

**Nutritional Outcomes of Nutritious Lunch on  
Selected 5-8 Year Old Children at  
Annai Sharada Primary School**

BY  
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# **Introduction**

## INTRODUCTION

"A child is one of God's most wonderful creations. The extent to which a child can think and observe is really wonderful. If we are alert to them, children can be a whole new fascinating world"-

Indira Gandhi.

Children are the most precious wealth of any country. As the vanguards and supreme powers of the world of tomorrow, they are important development factors.

Children in India form a large and significant percentage of the population. As per the country census, (1981) of the total national population of 683 million, 270 million or 40% are below the age of 15 years. Of this 16%, i.e. 109 million are below 6 years.

In India there is a widespread undernutrition and malnutrition and children are the worst sufferers. A majority of India's 270 million children live in impoverished, economic, social and environmental conditions which impede their physical and mental development. (ICDS, 1984).

Malnutrition adversely affects not only physical but also the mental performance and psychomotor activity in children with severe muscle wasting. It is an age old scourge, where most malnutrition is invisible to the parents.

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India which has more children than all the 46 countries of Africa, has majority of these children living in poverty. One in three is born underweight, one in seven die before the age of five and an estimated three million die each year from conditions which could be prevented easily by proper nutrition and health care. (UNICEF 1985).

Survey data in India (Gopalan 1980) indicate that 100 million children suffer from protein calorie malnutrition and more than 10 million of them from severe protein calorie malnutrition, which is normally fatal if untreated.

Out of 100 million children of the age 1-5 years in India, some eight million have Vitamin A deficiency symptoms including night blindness. It is estimated that 0.5 million below the age of 15 years are blind, and 10-15 per cent pre school children suffer from blindness entirely due to Vitamin A deficiency, which could be easily avoided. (Nutrition News, 1981).

Sen, (1981) points out from a country wide nutrition survey on preschool and school going children that heights and weights of 90 per cent <sup>OF</sup> these children were below the tenth percentile values of American children of corresponding age.

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Today nutrition and health of the masses are recognised as important factors of socio-economic and national development with special reference to the vulnerable groups.

Under-nutrition can lead to mental apathy, and psychological disturbance like irritability, lack of interest in the surroundings, reduced attention span and lowered problem solving capacity in children. Also any damage that occurred during the vulnerable period of school years is bound to result in serious consequences in later years. Besides this a hungry child cannot concentrate and achieve much academically.

Various programmes are in operation in Tamil Nadu to fight out malnutrition. One such programme as part of the Sixth five year plan, is Honourable Chief Minister's Nutritious Noon meal programme launched by Government of Tamilnadu on July 1st 1982. The current programme is to feed the children in the age range of 2<sup>+</sup> to 14<sup>+</sup> years, below the poverty line on all 365 days except on government holidays.

This massive nutrition programme was initiated by Tamil Nadu Chief Minister with the objectives of providing 1/3 of recommended dietary allowance, of developing and

leading a casteless society and increasing the attendance of the children. This was launched not only to improve the health and nutritional status of the children but also their social environment at a cost of nearly 120 crores per year.

A similar attempt of providing a nutritious lunch at a nominal cost was started by Sri Avinashilingam Education Trust Institution from 18th December 1985 at Annai Sharadha Primary School. Nutrition education was built in this programme to make the results long lasting.

The present research study was designed with the following objectives:

A) To assess the nutritional status of the 14 children participating in the nutritious lunch programme, before and after against a control group of 14 children using the parameters of:

1. Height, weight measurements and mid upper arm circumference.
2. Haemoglobin levels.
3. Clinical picture.
- and 4. Food consumption pattern.

B) To find out the opinion of the parents of the participating children and the children about the nutritious lunch offered in the school.

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- C) To study the nutritional knowledge of the children,
- and D) Impart nutrition education to the target group and assess its impact.

## **Review of Literature**

## II. REVIEW OF LITERATURE

The available literature relevant to this study was collected and discussed under the following headings.

- A. Nutritional Status of School going children
- B. Need for noon meal programme
- C. Parameters to assess the nutritional status
- D. Combating malnutrition through Nutrition Education.

### A. Nutritional Status of School Going Children:

The nutritional well-being of community or nation is an important determinant of its health status. Malnutrition, arising from inadequate food supply is a major cause of illness and most serious human health and social problems among children in India and other developing countries. (Sabary 1979, Krishnamoorthy, 1980 and Gupta, 1981).

Protein - Calorie malnutrition in early childhood is a dangerous problem. Severely malnourished children do not exceed 2-5 per cent of the child population in a community while 60-70 per cent of the children suffer from mild to moderate malnutrition presenting varying degrees

of growth retardation. So it is the plight of these hungry malnourished children of our times that call for greatest effort to combat malnutrition. (Ramalingaswamy, 1981 and Shivaleela, 1983).

Chopdar and Samal, (1979) in their study graded the 6,252 children according to weight for age. It was found that 42.2 per cent were graded normal, 31.46 per cent as grade I, 16.4 per cent as grade II, 4.78 per cent and 1.99 per cent as grade III, and IV malnutrition respectively.

The prevalence of malnutrition among 6,000 children was studied in Coimbatore and the deficiency symptoms manifested were vitamin A deficiency, (197 cases) Riboflavin deficiency, (51 cases) protein - calorie - malnutrition, (205 cases) phrynoderma, (22 cases) and anaemia (98 cases). (Vijayalakshmi et al., 1975).

About one million children suffer from Vitamin A deficiency in India at any point of time. A recent estimate shows that atleast 2,50,000 children are blind in India from Xerophthalmia or keratomalacia. (WHO, 1979 and Bhaskaran, 1981).

In a study of rural children near Coimbatore showed that 25 per cent of children manifested clinical signs

of Vitamin A deficiency and 12.5 per cent showed bitot spots. Saroja, (1980). Similar results have been shown by Sinha, (1980) who pointed out that 10-15 per cent of children show signs of vitamin A deficiency.

Rao and Sastry, (1986) found that nutritional morbidity in terms of prevalence of nutritional deficiency signs exhibited the usual pattern. The conditions of A vitaminosis and B complex deficiencies were the most common deficiency signs, encountered in all the age groups. The highest prevalence was seen among women 40 per cent followed by school age children 34 per cent. Similar study by Easwaran et al., (1976) showed that morbidity pattern 49 per cent was due to nutritional disorder. Besides 40 per cent mild to moderate vitamin A deficiency 30 per cent angular stomatitis 22 per cent, bowlegs and knock knees 41 per cent were common.

Thus, the present profile of malnutrition is alarming. It indicates both the urgent need for the formidable tasks involved in establishing speedy and cost effective measure for the delivery of basic health and nutrition service to the enormous number of vulnerable and largely inaccessible children. (Swaminathan, 1981 and Shivaleela, 1983).

**B. Need for Noon Meal Programmes:**

Poverty in India as anywhere else in the 3rd world is very ultimately linked with the needs of the children as hunger and malnutrition are the most striking and distributing manifestation of poverty affecting children more than adults. 40-50 per cent of the population in this country live below the poverty line. (Donoso 1978, Devedas 1979 and Swaminathan 1979).

Dominant malnutrition in large population appear to be due to ineffective use of proteins which in turn due to ineffective intake of food, energy or calories. All these relates to problem of inadequate income. Thus malnutrition in children get accentuated by poverty. (Berg, 1981 and Vijayaraghavan, 1981).

Nabarro, (1984) says that on frequent observation of children in less developed countries are particularly prone to the dangerous combination of under-nutrition, and illness had prompted the establishment of health and nutrition feeding programmes that focus on the needs of small children as a vulnerable group.

Sen, (1984) points out that many nutrition intervention programmes are launched to combat the widespread malnutrition among vulnerable sections of society specially children.

One such programme is the school feeding programme which has become catalytic agent for social change and serve as entry points for improving the quality of life of present and future generations of the disadvantaged (Artwood, 1979).

The Chief Minister's Nutritious Noon Meal Scheme was introduced in July 1982 for the benefit of the poor rural children in the age group of 2<sup>+</sup> to 14<sup>+</sup> years with a multiprolonged attack on nutrition, poverty and illiteracy. The impact of this scheme on children from Sri Avinashilingam Home Science College, Coimbatore, claims that the nutritious standards of the children fed with Nutritious Noon Meal has increased. (Mohanasundaram, 1985).

