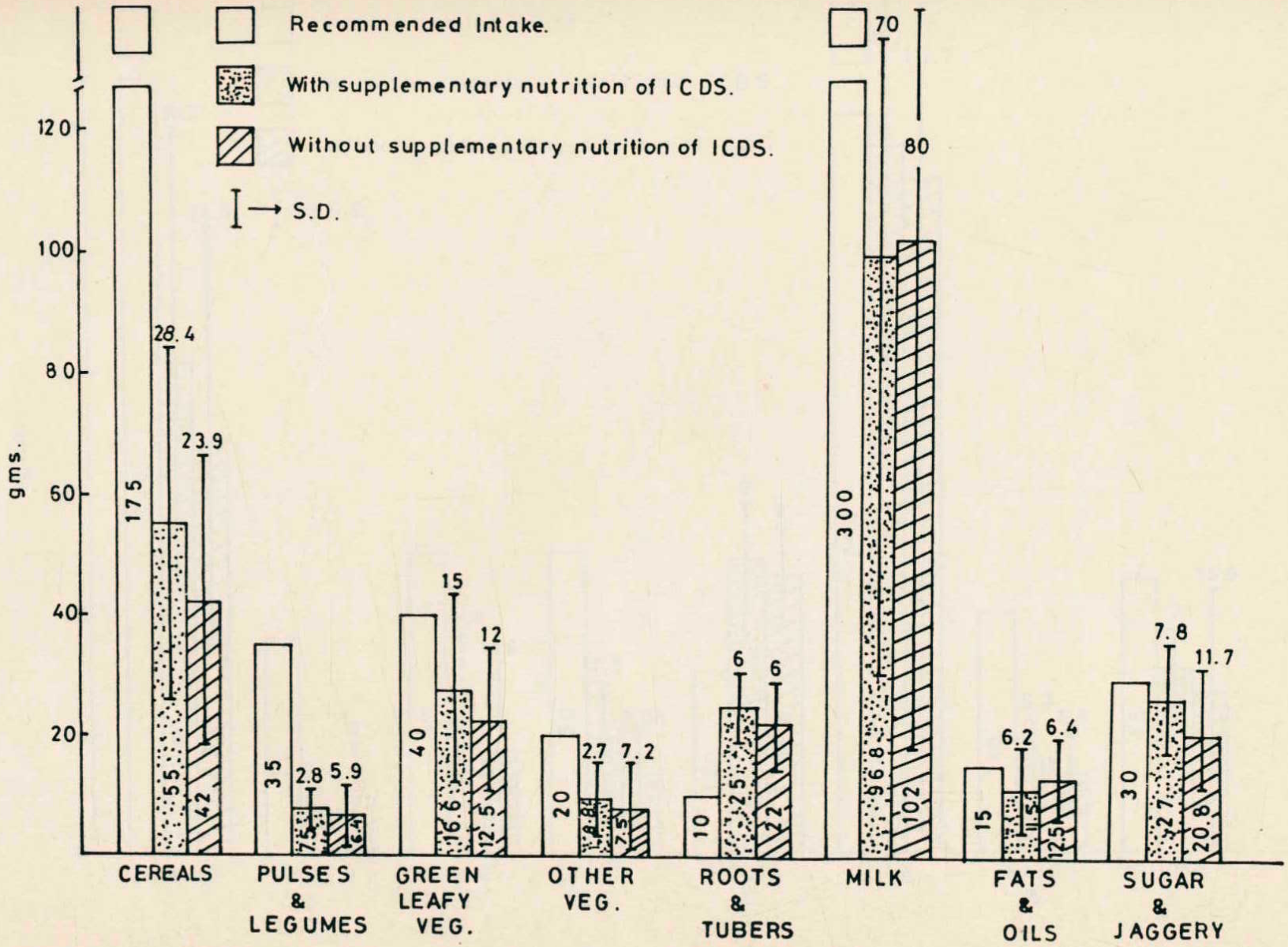

FIG. 1: AVERAGE DAILY FOOD INTAKE OF 1-4 YRS. CHILDREN.

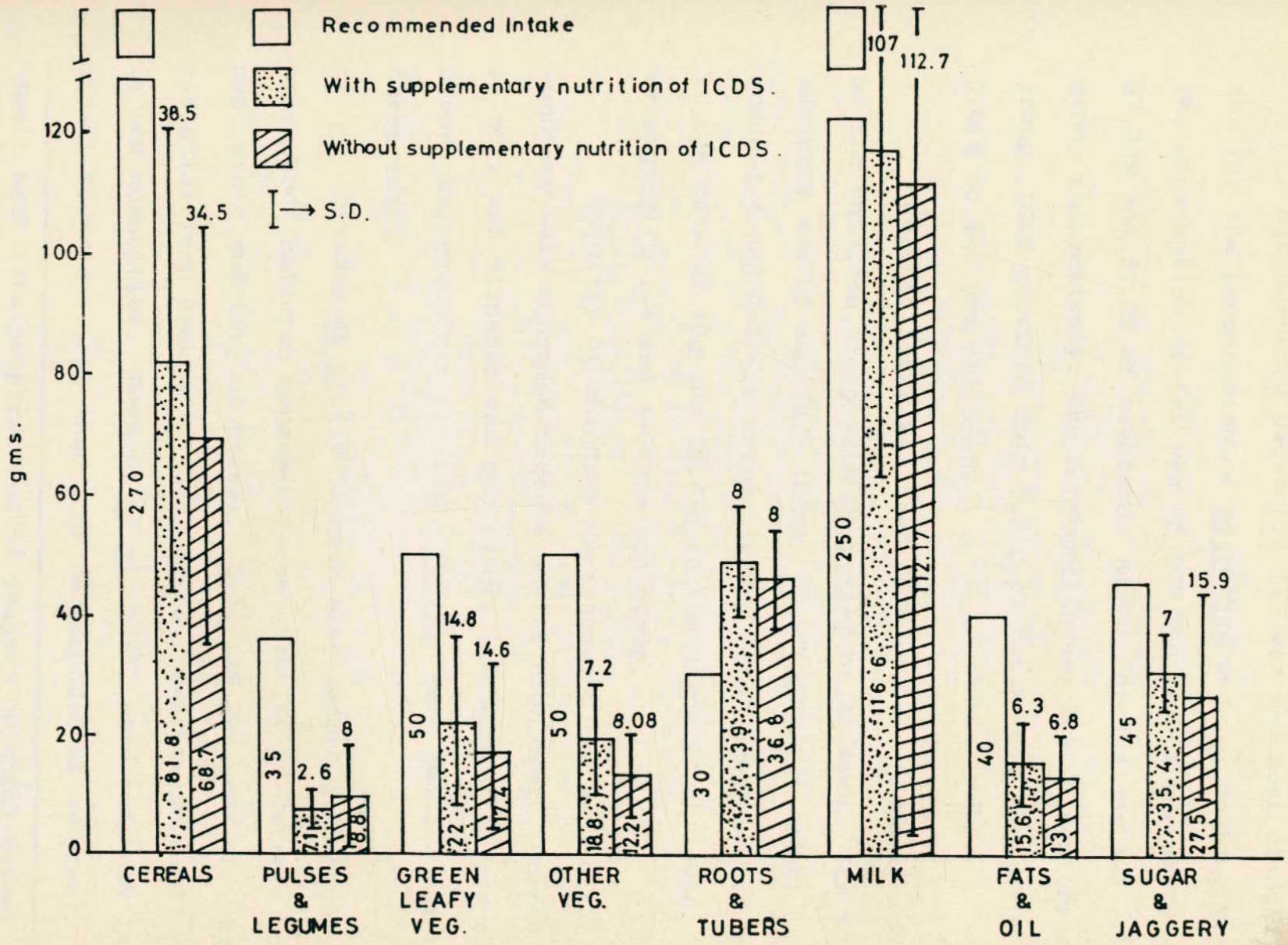

FIG.2: AVERAGE DAILY FOOD INTAKE OF 4 – 6 YRS. CHILDREN.

Hydrogenated vegetable fat was the most commonly used fat for the preparation of paranthas and for cooking vegetables. The consumption of fat was 76.67% and 39% of standards (WSN), 83.33% and 32.2% of standards (WOSN) for 1-4 and 4-6 yrs age group respectively. The consumption was low in 4-6 yrs age group. ICDS provided only 0.5 g of fat to 1-4 yrs children and 0.6 g to 4-6 yrs children.

Refined sugar was used to make tea. Jaggery was eaten by the children along with chapaties or as such. Its % adequacy was 90 and 78.6 (WSN), 69.33 and 61.1 (WOSN) in age group 1-4 and 4-6 yrs respectively. ICDS supplemented sugar at the rate of 10g and 12.4 g in the diets of children belonging to 1-4 and 4-6 yrs age group.

Majority of children were non-veg but negligible quantity were consumed because of its high cost. Quantity of nuts and oilseeds was negligible in diets of children. Groundnut, groundnut brittle, reories* were popular due to their cheap cost.

Devadas et al.(1977) have also reported that only 58% pre-school children consumed large quantity of cereals and negligible quantity of pulses. Only 13% included all the essential food groups in their diets. Protective foods were in low quantities. Devadas et al.(1983) stressed that intake of all foods was less than ICMR recommended allowances.

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*Small ball like preparations of jaggery on which sesame seeds are fixed.

Green leafy vegetables, fats and oils, sugar and jaggery were less than half of the requirements. Anne and Begum(1985) also emphasized that consumption of green leafy vegetables was rare. Other vegetables, fruits, meat, fish and eggs were consumed often whereas milk, cereal and pulses were consumed daily. FNB (1980) showed that consumption of various foodstuffs like pulses, vegetables, fats and oils, flesh foods and fruits was below recommended levels. Swaminathan et al.(1970) gave somewhat similar results that the intake of all foodstuffs except cereals was below standards. Chawla and Puri(1983) reported that the amount of all the food groups were lower than the recommended intakes for Balwari children in Chandigarh. Cereals predominated in the diet, but lacked in protective foods like pulses, legumes, meat, eggs, green leafy vegetables and fruits. According to CARE (1974) the diet of Punjabi pre-school children was mainly cereal-based and milk was second most important food.

4.2.6 Nutrient intake: For both the age groups i.e. 1-4 yrs and 4-6 yrs with supplementary nutrition (WSN) and without supplementary nutrition (WOSN), the nutrient intake was much below ICMR recommended allowances and was highly significant ($p < 0.01$).

In both the age groups per cent adequacy was increased for all the nutrients (energy, protein, vitamin A and iron) on the days when child ate at anganwadi than when child did not eat at anganwadi except iron intake in 4-6 yrs old children (Table 4.12- 4.13).

