EFFECT OF SUPPLEMENTATION OF GREEN LEAFY VEGETABLES ON THE NUTRITIONAL STATUS OF CHILDREN PARTICIPATING IN A RURAL SCHOOL LUNCH PROGRAMME

By

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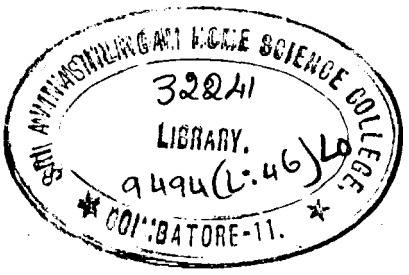

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I INTRODUCTION

In the developing world today there are nearly a billion children under 15 years of age. They constitute 40 to 45 per cent of the total population in those regions, UNICEF (1969)[1]. Towards fostering the physical, mental, social and emotional growth of children and helping them to attain maximum stature, good nutrition makes a great contribution (Swaminathan 1967)[2]. The requirements for protein and certain other nutrients for children are relatively greater than those of adults, FAO (1965)[3].

Malnutrition is one of the most widespread problem of children in developing countries. UNICEF (1970)[4] has estimated that 32 million infants and children under five years of age suffer from severe clinical protein calorie malnutrition which causes irreversible physical and mental damages. The United Nation's Economic and Social Council (UNESC, 1967)[5] has estimated that nearly 300 million children in the world today are physically and perhaps mentally retarded due to malnutrition. Half of these victims may die before reaching adulthood and the remainder may be crippled for life.

Gopalan (1964)[6] reveals that the most florrid forms of malnutrition seen in the world are to be found in the South East Asian region. Allan Berg (1968)[7] states that malnutrition debilitates the body to such a degree that it

is incapable of resisting what would otherwise be a passing infection. Pearson (1967)[8] claims that retardation in physical growth and poor health are still the fate of the great majority of children in developing countries.

The widening gap between the growing population and available food supplies, the generally unsatisfactory conditions of environmental hygiene and the low level of technological development contribute to the present state of malnutrition (Gopalan 1964)[6]. Sen (1965)[9] states that eradication of malnutrition and its attendant devastating effects on children, should be the primary concern in the rapid economic development of the country.

Allan Berg (1967)[10] points out that proper food is the most essential requisite for the growth and development of children, maintenance of their health and prevention of disease. A permanent plan to feed children would pay incalculable dividends by preparing them to become learned citizens ready to meet the challenges of the ever changing world. Our educational programmes need to help children to develop their capacities to the fullest extent through good nutrition.

The free school meal programme in several parts of India is one of the major measures to overcome malnutrition among primary school children (Simpson 1963)[11]. The importance of school lunch programmes has been stressed by Scott (1953)[12], Eppright (1955)[13], Devadas (1959)[14],

Swaminathan (1964)[15], Devadas and Radharukmani (1964)[16], Devadas et al (1965)[17], (1967)[18], (1968)[19], (1969)[20] and Anandam et al (1965)[21].

In India, school lunch programmes have been in operation since 1952. The Madras Scheme for free school meals to poor children in elementary schools was launched in 1956. It was intended to achieve the dual purpose of encouraging those who would not afford to attend school and also providing a meal to those who attended but were hungry throughout the day. The educational and nutritional significance of school lunch has been duly recognized by the Government of India by the provision made in the Fourth Five Year Plan, where in, out of 406.42 crores of rupees set apart for elementary education, 33 crores have been earmarked for midday meals alone (Johnston 1968)[22].

The international organisations, United Nation's Children's Fund (UNICEF) and Cooperatives for American Relief Everywhere (CARE) have come forward to strengthen the school lunch programme through the contributions of protective foods such as butter oil, Corn Soya Milk and Bulgar wheat. Even with such generous assistance the meals provided in most schools do not meet the allowances, recommended by the Indian Council of Medical Research (ICMR 1968)[23]. The supply of food aid from foreign sources cannot be eternal. Already skim milk has been replaced by CSM and further modifications are bound to come. Therefore, local substitutes must be found.

This study is an attempt in that direction. It was undertaken to improve a School Lunch Programme by introducing green leafy vegetables. Studies conducted by the National Institute of Nutrition and elsewhere have indicated that by encouraging the consumption of green leafy vegetables, which are rich but relatively inexpensive sources of pro-vitamin A, the incidence of vitamin A deficiency can be reduced considerably among the poor communities, without incurring additional dietary changes (Gopalan and Vijaya-raghavan 1969)[24]. Green leafy vegetables are available in the villages all the year round. Therefore, their use in the daily diet can help to correct at least the mineral and vitamin deficiencies in the existing school meals.

II REVIEW OF LITERATURE

The literature pertaining to this study "Effect of Supplementation of Green leafy vegetables on the Nutritional status of children participating in a Rural School Lunch Programme", is reviewed under the following headings:

A. Nutritional needs of children

B. Malnutrition among children

C. Assessment of nutritional status

D. Aims and scopes of school lunch programme

and E. Nutrition education

A. Nutritional Needs of Children

Growth is the resultant of genetic and environmental factors including Nutrition. It manifests itself by an increase in mass and volume as enduced by an increase in weight and by changes in external dimensions (Nutrition Reviews 1954)[25]. In stimulating growth, among all the environmental factors nutrition is crucial.

Venkatachalam and Bokhari (1963)[26] stress that because of their rapid growth children require building materials in comparatively large amounts. McWilliams (1964)[27] indicates that a school age child has a continuing need for an adequate diet to meet the demands of growth, furnish energy for vigorous physical activities, offer resistance to infections, and ensure that adequate

body stores of nutrients for growth stresses of adolescence.

The nutritional requirements of children as laid by the Nutrition Expert Group of the ICMR (1968)[28] are presented in Table I.

TABLE I

RECOMMENDED ALLOWANCES FOR THE AGE GROUP OF 6 - 12 YEARS

Nutrients	Recommended Allowances
Calories	1500 - 2100
Protein (g.)	21 - 41
Calcium (g.)	0.4 - 0.5
Iron (mg.)	15 - 20
Retinol (µg.)	300 - 600
or	
B - Carotene (mg.)	1200 - 2400
Thiamine (mg.)	0.8 - 1.0
Riboflavin (mg.)	0.8 - 1.2
Vitamin C (mg.)	30 - 50

Calories:

Madhavan et al (1967)[29] state that calorie inadequacy contributes to growth retardation. But it has a sparing effect on certain B vitamins. Therefore, incidence of growth retardation and specific vitamin deficiency signs in malnourished conditions may always run parallel.

The FAO (1963)[30] has estimated that there is a gap of ten per cent between calorie supply and requirement of the poorer sections of the populations in the Far East. Radhakrishna Rao (1967)[31] recommends that children must derive 13 to 15 per cent of total calories from protein, 15 to 20 per cent from fat and 65 to 70 per cent from carbohydrates.

Protein:

Aykroyd (1964)[32] has indicated that protein is needed for maintenance, repair and replacement of cells. In blood plasma, albumins, fibrinogen and haemoglobin play an extreme-ly important role. Proteins take part in the complex metabolic reactions in the form of hormones. Patwardhan and Phansalkar (1960)[33] point out that the requirements for protein decrease gradually as the child passes into adolescence till adulthood.

Minerals:

The World Health Organisation (WHO) (1963)[34] warns that if there is a continued deficiency of dietary iron, in childhood, the reserves and adaptation mechanisms would be unable to maintain the level of circulating haemoglobin within normal limits. The chief cause of anaemia in the school child is the result of inadequate red cell production, Secondary to metabolic defects or other diseases (Howell 1968)[35].

Apte and Venkatachalam (1962)[36] put forth that among the several factors which interfere with the digestion and absorption of food iron, the phytic acid and phytate content of diet are important. Apte and Venkatachalam (1965)[37] have shown that supplementation of ascorbic acid increased significantly the absorption of dietary iron.