Kumari, (1985) who initiated the Delhi experiments showed the striking effectiveness of tackling the problems of malnutrition in the most vulnerable groups. The nutritional status of 85.8 per cent of severely malnourished children was brought to normal or near normal by supplementary feeding.

Number of feeding days in a school and physical measurements of the children, showed a high correlation.

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With an increase in the number of feeding days, nutritional status improved significantly. Analysis of data using 3 indices, weight for age, height for age and weight for height showed that a large number of children 6 to 7 per cent more fall into the category of 'normal' in high programme efficiency schools when compared to low programme efficiency schools. (Kewal, 1981).

C. Parameters to assess the Nutritional Status:

a. Anthropometry:

Healthy child is one which is free from any disease and has achieved an optimum level of physical, mental and emotional growth. To achieve this the child must necessarily receive the required amount of nutrition while it is still unborn and continue even after its birth. (Merchant, 1983).

Studies carried out by the national institute of nutrition on a large number of well to do and well fed children infact, revealed that heights and weights of these children are similar to those of American children between the ages of 3-14 years in the case of boys and 5-12 years in the case of girls. These studies prove that better environment can bring about growth. (Nair 1979).

Baswaran and Devedas (1984) in their studies on children of 6-12 years old in Coimbatore revealed that height, weight, arm circumference and triceps skinfold thickness measured in 1978 when compared with those of children of the same ages in 1970 or 1974, showed that growth was related directly to intake of nutrients and growth over 4 years was satisfactory in relation to USA per centiles. Secular trends in height and weight over 8 years, showed a definite increase.

Study on 1105 children of 5-12 years old from 9 elementary schools by (Woodham, 1981) in Andhra Pradesh showed 4.6 per cent of boys and 6.3 per cent of girls weighed more than 80 per cent of the Harvard standard body weight and 25.9 per cent of boys and 32 per cent of girls were more than 90 per cent of the Harvard Standard height. Of the boys 8.6 per cent and of the girls 9.4. per cent had 60 per cent or less of Harvard body weight. Of the boys 25.9 per cent and of the girls 32 per cent had 91 per cent or more of the Harvard height, none had less than 71 per cent of the standard height.

A semi longitudinal investigation of 9 anthropometric measurements was undertaken on a sample of 905 normal Filipino children of good socio-economic status

4-12 years old. Boys were taller than girls from age 4.5 to 7 years, at which time the girls were the taller. Boys were heavier upto 7.5 years of age, from 8 years of to 12 years of age, the girls were the heavier (Baltazar, 1982).

Height, head circumference and chest circumference on children were found to be in normal range of ICMR standard. In case of weight, 17 per cent of age group 6-8 years, 38 per cent boys and 20 per cent girls of age group 9-12 fall in 61-74 per cent of the ICMR standard category. (Chitre et al., 1983).

## 2. Clinical Assessment:

Rao, (1976) says that clinical findings reflect the nutritional status of the persons examined, Nadiger and Krishnasachari, (1979) recorded monthly clinical examinations made on 165 boys, 5-15 years old and nutritional deficiency signs for one year. The major deficiency signs monitored were bitot spots, glossitis, angular stomatitis, cheilosis, nasolabial dissebacea and phyrmoderma.

Devadas et al., (1980) on examining the clinical picture of children registered in 3 medical centres in Coimbatore city showed the main cause of morbidity were

infection of upper and lower respiratory and gastro intestinal origin, the main nutritional disorders were Kwashiorkor, marasmus, anaemia and vitamin A deficiency.

Studies by Devadas et al., (1979) in 6 villages of Coimbatore, giving a low cost vegetable protein mixture to 200 children in the age group of 5 to 8 years showed lower incidence of Vitamin A deficiency and angular stomatitis. Similarly with the help of 35 multipurpose health workers and 9 supervisors organized education programmes in 76 villages of South Arcot District showed improvement of the clinical picture of 1,000 children eg. lacklustre hair reduced from 40 to 19 per cent (Devadas and Premakumari, 1983).

Clinical evidence of Vitamin A deficiency was observed in 2 children, Vitamin B Complex and Vitamin C deficiency was not detectable. Clinically Protein - Calorie Malnutrition was noted in 2 children. One was having oedema and other one having glossitis with moon face. Thus clinical assessment reveal negligible incidence of different deficiencies suggesting possibility of some type of adaptation process in human subjects (Chitre et al., 1983).

### 3. Haemoglobin Level:

This indicates the nutritional status of the individual person being examined.

Malhotra and Rao, (1984) showed in their studies of 6 primary schools in Maharashtra, in children of 6-14 years old that out of 280 boys 3 had 8g/100 ml, 75 had 8 to 9.9 g/100ml, 111 had 10 to 11.90 g/100ml and 91 had 12g/100 ml or over. Corresponding numbers for girls were 1, 48, 93 and 74. Hence it was seen that about 2/3rd of all children had some degree of anaemia which relates to low intake of iron rich foods.

Indian children with blood Haemoglobin values 6.1 to 10.9 g/100ml were given supplementary Vitamin B<sub>12</sub> and folic acid 250 mg, without or with 5, 10, 20 or 40 mg iron. There was a significant rise in Haemoglobin, after feeding with Vitamin B<sub>12</sub> and folic acid with or without iron. The greatest increase in Haemoglobin was in those given the Vitamin plus 40 mg iron. Children with Haemoglobin values equal to or greater than 11g/100ml showed no response to the vitamin and iron supplement (Singla et al., 1985).

The prevalence of deficiency anaemia were studied in 617 apparently healthy urban and 493 rural school

children 5 to 15 years old, in Varanasi. They were randomly divided into 2 groups, one received haematinic preparation containing iron, folic acid, vitamin B<sub>12</sub> and ascorbic acid on school days for 10 weeks; the other group was given placebo during the same time. On estimation 33.8 per cent of the urban and 69.7 per cent of the rural school children were anaemic (Single et al., 1980).

Study by Devadas et al., (1977) by giving a mixture of sunflower meal, maize, roasted bengal gram flour and sesame in the ratio 65:15:10:10 and assessing the growth on 50 school children participating in school lunch programme showed a higher increment in haemoglobin value when compared against 50 control group children.

#### 4. Food Consumption Pattern:

The main objectives of food consumption pattern helps to know the food habits, overall food supply and the cost of foodstuffs, the actual quantities of individual foods consumed, and the loss or waste of individual foods, and lastly the average daily intake of essential food nutrients per person (Beaton and McHenry, 1966).

Marchione, (1981) indicates that children's diet are poorer than diets of others in the household. This is mainly implied by the ignorance coupled with influences on behaviour, ignorance coupled from cultural beliefs (taboos) undermines child health and nutrition when household resources are supposedly adequate (Araya, 1981).

Study by Pushpamma et al., (1983) on the food intake of 341 school children living in rural areas, by 3 day weighment method showed, deficit in all foodstuffs except cereals. Except for protein, intake of all nutrients and energy was less than the recommended allowances for both the age groups. The most deficient nutrients were vitamin C, A, Calcium, riboflavin and iron.

Malhotra and Rao, (1984) pointed out in their study on the nutrient intake of 6 to 14 years old children from 6 primary schools that, on average for all 99 children, they got nearly the recommended intake of cereals, less than that of pulses other vegetables, fruits and sugar and jaggery and much less than of leafy vegetables, milk fats and oils. Protein intake was below the RDA by only 2.7 per cent and iron by 1.8 per cent. Average intake of energy was below the recommended intake by 33 to 39 per cent.

Thus it is seen that the quality of life of most children remain sadly below the standards and hence a group of majority of these children have incidence of malnutrition and nutrition related diseases, leading to temporary or irreversible disabilities and low literacy rates coupled with high rates of school dropouts. So the present position calls for an urgent need for the formidable task in establishing a speedy and cost-effective measure to wipe out the prevalence of malnutrition and deficiency diseases, namely by nutrition education (ICDS, 1984).

D. Combating malnutrition Through Nutrition Education:

Sankey, (1974) defines nutrition education as a multidisciplinary process that involves the transfer of information, the development of motivation and the modification of food habits when needed. It must form the bridge that carries appropriate information from the research and development laboratories to the public, the ultimate user. Ramos, (1977) says that it involves bringing about a change from undesirable to desirable food habits.