Table 4.12. Nutrient intake/day of children(1-4 yrs) with supplementary nutrition(WSN) and without supplementary nutrition (WOSN) with recommended intake (RI),1981

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Character	ICMR RI	Nutrient Intake		Per cent adequacy	
		WOSN	WSN	WOSN	WSN
Calories Kcal	1220	539±144 (-23.6)**	634±161 (-18.25)**	44	51.9
Protein, g	22	13.2±4.7 (-9.3)**	14.6±4.9 (-7.45)**	60	66.5
Iron, mg	20-25	9.3±4.3 (-15.93)**	11.2±7.3 (-8.03)**	42.3	50
Vit.A, I.U.	1666.6	760±338 (-251.47)**	878±381 (-205.8)**	45.6	52.7

Figures in parentheses indicate 't' values

**Values significant at 1 per cent level

Table 4.13. Nutrient intake/day of children (4-6 yrs) with supplementary nutrition and without supplementary nutrition (WOSN) in comparison with recommended intake (RI), 1981

Character	ICMR RI	Nutrient intake WOSN	Nutrient intake WSN	Per cent adequacy WOSN	Per cent adequacy WSN
Calories Kcal	1720	662±199.9 (-25.39)**	786±172 (-26.0)**	38.5	45.7
Protein, g	29.4	16.2±6 (-10.105)**	19.08±4.4 (-10.8)**	55	64.6
Iron, mg	20-25	12±7.4 (-37.2)**	13.47±4.8 (-24.4)**	52	62.2
Vit.A, I.U.	2000	778±422 (-291.6)**	941±404 (-258.1)**	38.9	47

Figures in parentheses indicate 't' values

**Values significant at 1 per cent level

Per cent adequacy was higher for all the nutrients except iron in case of 1-4 yrs age group children than 4-6 yrs age group (Fig.3-Fig.6).

The intake of calories, iron and vitamin A was less than half of the recommendation whereas the intake of protein was 60-66.5% of the recommendation in case of 1-4 yrs children. In 4-6 yrs old children calories and vitamin A was less than 50% of the recommendation whereas the intake of protein was 55-65% and iron was 62-82% of the recommendations.

The findings of the present study are similar to those of Vijaylakshmi et al.(1975), Devadas (1977) and Puri et al.(1983) who revealed that diets of pre-school children were deficient with respect to all nutrients. ICMR(1974) reported that diets were adequate for protein but low in case of calories. CARE (1974) was also of the same view, it showed that the intake of calcium and vitamin B intake was sufficient but the diet was poor in vitamin C. Paramjit and Bhat (1979) observed that diets of pre-school children of Habhowal in district Ludhiana. Punjab were low in calories and vitamin C and protein was adequate. Similar findings have also been reported by FNB (1980).

4.2.7 Nutrient intake at anganwadi: The nutrient intake of the supplements provided in anganwadi to the children was found to be much below the quantity prescribed by the

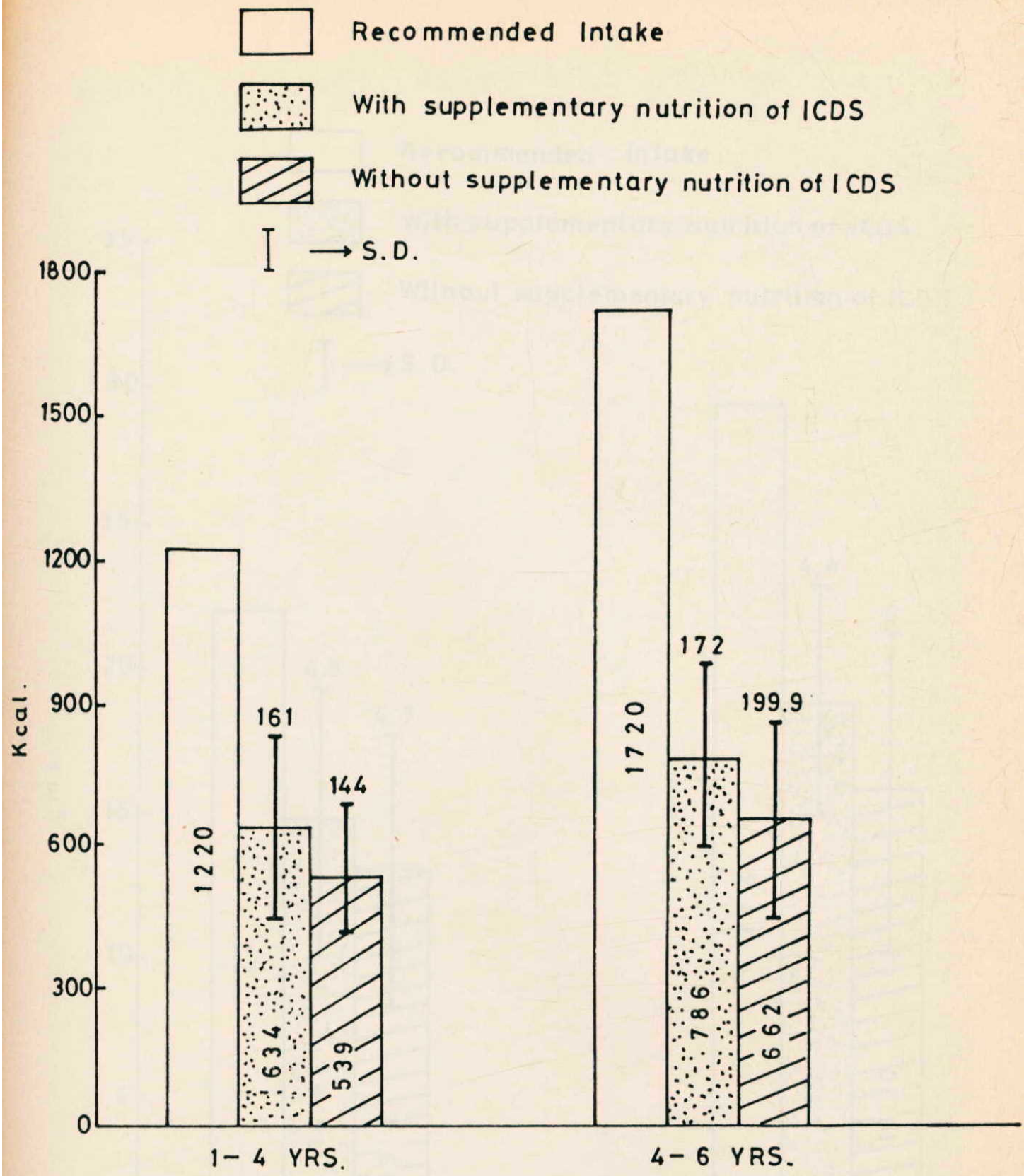

FIG.3 : MEAN DAILY ENERGY INTAKE OF CHILDREN AS COMPARED TO RECOMMENDED INTAKE (ICMR, 1981).

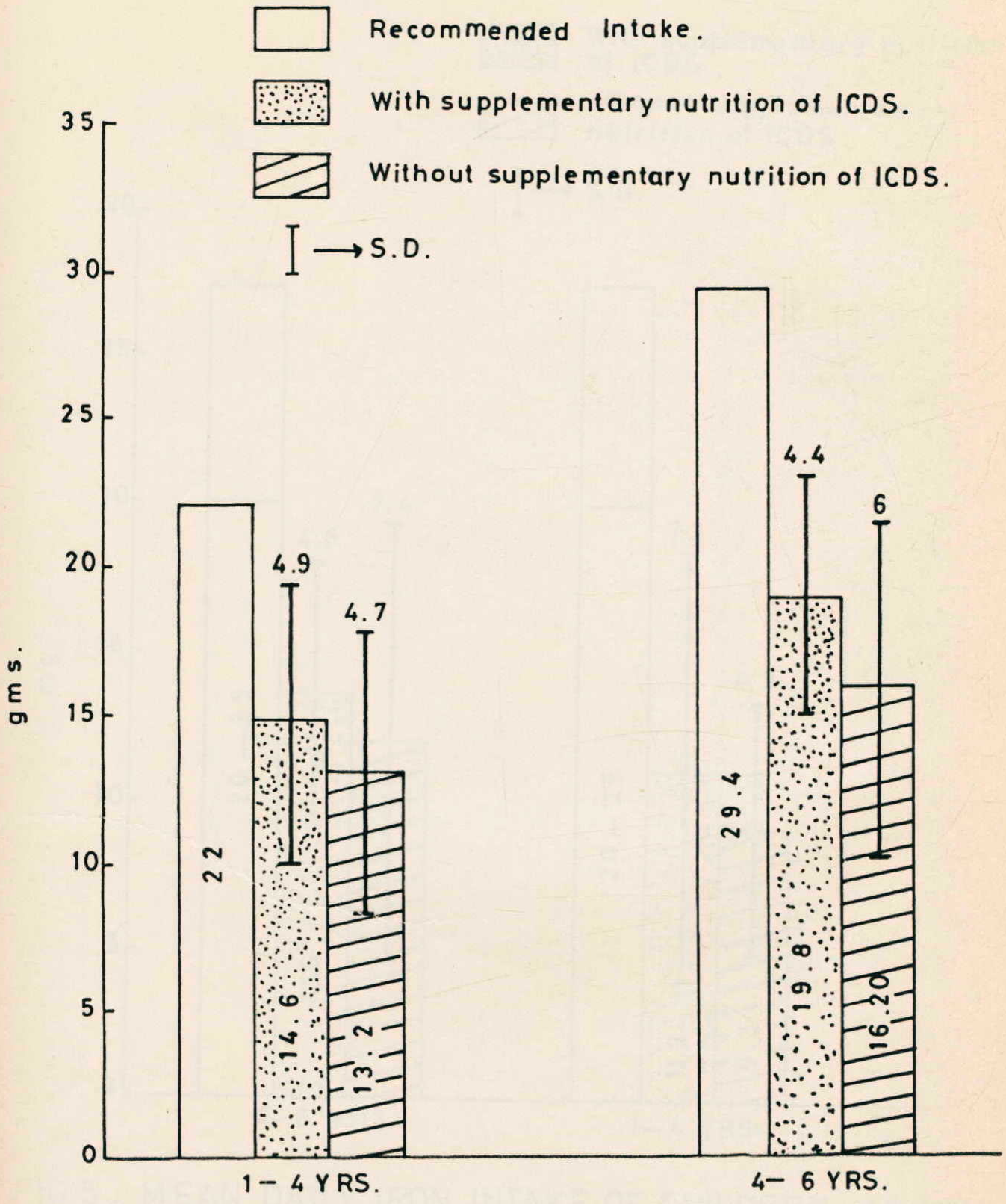

FIG.4: MEAN PROTEIN INTAKE OF CHILDREN AS COMPARED TO RECOMMENDED INTAKE(ICMR,1981)