Apte (1967)[38] estimates that 10 to 30 per cent of the world's population suffers from iron deficiencies. Gopalan (1967)[39] states that iron deficiency anaemia is widespread although the average Indian diets seemingly contain adequate amounts of iron. Deficiencies of other nutrients such as protein, calcium, and vitamin C may increase the body's need for iron for normal haemoglobin.

Vitamins:

ICMR (1966)[40] states that vitamin A is necessary to keep the several epithelial tissues in the body intact. The role of vitamin A in promoting growth, in tooth enamel formation and in dark adaptation are significant reasons for checking its adequacy during school years. According to McLaren (1963)[41], the structural changes attributable to vitamin A deficiency in the conjunctiva, Bitot's spots, pigmentation, xerosis of cornea and keratomalacia.

Thiamine is required for maintenance of appetite, normal action of the intestine and for the metabolism of carbohydrates (ICMR 1966)[40]. Numerous studies have been carried out to determine the human requirement for thiamine. On the basis of responses of adolescent girls to test doses of thiamine, Hart et al (1957)[42] suggested 0.3 mg. per 1000 calories as marginal.

Riboflavin is essential for the metabolism of amino acids, fatty acids and carbohydrates. It is also concerned with several oxidation processes inside the cell (ICMR 1966)[40].

Ascorbic acid is necessary for the maintenance of good health, healing of wounds and gums, mucous membrane and minor haemorrhage. Ascorbic acid appears to be necessary for the proper calcification of bones and teeth (ICMR 1966)[40] in childhood.

B. Malnutrition among children

The problems of malnutrition among the children are reviewed in relation to:

1. Incidence
2. Causes
3. Protein-calorie malnutrition

and 4. Mineral and vitamin deficiencies

The FAO (1963)[43] defines malnutrition as a condition resulting from diets which are incapable of providing the

minimum requirements of essential nutrients and under-nutrition as the sustained failure to obtain sufficient food, to supply the energy needs of the body.

1. Incidence of Malnutrition:

The problem of malnutrition in the developing countries particularly among young children has assumed large dimensions during the past two decades (Jelliffe (1963)[44]. Schaefer (1963)[45] states that in practially every developing country, over half the population die before attaining the age of 15 years and in many areas half or more of the infants die before reaching the age of five as a direct result of a combination of inadequate nutrition and widespread infectious diseases.

Sukhatme (1968)[46] has estimated that 25 per cent of the people in India are undernourished and well over half are malnourished out of her 512 millions. The incidence of protein malnutrition in India is probably among one-third of the population.

2. Causes of malnutrition:

Jelliffe (1962)[47], King (1963)[48], Simpson (1963)[11], FAO (1963)[49], WHO (1963)[50], Autret (1964)[51] and Gopalan (1966)[52] have traced the causes of malnutrition to poverty, ignorance, traditional beliefs and customs, faulty feeding practices, poor hygiene and insanitary conditions, insufficient utilisation of local, low-cost and easily available

foods, wastage of foods and nutrients through unsatisfactory cooking methods, undesirable food habits, food fads and low level of technological development.

3. Protein-calorie Malnutrition:

Jelliffe (1966)[53] states that school children in tropical regions are often undernourished with positive clinical signs and subnormal anthropometric measurements, such as a low weight for height, and their subcutaneous fat but without sufficient symptoms to warrant attendance at hospital or health centre.

Scrimshaw (1959)[54] cautions out that an inadequate intake of protein of good quality is the most widespread serious nutritional problem in technically underdeveloped areas and is particularly devastating in its effects on children. While protein malnutrition is the most universal nutritional deficiency among children, it is likely to become worse in many areas as population growth continues to match, or even outstrip increases in food supply (Scrimshaw 1963)[55].

Cravioto and Robles (1965)[56] report that if severe protein-calorie malnutrition develops at a very early age, it may have long lasting and perhaps even permanent effects on behavioural development.

Mineral and vitamin deficiency:

WHO (1968)[57] defines nutritional anaemias as a condition in which the haemoglobin content of blood is lower

than normal as a result of a deficiency of one or more essential nutrients, regardless of the cause of such deficiency. McLaren (1966)[58] states that nutritional anaemias, predominantly of the iron deficiency type, occur mainly during the second year of life. Other concurrent endemic diseases which contribute to chronic occulant blood loss or interference with intestinal absorption are important, contributing factors (Schaefer 1963)[45].

Chandra (1965)[59] and Venkatachalam (1967)[60] consider anaemia as the commonest manifestation of malnutrition in India. Gopalan (1968)[61] declares that approximately 50 per cent of preschool children have haemoglobin levels less than 10 gram per cent. The prevalence of nutritional anaemia is high among school going children also.

Mitra (1953)[62] and Radhakrishna Rao (1958)[63] have reported deficiencies of protein, vitamin A and C, Calcium and iron in the dietaries of childhood between the ages of 7-14 years. In the surveys conducted by Devadas et al (1964)[64] (1965)[65] 30 per cent of the children in the two villages surveyed showed rough skin, and eight per cent manifested signs of angular stomatitis.

Gopalan (1966)[66] observed 8 - 15 per cent of children showing vitamin A deficiency symptoms. A relative inadequacy of vitamin A activity is the commonest deficiency revealed by family dietary surveys, even though a deficiency

of protein of good quality is an even more serious problem for young children (Scrimshaw 1959)[54].

McLaren (1968)[67] estimates that thousand children go blind each year because of lack of vitamin A and more than one per cent of the poorest children of Asia have visual defects. The diet surveys conducted by Someswara Rao (1961)[68] shows the prevalence of deficiencies of vitamin A manifested by xerosis, night blindness, Bitot's spots and keratomalacia. He encountered also the deficiency of vitamin B_2 manifested by angular stomatitis, cheilosis and glossitis. Swaminathan (1960)[69] has reported on the gross retardation of growth of school age children accompanied by poor musculature, deficient subcutaneous tissue and symptoms of vitamin deficiency.

C. Assessment of Nutritional Status

Morgan (1959)[70] defines nutritional status as the state of health of an individual or group as conditioned by the nutrients required by the body for normal growth and development. Schaefer (1960)[71] accounts that the nutritional status of a population is influenced by many factors such as geography, agriculture, transportation, education, economics and infectious and parasitic disease.

Ferro Luzzi (1966)[72] lists several methods for evaluating nutritional level. The selection of any one of these methods depends upon the type of study, local conditions and capacity of the staff and facilities available.

Davidson and Passmore (1963)[73] and Martin (1963)[74] have grouped the available methods for the assessment of nutritional status as follows:

1. Anthropometric measurements
2. Diet surveys
3. Biochemical methods

and 4. Clinical examination

1. Anthropometric Measurements:

The WHO (1955)[75] points out that anthropometry provides important though limited tools for the assessment of nutritional status. Martin (1963) lists the body measurements commonly used in anthropometry as height, weight, skinfold thickness and circumference of head, chest and abdomen.

Someswara Rao (1961)[68] indicates that the body measurements such as height and weight if properly obtained and interpreted would serve as useful physical signs in the evaluation of nutritional status. Jelliffe (1966)[53] states that growth stature, especially height and weight are controlled by biological factors, particularly genetic influences and environmental factors chiefly nutrition.

2. Diet Surveys:

Usha and Devadas (1964)[76] have indicated that the starting point towards raising levels of nutrition of people is a knowledge of what they eat and how far the

existing diets are satisfactory. Diet surveys have been used to assess the nutritional status of population by several workers, Eppright et al (1954)[77], Someswara Rao et al (1954)[78], Berry and Schaefer (1958)[79], ICMR (1966)[80], Devadas et al (1964)[64], (1965)[65] and (1969)[81].