Nutrition education has an important part to play in any programme of nutrition improvement. The strategy of nutrition education should be to improve the existing

diets in the home. Deliberate and sustained nutrition education has been recognized as a potent weapon for prevention and control of malnutrition. Panikkar, (1973) and Murthy, (1982). Devadas et al., (1981 and 1982) have rightly pointed out that nutrition education is an important ingredient of good family living. Ignorance is one of the root causes of disease, which call for education in the rural areas. Nutrition education is considered as an investment in human resources development.

Nutrition education involves teaching the individual the essential nutrients in an adequate diet. But what is to be taught must include more than a list of dietary requirements or allowance for individual nutrients (Foods and Nutrition Board, 1980).

The primary aims of nutrition education is to bring the nutrition knowledge of each individual to the point where he makes the wisest choice of food within the existing limitations, and changes in eating habits, attitudes and values with regard to food (Robson, 1972 and Devadas et al., 1982).

In spite of this Parham (1980) says that nutrition education can increase motivation to take nutrient needs seriously and can improve well-being but, it cannot undo the previous effect of long term dietary practices.

nutrition education.  
increase in food and nutrient intake of children after  
Nurthy et al., (1975). They showed that there was an  
namely a week, similar effects have been shown by  
by the pupils using a schedule at an interval of time  
had increased in their families. The knowledge gained  
foods, green leafy and other vegetables and fruits a  
after nutrition education, consumption of protein rich  
nutritional practices. Devadas et al., (1973) noted that  
feeding programme had improved considerably, their  
mothers of the school children, who participated in the  
Kamalanathan et al., (1970) have reported that

## **Methodology**

### III METHODOLOGY

The steps involved for studying the nutritional outcomes of the nutritious lunch are as follows:-

- A. Selection of the sample
- B. Survey of Background Information and Dietary Practices of the Target Group
- C. Parameters Used for Assessing the Nutritional Status of the Participating Children before and After against a Control Group.
  1. Height, weight measurements and mid upper arm circumference
  2. Haemoglobin estimation
  3. Clinical Examination
  - and 4. Food consumption.
- D. Eliciting views of the participating children and their parents regarding the nutritious lunch programme.
- E. Planning and implementing the nutrition education programme for the children.
- F. Evaluating the impact of the nutrition education programme.

**A. Selection of the Sample.**

The Sample for the study were selected from Annai Sharadha Primary School in Coimbatore town between the age group of 5-8 years. Totally a sample of 28 were selected. Fourteen of the 28 samples voluntarily participated in the nutritious lunch programme and acted as participants. The remaining 14 acted as control group for comparison. Among the participants except for two, the rest were females, while in the non-participants except one, all were females, the reason being that the school catered primarily to girl students.

**B. Survey of Background Information and Dietary Practice of the Target Group.**

The background information and dietary practices of the target group was obtained by direct interview from their parents using a questionnaire as in Appendix. (I).

**C. Parameters used for Assessing the Nutritional Status of the Participating Children before and after against Control Group.**

**1. Height, weight measurements and mid upper arm circumference.**

Height, weight measurements along with mid upper arm circumference have been found to be an objective tool for

evaluating growth and nutritional status (Srikantia 1976 and Josefina et al., 1983).

a. Weight.

The weights of the selected children were taken with a detecto type balance, using internationally accepted standard procedures given by Jelliff, (1966) and National Academy of Science, NAS (1974). The weights were taken at the start and towards the end of four months period. The balance is checked constantly against standard weights and weights recorded to correct 0.5 kg. The weights for both the experimental and control group were taken at the last week of both periods.

b. Height.

Height is a linear measure of one dimension and it is an overall measure of body size says Illingworth, (1973). The heights of all the subjects were taken at the beginning and end of the four months period. The straight wall in the class room was chosen and a fibre glass tape marked in Cm was pasted against the straight wall. The child was made to stand on the floor, with bare heels, buttocks and shoulders touching the wall. The head was held comfortably erect and the arms were hanging at the

sides in the natural manner. A sturdy wooden block was then brought to the crown of the head and the measurement noted to the nearest 0.1cm.

**c. Mid upper arm circumference:**

The mid upper arm circumference abbreviated as arm circumference or arm girth has been suggested as one useful public health index of protein calorie malnutrition for the assessment of the nutritional status (Jelliffe, 1966), and Jelliffe and Jelliffe, 1969).

The mid upper arm circumference was taken for all subjects using fibre glass tape. The left arm was measured at its mid point while hanging freely to the nearest 0.1cm. The arm circumference was measured for the entire sample at both the periods.

**2. Haemoglobin Estimation.**

The blood samples for haemoglobin estimation was collected by finger method and estimated using the standardized procedure of cyanmethaemoglobin. Appendix (II).

**3. Clinical Examination.**

All the 28 subjects taken for the study were clinically examined for signs of deficiency diseases, with a clinical assessment form given in Appendix (III).

#### 4. Food Consumption.

Food consumption of all the subjects in the control and experimental group were quantified by the weightment of cooked foods consumed for three consecutive days (Appendix (IV)). The raw equivalents for the cooked food consumed were arrived at and mean daily food intake was computed. Plate wastage if any was taken into account Mean daily nutrient intake was arrived at making use of the nutritive value of Indian Foods, Gopalan, et al., (1984).

#### D. Eliciting views of Children and their Parents Regarding the Nutritious Lunch Programme:

The views and opinion of children and their parents were studied by sending the questionnaire Appendix (V) through the children with a personal request to fill the questionnaire. It was encouraging that the response from the parents was 100 per cent.

#### E. Nutrition Education:

The nutrition knowledge of the children was assessed using a questionnaire, Appendix (VI).

Nutrition education was given for a period of 10 days incorporating the following simple nutrition messages.

1. Link between nutrients and optimum health.
2. Components of a balanced diet.
3. The basic five food groups.
4. Role of nutrients in body functions.
5. What happens when the nutrients are deficient or lacking in the diet-nutritional deficiency diseases.
6. Role of kitchen and school garden.

The above messages were given with the use of audio visual aids in the form of charts and posters.

**E. Evaluating the impact of the nutrition education programme.**

The awareness of the basic facts about nutrition was assessed through administering the same questionnaire given at the entry point.

## **Results and Discussion**

#### IV. RESULTS AND DISCUSSION

The data obtained in this study were tabulated and discussed under the following heads.

- A. Background information of the children in the control and experimental group.
- B. Nutritional status of the control and experimental group at the entry point, and
- C. Impact of the nutritious lunch programme after a period of four month in terms of
  - 1. Nutritional status of children
  - 2. Nutrition education
  - 3. Nutritional knowledge on the part of the parents and children.

A. Background information of the children in the control and experimental group.

Based on the monthly per capita income, of the 14 in the control group 43 per cent belonged to middle income group while the rest were in the high income group. The experimental group also showed a similar picture.

The family size of the children in the study ranged between 3-6 members. Families with 6 members had their grand parents staying with them.

It was interesting to note that none of the mothers were illiterate, while a majority of them attained high school education and a few as to primary or college education. The fathers of 10 children in the control and 12 in the experimental group had college education while the remaining had only high school education.

B. Nutritional status of the control and experimental at the entry point.

1. Measurement of height, weight and mid upper arm circumference.

Table I shows the height, weight and mid upper arm circumference of the control and experimental group taken at the entry point.

TABLE - I

HEIGHT, WEIGHT AND MID UPPER ARM CIRCUMFERENCE OF THE CHILDREN IN THE CONTROL AND EXPERIMENTAL GROUP AT THE ENTRY POINT.