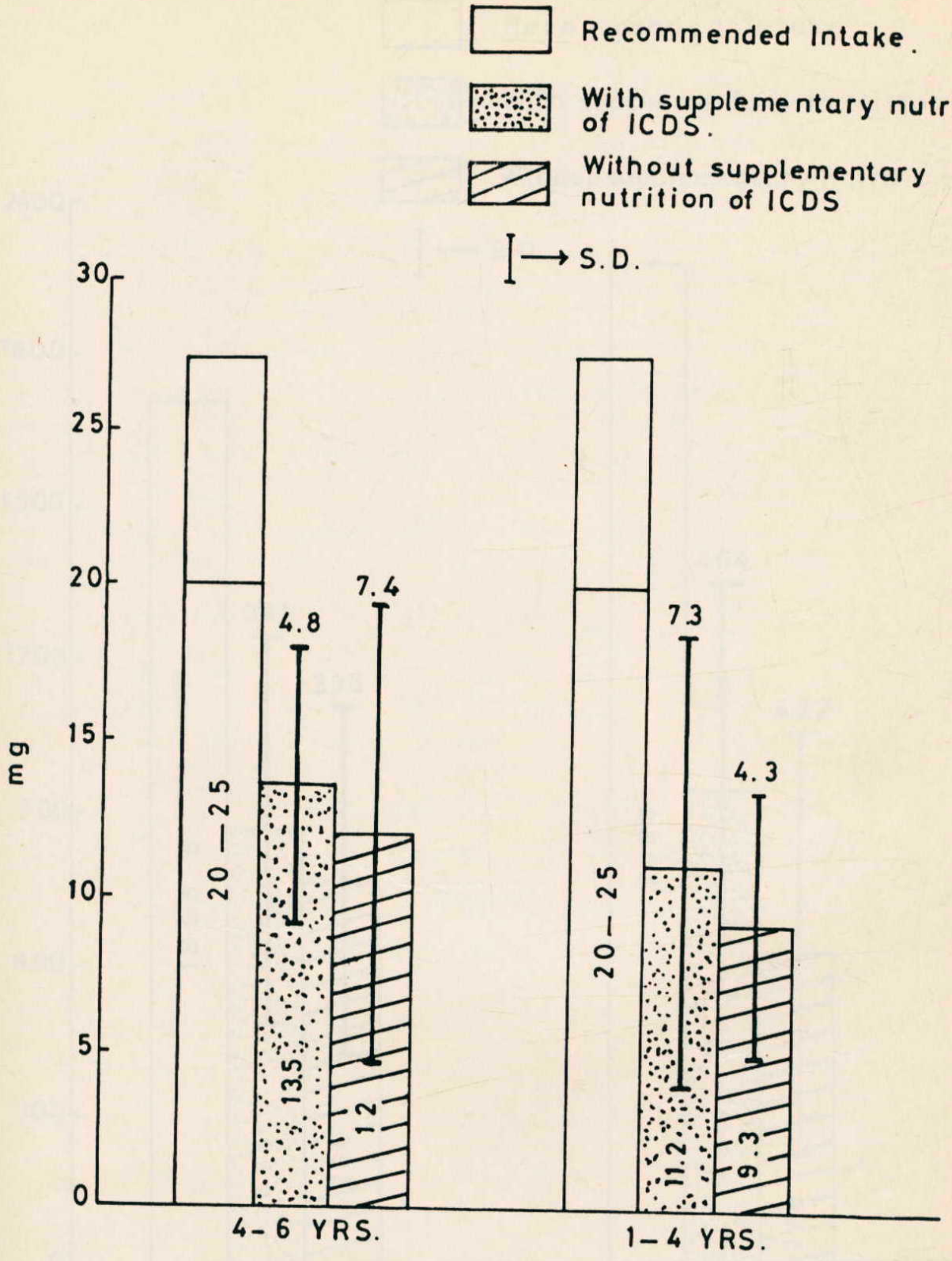

FIG.5 : MEAN DAILY IRON INTAKE OF CHILDREN AS COMPA--RED TO RECOMMENDED INTAKE(RI) ICMR,1981.

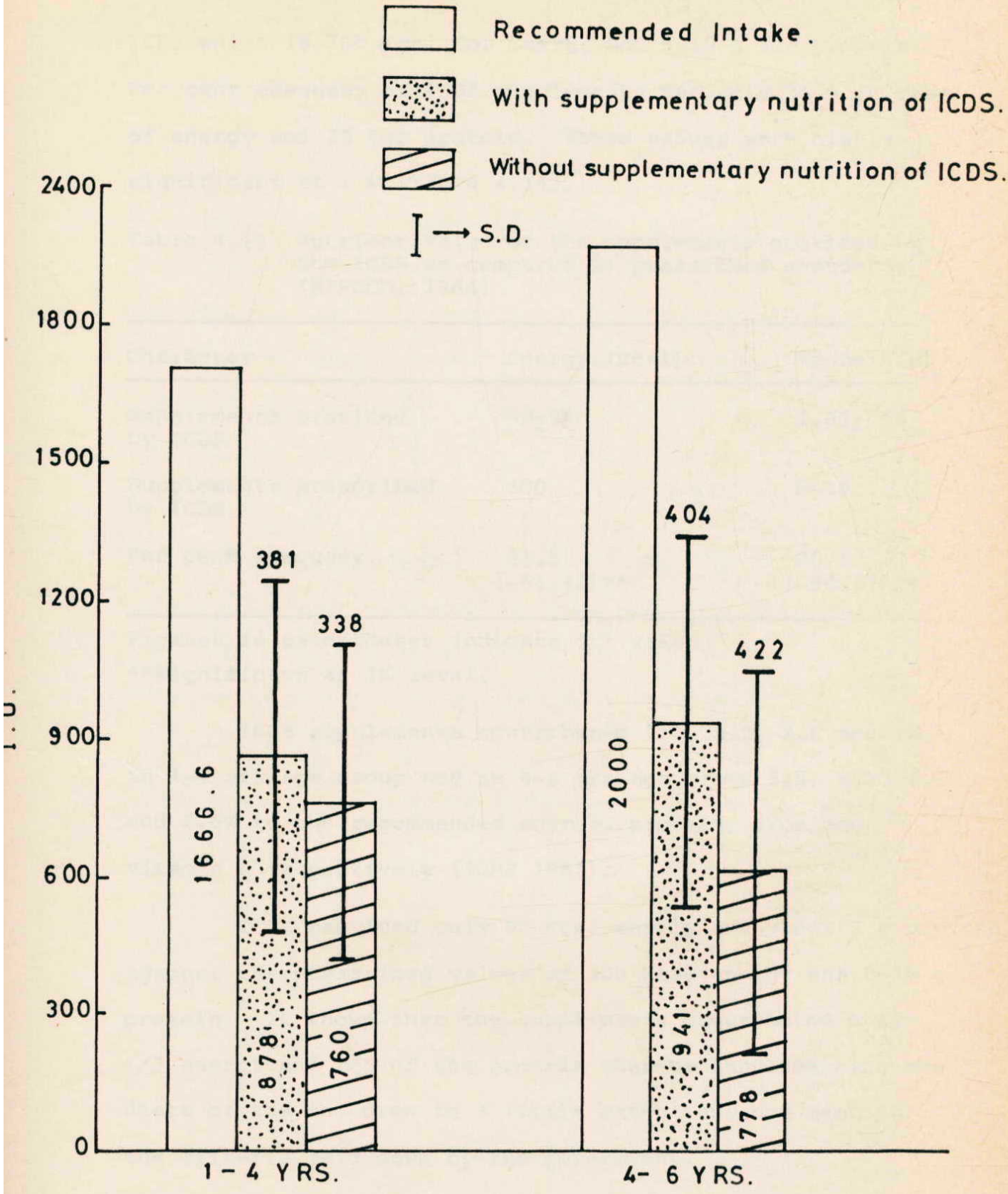

FIG. 6: MEAN DAILY VITAMINE A INTAKE OF CHILDREN AS COMPARED TO RECOMMENDED INTAKE (RI) ICMR, 1981.

ICDS which is 300 Kcal for Energy and 8-10 g for protein. Per cent adequacy of ICDS supplements was only 31.5 in case of energy and 20 for protein. These values were highly significant at 1 % (Table 4.14).

Table 4.14 Nutrient value of the supplements provided by the ICDS as compared to prescribed standards (NIPCCD, 1984)

Character	Energy (Kcal)	Protein(g)
Supplements provided by ICDS	95±24	1.81±.56
Supplements prescribed by ICDS	300	8-10
Per cent adequacy	31.5 (-61.42)**	20.1 (-90.37)**

Figures in parentheses indicate 't' value
**Significant at 1% level.

ICDS supplements contributed 7.8, 8.2, 2.6 and 3% in 1-4 yrs age group and in 4-6 yrs age group 5.5, 6.1, 2.6 and 2.6% to the recommended energy, protein, iron and vitamin A respectively (ICMR 1981).

ICDS provided only 95 Kcal energy and about 2 g protein against the prescribed values of 300 Kcal energy and 8-10 g protein. It shows that the supplements contributed only 1/3 energy and 1/5 of the protein thereby supplementing the diets of the children to a little extent and not meeting the criteria laid down by the government.

These results of the study are similar to the results reported by Devadas et al.(1972), Devadas et al.(1975), Lal et al.(1978), Bhandari et al.(1981), Gopaldas(1982), Chawla and Puri (1983) and Puri et al.(1984) who stressed that nutrition improvement programme provided diet inadequate in all nutrients whereas according to Chanderasekhar and Amrithavene (1976), Indira et al.(1979), Kushwaha et al.(1983), Patel (1986) and Devadas (1986) the nutrition improvement programme had positive effect on nutritional status of children.

4.3 Morbidity

4.3.1 Common diseases: Cold and cough were most common among children. Sixty-two per cent suffered from this frequently and 30% sometimes. Majority of children suffered from fever and diarrhoea sometimes. Prevalence of Bronchitis was rare (Table 4.15).

Table 4.15. Per cent distribution of children according to morbidity pattern (N-50)

Common diseases	Often	Sometimes	Rarely
Bronchitis	0	8	92
Cold and cough	62	30	8
Diarrhoea	12	60	28
Dysentery	6	26	68
Fever	12	76	12

Children suffered from cold and cough in winter due to a few woollen clothes worn by them and diarrhoea occurred due to poor hygiene at home. These health problems arose due to mother's ignorance, carelessness and poor socio-economic status of the family.

Kumar et al.(1981) reported that rural children suffered mostly from respiratory tract infection, diarrhoea, vomiting, fever, measles, malaria and anaemia.

4.4 Immunization Record

The information was collected from the records of dispensary or from that of Anganwadi but at both the places (Phullawal and Dugri), these were incomplete and according to which 22% children did not get any immunisation. The records obtained from the dispensary or anganwadi were as follows:

Table 4.16. Distribution of children according to immunization

Vaccination	Children immunized N=50	
	No.	%
B.C.G.	36	72
D.P.T.	37	74
Polio	31	62
T.A.B.	11	22
Measles	18	36
Records not available	11	22

Most of the children had been vaccinated against B.C.G. (72%), D.P.T.(74%) and Polio(62%) as compared to T.A.B.(22%) and Measles (36%).