The FAO (1949)[82] outlines the functions of dietary surveys as the means of obtaining information on the existing diets, their adequacies or inadequacies and their relationship between diet and health. According to Schaefer (1960)[71], the primary objective of the diet survey is to assess, to assist and to learn. The assessment phase involves an evaluation of the nutritional status of the population to define the major problems. Martin (1963)[74] states that dietary studies are of two types: those which determine the food intake of a group from which the individual intake can be computed and those which determine directly the food intake of individuals. Young and Trulson (1960)[83] point out that the selection of the methods depends upon the objective of the surveys and the size of the sample.

3. Biochemical Methods:

Biochemical investigation offer the most objective means for assessing nutritional status. Arroyave (1960)[84] has classified the biochemical measurements into (1) those which measure directly the supply of nutrients such as

ascorbic acid concentration in the plasma, and (2) those which detect the biochemical changes directly, reflecting metabolic alterations.

Davidson and Passmore (1963)[73] recommend that with the haemoglobinometer the degree of nutritional anaemia present in a community can be assessed. Estimation of haemoglobin has been a method used in the nutrition surveys carried by Wilson et al (1937)[85], Napier and Dasgupta (1940)[86], Bhave and Bopaiya (1942)[87], Beach et al (1950)[88], Someswara Rao et al (1953)[89], Ramamoorthi (1955)[90], Montoye et al (1965)[91] and Devadas et al (1964)[16], (1967)[18], (1968)[19] and (1969)[20] and Nirmala et al (1968)[92].

4. Clinical Examination:

According to Plough (1962)[93], clinical examination is the simplest and basic procedures in the evaluation of nutritional status and the overall nutriture can be judged. It was classified into nutritional categories as 'good', 'fair', and 'poor'. Each category has a specific definition for the examiner judging the children. This type of grading is often used in a school or community with a view to establish nutrition education programme if a large number of children are classed as fair or poor.

D. Aims and Scopes of School Lunch Programme

The School Health Committee (1960-61)[94] has praised the Madras scheme of free school meals to poor children in

elementary schools launched in 1956. During 1961-62, the CARE organisation generously came forward to give support to the Midday Meal Scheme, offering to supply Corn Soya Milk, rice, wheat, vegetable oil and milk powder. In providing adequate nutrition to children and helping them to form desirable food habits, the school lunch programme has a great role to play. Scott (1953)[12], Eppright (1955)[13], Devadas (1959), Swaminathan (1964), Devadas and Radharukmani (1964), Devadas et al (1966), (1967), (1969) and Anandam et al (1965).

Scott (1953)[12] says that school feeding is of importance as an educational measure. It offers a means of teaching children better habits of diet and through children their parents and the community as a whole and in this way school feeding can be made part of broad programmes to improve the nutrition of the people.

Hill (1960)[95] has stressed that the school should be a vital part of the educational programme. Mack (1947)[96] states that the school lunch should provide lunches which will furnish the energy, protein, minerals and vitamins needed by the majority of children so that the sum of the home and school food will meet the recommended allowances. According to Stiebeling (1950)[97] school meals must be good meals. Food must be prepared well and served attractively in pleasant surroundings.

Thus the school lunch has unlimited educational possibilities. As a part of an over all programme in the school, it can help children to grow better in mind, body and spirit.

E. Nutrition Education

FAO/WHO (1961)[98] state that education in nutrition makes it possible for the information obtained by research in the laboratory and the field, to be used to benefit the population directly. Experience has shown that it is difficult to spread such education effectively because of economic factors, ignorance and deep seated attitudes and beliefs which form part of local cultural patterns. UNICEF (1963)[99] and Hill (1963)[100] regard nutrition education as an indispensable part of any campaign to combat malnutrition. The FAO (1957)[101] has stressed that education in sound habits of diet is necessary, particularly, when the choice of food is restricted by poverty or inadequate supplies.

The aims of programmes of education in nutrition must be defined before the programmes are started. Evaluation can then be related to initial aims. It should be carried out periodically and then evaluation methods should be as objective as possible and acceptable in the statistical sense (FAO/WHO 1961)[98].

Ritchie (1950)[102] points out that nutrition education should have a positive approach, teaching people what to do rather than what not to do. One of the best methods

of stimulating active interest is to relate teaching to home conditions, and the daily pattern of life. Teaching should be diverted towards meeting some need which the people themselves feel.

Schools provide an important channel for education in nutrition for the following reasons:

a. A high proportion of the population consists of children in the school age group.

b. There is a considerable incidence of nutritional defects in school children.

c. Children of this age group have high requirement for proteins and other nutrients.

d. The health of the children of school age is readily affected by malnutrition.

e. What is learned in the school may be carried home by the child and so influence his family.

f. The immature minds of young children are receptive to new ideas which may help to break down harmful social customs (FAO/WHO 1961)[98].

McWilliams (1967)[27] says that elementary grades are an important time to emphasize nutrition education in the classroom as well as in the lunch room. An enthusiastic imaginative approach is essential. After an adequate elementary introduction to nutrition has been given, this subject can be integrated very effectively with other study units throughout the school year.

III EXPERIMENTAL PROCEDURE

The experimental work in this investigation consisted of the following phases:

A. Selecting the Schools and Subjects

B. Study of existing School Lunch Programme

C. Supplementing the School Lunch with green leafy vegetables

D. Conducting Food weighment Survey

E. Assessing the Nutritional Status

F. Conducting and Evaluating Nutrition Education

A. SELECTING THE SCHOOLS AND SUBJECTS:

The elementary school in Pannimadai village situated eight miles north of Coimbatore city was selected for improvement and to serve as a control, the elementary school at Thaliyur village situated one mile away from Pannimadai was selected. The reasons for selection of these two schools are :

1. Both the schools had an on going school lunch programme

2. Previously no study had been conducted in these schools

3. The management of the schools permitted the investigator to conduct the study and assured co-operation.

Of the total enrolment of 540 children in the elementary school at Pannimadai and 200 children in the elementary school at Thaliyur, 120 and 80 children respectively are

participating in the school lunch programme in the two schools. All the 120 children participating in the school lunch programme in Pannimadai elementary school received greens supplement, but 60 children were selected for the assessment of nutritional status. A group of 60 children from Thaliyur elementary school were selected to serve as control. A third group of 60 children were selected from those who were not participating in the school lunch in Pannimadai village for comparing the effects of the school lunch itself, with and without greens. The children in all the three groups were comparable in age and income range of parents, to the extent possible. The three groups were designated as SLG, SL and NSL and had diets as specified in Table II.

TABLE II

CODES AND DIETS OF THE SELECTED CHILDREN

Code	Number of Children	Diet
SLG	60	School lunch and green leafy vegetables
SL	60	School lunch
NSL	60	Home lunch

B. STUDY OF THE EXISTING SCHOOL LUNCH PROGRAMMES:

The existing school lunch programme in the two schools were studied with regard to the organisation, cost, menu and nutritive value of the lunch.

Since 1961, the school lunch programme in the elementary schools at Pannimadai and Thaliyur were operating under the Madras Midday Meals scheme as per the orders of the Government of Madras, 1957 for five days in a week. The school meals were cooked by the peon under the supervision of the headmaster and school teachers in Pannimadai elementary school. In Thaliyur elementary school, the headmaster and the children cooked and served the meals.

The meals are cooked and served in an open space outside the classroom in Pannimadai elementary school and inside the classroom in Thaliyur elementary school. The details of the menu of the two lunch programmes for the week are given in Table III.

TABLE III

WEEKLY MENU IN THE TWO SCHOOLS

Days	Menu
Monday and Thursday	Bulgar wheat uppuma and CSM Chutney
Wednesday	Seasoned Rice and CSM Chutney
Tuesday and Friday	CSM uppuma

The menu consists of CARE commodities for four days, bulgar wheat uppuma and CSM uppuma and rice is given once in a week.