Subject Number	Sex	Income Status	Control Group			Subject Number	Sex	Income Status	Experimental Group			
			Height in (cm)	Weight in (kg)	Mid arm circumference in (cm)				Height in (cm)	Weight in (kg)	Mid arm circumference in (cm)	
5 Years	1.	F	High Income	107.9	14.6	14.7	1.	F	High Income	108.1	15.7	14.1
	2.	F	High Income	103.0	18.2	18.1	2.	F	High Income	106.4	16.0	18.0
	3.	F	Middle Income	107.9	15.2	14.6	3.	F	Middle Income	106.5	16.0	15.2
	4.	F	Middle Income	106.4	15.4	15.4	4.	F	Middle Income	109.3	15.7	15.1
	5.	F	Middle Income	112.2	16.1	14.6	5.	F	Middle Income	110.9	16.2	14.9
ICMR Norms (1961)			112.0	18.6	18.3							
Kawaran and Devadas Norms (1964)			106.5	16.2	15.5							
6 Years	6.	M	High Income	112.7	20.1	15.9	6.	M	High Income	118.7	19.8	15.0
	7.	F	High Income	113.3	17.2	17.0	7.	F	High Income	116.0	17.9	17.0
	8.	F	High Income	119.1	16.7	14.4	8.	F	High Income	120.1	17.5	14.0
	9.	F	Middle Income	115.0	16.6	16.2	9.	F	High Income	125.0	18.6	15.2
	10.	F	Middle Income	119.3	17.0	14.0	10.	F	Middle Income	115.1	17.0	16.0
ICMR Norms (1971)			118.9	22.1	16.7							
Kawaran and Devadas Norms (1964)			117.3	19.9	17.0							
Kawaran and Devadas Norms (1964)			119.6	20.9	16.0							
7 Years	11.	F	High Income	119.6	23.0	17.2	12.	F	High Income	118.3	19.5	15.8
	12.	F	High Income	119.9	18.0	14.5						
ICMR Norms (1971)			122.7	24.8	17.7							
Kawaran & Devadas Norms (1964)			123.7	22.4	15.8							
8 Years	13.	F	High Income	130.7	27.0	14.0	13.	M	High Income	129.9	27.5	18.9
	14.	F	Middle Income	123.3	18.0	18.7	14.	F	High Income	121.1	22.3	15.3
ICMR Norms (1971)			131.5	32.1	16.0							
Kawaran and Devadas Norms (1964)			125.2	24.9	15.9							

29.a.

The height, weight measurements of the children in the control and experimental group were comparable when compared with the ICMR Norms (1971). Children in both the groups were shorter and lighter, while they compared well with the norms recommended by Easwaran and Devadas, (1984) for Coimbatore children. The income status did not make much difference in the height, weight measurements.

2. Clinical Examination:

The prevalence of nutritional deficiency symptoms can be pictured in Table II.

TABLE II

PREVALENCE OF NUTRITIONAL DEFICIENCY SYMPTOMS

S.No.	Deficiency Symptoms	Control Group		Experimental Group	
		Number	Percent	Number	Percent
1.	Healthy and free from disease	10	71	10	71
2.	Dental caries	3	21	3	21
3.	Spongy bleeding gums	2	14	3	21
4.	Pallor of the skin	2	14	3	21
5.	Poor musculature	2	14	2	14



The clinical picture of the control and experimental group at the entry point indicated that 10 out of the 14 children in both the groups were healthy and free from any nutritional deficiency symptoms. The remaining four in both the groups manifested symptoms like spongy bleeding gums, dental caries and pallor of the skin. Two in each of the two groups had poor musculature.

### 3. Food consumption patterns:

The dietary practices of the children indicated the pattern of two major meals namely lunch and dinner with morning breakfast and evening tea. The common breakfast items in both groups was iddli, dosai and chappathi while the lunch was a mixed rice with a seasonal vegetable preparation. The evening tea included a glass of milk or tea with snacks like biscuits. Dinner consisted of items like dosai, vegetable, uppuma or chappathi with a few children having meal with rice. Of the total participants about 8 in the experimental were non-vegetarian and consumed once a week, while the rest 6 were vegetarians. The vegetarians included egg in their dietaries.

The mean day's food intake of the subjects in the control and experimental group included their food consumption at home and also the nutritious lunch provided in the school.

Following Table III gives a comparative picture of the constituents of the nutritious lunch as against the lunch brought by the subjects in the control group.

TABLE III

CONSTITUENTS OF THE NUTRITIOUS LUNCH AS AGAINST HOME LUNCH.

Food-stuffs in gms.	Nutritious lunch.	Lunch brought from home.
Rice	75	70
Dhal	10	10
Green leafy vegetables	25	15
Other vegetables	25	20
Roots and tubers	25	35
Curds	50	50
Oil	10	10

The lunch brought from home by the control group met all the constituents of the nutritious lunch except for rice, green leafy vegetables and other vegetables.

Table IV shows the mean daily food intake of 4-6 year old children.

TABLE IV  
MEAN FOOD INTAKE OF 4-6 YEAR OLD CHILDREN

Foodstuffs	RDA ICMR (1981)	Control group		Experimental group	
		Actual intake	Percent met	Actual intake	Percent met
Cereals	270	140	52	160	59
Pulses	35	34	97	35	100
Green leafy vegetables	50	40	80	50	100
Roots & tuber	20	30	150	25	125
*Fruits	50	180	160	85	170
Milk	250	190	76	210	84
Fats & oils	25	20	80	20	80
Sugar and Jaggery	40	40	100	40	100

\* As per 1968

The mean daily food intake of the 4-6 year old children in the control group met the ICMR recommended allowances for all foods except for cereals, milk and fats and oils. The deficit ranged between 48 per cent, 24 per cent and 20 per cent respectively.

The subjects in the experimental group met allowances for all foods except cereals and fats and oils, where they met only 59 per cent and 80 per cent of the recommended allowances. The cereal recommended for this age was rather high and the children could never eat the bulk quantity.

The mean nutrient intake of the 4-6 year old children can be seen from Table V as follows:-

TABLE V

MEAN NUTRIENT INTAKE OF 4-6 YEAR OLD CHILDREN.

Nutrients	RDA ICMR 1981	Control group		Experimental group	
		Actual intake	Percent met	Actual intake	Percent met
Energy (K.cal)	1720	1425	83	1465	85
Protein (gms)	29.4	22.4	76	23	78
Calcium (mg)	400-500	338	75	343	76
Iron (mg)	20-25	17.0	77	18	82
Carotene (µg)	1200	473	39	500	42
Thiamine (mg)	0.9	0.78	87	0.85	94
Riboflavin (mg)	1.0	0.9	90	0.97	97
Niacin (mg)	11	9.1	83	9.7	88
Vitamin C (mg)	40	31	78	34	85