According to UNICEF in 1988 75% of the children in India are being immunised againstDPT, 65% against polio, 45% against measles.

Whereas, Chansoria et al.(1975) revealed that number of the children vaccinated against primary small pox was satisfactory (97%),but it was low in case of B.C.G., triple antigen, polio and T.A.B. (23, 11.9, 9.7 and 1.2% respectively) among children belonging to urban population. Patwari et al. (1979) found that immunization status of rural children continued to be unsatisfactory since as many as 20% children had not received any vaccination. Kushwaha et al.(1983) observed that immunization against DPT, Polio, BCG and small pox was done in 63%, 24%, 31.7% and 30.4% of children respectively.

4.4.1 Administration of vit.A oral massive doses: There were only 32% children who had two doses of vit.A, 20% had one dose and 32% had none whereas no record was available regarding the rest 16 per cent of the children and no body knew about the time gap between two doses. However, according to ICBS, every child should receive 2 lakh units of vitamin A solution orally after every six months in the age group of 1-5 yrs.

Kushwaha et al.(1983) observed that vitamin A solution was given to 41% children in ICDS scheme.

4.5 Anthropometric measurements

4.5.1 Height: The mean heights of children for different age group for both boys and girls are given in table 4.17.

Table 4.17. Mean height of pre-school children in comparison to ICMR standard (1968)

Age (yrs)	No.of children	Height (cms)	ICMR Std.(cms)	% Standard	't'value
	Boys				
1+-2	2	77	73.9	104.2	1.55
2+-3	9	86.4	81.6	105.9	2.01
3+-4	2	98	88.8	110.4	9.2*
4+-5	9	95	96	98.9	-.19
5+-6	7	110	102.1	107.7	1.33
	Girls				
1+-2	3	70.3	72.5	96.9	-.39
2+-3	9	86.3	80.1	107.7	2.97*
3+-4	1	90	87.2	103.2	-.001
4+-5	6	92	94.5	97.4	-.56
5+-6	2	106.5	101.4	105	2.828

* 't' values significant at 5%

The mean heights of all the boys (1-4 yrs, 4-6 yrs) ranged between 77 to 110 cms. When compared with the standards of the ICMR (1968), the pre-school boys were found to be taller by 3.1 to 9.2 cms in all the age groups except

for 4-5 yrs old where the height was little (1 cm) below the standards. The mean height of the present pre-school boys was 77 to 98 cm for 1-4 yrs age group and heights of Ludhiana pre-school boys as recorded by Neumann (1969) were from 69.3 to 85.5 cm for the same age group. The heights were highly significant in 3-4 yrs old boys. The heights of boys were 98.9 to 110.4% of ICMR standards.

The heights of the girls (1-4 yrs, 4-6 yrs) ranged between 70.3 to 106.5 cms. When compared with the standards of ICMR (1968) these girls were found to be taller by 2.8 to 6.2 cms in all the age groups except for 1-2 and 4-5 yrs age groups whose height was below standards by 2.2 cm and 2.5 cms respectively. The heights were highly significant in 2-3 yrs old girls. Neumann (1969) found that the height ranged from 70.9 to 80.7 cm for 1-4 yrs old girls, in the present study it ranged from 70.3 to 90.0 cms for girls, that means these girls are taller than studied by Neumann. The heights of girls were 96.9 to 107.7% of ICMR standards.

Prabhakar et al.(1975) observed that heightof Punjabi boys and girls (0-5 yrs) was 92% of the Harvard standards and 106% of ICMR standards. Whereas in the present study height of the boys and girls was 103.5% of ICMR standards.

4.5.2 Weight: The mean weight of boys and girls is given in table 4.18.

Table 4.18. Mean weight of pre-school children in comparison to ICMR standard (1968)

Age (yrs)	No.of children	Weight (kg)	ICMR std.(kg)	% Std.	't'value
	Boys				
1^{+}-2	2	10.00	8.4	119	1.6
2^{+}-3	9	10.72	10.1	106	2.2
3^{+}-4	2	12.50	11.8	105.9	1.4
4^{+}-5	9	12.60	13.5	93.3	1.08
5^{+}-6	7	14.86	14.8	100.4	.067
	Girls				
1^{+}-2	3	8.7	7.8	111.5	1.04
2^{+}-3	9	10.7	9.6	111.4	2.19
3^{+}-4	1	12.3	11.2	109.8	.007
4^{+}-5	6	12.2	12.9	94.6	-1.02
5^{+}-6	2	13.8	14.5	95.2	-.600

The mean weight of boys ranged from 10.0-14.8 kg. When compared with ICMR standards these boys were found to be heavier by 0.4 to 19.0% (.06 to 1.6 kg) in all the age groups except 4-5 yrs age group, who were 6.7%(0.9 kg) below standards. Weight of children recorded by Neumann(1969) was also lower than that of this study.

The mean weight of all the girls ranged between 8.7 to 13.8 kg.The weight of girls was 9.8 to 11.5%(.9 to 1.1 kg) above ICMR standards in age group 1-4 yrs, whereas in 4-5

and 5-6 yrs this was 5.4 and 4.8% (0.7 kg each) below standards. Weight of the girls ranged from 8.7 to 12.3 kg in 1-4 yrs age group but Neumann(1969) has reported that weight of girls ranged between 6.9 to 8.7 kg(1-4 yrs). This was lower than the weight recorded in the present study.

In the present study the weight of boys and girls was 104.7% above standards. Prabhakar et al.(1975) also reported that Punjabi boys and girls weighed 115% of ICMR standards but 79% of Harvard standards.

The findings of present study are similar to those of Bhat and Dahiya (1985) but Chawla and Puri in 1983 revealed that weight of the Chandigarh children were below ICMR standards but far below the Harvard standards.

4.5.3 Arm Circumference (MUAC): The mid upper arm circumference (MUAC) of boys ranged from 14.5 to 17.4 cm. This was below standards except 5-6 yrs which was marginal above standards (.7 %) . The MUAC of boys was significantly below standards for 2-3 age group (at 5% and 4-5 yrs age group (at 1%).

The MUAC of girls ranged from 15.5 to 18 cm. In all the girls except 2-3 yrs age group it was above standards (1.3 to 6.5%). The average MUAC for all the children was 16.2 cm, but according to Prabhakar et al.(1975) the MUAC of Punjabi children was 15.2 cm.

Table 4.19. Mean mid upper arm circumference of school children as compared to standards

Age (yrs)	No.of children	MUAC (cms)	Standard (cms)	X Std.	't'values
	Boys				
1^{+}-2	2	14.5	15.8°	91.8	-2.6
2^{+}-3	9	14.4	16.2°	88.9	-3.1*
3^{+}-4	2	16.5	16.9°	97.6	-.27
4^{+}-5	9	15.06	16.9°	89.1	-4**
5^{+}-6	7	17.43	17.3°°	100.7	.174
	Girls				
1^{+}-2	3	16.0	15.8°	101.3	.099
2^{+}-3	9	15.5	16.2°	95.9	-2.7
3^{+}-4	1	18.0	16.9°	106.9	.007
4^{+}-5	6	17.7	16.9°	104.7	.717
5^{+}-6	2	17.0	17.3°°	102	-.300

*Values significant at 5%
**Values significant at 1%

° Wolanski, 1964
°°O'Brien, Girshi, K.&Hink, 1941) Cited by Jelliffe(1966)

Sood and Kapil(1984) showed that mean MUAC in rural pre-school children was significantly lower when compared to that of British children.

4.5.4 Head circumference: The head circumference of the boys ranged between 48 to 52.7 cm. In all the age groups the head circumference was above (1.5 to 11.5%) ICMR standards. (Table 4.20). Neumann (1969) found that the head circumference

Table 4.20. Mean head circumference of pre-school children as compared to ICMR standards (1968)

Age (yrs)	No.of children	Head circum. (cms)	ICMR Std. (cms)	% Std.	't' value
	Boys				
1^{+}-2	2	49.5	44.4	111.5	10.2**
2^{+}-3	9	49.9	45.9	108.7	5.12**
3+-4	2	48.0	47.3	101.5	0.35
4^{+}-5	9	51.1	48	106.5	2.6*
5^{+}-6	7	52.7	48.5	108.7	5.6**
	Girls				
1^{+}-2	3	45.7	43.6	104.8	1.12
2+-3	9	49.9	45.2	110.4	6.4**
3^{+}-4	1	54.0	46.2	116.9	.008
4^{+}-5	6	50.5	47.1	107.2	5.8**
5^{+}-6	2	50.0	47.8	104.6	.004

*Values significant at 5%
**Values significant at 1%

was 45.2 to 48.1 cm in boys (1-4 yrs). The head circumference, in present study boys (1-4 yrs) ranged from 48-49 cm.

The head circumference (cm) of the girls ranged from 45.7 to 54 cm. This was above ICMR standards by 4.6 to 10.4% in all the age groups (Table 4.20).

Neumann (1969) reported that head circumference of girls (1-4 yrs) was 43.6 to 46.3 cm while in present study it was 45.7 to 54 cm.

According to Bhat and Dahiya (1985) the head circumference of Hissar children were above ICMR and Ludhiana studies.

4.5.5 Chest circumference: The mean chest circumference of boys and girls are given in table 4.21. The chest circumference of all children was above standards. In case of boys chest circumference ranged from 46.0 to 53.4 cm i.e. 3.5 to 7.3% above ICMR standards (Table 4.21).

Table 4.21. Mean chest circumference of pre-school children as compared to ICMR (1968)

Age (yrs	No.of children	Chest circum. (cms)	ICMR std. (cms)	% Std.	't'value
	Boys				
1^{+}-2	2	46.0	43.3	106.2	2.7
2^{+}-3	9	50.1	45.8	104.4	6.1**
3^{+}-4	2	51.5	48	107.3	4
4^{+}-5	9	51.1	49.4	103.5	1.3
5^{+}-6	7	53.43	50.8	105.2	1.8
	Girls				
1^{+}-2	3	47.0	42.3	111.1	1.6
2^{+}-3	9	50.4	45.2	111.5	3.6**
3^{+}-4	1	52.0	47.2	110.2	0.006
4^{+}-5	6	51.5	48.7	105.7	3.9*
5^{+}-6	2	52	50.1	104	0.95

*Values significant at 5%
*Values significant at 1%

Neumann(1969) found that chest circumference ranged from 43.3 to 47.5 cm in boys and 42.3 to 46.1 cm in case of girls (1-4 yrs). This was lower than the values reported in the present study (46.0 to 51.5 cm for boys and 47 to 52 cm for girls).

Head circumference has a positive correlation(.609) with chest circumference. According to Devadas et al.(1980) head and chest circumference were equal to 4 to 5 yrs of age.