The quantities and cost of the foods supplied by the School lunches in the two schools are presented in Table IV.

TABLE IV

QUANTITIES AND COST OF FOODSTUFFS IN THE MENU PER CHILD

Foodstuffs	. . Elementary School Pannimadai		. . Elementary School Thaliyur	
	Amount G.	Cost Ps	Amount G.	Cost Ps
Rice	156	6	144	6
Bulgar wheat	104	CARE	101	CARE
CSM Mixture	29	CARE	29	CARE
Oil	10	CARE	10	CARE
Greens	25	Garden	-	-
Miscellaneous	-	4	-	4
Total		10		10

The average food and nutrients supplied by the school lunch per child per day was found out by noting the total raw weights of the foods, total cooked weights and the food consumed by each child for all the children each day for one week. The raw equivalents of the food consumed by each child, for all the children were calculated for one week and the average food consumed per child per day was found out. The nutrients consumed by each child was calculated using the tables of ICMR Special Report Series No.42 (1966)[40].

The average nutrients obtained per child per day compared with the allowances recommended by ICMR (1968)[23] is presented in Table V.

TABLE V

DAILY REQUIREMENTS AND NUTRIENTS SUPPLIED BY LUNCH IN THE TWO SCHOOLS

Nutrients	Daily allowances of nutrients	1/3 of the daily allowances	Elementary School (Pannimadai)	Elementary School (Thaliyur)
Calories	1500-2100	500 - 700	357	345
Protein (g)	22 - 41	7 - 13	10.9	11.3
Calcium (g)	0.4 - 0.5	0.1 - 0.2	0.4	0.6
Iron (mg)	15 - 20	5 - 7	4.7	6.6
Retinal (µg)	300 - 600	100 - 200	82.0	84.0
Thiamine (mg)	0.8 - 1.0	0.2 - 0.3	0.68	0.66
Ascorbic acid (mg)	30 - 50	10 - 17	0.07	0.08

C. SUPPLEMENTATION OF THE SCHOOL LUNCH WITH GREENS:

A garden was started in the school grounds with the help of the Headmaster and school children with greens, field beans and tomatoes. Twenty grams of greens (two days drumstick leaves and three days amaranthus) obtained from the garden are given in the form of kootu to supplement the school lunch for each child daily.

D. CONDUCTING FOOD WEIGHMENT SURVEY:

Food weighment is the method used daily in the household during a given period of time. Eppright et al (1952)[77] and Usha and Devadas (1964)[76] have used this because of its reliability as an accurate tool. Pike and Brown (1967)[103] recommend this method as a very accurate record of food consumption during a given period of time. Steele (1951)[104], Trulson (1954)[105] and Adelson (1960)[106] recommend a seven day period for weighment.

The Joint FAO/UNICEF Committee (1959)[107] and the School Health Committee (1961)[108] emphasise that more and better information on actual nutritional conditions should be obtained through food consumption surveys. Accordingly a food consumption survey was conducted in the selected families.

The food consumption survey schedule included the number of meals, timings of meals, weights of foodstuffs as purchased before and after cooking and also the amount consumed by the individual child (Appendix A).

The survey was conducted after establishing rapport with the villages. Through home visits and general meetings arranged in the village, the purpose of the study was explained to the villagers.

A total of 15 children, consisting of five children from each group were selected at random to find out the food consumption. Flores (1962)[109] and Krehl and Hodges (1965)[110]

point out that using a small population sample taken at random saves time and money and we can minimise the problem of refusal.

For seven consecutive days food consumption data were collected during the daily visits to the family. Weights of raw food, cooked food and food consumed by the subjects were recorded daily for all the meals in all the families. From the cooked weights of the consumed foods, raw equivalents of weights were computed. The nutritive value was then calculated using ICMR Special Report Series No.42 (1966)[40].

E. ASSESSING THE NUTRITIONAL STATUS:

The nutritional assessment was done through :

1. Height
2. Weight
3. Haemoglobin estimation
4. Clinical assessment

1. Height:

The heights were noted with the children standing against a wall on which the scale was graduated. The children were made to stand erect with barefoot looking straight. A wooden flat ruler was placed at right angles to the wall just touching the head and the heights were recorded in centimeters.

2. Weight:

The subjects were made to stand on the centre of the platform without touching anything else. Pupils were weighed

with minimum garments after emptying their bladders. Weights were taken on a precise or portable balance (Jelliffe 1966)[53].

3. Haemoglobin Estimation:

Haemoglobin level of all children was estimated colorimetrically following Drabkin's Method given by Varley (1963)[111] at the beginning, middle and end of the experiment.

4. Clinical Assessment:

The children clinically assessed by a Physician with the help of a schedule formulated according to ICMR (1966)[40] (Appendix B).

F. CONDUCTING NUTRITION EDUCATION:

Devadas (1968)[112] states that the chief purposes of education in nutrition in schools and communities are to help pupils, individuals and their families to: appreciate that nutrition is essential to health, well-being, growth and vitality; understand the simple principles of good nutrition and basic food values; select the right kinds of foods and secure adequate diets within the limits of purchasing power and apply proper kinds of cooking and hygienic practices in the handling of food.

Nutrition education must be accompanied by usage of audio-visual aids such as charts, films, filmstrips, demonstrations and group discussions.

FIGURE - 1

NUTRITION EDUCATION THROUGH SKITS

1. General Meeting:

Wilson and Gallup (1955)[113] point out that the advantage of the general meeting is that a large number of people can be reached, and all kinds of subjects introduced. At the same time, the scope of discussion is limited. A general meeting was used as a tool not only for nutrition education but also to establish rapport between the villagers and to inform about the purpose of surveys and interest of the nutritionist to share their knowledge with the home makers.

2. Skit:

The children enacted a skit, enlightening the people on the importance of the various foods such as papaya, greens, carrot, beetroot, milk, tomatoes and egg (Figure I).

3. Songs:

The Ministry of Food and Agriculture (1959)[114] reports that the songs are good for conveying information on better ways of living. Accordingly a song was taught to children.

4. Demonstration:

Kelsey and Hearne (1955)[115] state that method demonstration is useful to teach an improved practice if proved worth in terms of its practical application to a specific situation. Demonstration has been considered as the most effective form of visual education by Rathore (1962). Usha and Devadas (1964)[76] stress that the advantage of demonstration as an effective teaching skill lies in that it stimulates action, builds confidence, serves publicity purposes,

increases acquaintance of nutrition workers with the local people and introduce change of practices at low cost.

Usha and Devadas (1964)[76] point out that result demonstrations are useful in introducing a beneficial new practice and in convincing the audience and giving them factual data. Result demonstration on the cooking of greens, and sprouting of green gram was conducted to improve their methods of cooking.

Evaluation of the nutrition education programme:

Nickel and Dorsey (1960)[116] define evaluation as a checking up and testing which tells whether or not the results are turning out as planned. Blanchard (1950)[117], Robinson (1960)[118] and Porter (1960)[119] regard evaluation as a process of determining the strength and weakness, worth, value or meaning of a programme, situation or teaching method in relation to some predetermined standard or criteria. Ritchie (1950)[120] advises that evaluation of nutrition programme should be made at intervals long enough to allow changes. Based on these considerations the effectiveness of the nutrition education programme was evaluated after three months.

IV RESULTS AND DISCUSSION

The effect of the supplementation of green leafy vegetables on the nutritional status of children participating in a rural school lunch programme is discussed under the following headings :

A. The nutrient intake of the selected subjects

B. The nutritional status of the children

C. Evaluation of the nutrition education imparted

A. THE NUTRIENT INTAKE OF THE SELECTED SUBJECTS:

The average nutrient intake of the selected subjects in the three groups is presented in Table VI and the details given in Appendix C.