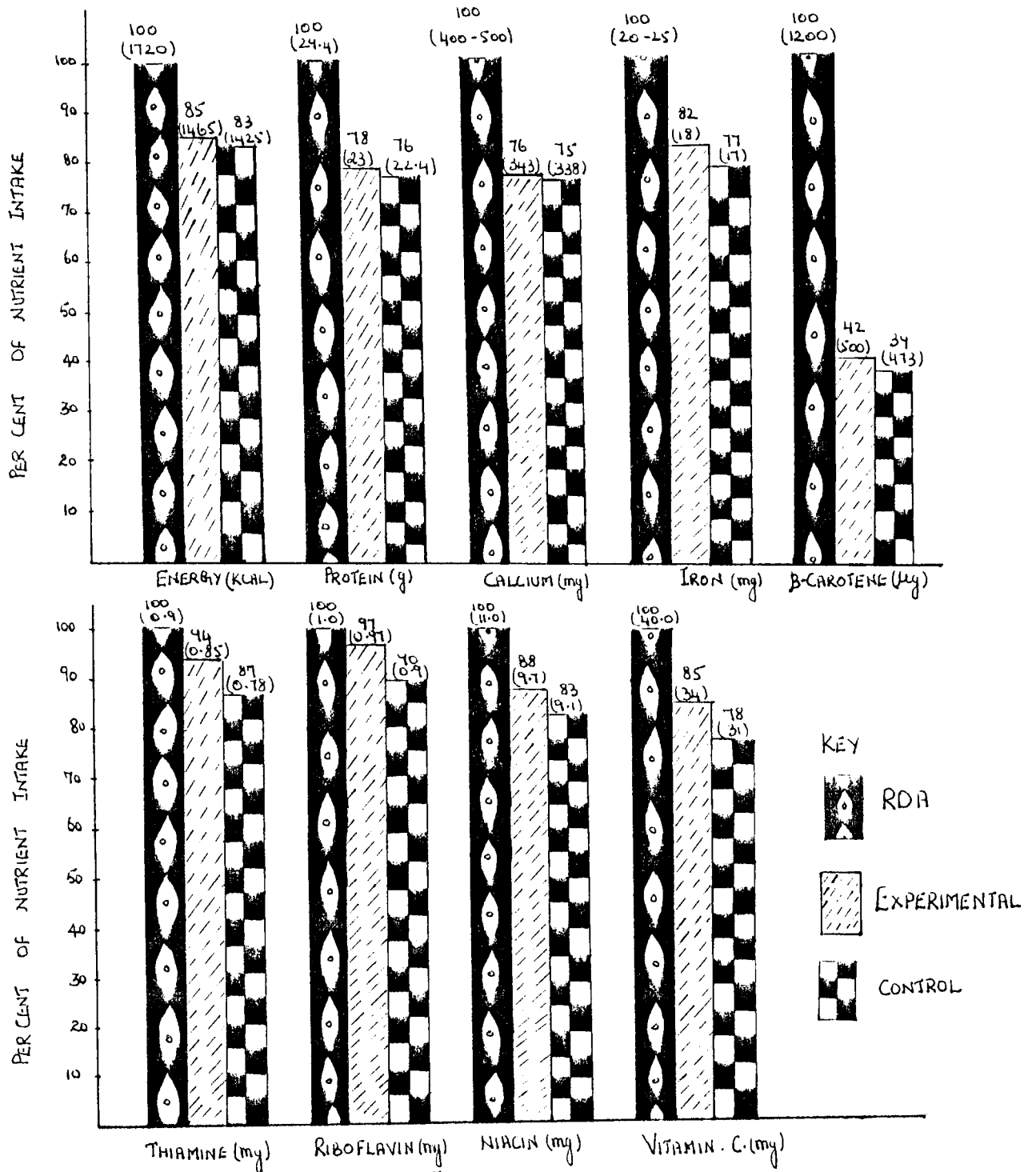


FIGURE - I  
 MEAN NUTRIENT INTAKE OF 4-6 YEAR OLD CHILDREN

The nutrient picture was corollary to the food intake. The subjects both in the control and experimental groups did not meet the day's allowances for any nutrient starting from energy. The deficit in energy was 17 and 15 per cent respectively in the control and experimental group. The protein deficit in both the groups could be attributed to their inadequate cereal intake because in Indian dietaries cereals form an important source of protein.

Table VI indicates the mean daily food intake of the 7-9 year old children.

TABLE VI.

MEAN FOOD INTAKE OF 7-9 YEAR OLD CHILDREN

Foodstuffs.	RDA* ICMR 1968	Control Group		Experimental group	
		Actual intake	Percent met	Actual intake	Percent met
Cereals	250	205	82	215	86
Pulses	70	47	67	49	70
Green leafy vegetables	75	50	67	55	73
Roots & tubers	50	55	110	50	100
Fruits	50	85	170	85	170
Milk	250	195	75	200	90
Fats & Oil	30	23	76	25	83
Sugar and jaggery	50	40	80	40	80

\* 1961 RDA Not available for 7-9 year age group.

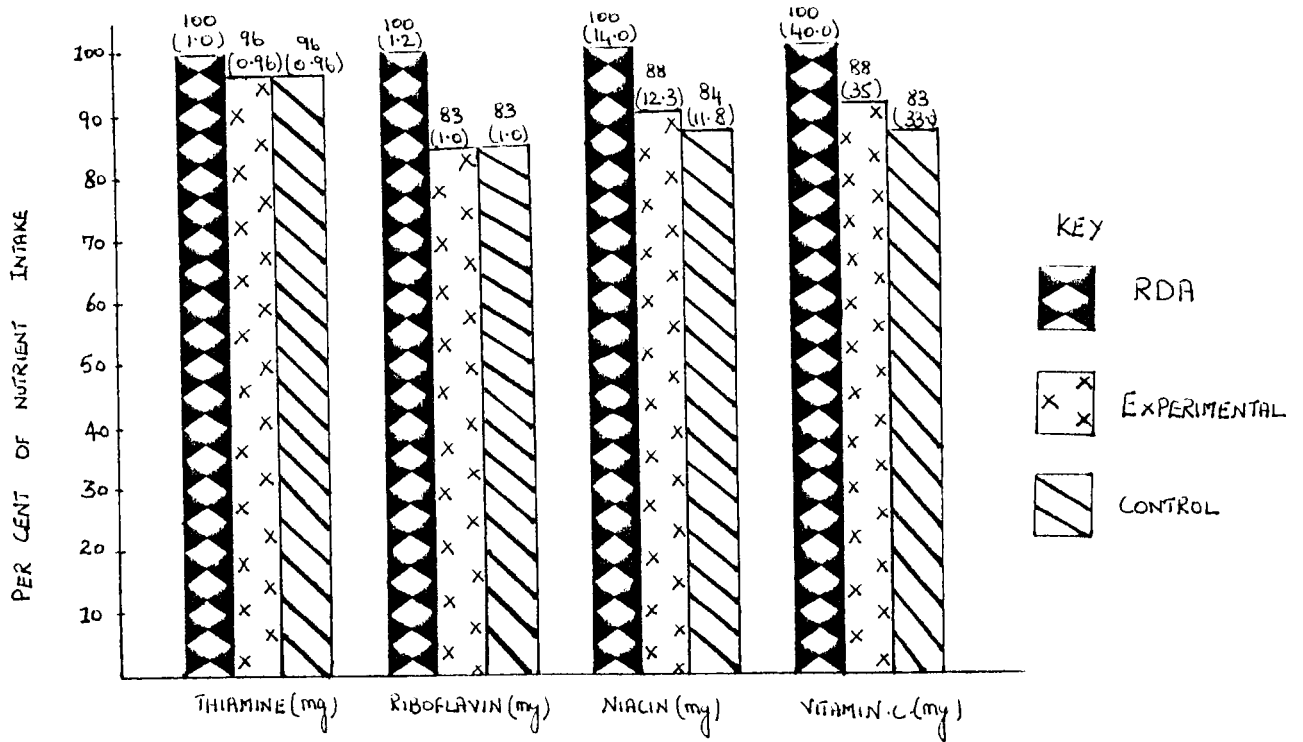
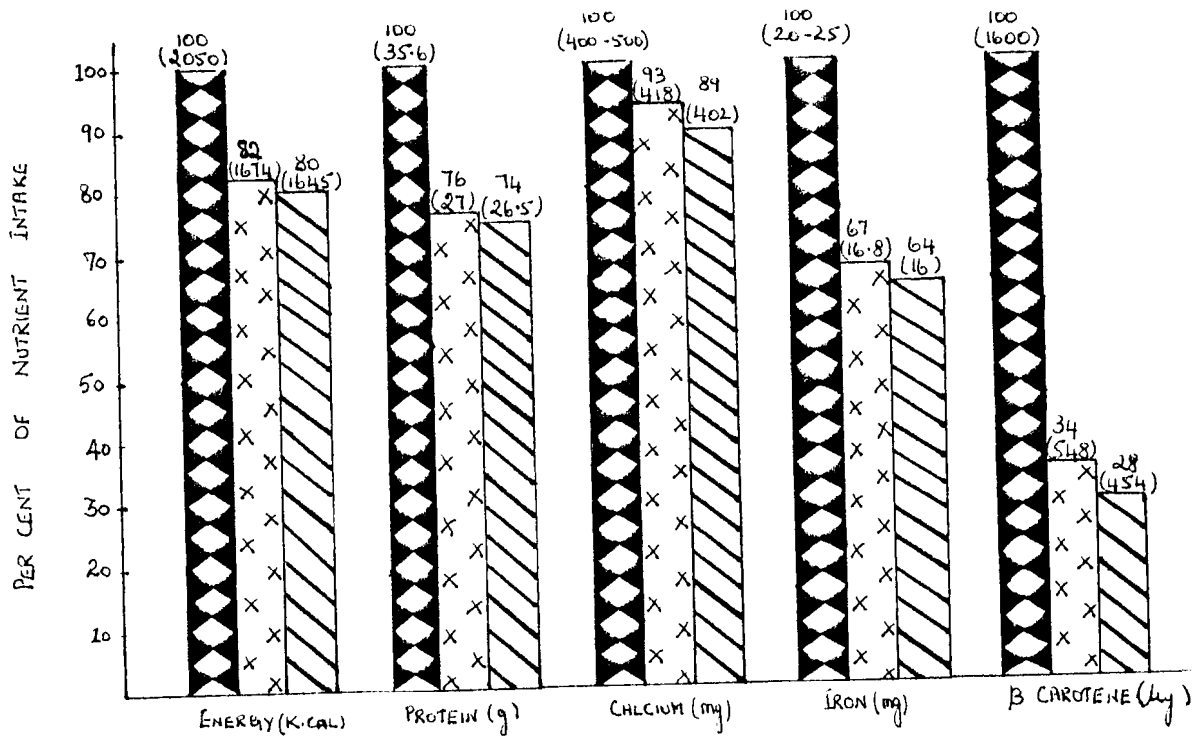
The mean daily food intake of the 7-9 year old children in the control and experimental group met the food allowances in terms of roots and tubers and fruits while the staple item of the diet namely cereal was met only to the extent of 82 and 86 per cent in the control and experimental respectively. The green leafy vegetable consumption was better in the experimental group due to its inclusion in the nutritious lunch.