4.6 Clinical symptoms

Table 4.22. Incidence of clinical symptoms

Symptoms	No.of children	%
Lack of lustre of hair	2	4
Pale conjuctiva	8	16
Angular stomatitis	1	2
Spongy and bleeding gums	1	2
Cheilosis	1	2

Clinical symptoms were observed with the help of the doctor and a few clinical symptoms have been noticed. Pale conjuctiva was in 16% children, Lack of lustre of hairs in 4%, angular stomatitis, spongy and bleeding gums and cheilosis were observed in 2% children each.

The incidence of pale conjuctiva was high because of low iron intake and the prevalence of other symptoms was

also due to low nutrient intake of ascorbic acid, B-complex, energy and protein. FNB (1980) also reported that angular stomatitis, vitamin A, vitamin B and ascorbic acid deficiency was common among pre-school children in Punjab. Somewhat similar results were given by Mishra et al.(1986) that Glossitis, Bitot's spots, xerosis, angular stomatitis had higher prevalence among harijan and tribal children. Bhat and Dahiya (1985) also showed that Bitot's spot, angular stomatitis, glossitis, rickets and dental caries were most common.

4.7 Effect of various factors on nutritional status

The effect of sex, age, birth orderof child, size of family, income, duration of breast-feeding on the anthropometric measurements and nutrient intake was determined by analysis of the data. The effect of sex, size of family and duration of breast feeding with anthropometric and nutrient intake were found to be statistically non-significant. Income was also found to be non-significant with other variables as variability in the income groupswere very low due to the fact that all the families were belonging to the low-socio-economic group. The same was the case with the occupation of the parents as maximum of the parents were belonging to the labour class.

The birth order and age were included in the final model. The effect of each factor on the anthropometric measurements and nutrient intake is discussed below:

4.7.1 Correlation between age and various anthropometric measurements: Age was found to be highly ($P < 0.01$) positively correlated with height, weight, arm, head and chest circumference.

Bhat and Dahiya (1985) also revealed the positive relation of age with head and chest circumference in both the sexes.

4.7.2 Birth order correlation between anthropometry and nutrient intake: Birth order had significant negative correlation ($P < 0.05$) with weight showing that higher the birth order the less is the increase in weight. With other anthropometric measurement and nutrient intake the relation was non-significant (Table 4.23). However, Morley et al. (1968) have reported that birth order greater than sevenhas a definite ill-effect to cause under-weight in children in Nigeria. According to Jacoby et al.(1975) first born children who remained the only child of his parents was taller and heavier as his consumption was high than those born first but with siblings.

4.7.3 Correlation between anthropometry and nutrient intake: Energy, protein and iron intake had both positive correlation ($P < 0.01$) with weight, height and head circumference only. Weight, height and head circumference. Only energy and protein had high significant positive ($P < 0.01$) effect on chest circumference. Energy, protein and vitamin A had significant ($P < 0.05$) relationship with arm circumference (Table 4.23).

Table 4.23. Correlation coefficient between birth order, anthropometric measurements and nutrient intake of the child

Character	Weight	Height	Arm circum-ference	Head circum-ference	Chest circum-ference
Birth order	-.3211*	-.1427	.0874	.0358	.0439
Energy	.5435**	.4929**	.3220*	.5259**	.4521**
Protein	.5741**	.4872**	.2879*	.3780**	.4649**
Vitamin A	.0017	.0673	.3223*	.3872**	.2756
Iron	.3642**	.4013**	.1645	.4720**	.2189

*Significant at 5% level
**Significant at 1 % level

4.7.3. Age Vs. Nutrient intake: Age had significant relationship ($P < 0.05$) with protein provided by ICDS supplement, with iron when child ate at anganwadi, with energy and protein when child did not eat at anganwadi.

It had highly significant correlation at 1 % level of significance with energy and protein of the days when child got supplementary nutrition and with iron when he ate home diet only.

So it shows that the nutrient intake except that of vitamin A significantly increased with increase in age(Table 4.24).

4.7.4. Correlation of nutrient intake with and without supplementary nutrition ofICDS: At anganwadi with increase in energy in the supplements, significant increase in protein

Table 4.24. Correlation coefficient between the age and nutrient intake at Anganwadi, daily diet with and without supplementary nutrition

Character		ICDS				With supplementary nutrition				Without supplementary nutrition			
		Energy	Protein	Vit.A	Iron	Energy	Protein	Vit.A	Iron	Energy	Protein	Vit.A	Iron
	Age	.2713	.3299*	.0462	.2263	.4758*	.5287**	.0986	.3268*	.3377*	.3227*	-.0296	.4065*
ICDS	(Energy	-	.5798**	.0753	.6854**	.3871**	.3755**	-.1941	.1680	.1669	.2070	-.2658	.1561
	(Protein	-	-	.3589*	.2971*	.4708**	.4506**	.0658	.3552*	.3031	.3361*	-.0463	.4276*
	(Vit.A	-	-	-	.1761	.4095**	.2794*	.4966**	.2043	.3396*	.3066*	.3303*	.2132
	(Iron	-	-	-	-	.1798	.2826*	-.2292	.0610	.0208	.1574	-.3817**	.0934
With Supplementary nutrition	(Energy	-	-	-	-	-	.8785**	.4222**	.5077**	.7120**	.7618**	.2160	.5850**
	(Protein	-	-	-	-	-	-	.2630	.5188**	.7180**	.8158**	.0670	.4756*
	(Vit.A	-	-	-	-	-	-	-	.5166**	.3819**	.3046*	.4863**	.2935
	(Iron	-	-	-	-	-	-	-	-	.4185**	.4859**	.1401	.2442
Without Supplementary nutrition	(Energy	-	-	-	-	-	-	-	-	-	.8560**	.4253**	.3818**
	(Protein	-	-	-	-	-	-	-	-	-	-	.2494	.3690*
	(Vit.A	-	-	-	-	-	-	-	-	-	-	-	.2653

*Significant at 5% level
**Significant at 1% level

and iron was also observed at 1% level. Energy and protein also increased significantly for the days when the child got supplementary nutrition.

With increase in nutrient intake at anganwadi, the nutrient intake of the whole day when child attended anganwadi also increased significantly.

Energy intake had highly significant effect (+ve) on protein, vitamin A and iron intake when child attended anganwadi or did not attend the anganwadi (Table 4.24).

Drawbacks of Anganwadi

Fuel: Fuel used for cooking the supplements in anganwadis was not supplied under ICDS scheme in rural areas. So children were asked to bring it by themselves or to pay Rs.2 to 5 per month for that purpose. Somehow, children of Dugri village were able to bring the fuel. As observed in village Phullanwal the children were unable to bring the fuel. So they were served with only sugar or powdered milk reconstituted in cold water.

Menu: Children were served with sugar, panjiri or milk at village Phullawal, while at village Dugri panjiri or porridge was served against the usual menu of milk, porridge, panjiri, kheer, sweet rice or khichri on different days of the week. The fact was that children failed to get all these because generally some or the other item of ration remained out of stock.

Preparation and consumption of supplements

At village Phullawal, it was observed that worker/ helper had a poor knowledge of reconstitution of milk from the powdered state. So too much diluted milk with inadequate sugar and inadequate warmed milk was served often to the children as the children did not have the taste for this kind of milk, it was rarely consumed. At Dugri porridge was prepared in water and sugar (without milk and fat), panjiri too coarse to be chewed by the little children. At village Phullawal, some children did not eat the supplements provided by anganwadi, but took these home and shared it with their siblings/parents. Anganwadis were not giving supplement or special attention to the malnourished children as prescribed by ICDS.

Punctuality: Anganwadi worker/helper usually reported late in the anganwadi.Worker and helper used to skip their duties, if they had some personal work, social engagement, temptation for watching video etc.

Immunization and prophylaxis for vit.A deficiencies and anaemia

Records of immunization were not complete at any of the anganwadi studied. According to the registered number of the village dispensary register, both the anganwadis of village Phullawal received massive doses (2 lakh I.U.) of vit.A, while not even a single child of one of these anganwadis was provided thise dose of vit.A. Same was the fate of ferric

and folic acid tablets, which were to be given daily to the children, but were rarely provided. The Anganwadi did not get these because it was far from dispensary. The other anganwadi of same village got these because the dispensary was very close to the anganwadi. Anganwadis of Dugri village did not have the complete records of immunisation and prophylaxis for vit.A deficiencies and anaemia, because these were given to children when they visited dispensary for the treatment of other ailments.

Community participation

The community participation was also observed to a limited extent due to lack of interest of the worker to approach the villagers and villagers over-business in their fields or household chores.

Suggestions for improvement

Officers concerned should be aware of the position of ration at each anganwadi and the supply of ration should be regular throughout the year, to provide the prescribed nutritious supplements to the children. They should also be advised to make arrangement for making food supplements palatable, tasy and nutritious.

Fuel, etc. should be provided in the rural anganwadis under ICDS, because poor people cannot afford to supply the fuel.

Officers concerned should make surprise visits to anganwadis to observe the presence and regularity of the worker and helper and children, type of supplements given, immunisation, prophylaxis for vit.A deficiencies and anaemia.

According to anganwadi workers and helpers the wages for the work expected and they had to work more are inadequate for themselves, so whey should they work hard to prepare tasty meals and take care of the children. Thus, their wages should be considered for revision commensurate with the work expected and rise in the cost of living, so that they can dedicate themselves to work.

Government should give special training to the anganwadi worker about the preparation of low cost nutritious meal. So that they can prepare and provide nutritionally rich supplements to the poor children. The duration of nutrition component of the training may be increased to include such aspects.

Anganwadi worker should not allow the children to take the supplements home instead child should be encouraged by them to eat the food at anganwadi itself. So that they can eat whole food, to get the prescribed nutrient intake, instead of sharing it with the siblings or parents.

To keep accurate immunization record and prophylaxis for vit.A deficiencies and anaemia, ANM, other health worker and anganwadi worker must constitute a single functional team and to meet frequently to ensure that required services are

provided to children. Lack of co-ordination amongst ANM and anganwadi worker leads to incomplete immunization record.

Anganwadi worker should be polite with the children and teach the children and mothers about the importance of hygiene and eating of leafy vegetables and other low cost seasonal vegetables and fruits, pulses etc. to balance their diet.

Malnourished children should be given extra attention. Govt. should take the help of the Foods and Nutrition Department of Home Science Colleges to make the food nutritional and easily digestible for malnourished children to help them to recover from malnourishment.

The supplementary nutrition component of ICDS needs improvement in several respects. The important point, however, is that the ICDS system is providing packages of services and with the desired modifications it can make a significant contribution to the promotion of child nutrition and health of the future citizens of the country.