TABLE VI

AVERAGE NUTRIENT INTAKE OF THE SELECTED SUBJECTS IN THE THREE GROUPS

Group	Particulars	Calories	Protein g.	Calcium mg.	Iron mg.	Retinal µg.	Thiamine mg.	Riboflavin mg.	Ascorbic acid mg.
SLG	Home diet	1190	30.8	196.7	22.5	218	1.26	0.76	49
	School lunch	383	11.4	57.6	5.2	27	0.57	0.19	-
	Green leafy vegetables	13	1.0	82.6	3.6	422	0.01	0.02	30
	Whole day's diet	1586	42.2	336.9	31.3	667	1.84	0.87	79
SL	Home diet	899	26.9	143.1	15.5	5	0.81	0.53	44
	School lunch	383	11.4	57.6	5.2		0.57	0.19	0
	Whole day's diet	1282	38.3	200.7	20.7		1.38	0.72	44
NSL	Home diet	841	26.6	224.1	12.6		0.69	0.48	13.24
Recommended Allowances ICMR 1968		1800	36	400-600	15.20	450	0.8-1	0.8-1.2	30-50

The group SLG receiving school lunch and greens supplement obtained a higher intake of nutrients from the home diets when compared to groups SL and NSL. The nutrient intake of the group NSL was the lowest when the whole-day's diets of the three groups SLG, SL and NSL were compared with the allowances recommended by the ICMR (1968). The group SLG met the recommended allowances for calories, iron, thiamine, riboflavin and ascorbic acid, the group SL met the recommended allowances for iron and ascorbic acid and the group NSL was inadequate in all the nutrients supplied by the home diet.

The higher nutrient intake by the children in the groups SLG and SL obtained from the home diet itself, may be due to the nutrition education imparted to these groups.

B. THE NUTRITIONAL STATUS OF CHILDREN:

1. Height:

The mean monthly heights of the three groups of children is presented in Table VII with the details shown in Appendix D.

TABLE VII

MEAN HEIGHTS OF CHILDREN IN THE THREE GROUPS

Groups	Mean Heights in Centimeters (Period in months)							Mean increase
	1	2	3	4	5	6	7	
SLG	119.9 ± 1.28	120.5 ± 1.15	121.2 ± 1.04	121.9 ± 1.34	122.5 ± 0.97	123.1 ± 1.11	123.7 ± 0.83	3.81 ± 0.072
SL	116.6 ± 1.75	112.4 ± 1.27	113.0 ± 1.36	113.4 ± 1.51	114.1 ± 1.64	114.7 ± 1.16	115.2 ± 1.39	3.67 ± 0.056
NSL	124.0 ± 1.82	124.7 ± 1.57	125.3 ± 1.41	125.9 ± 1.18	126.1 ± 1.77	127.0 ± 1.61	127.3 ± 0.63	3.3 ± 0.040

All the three groups had registered an increase in height, however the greatest increase was shown by the group SLG. receiving greens supplement.

Table VIII gives the 't' values obtained from the statistical analysis of the mean increases in height for the three groups, with the details in Appendix E.

TABLE VIII

't' VALUES FOR THE INCREASES IN MEAN HEIGHTS

Group compared	Group in whose favour	't' value
SLG - SL	SLG	2.0*
SLG - NSL	SLG	7.0**
SL - NSL	NSL	4.1**

* Significant at 5 per cent level

** Significant at 1 per cent level

The differences between the mean increases in weights were significant at five per cent level for group SLG, receiving school lunch and greens when compared to the group SL and significant at one per cent level when compared to the group NSL.

2. Weight:

The mean weights of the children in the three groups are presented in Table IX and the record of monthly weights are given in Appendix F.

TABLE IX

MEAN WEIGHTS OF THE CHILDREN IN THE THREE GROUPS

Groups	Mean Weight in Kilograms (Period in months)							Mean increase
	1	2	3	4	5	6	7	
SLG	20.1 ± 0.42	20.1 ± 0.50	20.2 ± 0.43	20.3 ± 0.45	20.6 ± 0.41	20.8 ± 0.45	21.1 ± 0.44	1.0 ± 0.115
SL	17.3 ± 0.57	17.2 ± 0.54	17.4 ± 0.55	17.4 ± 0.54	17.6 ± 0.52	17.7 ± 0.53	18.0 ± 0.53	0.7 ± 0.087
NSL	22.7 ± 0.64	22.6 ± 0.65	22.6 ± 0.66	22.7 ± 0.64	22.9 ± 0.65	23.0 ± 0.66	23.2 ± 0.64	0.5 ± 0.089

There was an increase in the weights of the children in all the three groups, but the increase was greatest in the group SLG receiving school lunch and greens supplement, followed by that registered by the group SL receiving school lunch only. Table X and Appendix E gives the 't' values obtained from the statistical analysis of the mean increases in weights.

TABLE X

't' VALUES FOR THE INCREASE IN MEAN WEIGHTS

Group compared	Group in whose favour	't' value
SLG - SL	SLG	2.5*
SLG - NSL	SLG	3.1**
SL - NSL	SL	1.6

* Significant at 5 per cent level
** Significant at 1 per cent level

The mean increase in weight of the group SLG over that of NSL was statistically significant but was insignificant when compared to the group SL. The group SL showed statistically significant increase in the mean weights when compared to the group NSL.

The highly significant increase in the groups SLG and SL over the group C may be due to the higher intakes of calories, carotene, proteins and calcium by these groups from the home diets and school lunch.

3. Haemoglobin levels:

The haemoglobin content of the blood, estimated at the beginning, middle and end of the experiment for all the children in the three groups are shown in Appendix G and the mean initial, middle and final haemoglobin levels for each group is given in Table XI.

TABLE XI

THE HAEMOGLOBIN LEVELS IN THE THREE GROUPS

Groups	Mean Haemoglobin g/100 ml			
	Initial	Middle	Final	Increase
SLG	7.71 ± 0.16	8.53 ± 0.07	9.03 ± 0.32	1.32 ± 0.098
SL	6.26 ± 0.10	7.02 ± 0.05	7.44 ± 0.09	1.18 ± 0.028
NSL	7.97 ± 0.68	8.46 ± 0.11	8.91 ± 0.17	0.92 ± 0.08

The mean increase in haemoglobin was greatest in the group SLG, receiving school lunch and greens supplement followed by the group SL receiving school lunch only. The 't' values of the mean increase in the haemoglobin content is shown in Table XII with the details in Appendix E.

TABLE XII

't' VALUES FOR THE INCREASE IN AVERAGE HAEMOGLOBIN LEVELS FOR THE THREE GROUPS

Groups compared	Group in whose favour	't' value
SLG - SL	SLG	1.5
SLG - NSL	SLG	3.6**
SL - NSL	SL	2.8**

* Significant at 5 per cent level

** Significant at 1 per cent level

The increase of the SLG over the NSL group was statistically significant at one per cent level. The difference between SL and NSL was significant at 5 per cent level. Although the greatest gain was registered by SLG, the difference between SLG and SL was not significant.

4. Clinical Assessment:

Table XIII presents the incidence of deficiency symptoms among the children in the beginning and end of the study.