Table VII Represents the mean nutrient intake of the 7-9 year old children in both the groups.

TABLE VII

MEAN NUTRIENT INTAKE OF 7-9 YEAR OLD CHILDREN

Nutrients	RDA ICMR (1981)	Control group		Experimental group	
		Actual intake	Percent met	Actual intake	Percent met
Energy (K.cal)	2050	1645	80	1674	82
Protein (gms)	35.6	26.5	74	27	76
Calcium (mg)	400-500	402	89	418	93
Iron (mg)	20-25	16	64	16.8	67
Carotene ( $\mu$ g)	1600	454	28	548	34
Thiamine ( $\mu$ g)	1.0	0.96	96	0.96	96
Riboflavin (mg)	1.2	0.90	75	1.0	83
Niacin (mg)	14	11.8	84	12.3	88
Vitamin C. (mg)	40	33	83	35	88



KEY




-  RDA
-  EXPERIMENTAL
-  CONTROL

FIGURE - II  
 MEAN NUTRIENT INTAKE OF 7-9 YEAR OLD CHILDREN

The nutrient intake reflected a picture where the subjects in the control and experimental group did not meet any nutrient. The glaring deficit was in terms of B-carotene due to inadequate consumption of green leafy vegetables in both the groups. Iron ranked next in the order of deficit with the subjects in the control group meeting only 64 per cent of the allowances.

C. Impact of the nutritious lunch programme after a period of four months in terms of:

1. Nutritional status of children.

a. Height:

The heights of the experimental and control group studied can be pictured in Table VIII.

TABLE VIII

INDICES OF THE CHANGES IN THE GENERAL AND EXPERIMENTAL GROUP BEFORE AND AFTER FOUR MONTHS PERIOD

Subject Number	Sex	Income Status	Control Group		Height in cm	Subject Number	Sex	Income Status	Experimental Group		
			Before	After					Before	After	
5 Years											
1.	F	High Income	107.9	108.8	0.9	1.	F	High Income	108.1	108.9	0.8
2.	F	High Income	103	104.4	1.4	2.	F	High Income	106.4	107.5	1.1
3.	F	Middle Income	107.9	109.0	1.1	3.	F	Middle Income	106.5	107.7	1.2
4.	F	Middle Income	106.4	107.4	1.0	4.	F	Middle Income	109.3	110.4	1.1
5.	F	Middle Income	112.2	113.4	1.2	5.	F	Middle Income	110.9	122.2	1.3
6 Years											
6.	M	High Income	112.7	113.4	0.7	6.	M	High Income	118.7	119.9	1.2
7.	F	High Income	112.3	114.7	1.4	7.	F	High Income	116.0	116.9	0.9
8.	F	High Income	119.1	120.2	1.1	8.	F	High Income	120.0	121.0	1.0
9.	F	Middle Income	115.0	115.8	0.8	9.	F	High Income	125.0	126.5	1.5
10.	F	Middle Income	119.3	120.2	1.1	10.	F	Middle Income	115.1	116.2	1.1
7 Years											
11.	F	High Income	119.3	120.7	1.4	11.	F	High Income	116.3	117.2	0.9
12.	F	High Income	119.9	120.6	0.8	12.	F	High Income	119.3	120	1.7
8 Years											
13.	F	High Income	120.7	122	1.3	13.	M	High Income	129.9	131.4	1.5
14.	F	Middle Income	121.3	122.7	1.4	14.	F	High Income	121.1	122.2	1.1

The maximum increment registered by the children in the experimental group was 1.7 cm over the period of four months in the 7 year old girl as against 1.4 cm in the 8 year old girl of control group. The increments ranged between 0.8 to 1.7 cm and 0.4 to 1.4 cm in the experimental and control group respectively. The mean increment was 1.2 cm in the experimental as against 1.1 cm in the control group. The increments registered by the children of experimental and control group did not differ much, perhaps this may be attributed to the income classes namely high and middle to which the children belonged to and thus did not have constraints on food intake.

**b. Weight:**

Table IX shows the weights of the Control and experimental group studied for a period of four months.

Over the four month period, the children in the experimental and control group registered similar increments in terms of weights namely 0.5 to 0.9 kg and 0.5 to 0.8 kg. The children registered increments typical for this age group namely the annual increment of 2.0-2.5 kg as has been observed by Easwaran and Devadas (1984). The mean increment was also similar with 0.69 kg in the experimental group as against 0.65 kg in the control group.

**C. Mid Upper Arm Circumference:**

Table X indicates the mid upper arm circumference of the control and experimental group studied over a period of four months.

The mid upper arm circumference of the children in the experimental and control group remained the same with slight increment of 0.1 to 0.2 cm in a few children which is typical of normal pattern. As far as this group of children was considered, there was no economic constraint on food intake and hence the experimental and control group children presented similar picture.

d. Haemoglobin level:

The haemoglobin level of the control and experimental group is indicated in Table XI.

WHO (1975) suggests that haemoglobin levels below 12g/100ml in the age group of 6 years to 14 years is indicative of anaemia. Rated against this norm, only four and six children in the control and experimental group respectively could be rated as normal. None of the children had values less than 10g. per cent which has been a common observation among school going children.

The increment registered over a four month period ranged between 0.1 to 0.1g. The difference between the control and experimental group was also negligible.

## 2. Clinical Examination.

The following Table XII indicates the clinical picture of the children in both the groups after a period of four months.



The clinical examination after a four months period indicated improvement in the experimental group in terms of spongy bleeding gums and pallor of the skin totally disappearing from the two children who had it earlier. The number of children designated as healthy and free from disease also increased to 12 from the initial 10.

In the control group the changes observed were in terms of bleeding gums and pallor of skin reducing to two from original of three children. The improvements in the experimental group could probably be attributed to the nutritious lunch and also the impact of nutrition education. Similar observation towards improvement of clinical picture by Devadas et al. (1979) as the outcome of nutrition supplements.

## 2. Nutrition education

Nutrition education to the participating children in the experimental group included simple message such as

1. Link between nutrients and optimum health
2. Components of a balanced diet
3. The basic five food groups
4. Role of nutrients in body functions
5. What happens when the nutrients are deficit or lacing in the diet.

The impact of the education was evaluated by assessing the <sup>inclusion of foods</sup> in the days diet and the nutritional knowledge of the childrens

Table XIII represent the foods included in the day's diet before and after nutrition education.

TABLE XIII  
FOODS INCLUDED IN DAILY DIET OF THE PARTICIPATING  
CHILDREN

Foodstuffs	Participating children			
	Before	Percent	After	Percent
Greens	7	50	11	79
Carrot	9	64	11	79
Papaya	7	50	10	71
Milk	10	71	12	86
Ragi	1	7	2	14

In the participating children there was a change as to the consumption of the food items like greens, carrot, papaya milk and ragi after nutrition education. It can be seen that from 50 per cent it increased to 79 per cent in consumption of greens, 64 per cent to 79 per cent for carrot, 50 per cent to 71 per cent for papaya, 71 per cent to 86 per cent for milk and 7 per cent to 14 per cent in ragi consumption. This change towards food habits is welcome and such trends have been observed by Devadas, (1978).