CHAPTER V

SUMMARY AND CONCLUSIONS

The objective of the present investigation was to make an appraisal of supplementary nutrition component provided to pre-school children under the ICDS Scheme. Fifty children from two anganwadis each of villages 'Phullawal' and 'Dugri' situated near to the Punjab Agricultural University,Ludhiana, were selected for investigation.

An interview schedule was used to collect the general information about the children and their families. The diets consumed by the children were recorded for seven consecutive days by recall-cum-weighment method. The children were also assessed for anthropometric measurements and clinical signs of nutritional deficiency.

Most of the children were from backward and scheduled castes (98%) and belonged to low socio-economic group with per capita income of Rs.60 to 180. Majority of parents were illiterate. In most of the cases father worked as field worker(78%).

Results of dietary survey indicated that there was no variation in the meal pattern of the families and that of children. There were no special preparations for the children. They were given the same food as consumed by the other members of the family.

The quantity of foods consumed were much below the ICMR recommended intakes (1981) except for roots and tubers. The consumption of meat and egg was almost nil and that of fruits very meagre. Supplementary nutrition under ICDS provided only broken wheat, wheat flour, dry milk, fat and sugar, which was 8 g, 1.3 g, 1.8 g, 0.5 g and 9.8 g respectively in case of 1-4 yrs children and 9.7 g, 1.04 g, 1.6 g, 0.6 g and 12.4 g respectively in case of 4-6 yrs old children.

The average energy daily intake when child did not get supplementary nutrition under ICDS was 539 Kcal and with supplementary nutrition it was 634 Kcal in case of 1-4 yrs children against the recommendations of 1220 Kcal(44 and 52% adequacy). In case of 4-6 yrs child it was 662 Kcal(WOSN) and 786 Kcal (WSN) against the recommendations of 1720 Kcal (38.5 and 45.7% adequacy).

The average daily intake of protein by 1-4 yrs and 4-6 yrs old children was 14.7 g when child did not get supplementary nutrition (WOSN) and 16.8 when he got supplementary nutrition (WSN) and 13 g (WOSN), 14.6 g (WSN) respectively compared with ICMR (1981) recommended intakes of 22 g i.e. 60 (WOSN) and 66.5 (WSN) % adequacy in case of 1-4 yrs and 55 (WOSN) and 64.6 (WSN) % adequacy in case of 4-6 yrs.

Iron and vitamin A was also much below the standards. ICDS provided only 95 Kcal energy and about 2 g protein against the prescribed standards of 300 Kcal energy and 8-10 g protein. ICDS supplements provided only 7.8, 8.2,2.6 and 3% of the ICMR recommended intake for energy, protein, iron and vitamin A respectively.

Cold and cough were very common among children. Prevalence of Bronchitis was rare. The vaccination against B.C.G.(72%), D.P.T(74%) and polio (62%) was more as compared to T.A.B.(22%) and measles (36%). The vitamin A solution was not given to 32% of the total children of Anganwadi.

Height, weight, chest and head circumference of the children were significantly more when compared to ICMR(1968), only few children were marginally below standards. Arm circumference was below standards in many cases when compared with foreign standards.

Clinical symptoms of nutritional deficiencies were observed in a few children. These were pale conjuctiva in 16%, lack of lustre of hair in 4% angular stomatitis, spongy and bleeding gums and chelosis were dbserved in 2% childreneach.

The coefficient of correlation between age and anthropometric measurements was positive and significant. Birth order had negative significant correlation with weight only. Age had significant positive relationship between energy, protein and iron for the days when child got

supplements at anganwadi. Nutritive value of ICDS supplements had positive relationship with nutrient intake on the days when the child got supplementary nutrition.

The results of the present investigation indicated that supplements provided under ICDS were of poor quality. They were supplementing the home diets of the children to a very little extent. So government should pay attention to improving the quality of supplementary nutrition component of ICDS.

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APPENDIX I

NUTRITIONAL ASSESSMENT OF PERSCHOOL CHILDREN UNDER ICDS

General Information

i) About Anganwadi -

1. Name of place/Anganwadi and its address

2. Block & District

3. Education of Anganwadi worker -

Attendance of Anganwadi worker -

4. Education of Helper -

Attendance of Helper -

5. Number of children fed under Anganwadi -

Number of children supposed to fed -

ii) About Child

Name of child -

Home address -

Age -

Sex -

Birth order -

Miscarriage and still birth -

iii) Socio-economic details -

S.No.	Name of family member	Sex	Age	Relation to Head	Educational level	Occupation	Income

iv) Feeding Habits -

1. Breast fed - i) Duration of breast feeding -

ii) Frequency of feeding time/day -

2. Artificial feeding -

At which age the mother started giving supplements -

Type of supplement	Quantity

v) Food Habits - Vegetarian / Non-vegetarian/ Lacto-ova

vi)

Diseases	Age
Bronchitis	
Cold and cough	
Diarrhoea	
Dysentry	
Fever	
Any other	

vii) Immunization Record

	Yes	Age & Interval	No
1. B.C.G.			
2. DPT I			
II			
III			
3. Polio			
4. T.A.B. (Typhoid & Cholera)			
5. Measles			

viii) Administration of massive doses of vit.A - Age & Dose -

DIETARY INTAKE

Meals	Approximate time	Menu	Cooked weight	Raw weight
Early Morning				
Breakfast				
Mid morning				
Lunch				
Evening Tea				
Dinner				
Any other				

Note - Standard katori measurement will be used.

Child's Examination Record -

I. Anthropometry -

i) Height (cm) =

ii) Weight (kg) =

iii) Head circumference(cm) =

iv) Chest circumference(cm) =

v) Arm circumference (cm) =

II. Clinical Examination -

Clinical symptoms	Yes	No
1. Hair -		
Lack of lustre		
Thinness and sparsness		
Straightness		
Dyspigmentation		
Flag sign		
Easy pluckability		
2. Face -		
Diffuse depigmentation		
Naso labial dyssebacea		
Moon face		
3. Eyes -		
Pale conjuctiva		
Bitot's spots		
Conjuctival xerosis		
Cornealxerosis		
Keratomalacia		
Angular palpebritis		
4. Lips -		
Angular stomatitis		
Angular scars		
Cheilosis		
5. Tongue -		
Odema		
Scarlet and raw tongue		
Magenta tongue		
Atrophic papillas		

Clinical symptoms	Yes	No

6. Teeth -

   Mottled enamel

7. Gums -

   Spongy, bleeding gums

8. Glands -

   Thyroid enlargement

   Parotid enlargement

9. Skin -

   Xerosis

   Follicular hyperkeratosis

   Petechiae

   Pellagrous dermatosis

   Flaky paint dermatosis

   Scrotal and vulvuldermatosis

10. Nails -

    Koilonychia

11. Subcutaneous tissue -

    Odema

    Amount of subcutaneous fat

12. Muscular and skeletal system -

    1. Muscle wasting
    2. Pot Belly
    3. Frontal and parietal bossing
    4. Epiphyseal enlargement
    5. Beading of ribs
    6. Persistent open anterior fontanelle

Clinical symptoms	Yes	No
7. Knock-knees or bow legs		
8. Diffuse or local skeletal deformities		
9. Deformities of thorax		
10. Musculo-skeletal haemorrhages		

APPENDIX II

Sample Menu of 7 days of 5 children belonging to 1-2 , 2-3, 3-4, 4-5, 5-6 yrs age groups.

Age group = 1-2 yrs

Meals	Menu	Cooked weighed
1.2.88		
Early Morning	-	
Breakfast	Chapati with salt Tea	1/4 1 cup
Mid morning(ICDS)	Milk	25 ml
Lunch	Chapati Mustard leaves	1/2 1 tb.sp.
Evening Tea	Tea	1 cup
Dinner	Chapati Mustard leaves	1/2 1 tb.sp.
Any other	-	
2.2.88		
Early Morning	Tea	1 cup
Breakfast	Chapati with salt	1/2
Mid morning(ICDS)	Milk	25 ml
Lunch	Chapati French beans	1/4 1 tb. sp.
Evening tea	Tea	3/4th cup
Dinner	Chapati Washed green gram	1/2 2 tb.sp.
3.2.88		
Early morning	Tea	1½ glass
Breakfast	Chapati with salt	1/2
Mid morning(ICDS)	Porridge	1/4 katori

Meals	Menu	Cooked weight
Lunch	Chapati Jaggery	1/2 15g
Evening tea	Tea	1 cup
Dinner	Chapati Mustard leaves	1/2 1 tb. sp.
Any other	-	
4.2.88		
Early morning	Tea	1½ cup
Breakfast	Chapati with salt	1/2
Mid morning	Sunday	
Lunch	Chapati Mustard leaves	1 1 tb.sp.
Evening tea	Tea	1 glass
Dinner	Chapati Mustard leaves	1/2 2 tb.sp.
Any other	-	
5-2-88		
Early morning	Tea	1 cup
Breakfast	Chapati Mustard leaves	1/2 1 tb.sp.
Mid morning	Absent	
Lunch	Chapati Cauliflower-potatoes	1 1 tb.sp.
Evening Tea	Tea	1 cup
Dinner	Chapati Cauliflower-potatoes	1/2 2 tb.sp.
Any other	-	

Meals	Menu	Cooked weight
6.2.88		
Early Morning	Tea	100 ml
Breakfast	Chapati with salt	1/4
Mid morning(ICDS)	Milk	25 ml
Lunch	Chapati Potato-cauliflower	1/2 2 tb.sp.
Evening tea	Tea	1 glass
Dinner	Chapati Potato-carrot	1/2 2 tb.sp.
Any other	-	
7-2-88		
Breakfast	Tea Bread	1 glass 1 slice
Mid morning(ICDS)	Porridge	1/4 katori
Lunch	Chapati Mustard leaves	1/2 2 tb.sp.
Evening Tea	Tea	1 glass
Dinner	Chapati Mustard leaves	1/2 2 tb.sp.

Age group 2-3 yrs

17.3.88

Meals	Menu	Cooked weight
Early Morning	Tea	2 glasses
Breakfast	Chapati with salt	1½
Mid morning(ICDS)	Porridge	1/2 katori
Lunch	Chapati with salt	1½
Evening tea	Tea	1 glass
Dinner	Chapati with salt	1
Any other	Biscuit	1-2
18.3.88		
Breakfast	Tea	2 glass
	Chapati with salt	1½
Mid morning(ICDS)	Porridge	1/2 katori
Lunch	Chapati	1
	Whole lentil	2 tb.sp.
Evening Tea	Tea	1 glass
Dinner	Chapati	1½
	Whole lentil	3 tb.sp.
19.3.88		
Breakfast	Tea	2 glass
	Chapati	1
	whole lentil	2 tb.sp.
Mid Morning(ICDS)	Porridge	3/4 Katori
Lunch	Chapati with salt	2
Evening Tea	Tea	1 glass
Dinner	Chapati	1½
	Sugar	20 g
20.3.88		
Breakfast	Tea	
	Chapati	1
	Sugar	10 g
Mid morning(ICDS)	Sunday	
Lunch	Chapati	1½
	Washed black gram	2 tb.sp.