TABLE XIII

INCIDENCE OF DEFICIENCY SYMPTOMS IN THE THREE GROUPS

Symptoms	SLG		SL		NSL	
	Beginning	End	Beginning	End	Beginning	End
Xerosis of conjunctiva						
a. Slight dry or exposure to half minute lack of lusture	45	32	33	30	35	36
b. Conjunctiva dry and wrinkled	9	1	12	8	10	8
Pigmentation						
a. Slight discoloration	35	23	35	35	13	12
b. Moderate browning in Patches	7	6	6	4	6	6
Discharge						
Watery, excessive lachry rmation	6	4	18	16	14	12
Xerosis of cornea						
a. Sight dryness and diminished sensitivity	11	7	8	5	12	8
Vascularization cornea						
a. Circumconial infection	-	-	2	-	6	8
Excoriation of eyelids						
a. Slight excisation	3	2	16	10	6	8
Follicles of eyelids						
a. A few granules	21	12	23	18	26	18
Angular conjunctivities a. Mild	14	8	16	11	13	13
b. Moderate	2	2	1	-	-	-
Night blindness						
a. Mild	7	1	6	4	10	12
b. Moderate	-	-	-	-	-	-
Total	160	88	176	141	153	141

The figures in Table XIII show the beneficial effects of green leafy vegetables in overcoming the deficiency symptoms, especially those of the eyes. The deficiency symptoms which were 160 in the group SLG, receiving school lunch and green leafy vegetables had decreased to 88 at the end of the study. This salutary outcome may be due to the provitamin A content of greens and the higher nutrient intake by this group. In the group SL receiving school lunch only, the deficiency symptoms had decreased from 176 to 141. This may be due to the extra nutrient intake received from the home diets and school lunch by this group when compared to the group NSL.

C. EVALUATION OF NUTRITION EDUCATION IMPARTED:

A questionnaire was evolved to determine the nutritional knowledge of 135 children participating in the school lunch. To evaluate knowledge of children after nutrition education, the same questionnaire was used after three months. The details of the improvement in the nutritional knowledge of children is presented in Table XIV.

TABLE XIV

EVALUATION OF THE NUTRITION EDUCATION IMPARTED

The Test	Expected Replies	Number of Children answered			
		Before education		After education	
		No.giving expected replies	Wrong answers	No.giving expected replies	Wrong answers
1	2	3	4	5	6
Questions					
1. Importance of food in day today life	To maintain health and strength. For growth to repair the worn out tissues	60	75	126	9
2. Which are the foods that are important for good growth and strong muscles?	Pulses, fruits vegetables, nuts, milk	12	123	124	11
3. Which foods are important for strong bones and teeth?	Milk and milk products fruits	21	114	115	20
4. Which foods are important for the health of the blood?	Green leafy vegetables Beet root, carrot	21	114	127	8
5. Which foods are important for the health of eyes?	Green leafy vegetables Papaya, carrot, milk	13	122	135	--
6. Which foods should you eat for sound gums and quick wound healing?	Fruits, fresh vegetables, green leafy vegetables	28	107	130	5
7. Why should you not drain off the excess water after cooking vegetables and cereals?	Due to less of nutrients in the cooking water	10	125	96	39
8. Why should you wash vegetables before cutting?	To clean the outer-portion; after cutting the nutrients will be lost	8	127	99	36

1	2	3	4	5	6
9. Why should you cut vegetables into large pieces?	To preserve the nutrients as only larger portions of vegetables will be exposed	7	128	97	28
10. Why should you eat raw vegetables?	To detain all the nutrients which are destroyed while cooking	32	103	97	28
11. What nutrient cannot contains?	Vitamin A, Carotene	0	135	108	27
12. What nutrient papaya contains?	Vitamin A & C	0	135	96	29
13. What nutrient greens contains?	Vitamin A & iron	0	135	120	15
14. What nutrient egg contains?	Proteins, vitamins and minerals	0	135	99	36
15. What nutrient Amla contains?	Vitamin C	0	135	94	41
16. What nutrient tomato contains?	Vitamin C	0	135	110	25
17. What nutrient milk contains?	Minerals	-	135	92	43
18. What is your opinion about fruits?	Rich in vitamins	12	123	97	28
	Total	224	2206	1872	428

It is evident from Table XIV that the total number of expected answers obtained had increased from 224 to 1872 after nutrition education and the total number of wrong answers obtained had decreased from 2206 to 428 after nutrition education. This shows that the children had a better knowledge of the principles of nutrition after education.

V SUMMARY AND CONCLUSION

The effect of the supplementation of green leafy vegetables on the nutritional status of a group of 60 children (SLG) participating in the school lunch programme in Pannimadai Elementary School was studied over a period of six months. Another comparable group of 60 children (SL) from the elementary school in Thaliyur, a nearby village who were receiving school lunch without green leafy vegetables was selected to serve as control. A third group of 60 school children (NSL) who were similar in age were selected but were not participating in the school lunch, in Pannimadai village for comparing the effects of the school lunch itself, with and without the green leafy vegetables.

The menu and composition of the two school lunches were similar. Food intake, height, weight, haemoglobin levels and clinical assessment were used as the criteria for the assessment. The findings of this study were :

1. The total food consumption and hence calorie and protein intake along with the other nutrients were found to be the greatest for the group SLG, receiving green leafy vegetables with school lunch followed by the group SL receiving school lunch only. It was the lowest for the NSL group.

2. The mean increases in height, weight and haemoglobin levels were the highest for the group SLG receiving green leafy vegetables as supplement followed by SL. The difference betweeen the increases for the SLG and NSL group receiving home lunch as significant.
3. The mean increases in weight and haemoglobin level registered by the group SL, receiving school lunch only was also higher than those enduced by the group NSL. These differences were statistically significant.
4. In children receiving green leafy vegetables with the school lunch, the incidence of the deficiency conditions such as xerosis of conjunctiva, xerosis of cornea, excoriation of eyelids, angular conjunctivitis and night blindness was reduced to a greater extent as compared to the responses in the groups SL, receiving school lunch only and NSL receiving home lunch. This is attributable to the provitamin A content of the green leafy vegetables.
5. The evaluation of the nutrition education imparted to the children participating in the school lunch showed that the nutritional knowledge of the children had improved after education.

In view of the significantly supplementary effects of green leafy vegetables, it is recommended that efforts must be made to include them as components of the daily meals in the school.

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APPENDICES

APPENDIX A

SRI AVINASHILINGAM HOME SCIENCE COLLEGE
COIMBATORE-11

Food Consumption Survey

Name of the Investigator: DATE:

Name of the Child:

Meal	Menu	Weight of Raw Ingredients	Weight of cooked Foods	Individual Consumption	Raw Equivalent
Breakfast					
Lunch					
Tea					
Dinner					
Others					

APPENDIX B

SRI AVINASHILINGAM HOME SCIENCE COLLEGE
COIMBATORE-11

CLINICAL ASSESSMENT

Name: Sex: Age:

Height: Weight:

Hip width (inter/cristal)