This is an age group where the education at the school has a profound impact which has brought about such desirable changes in food practices.



FIGURE III

NUTRITION EDUCATION IMPARTED TO  
PARTICIPATING CHILDREN

The nutritional knowledge of participating children before and after nutrition education are given in Table XIV.

TABLE XIV  
NUTRITIONAL KNOWLEDGE OF PARTICIPATING CHILDREN.

S.No.	Knowledge aspect	Participating children			
		Before	Percent	After	Percent
1.	Carrot is good for good eyesight	5	36	11	79
2.	Papaya is good for good eyesight	2	14	9	64
3.	Tomato is good for gums	3	21	10	71
4.	Greens are good for blood circulation	3	21	12	86
5.	Milk is good for bones	4	29	10	71
6.	Greens are rich in iron	2	14	13	93

The participating children retained the simple nutrition messages imparted to them with an improvement in their nutritional knowledge from 36 per cent to 86 per cent. Relating foods to the body functions made an impact on these children.

3. Nutritional knowledge on the part of the parents and children.

a. Views of parents:

Among the 14 participants in the nutritious lunch programme, 12 children were from individual family while 2 children were from the same family. The response from the parents in returning the duly filled in questionnaire was 100 per cent.

Table XV shows the reasons given by the parents for enrolling their children in the programme.

TABLE XV  
REASONS FOR ENROLMENT

S.No.	Reasons	Number of families	Per cent
1.	Good nutritious lunch	6	46
2.	Good health	8	62
3.	Hot Lunch	5	38
4.	Tasty food	4	31
5.	To develop desirable habits	3	23
6.	Variety in lunch	5	38
7.	Lack of time and person to take lunch to school	5	38

About 62 per cent of the families expressed the main reason for enrolling their children in the nutritious lunch programme was considering the child's good health, followed by 46 per cent as to good nutritious lunch, 38 per cent as to hot lunch and variety in lunch. The other reasons expressed were lack of time and person to take lunch to the school.

All the parents were very interested in giving their views about their children's enjoyment of the food. 77 per cent of parents expressed that it was duly because of wholesome nutritious lunch, while 38 per cent of the parents said because of hot lunch and 62 per cent as to taste of the food preferred by the children.

The quantity of food given in the nutritious lunch was found to be over and above actual requirements of the children.

All the parents said that the children spoke often about the lunch provided at the school. Forty six

Per cent of the parents said that the children spoke about the good taste of food and the adequate quantity. School lunch thus acted as an effective tool to develop good food habits as has been observed by Chandrasekar and Anirthaveni (1996). The school lunch also provided socialising atmosphere for the children, when they all ate together.

With regard to food consumption, sixty nine per cent of the parents said that there was improvement in eating greens, carrots and other vegetables like beans.

The parents remarked that their children attended the school regularly after their participation in the nutritious lunch programme. This increased attendance may be due to the eagerness to eat the lunch and this may increase their learning capacity, mental vigour and academic performance.

All the parents expressed enthusiastically that they were satisfied with the programme in operation. They were very happy for having enrolled their children as it relieved many of their problems they had faced earlier. They were thankful that their children could eat a nutritious and wholesome lunch.

b. Views of Children:

Out of the 14 participating children in the nutritious lunch programme 71 per cent of the children were participants of the lunch provided at Annai Sharadha Nursery School, while 29 per cent were non-participants. All the participants liked the food provided in the nursery school.

All the children reported that the food given in the school was more than what they could consume.

The preference for school food by the children can be seen from table xvi

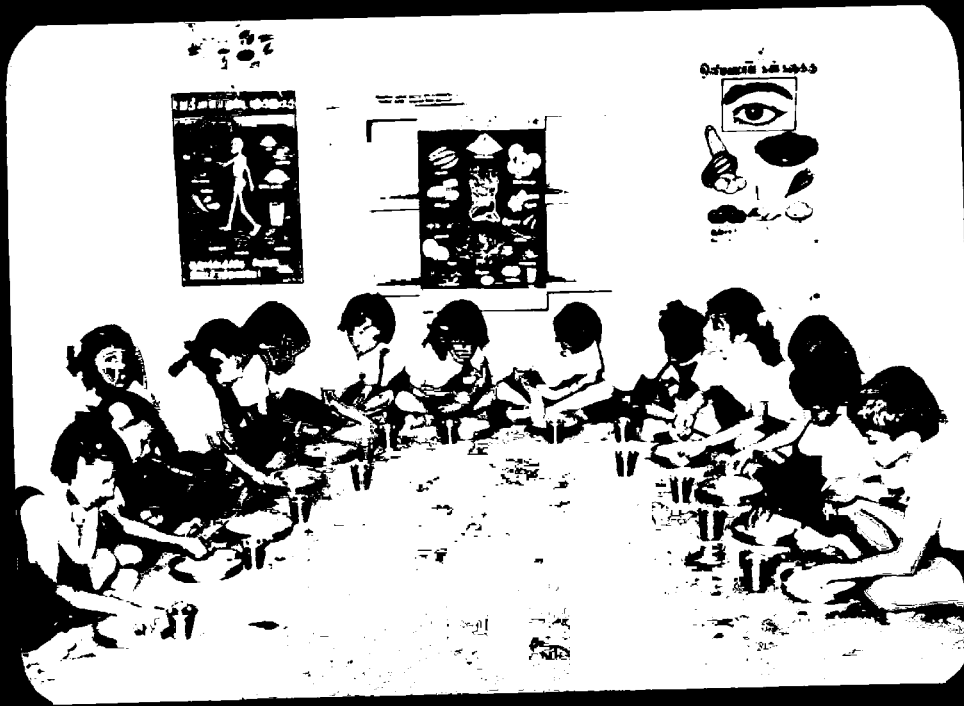


FIGURE IV

CHILDREN RELISHING THE NUTRITIOUS  
LUNCH AT SCHOOL

TABLE XVI

REASONS FOR PREFERENCE OF SCHOOL FOOD

S.No.	Reasons	Number of children	Per cent
1.	Variety of items	5	36
2.	Appearance	4	29
3.	Taste	10	71
4.	Flavour	6	43

All the children liked it as they got more than their actual requirements. 36 per cent of the children liked the food as it had variety of items. 71 per cent as to the taste of food, 43 per cent as to the flavour, as it encouraged the children to eat different food.

All the children were in favour of the five day cycle menu. All the 14 participating children enjoyed the food served without wasting. The few suggestions offered by the children were inclusion of more fruit and avoidance of dhal rice and brinjal in the menu.

## **Summary and Conclusion**

## V. SUMMARY AND CONCLUSION

The present study entitled "The Nutritional outcomes of nutritious lunch on selected 5-8 year old children at Annai Sheredha Primary School"; was carried out for a period of four months. This study was designed with the objective of assessing the nutritional status of participants as against the non-participants using the parameters of height, weight and mid upper arm circumference, haemoglobin estimation, clinical picture and food consumption pattern. The opinion of the parents and participating children regarding the nutritious lunch, was also studied. Impact of the nutrition education imparted to the target group was also assessed.

The family background information was collected through a questionnaire. Standardized procedures were adopted for height and weight measurements and clinical examination of the children. Food consumption was found out by weighing of cooked food for three consecutive days. Simple nutrition messages were imparted making use of visual aids such as charts and posters.

The results revealed that all children came from middle and high income group, with both the parent being educated. The average family size ranged between 3-6 members.

The clinical picture indicated that 10 out of 14 children in both the groups were healthy and free from nutritional symptoms. The remaining four children in both the groups manifested symptoms like spongy bleeding gums, dental caries, pallor of the skin, and poor musculature.

The dietary practices indicated the pattern of two major meals namely lunch and dinner with morning breakfast and evening tea. The mean days food intake by the subject in the experimental group included the consumption of food at home and the nutritious lunch provided in the school. The food consumption pattern of 4-6 year old children revealed that the cereal consumption was deficit to the extent of 48 and 41 per cent in control and experimental group respectively. The nutrient intake of the subjects in both the groups did not meet the days allowances for any nutrient. The food consumption pattern of 7-9 year old children met only for fruits and roots and tubers. Consumption of other foods were inadequate. The nutrient intake reflected a picture, where the subjects in both the groups did not meet any nutrient allowance.