Meal	Menu	Cooked weight
Evening Tea	Tea	2 glass
Dinner	Chapati	2
	Washed black gram	3 tb.sp.
21.3.88		
Breakfast	Tea	1 glass
	Chapati	1
	Lentil	2 tb.sp.
Mid morning(ICDS)	Absent	
Lunch	Chapati with salt	1
Evening Tea	Tea	1 glass
Dinner	Chapati	1
	Sugar	10 g
22.3.88		
Breakfast	Chapati	1½
	Sugar	10 g
	Tea	2 glass
Mid morning(ICDS)	Porridge	1/2 katori
Lunch	Chapati	2
	Potato-cauliflower	4 tb.sp.
Evening Tea	Tea	1 glass
Dinner	Chapati	1½
	Potato-cauliflower	4 tb.sp.
23.3.88		
Early morning	Tea	1 glass
Breakfast	Tea	1 glass
	Chapati	1
Mid morning(ICDS)	Porridge	1/2 katori
Lunch	Chapati	1½
	salt	
Evening Tea	Tea	1 glass
Dinner	Chapati	1½
	Sugar	10 g

Age group - 3-4 years

Meals	Menu	Cooked weight
29.12.87		
Early Morning	Tea	1½ cup
Breakfast	Tea	1 cup
	Chapati	1
Mid-Morning(ICDS)	Milk (too diluted)	150 ml
Lunch	Chapati with salt	1
Evening Tea	Tea	1 cup
Dinner	Chapati with salt	1
30.12.87		
Breakfast	Chapati	1
	Tea	1 cup
Mid-morning(ICDS)	Sugar	15 g
Lunch	Chapati	1
	Salt	
Evening Tea	Tea	1/2 glass
Dinner	Chapati	1/2
	Jaggery	30 g
31.12.87		
Early Morning	Tea	1 glass
Breakfast	Chapati with salt	1
Mid-morning(ICDS)	Porridge	1/2 Katori
Lunch	Chapati with salt	1
Evening Tea	Tea	1 glass
Dinner	Chapati with salt	1
Any other	Sweets	
1.1.88		
Early morning	Tea	1 glass
Breakfast	Chapati	1
	salt	
	Tea	1 glass
Mid Morning(ICDS)	Absent	
Lunch	Chapati	1
	Mustard leaves	2 tb.sp.
Evening Tea	Tea	1 glass
Dinner	Chapati	1
	Mustard leaves	2 tb.sp.

Meals	Menu	Cooked Weight
2.1.88		
Early morning	Tea	1 glass
Breakfast	Chapati with salt	1
Mid-morning(ICDS)	Milk	50 mg
Lunch	Chapati Potato-cauliflower	1 2 tb.sp.
Evening Tea	Tea	1 glass
Dinner	Chapati Jaggery	1 15 g
3.1.88		
Early Morning	Tea	1 glass
Breakfast	Chapati with salt	1
Mid-Morning(ICDS)	Sunday	
Lunch	Chapati Jaggery	1 25 g
Evening Tea	Tea	1½ glass
Dinner	Chapati Mustard leaves	1 2 tb.sp.
4.1.88		
Early morning	Tea	1 cup
Breakfast	Chapati with salt	3/4
Mid-Morning(ICDS)	Porridge	1/2 Katori
Lunch	Chapati Jaggery	1 30
Evening Tea	Tea	1 glass
Dinner	Chapati with salt	1
Any other	Chikki	30 g

Age group - 4-5 yrs

Meals	Menu	Cooked weight
29.12.87		
Early Morning	Tea	3/4 glass
Breakfast	Chapati	1½
	Mustard leaves	1 tb.sp.
Mid-Morning(ICDS)	Milk(V. diluted)	150 ml
Lunch	Biscuits	3
	Chapati	1½
	Mustard leaves	1 tb. sp.
Evening Tea	Tea	1/2 glass
Dinner	Chapati	1
	Mustard leaves	1 tb.sp.
	Milk	1 cup
30.12.87		
Early morning	Tea	1/2 glass
Breakfast	-	-
Mid-Morning(ICDS)	Sugar	25 g
Lunch	Sweets	2
Evening Tea	Chapati	1
	Mustard leaves	2 tb. sp.
Dinner	Milk	1/2 cup
31.12.87		
Early Morning	Tea	1 glass
Breakfast	Chapati	1
	Mustard leaves	1 tb. sp.
Mid-Morning (ICDS)	Porridge	1/2 katori
Lunch	Chapati	1
	Mustard leaves	2 tb. sp.
Evening Tea	Tea	1 glass
Dinner	Chapati	1
	Potato-cauliflower	2 tb.sp.
1.1.88		
Early Morning	Tea	1 glass
Breakfast	Chapati	1
	Potato cauliflower	1 tb.sp.
Mid-Morning(ICDS)	Porridge	1/2 katori
Lunch	Chapati	1
	Potato-cauliflower	1/2 katori

Meals	Menu	Cooked Weight
Evening Tea	Tea	1/2 Cup
Dinner	Chapati	1
	Potato-Peas	2 tb.sp.
2.1.88		
Early Morning	Tea	2 cup
Breakfast	Chapati	1
	Mustard leaves	2 tb.sp.
Mid-morning(ICDS)	Milk(V.diluted)	150 ml
Lunch	Chapati	1
	Mustard leaves	3 tb.sp.
Evening Tea	Tea	1 cup
Dinner	Chapati	1/2
	Mustard leaves	1 tb.sp.
Anyother	Chikki	30 g
3.1.88		
Early morning	Tea	2 cup
Breakfast	Chapati	1
	Mustard leaves	2 tb.sp.
Mid-morning(ICDS)	Sunday	
Lunch	Chapati	1
	Potato-pea	1/2 katori
Evening Tea	Tea	2 cup
Dinner	Chapati	1
	Potato-Peas	2 tb.sp.
4.1.88		
Early Morning	Tea	2 cup
Breakfast	Chapati	1/2
	Potatoes-Pea	2 tb.sp.
Mid-morning(ICDS)	Porridge	1/2 katori
Lunch	Chapati	1
	Mustard leaves	2 tb.sp.
Evening Tea	Tea	1 cup
Dinner	Chapati	1
	Mustard leaves	2 tb.sp.

24.3.88	Age group - 5-6 yrs	
Meals	Menu	Cooked Weight
Early Morning	Tea	1 cup
Breakfast	Chapati	1/2
	Green gram Dal	2 tb.sp.
Mid-Morning(ICDS)	Porridge	1/2 katori
Lunch	Chapati	2½
	Mustard leaves	1/2 Katori
Evening Tea	Tea	1 glass
Dinner	Chapati	1½
	Mustard leaves	3 tb.sp.
	Milk	1/2 cup
25.3.88		
Breakfast	Tea	1 glass
	Chapati with salt	1
Mid Morning(ICDS)	Porridge	1/2 katori
Lunch	Chapati	2
	French Beans	1/2 katori
Evening Tea	Tea	½ glass
Dinner	Chapati	1½
	French Beans	3 tb.sp.
26.3.88		
Early Morning	Tea	1 glass
Breakfast	Chapatiwith salt	1
	Tea	1 glass
Mid-morning(ICDS)	Porridge	3/4 katori
Lunch	Chapati	2
	Carrot-potato	1/2 katori
Evening Tea	Tea	1 glass
Dinner	Chapati	2
	Carrot-Potato	1/2 katori
27.3.88		
Breakfast	Chapati with salt	1
	Tea	1 glass
Mid Morning(ICDS)	Sunday	
Lunch	Chapati	1
	Brinjal-Potato	2 tb.sp.
Evening Tea	Tea	1 glass
Dinner	Chapati	1½
	Brinjal potato	2 tb.sp.

28.3.88		
Breakfast	Chapati	1½
	Potato	2 tb.sp.
	Tea	1 glass
Mid-morning(ICDS)	Porridge	1/2 katori
Lunch	Chapati	1½
	Potato-turnip	3 tb.sp.
Evening Tea	Tea	1 glass
Dinner	Chapati	1½
	Potato-Turnip	4 tb.sp.
29.3.88		
Breakfast	Chapati	1½
	Curd	2 tea sp.
	Tea	1 glass
Mid-morning(ICDS)	Absent	
Lunch	Tea	1 glass
	Chapati	2
	Cauliflower-Potato	3 tb.sp.
Evening Tea	Tea	1 glass
Dinner	Chapati	2
	Cauliflower-potato	4 tb.sp.
30.3.88		
Breakfast	Tea	1 glass
	Chapati	1½
	Mustard leaves	2 tb.sp.
Mid-Morning(ICDS)	Porridge	1/2 Katori
Lunch	Chapati	2
	Mustard leaves	2 tb.sp.
Evening Tea	Tea	1½ cup
Dinner	Chapati	1½
	Mustard leaves	3 tb.sp.

APPENDIX III

General information, Anthropometric measurements and Nutrient intake of the child.