3 Good

2 Fair

1 Poor

0 Very poor

II. Eyes:

A. Xerosis of Conunctiva

3 Absent - glistening and moist.

2 Slightly dry or exposure for ½ minute, lack of lustre.

1 Conjunctiva dry and wrinkled.

0 Conjuntiva very dry and Bitot's spots present.

B. Pigmentation

3 Normal colour

2 S-light Discolouration

1 Moderate browning in patches

0 Severe earthy discolouration

C. Discharge

3 Absent

2 Watery, excessive lachrymation

1 Mucopurulent

0 Purulent

D. Xerosis of Cornea

3 Absent

2 Slight dryness and diminished sensitivity

1 Haziness and diminished lachrymation

0 Ulceration

E. Vascularisation of Cornea

3 Absent

2 Circumcohial injection of blood vessels

1 Vascularisation present

0 Severe

F. Excoriation of Evelids

3 Absent

2 Slight excisiation

1 Blapharitis

0 Severe

G. Koliculosis of Eyelids

3 Absent

2 A few granules

1 Lids covered with extensive granules

0 Hyper trophy

H. Angular conjunctivities of Eyslids

3 Absent

2 Mild

1 Moderate

0 Severe

I. Night Blindness

3 Absent

2 Mild

1 Moderate

0 Severe

III. Mouth

A. Condition of lips

3 Normal

2 Angular stomatitis - Mild

1 Angular stomatitis - Moderate

0 Angular stomatitis - Severe

B. Colour of tongue

3 Normal

2 Pale but not coated

1 Red

0 Red and raw

C. Surface of tongue

3 Normal

2 Fissured

1 Ulcered

0 Glazed and atropic

D. Condition of Gums

3 Norma l

2 Bleeding and/or Gingivitis

1 Pyorrhea

0 Rettacted

E. Teeth

3 Flourisis Absent

2 Chalky teeth

1 Pitting of teeth

0 Mottled enamel and discoloured teeth

F. Caries

3 Absent

2 Slight

1 Moderate

0 Severe

E. Tonsils, enlargement

3 Absent

2 Slight

1 Moderate

0 Severe

IV. Hair

3 Normal

2 Loss of lustre

1 Discoloured and dry

0 Sparse and brittle

V. Skin

A. General Appearance

3 Normal

2 Loss of Lustre

1 Dry and rough or crazy pavement

0 Hyperkeratosis, phrynoderma

B. Elasticity

3 Normal

2 Diminished

1 Wrinkled

0 Severely wrinkled

VI. Face

3 Normal

2 Nasolabial Seborrhoea

1 Symmetrical - suboribital segmentation

0 Severe - Pigmentation

VII. Oedema

3 Absent

2 Oedema on dependend parts

1 Oedema on face and dependant parts

0 General emasrea

VIII. Alimentary System

Appetite

3 Normal

2 Anorexia mild

1 Moderate

0 Severe

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APPENDIX - C

DAILY NUTRIENT INTAKE OF CHILDREN IN THE THREE GROUPS

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 1

GROUP: SLG (School Lunch + Greens)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	Vitamin A I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Cholam	49.3	181.	5.1	12.0	2.9	39	0.09	0.14	--
Rice,Parboiled,Milled	79.9	269	5.1	8.0	3.2	--	0.17	0.07	--
Black gram dhal	2.3	8	0.6	4.0	0.2	2	0.01	0.01	--
Cow gram	11.7	38	2.9	9.0	1.3	7	0.06	0.02	--
Green gram	4.2	14	1.0	5.0	0.3	7	0.02	0.02	--
Red gram dhal	14.3	48	3.2	10.0	1.0	32	0.64	0.07	--
Pannikeerai	7.2	3	0.3	20.0	1.7	--	--	--	--
Paruppukeerai	4.1	1	0.1	5.0	0.6	157	0.004	0.01	1.2
Onion Small	8.7	5	0.2	4.0	0.1	2	0.01	0.002	0.2
Tapica	89.5	141	0.6	45.0	0.8	--	0.01	0.09	22.4
Cluster Beans	3.2	2	0.1	4.0	0.1	11	0.003	0.001	1.6
Ridge Gound	31.0	5	0.2	12.0	0.5	17	0.02	0.003	1.6
Chillies Green	7.1	2	0.2	2.0	0.1	21	0.01	0.031	7.9
Tamarind	2.2	6	0.1	4.0	0.2	2	--	0.002	0.1
Oil	1.9	17	--	--	--	--	--	--	--
Jaggery	4.0	15	0.02	3.0	0.5	--	0.001	--	--
Coconut	0.9	6	0.10	4.0	0.02	--	0.001	0.001	0.1
Total		761	19.82	151.0	13.52	297	1.049	0.472	35.1

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 2

GROUP: SLG (School Lunch + Greens)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	Vitamin A I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Cholam	242.3	840	25.2	60.6	14.1	191	0.90	0.68	--
Rice Parboiled Milled	138.1	477	8.8	12.4	6.5	-	0.29	0.12	--
Wheat	14.6	51	1.7	5.9	0.7	16	0.07	0.02	--
Wheat flour	14.5	50	1.8	6.9	1.7	7	0.07	0.04	--
Cow Gram	37.5	123	9.2	29.6	4.1	23	0.19	0.18	--
Green Gram	40.2	134	9.7	49.9	2.9	64	0.19	0.06	0.4
Red gram dhal	13.4	45	2.9	9.8	0.8	29	0.06	0.07	--
Bengal gram dhal Roasted	0.2	11	0.1	0.1	0.02	1	0.001	0.001	--
Ponnanikeerai	2.0	1	0.1	5.4	0.5	--	--	--	--
Parupukeerai	12.3	3	0.3	13.7	1.8	450	0.01	0.03	3.6
Beetroot	12.2	5	0.2	24.4	0.12	--	0.01	0.01	10.7
Onion Small	32.8	19	0.6	13.1	0.4	8	0.03	0.01	0.7
Potato	7.9	8	0.1	0.8	0.06	3	0.01	0.001	1.3
Carrot	12.4	6	0.1	9.9	0.3	391	0.01	0.003	0.4
Knol-khol	6.5	1	0.1	1.3	0.03	2	0.003	0.01	5.5
Ashgourd	37.7	4	0.2	11.3	0.3	--	0.02	0.004	0.4
Ridge gourd	4.0	1	0.0	1.6	0.1	2	0.003	--	--
Chillies Green	29.9	9	1.0	8.9	0.4	87	0.06	0.117	33.2
Tamarind	7.0	20	0.2	11.9	0.8	7	--	0.01	0.2
Brinjal	15.9	4	0.2	2.9	0.1	20	0.01	0.02	1.9
Coconut	13.4	89	0.9	53.6	0.4	--	0.01	0.01	0.9
Total		1907	61.4	334.0	36.33	1301	1.947	1.396	59.20

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 3

GROUP: SLG (School Lunch + Greens)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	Vitamin A I.U.	Thiamine Mg.	Riboflawin mg.	Ascorbic acid mg.
Cholam	130.0	454	15.5	32.5	7.5	103	0.48	0.36	--
Rice Parboiled Milled	59.0	204	3.8	5.3	2.4	--	0.12	0.05	--
Wheat	61.1	211	7.2	25.1	3.0	66	0.27	0.07	--
Bengalgram	8.2	30	1.4	16.6	0.8	26	0.03	0.04	0.3
Blackgramdhal	7.6	26	1.8	11.7	0.7	5	0.03	0.03	--
Cow gram	7.7	25	1.9	6.1	0.9	5	0.04	0.04	--
Redgramdhal	20.8	70	4.6	15.2	1.2	50	0.10	0.11	--
Bengalgramdhal Roasted	0.9	3	0.2	0.5	0.1	0	0.002	0.01	--
Amaranthus	0.7	--	--	3.4	5.3	92	--	0.001	1.8
Onion Small	6.7	4	0.1	2.7	0.1	2	0.01	0.001	0.1
Potato	6.7	7	0.1	0.7	0.1	3	0.001	0.001	1.1
Coconut	2.7	18	0.2	10.8	0.1	--	0.002	0.002	0.2
Brinjal	14.2	3	0.2	2.6	0.1	18	0.001	0.02	1.7
Cho-cho	2.3	1	--	3.2	0.01	--	--	0.001	0.1
Nellikai	11.4	7	0.1	5.7	0.14	2	0.003	0.001	68.0
Ridge gourd	41.7	7	0.2	16.7	0.7	23	0.03	0.004	2.0
Chillies green	5.4	2	0.2	0.4	0.02	16	0.01	0.021	6.0
Chillies Dry	1.3	3	0.1	2.1	0.03	8	0.01	0.000	0.7
Tamarind	3.2	9	0.1	5.4	0.4	3	--	0.002	0.1
Papaya	22.9	7	0.1	3.9	0.1	254	0.01	0.06	13.1
Buttermilk	11.4	2	0.1	3.4	0.1	--	--	--	--
Jaggery	9.2	35	--	7.4	1.1	--	0.002	--	--
Total		1128	37.9	181.4	24.90	676	1.151	0.830	88.40