The increments in height, weight and mid upper arm circumference registered by the children of experimental and control group did not differ much, perhaps this may be attributed to the income classes namely high and middle to which the children belonged to and thus did not have constraints on food intake.

The clinical picture after four months period improved in case of experimental group, in terms of spongy bleeding gums and pallor of the skin totally disappearing from the 2 children who had it earlier.

The impact of nutrition education on the participating children was profoundly good. The simple nutrition messages was found to increase the knowledge of the children and hence the response by the children were appreciable.

All the parents opined that by the introduction of their children into the nutritious lunch programme, solved many of their worries and problems about their children. Improvements in their studies, good food habits and social behaviour were noticed by the parents in their children. The children opined that the food provided was more than what they could eat, and preferred school food better than home food because of variety of items, appearance, taste and flavour.

Few suggestions offered by the children were inclusion of more fruits and avoidance of dhal rice and brinjal in the menu.

**Recommendations:**

Such nutritious lunch programmes in primary schools are welcomed by the parents and hence could be started wherever the infra structure and trained personnel are available. This will be a step towards improvement of nutritional status of the children. When such programmes are initiated, continuous monitoring, follow-up and evaluation are essential.

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## Appendices

SRI AVINASHILINGAM HOME SCIENCE COLLEGE FOR WOMEN  
COIMBATORE-641043.

QUESTIONNAIRE TO ELICIT BACKGROUND INFORMATION AND  
DIETARY PRACTICES OF CHILDREN.

APPENDIX I.

1. Name of the interviewer :
2. Name of the interviewee :
3. Name of the head of the family :
4. Address :

Background information of children:-

1. Total family income per month:

2. Family composition-

Members of the family	Composition			Educational level
	Males	Females	Total	
Under 1 year				
2-5 years				
6-12 years				
13-19 years				
20-55 years				
Above 56 years				



APPENDIX II

HAEMOGLOBIN ESTIMATION

CYANMETHAEMOGLOBIN METHOD

The haemoglobin is treated with a reagent containing potassium ferricyanide, potassium dihydrogen phosphate. The ferricyanide forms methaemoglobin which is converted to cyanmethaemoglobin by the cyanide.

Reagents:

1. Ferricyanide-Cyanide reagent.

Dissolve 200 mg potassium ferricyanide, 50g potassium cyanide and 140mg potassium dihydrogen phosphate in water and make to a litre with water. The reagent keeps for several months in a dark polythene bottle, between 4 and 20°C. It should not be frozen.

2. Cyanmethaemoglobin Standard:-

The international Committee for standardisation in Hematology adopted specifications using a molecular weight for haemoglobin of 64458 and a millimolar extinction of co-efficient of 44.0. It is supplied in sealed ampoules, sterile and without suspended particles. Kept in the dark between 4 and 20°C, the colour remains unchanged until the date stated. The equivalent haemoglobin concentration is given and the typical value is 60 mg/dl.

**Technique:**

Add 20  $\mu$ l blood to 4.0 or 5.0 ml of the reagent. Stand atleast 4 minutes and read against a reagent blank at 540 nm. Read the standard in the same way. Use a fresh ampoule of the standard each day and keep in the dark during the day of use,

Then:

$$\text{Blood haemoglobin (g/dl)} = \frac{\text{Reading of unknown}}{\text{Reading of standard}} \times \text{Dilution factor} \times \frac{\text{Concentration of Standard (mg/dl)}}{1000}$$

The dilution factor is 201 or 251 according to whether 4.0 or 5.0 ml of reagent is used.

A standard curve can be prepared by suitably diluting the standard with the reagent.

SRI AVINASHILINGAM HOME SCIENCE COLLEGE FOR WOMEN,  
COIMBATORE-43.

CLINICAL SURVEY FORM.

APPENDIX III

Name of the child : Sex : Male      Female  
Age :

S.No.	System	Grade I	Grade II	Grade III
1.	Hair	Glossy Shining	Lack of lusture	Dyspigmentation Easy pluckability Thinness and Sparseness.
2.	Face	Healthy colour of face	Dry or flattened cheeks Pale colour	Moon face.
3.	Eyes	Bright	Exudate Redness drooping eyes	Pale conjuncti- vitis Bitot spots Corneal Xerosis.
4.	(i) Lips	Normal	Dry	Fissures Angular Stomatitis Cheilosis.
	(ii) Tongue	Normal	Smooth and Shiny	Magenta Tongue Fissures.
	(iii) Teeth	Good	-	Mottled enamel.
	(iv) Gums	Normal	-	Spongy bleeding gums.

S.No.	System	Grade I	Grade II	Grade III
5.	Nails	Healthy	Pale nails Hard nails	Cracky spoon shaped.
6.	Skin	Smooth	Dry or rough skin	Pellagrous Dermatitis Flaky Dermatitis Follicular Hyperkeratosis.
7.	Arm	Normal	Muscular wastage	Deficient subcutaneous fat.
8.	Chest	Normal	Poor Musculature	Pigeon chest.
9.	Abdomen	Intact	Slightly bulging	Markedly Protruding.
10.	Legs	Good Posture	Tenderness of Calf muscle	Knock Kness Bow legs.
11.	General	Alert	Lack of Interest	Lethargic.

APPENDIX IV.

FOOD CONSUMPTION SURVEY - WEIGHMENT METHOD.

Name of the Child :

Age :

Date :

Sex :

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Name of the meal	Menu	Name of the raw foodstuff.	Weight of raw foodstuff.	Total Volume of cooked foods.	Weight of cooked food consumed by the individual.
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**SRI AVINASHILINGAM HOME SCIENCE COLLEGE FOR WOMEN,  
COIMBATORE-641043.**

**QUESTIONNAIRE TO STUDY THE VIEWS OF THE PARENTS AND CHILDREN  
REGARDING THE NUTRITIOUS LUNCH PROGRAMME.**

**APPENDIX-V.**

**a) Views of Parents:**

1. Name of the interviewer :
2. Name of the interviewee :
3. Name of the child :
4. Address :
5. Number of children from the family participating in the programme?
6. Reasons for enrolling your children in the nutritious lunch programme?
7. Does your child enjoy the food given in the school.  
Yes ( ) No ( )

**Reasons:**

8. Is enough food given to your child in the School?  
Yes ( ) No ( )
9. Does your child talk about the school food at home?  
Yes ( ) No ( )

If yes, in terms of

- a) Quantity :
- b) Taste :
- c) Variety :
- d) Appearance :



3. Do you like the food given now, at the school?

Yes (        )        No (        )

Reasons:

4. Is food given to you adequate in quantity.

Yes (        )        No (        )

5. Are you in favour of the cycle menu?

Yes (        )        No (        )

6. Do you feel the meal served in the school is better than home food?

Yes (        )        No (        )

If yes, as to

- a) adequate quantity
- b) Variety of items
- c) appearance
- d) taste
- f) flavour

If no, as to

- a) Inadequate
- b) No variety of items
- c) Poor appearance
- d) Tasteless
- e) Flavourless.

7. Do you dislike any item served in the nutritious lunch programme?

Yes (            )      No (            )

If Yes, list them:

8. Do you suggest any alteration in the programme?

Yes (            )      No (            )

If yes, list them.

APPENDIX VI

**NUTRITIONAL KNOWLEDGE OF PARTICIPATING CHILDREN**

1. Name of the Child :
2. Date :
3. Do you include the following foods in your daily diet?
  - a) greens
  - b) carrot
  - c) papaya
  - d) milk
  - e) ragi
4. Carrot is good for
  - a) good eyesight ( )
  - b) strong bodies ( )
  - c) gums ( )
  - d) tissues ( )
5. Papaya is good for
  - a) good eyesight ( )
  - b) good gums ( )
  - c) good health ( )
6. Tomato is good for
  - a) good gums ( )
  - b) good health ( )
  - c) strong bodies ( )

7. Greens are needed for

- a) blood circulation ( )
- b) strong bodies ( )
- c) good health ( )

8. Milk is good for

- a) strong bones ( )
- b) good gums ( )
- c) good tissues ( )

9. Foods rich in iron are

- a) greens
- b) tomatoes
- c) potatoes