Subject No.	Birth Order	Family Member	Income (Rs)	Duration of Breast feeding (yrs)	Age (yrs.)	Weight (Kg.)	Height (cms)	Arm circum (cms)
1	4.00	8.00	1000.00	3.00	2.30	13.75	99.50	16.00
2	2.00	5.00	600.00	2.00	4.00	14.25	102.00	14.00
3	3.00	6.00	600.00	2.00	4.00	15.00	104.00	18.00
4	4.00	6.00	600.00	1.50	3.30	12.00	97.00	18.00
5	5.00	7.00	900.00	1.50	2.00	12.00	93.00	13.00
6	4.00	7.00	900.00	2.00	4.00	12.00	102.00	19.00
7	4.00	8.00	1000.00	2.00	4.50	15.00	108.00	16.00
8	3.00	7.00	900.00	2.00	5.00	16.00	120.00	17.00
9	4.00	6.00	800.00	1.50	5.00	15.00	140.00	20.00
10	3.00	6.00	1000.00	1.50	5.00	13.00	100.00	20.00
11	4.00	7.00	800.00	.50	4.00	11.50	92.00	20.00
12	4.00	7.00	900.00	3.00	2.00	11.50	90.00	18.00
13	5.00	7.00	1000.00	1.00	2.00	9.70	80.00	16.00
14	6.00	9.00	1000.00	1.50	2.00	9.50	75.00	16.00
15	5.00	7.00	800.00	1.00	2.50	9.70	80.00	16.00
16	2.00	5.00	600.00	1.50	2.00	9.70	87.30	16.00
17	4.00	8.00	800.00	1.00	2.50	10.00	87.30	16.00
18	4.00	7.00	500.00	.80	2.50	9.80	83.00	16.00
19	2.00	4.00	800.00	3.00	5.00	12.50	100.00	18.00
20	1.00	4.00	500.00	.70	1.80	11.00	79.00	15.00
21	2.00	5.00	500.00	1.50	2.50	10.50	82.00	14.50
22	2.00	4.00	300.00	2.00	3.20	12.30	90.00	18.00
23	4.00	6.00	500.00	0.00	2.50	10.00	88.00	15.00
24	5.00	8.00	800.00	1.00	1.50	9.50	72.00	20.00
25	1.00	5.00	600.00	1.50	4.50	15.00	105.00	20.00
26	3.00	5.00	700.00	2.50	3.00	13.00	99.00	15.00
27	1.00	5.00	750.00	1.00	4.00	10.00	78.00	14.00
28	1.00	6.00	700.00	2.50	4.00	12.00	100.00	16.00
29	2.00	6.00	700.00	1.50	2.50	10.00	82.00	14.00
30	3.00	7.00	600.00	1.50	4.00	14.00	111.00	14.50
31	4.00	7.00	600.00	1.50	2.00	11.50	96.00	13.50
32	3.00	5.00	900.00	1.50	1.50	9.00	75.00	14.00
33	2.00	5.00	900.00	1.50	4.00	11.50	91.00	15.00
34	1.00	5.00	900.00	1.00	5.50	19.50	113.00	18.00
35	3.00	5.00	1200.00	1.50	2.00	11.00	93.00	13.00
36	4.00	9.00	800.00	2.00	4.00	9.50	77.00	15.00
37	4.00	9.00	800.00	2.00	5.00	13.00	100.00	16.00
38	2.00	6.00	1200.00	1.30	2.50	12.50	92.00	15.00
39	3.00	6.00	1200.00	4.00	4.00	7.00	63.00	14.00
40	1.00	5.00	900.00	2.00	4.00	14.00	98.00	14.00
41	2.00	5.00	700.00	1.50	1.50	7.00	60.00	14.00
42	1.00	5.00	900.00	3.00	4.00	12.50	89.00	18.00
43	3.00	5.00	800.00	1.00	2.00	10.00	79.00	13.00
44	5.00	7.00	600.00	1.30	1.50	9.50	79.00	14.00
45	2.00	5.00	600.00	2.00	5.00	14.50	98.00	16.00
46	3.00	5.00	600.00	1.00	2.50	11.00	86.00	15.00
47	4.00	12.00	1400.00	1.50	2.50	10.50	82.00	14.00
48	2.00	5.00	700.00	2.00	5.00	15.00	113.00	16.00
49	1.00	5.00	500.00	2.00	5.50	13.00	99.00	15.00
50	1.00	5.00	750.00	1.50	4.00	12.50	88.00	14.00

P.T.O

Subject No.	Head Circum (cms.)	Chest Circum (cms.)	Sex	ICDS Energy (Cal.)	ICDS Protein (g)	ICDS Vit. A (I.U)	ICDS Iron (mg.)	WSN Energy
1	52.00	56.00	0.00	120.00	2.00	94.00	.60	1096.00
2	50.00	52.00	1.00	115.00	2.00	91.00	.30	995.00
3	56.00	54.00	1.00	117.00	3.00	180.00	.50	1308.00
4	50.00	50.00	1.00	78.00	2.00	71.00	.30	761.00
5	50.00	50.00	1.00	70.00	2.00	71.00	.30	635.00
6	51.00	52.00	0.00	70.00	3.00	140.00	.10	845.00
7	56.00	56.00	1.00	96.00	2.00	92.00	.60	799.00
8	54.00	60.00	1.00	110.00	2.00	207.00	.70	929.00
9	56.00	54.00	1.00	99.00	2.00	70.00	.60	884.00
10	52.00	52.00	1.00	91.00	2.00	81.00	.40	835.00
11	52.00	52.00	0.00	87.00	1.00	65.00	.50	714.00
12	54.00	54.00	1.00	79.00	1.00	65.00	.50	633.00
13	50.00	54.00	0.00	79.00	2.00	79.00	.60	639.00
14	50.00	48.00	1.00	52.00	1.00	31.00	.20	506.00
15	50.00	56.00	0.00	68.00	1.00	65.00	.50	456.00
16	50.00	50.00	0.00	64.00	1.00	65.00	.50	623.00
17	52.00	43.00	0.00	79.00	2.00	59.00	.30	552.00
18	51.00	48.00	0.00	98.00	2.00	169.00	.70	791.00
19	50.00	50.00	0.00	87.00	2.00	60.00	.50	568.00
20	50.00	45.00	1.00	32.00	1.00	40.00	.20	511.00
21	47.00	50.00	1.00	92.00	2.00	80.00	.70	710.00
22	54.00	52.00	0.00	126.00	3.00	191.00	.80	789.00
23	52.00	50.00	1.00	99.00	2.00	70.00	.60	635.00
24	48.00	52.00	0.00	54.00	1.00	78.00	.70	718.00
25	50.00	54.00	0.00	113.00	2.00	118.00	.60	572.00
26	46.00	53.00	1.00	97.00	2.00	5.00	.60	567.00
27	48.00	48.00	1.00	112.00	2.00	6.00	.70	897.00
28	52.00	50.00	1.00	119.00	2.00	6.00	.80	788.00
29	48.00	49.00	0.00	90.00	1.00	5.00	.60	524.00
30	52.00	56.00	1.00	115.00	2.00	6.00	.80	738.00
31	51.00	49.00	1.00	64.00	.90	3.00	.40	650.00
32	49.00	47.00	1.00	112.00	2.00	6.00	.70	496.00
33	51.00	50.00	1.00	60.00	1.00	3.00	.40	539.00
34	54.00	56.00	1.00	122.00	2.00	7.00	1.00	852.00
35	50.00	52.00	1.00	97.00	2.00	5.00	.60	441.00
36	48.00	50.00	0.00	90.00	2.00	5.00	.60	660.00
37	51.00	48.00	1.00	124.00	2.00	7.00	.80	850.00
38	51.00	51.00	0.00	124.00	2.00	7.00	.80	1034.00
39	45.00	44.00	1.00	95.00	2.00	4.50	.70	670.00
40	50.00	50.00	1.00	112.00	2.00	6.00	.70	508.00
41	42.00	42.00	0.00	107.00	2.00	6.00	.70	500.00
42	51.00	52.00	0.00	90.00	1.00	5.00	.60	699.00
43	47.00	47.00	1.00	150.00	2.00	77.00	1.00	608.00
44	47.00	47.00	0.00	106.00	2.00	6.00	.70	501.00
45	51.00	51.00	1.00	126.00	3.00	7.00	1.00	935.00
46	45.00	47.00	0.00	97.00	2.00	5.00	.60	436.00
47	48.00	51.00	1.00	84.00	1.00	5.00	.40	664.00
48	50.00	54.00	0.00	112.00	2.00	6.00	.70	813.00
49	51.00	53.00	1.00	56.00	2.00	7.00	.80	865.00
50	51.00	49.00	0.00	90.00	1.00	5.00	.60	608.00

0 - female
1 - Male

P.T.O

Sbject. No.	WSN			WOSN			
	Protein	Vitamin A	Iron	Energy	Protein	Vit. A	Iron
1	26.00	1497.00	29.00	775.00	25.00	771.00	14.00
2	27.00	567.00	11.00	1272.00	28.00	1230.00	10.00
3	26.00	1720.00	20.00	888.00	21.00	1206.00	5[illegible].00
4	17.00	515.00	11.00	673.00	17.00	881.00	15.00
5	15.00	919.00	11.00	615.00	16.00	855.00	11.00
6	22.00	1360.00	15.00	753.00	19.00	1293.00	32.00
7	18.00	1557.00	18.00	786.00	17.00	1208.00	18.00
8	22.00	1581.00	17.00	880.00	26.00	1365.00	15.50
9	18.00	991.00	15.00	500.00	11.00	735.00	18.00
10	17.00	1017.00	8.00	802.00	16.00	1094.00	11.00
11	15.00	1308.00	14.00	623.00	13.00	617.00	13.80
12	11.00	1184.00	10.00	526.00	12.00	947.00	10.30
13	15.00	1538.00	15.00	941.00	20.00	1272.00	16.00
14	12.00	1344.00	13.00	528.00	12.00	729.00	9.00
15	11.00	1172.00	12.00	523.00	10.00	516.00	7.00
16	15.00	1208.00	14.00	653.00	12.00	648.00	7.00
17	14.00	1310.00	38.00	523.00	14.00	1275.00	5.00
18	17.00	1365.00	14.00	523.00	14.00	1180.00	15.00
19	15.00	788.00	12.00	469.00	13.00	704.00	9.00
20	8.00	697.00	5.00	425.00	12.00	868.00	11.00
21	19.00	687.00	10.00	593.00	17.00	1226.00	16.00
22	19.00	794.00	9.00	436.00	16.00	166.00	6.20
23	14.00	1064.00	11.00	379.00	8.00	377.00	4.40
24	22.00	830.00	3.00	729.00	23.00	857.00	12.00
25	14.00	712.00	10.00	452.00	1.00	437.00	7.00
26	18.00	601.00	8.00	405.00	8.00	695.00	7.00
27	16.00	1329.00	13.00	697.00	18.00	1188.00	13.00
28	21.00	944.00	16.00	646.00	18.00	46.00	13.00
29	11.00	706.00	7.00	466.00	9.00	857.00	6.00
30	20.00	209.00	14.00	601.00	17.00	136.00	25.00
31	12.00	766.00	8.00	416.00	9.00	1055.00	8.00
32	10.00	687.00	6.00	311.00	7.00	340.00	4.00
33	13.00	627.00	9.00	490.00	12.00	1196.00	12.00
34	22.00	701.00	19.00	708.00	22.00	785.00	16.00
35	6.00	135.00	7.00	322.00	9.00	88.00	7.00
36	14.00	1030.00	9.00	487.00	10.00	1040.00	37.00
37	24.00	723.00	18.00	786.00	22.00	1060.00	21.00
38	26.00	481.00	17.00	725.00	20.00	512.00	14.00
39	15.00	950.00	9.50	500.00	9.00	1100.00	35.00
40	14.00	141.00	9.00	380.00	11.00	132.00	8.00
41	10.00	700.00	6.50	575.00	10.00	1100.00	4.00
42	18.00	570.00	5.00	524.00	15.00	594.00	20.00
43	15.00	473.00	8.00	531.00	13.00	635.00	18.00
44	10.00	701.00	6.00	550.00	10.00	1093.00	4.00
45	26.00	880.00	20.00	821.00	24.00	14.00	25.00
46	10.00	162.00	6.00	424.00	9.00	167.00	5.00
47	17.00	1304.00	7.00	439.00	12.00	654.00	6.00
48	22.00	1122.00	19.00	565.00	17.00	386.00	12.00
49	25.00	1244.00	23.00	770.00	20.00	579.00	16.00
50	14.00	504.00	6.00	401.00	9.00	528.00	5.00