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 4

GROUP: SLG (School Lunch + Greens)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	VitaminA I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Rice,Raw,milled	57.7	199.0	3.9	5.8	1.8	--	0.35	0.04	--
Rice,Parboiled Milled	57.4	198	3.7	5.2	2.3	--	0.12	0.05	--
Rice, flakes	19.3	67	1.3	3.9	4.0	--	0.04	0.01	--
Wheat	26.8	93	3.2	11.0	1.3	29	0.12	0.03	--
Wheat flover	77.7	265	9.4	37.3	9.0	38	0.38	0.23	--
Bengalgram dhal Roasted	1.0	4	0.2	0.6	0.1	2	0.002	0.01	--
Blackgram Dhal	1.0	4	0.2	1.5	0.1	1	0.004	0.004	--
Cowgram	3.9	13	1.0	13.1	0.4	2	0.020	0.02	--
Red gramdhal	1.6	5	0.4	1.2	0.1	4	0.007	0.01	--
Onion	5.7	3	0.1	2.3	0.1	1	0.01	0.001	0.1
Potato	1.0	1	--	0.1	0.01	--	0.001	--	0.2
Bitter gourd	9.6	2	0.2	2.0	0.2	20	0.01	0.01	8.5
Bringal	1.0	--	--	0.2	0.1	1	--	0.001	0.1
Field beans	1.0	1	--	2.1	0.02	3	0.001	0.001	0.1
Ladies finger	6.4	2	0.1	4.2	0.1	6	0.01	0.01	0.8
Coconut	1.9	13	0.1	7.6	0.1	--	0.002	0.001	0.1
Groundnut Roasted	1.0	6	0.3	0.5	0.00	--	0.004	0.001	--
Chillies Green	1.0	--	--	0.3	0.01	3	0.002	0.004	1.1
Chillies dry	1.0	3	0.2	1.6	0.02	6	0.01	0.004	1.0
Corriander	2.1	6	0.3	13.2	0.38	33	0.01	0.01	--
Orange	14.0	7	0.1	7.0	0.01	46	0.02	0.01	9.5
Tomato	5.0	1	0.1	2.4	0.20	29	0.01	0.003	1.4
Tamarind	4.3	12	0.1	7.3	0.47	4	--	0.003	1.1
Oil	5.7	51	--	--	--	--	--	--	--
Milk	7.6	5	0.2	9.4	0.02	13	0.004	0.014	0.2
Jaggery	12.6	48	--	10.1	1.44	--	0.003	--	--
Total		1030	26.1	151.4	22.68	241	1.149	0.484	24.2

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 5

GROUP: SLG (School Lunch + Greens)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	VitaminA I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Cholam	51.9	181	5.4	12.9	3.0	41.0	0.19	0.15	--
Rice, Parboiled Milled	107.2	370	11.2	10.0	4.3	--	0.23	0.10	--
Rice, Puffed	9.4	31	0.7	2.2	0.6	--	0.02	0.01	--
Wheat	89.1	308	10.5	36.5	4.5	96	0.40	0.11	--
Bengalgramdhal	4.0	15	1.0	2.3	0.4	8	0.01	0.02	--
Blackgramdhal	3.1	11	1.0	4.8	0.3	2	0.01	0.01	--
Cow gram	2.4	8	1.0	1.9	0.3	2	0.01	0.01	--
Greengram	2.9	10	1.0	3.6	0.2	5	0.01	0.01	--
Red gramdhal	17.1	57	3.8	12.5	1.0	38	0.08	0.09	--
Cabbage	10.0	3	0.2	4.0	0.1	200	0.01	0.003	12
Drumstick leves	2.0	2	0.1	9.0	0.1	226	0.001	0.001	4
Carrot	13.8	7	0.1	11.0	0.3	435	0.01	0.003	--
Onion Small	10.9	6	0.2	4.4	0.1	1	0.004	0.002	--
Potato	4.9	5	0.1	1.00	0.03	4	0.01	0.001	2
Brinjal	2.6	1	--	1.0	0.02	3	0.001	0.003	--
Field beans	3.7	2	0.1	8.0	0.1	12	0.004	0.002	--
Snake gourd	11.3	2	0.6	6.0	0.12	18	0.01	0.01	--
Coconut	4.3	29	0.3	17.2	0.11	--	0.003	0.003	--
Groundnut Roasted	2.9	16	1.0	2.0	0.01	--	0.01	0.004	--
Chillies, Green	8.9	3	--	3.0	0.11	26	0.02	0.04	11
Tamarind	4.6	13	0.1	8.0	0.5	5	--	0.003	--
Buttermilk	15.0	2	0.1	5.0	0.1	--	--	--	--
Oil	14.3	39	--	--	--	--	--	--	--
Total		1121	27.54	166.3	16.30	1122	1.044	0.585	29

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 1

GROUP: SL (School Lunch)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	Vitamin A I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic mg. acid
Cholam	44.4	151	4.6	11.1	5.9	35	0.16	0.12	--
Rice, Parboiled Milled	93.8	324	5.4	8.4	3.8	--	0.2	0.04	--
Black gramdhal	2.9	10	0.7	4.5	0.3	2	0.01	0.01	--
Cowgram	16.5	55	4.1	21.6	1.8	10	0.1	0.08	--
Redgramdhal	16.8	56	3.7	12.3	1.0	37	0.1	0.09	--
Green Gram	3.4	11	0.8	4.2	0.3	5	0.02	0.01	--
Panni Keerai	8.9	4	0.3	23.8	0.2	--	--	--	--
Paruppukeerai	1.2	--	--	1.3	0.2	46	0.001	0.003	--
Onion Small	10.2	6	--	4.1	0.1	3	0.01	0.002	--
Tapioca	50.1	79	0.1	25.1	0.5	--	0.03	0.05	13
Cluster beans	3.6	2	--	4.7	0.2	14	0.003	0.001	2
Ridge gourd	27.8	5	0.1	11.1	0.5	16	0.02	0.003	1
Chillies, Green	9.6	3	0.3	22.9	0.1	28	0.02	0.04	11
Tamarind	4.9	14	0.2	8.3	0.5	5	--	0.003	--
Oil	2.9	26	--	--	--	--	--	--	--
Jaggery	4.0	15	0.01	3.2	0.5	--	0.001	--	--
Coconut	1.1	7	0.1	4.4	---	--	0.001	0.001	--
Total		768	17.4	151.0	15.9	191	0.476	0.453	27

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 2

GROUP: SL (School Lunch)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	Vitamin A I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Cholam	97.7	341	10.2	24.4	5.7	77	0.36	0.27	--
Rice, Poraboiled, Milled	50.7	175	3.3	4.6	2.0	--	0.11	0.05	--
Wheat	46.4	161	5.5	19.0	2.4	50	0.21	0.06	--
Bengal gram	11.4	41	2.0	23.0	1.2	36	0.03	0.06	0.3
Black gramdhal	8.3	29	1.9	12.8	0.8	5	0.04	0.03	--
Cow gram	5.4	18	1.3	4.3	0.6	3	0.03	0.03	--
Redgram Dhal	10.5	35	2.3	7.7	0.6	2	0.05	0.05	--
Bengal gramdhal Roasted	1.0	4	0.2	0.6	0.1	2	0.002	0.01	--
Amaranthus	1.0	1	--	3.9	0.3	92	0.001	0.001	1.0
Onion Small	7.1	4	0.13	4.8	0.1	2	0.01	0.001	0.1
Potato	6.0	6	0.1	0.6	0.04	2	0.004	0.001	1.0
Bitter gourd	1.0	--	--	0.2	0.2	2	0.001	0.001	1.0
Brinjal	12.5	3	--	2.3	0.1	16	0.01	0.014	2.0
Cho-cho	1.3	--	0.1	1.8	0.01	--	--	0.001	--
Nellikai	11.4	7	0.1	5.7	0.14	2	0.003	0.001	68.0
Ridge gourd	48.7	8	0.2	19.5	0.8	27	0.034	0.01	2.0
Chillies, Green	5.7	2	0.1	1.7	0.1	17	0.011	0.022	6.0
Tamarind	2.8	8	0.1	4.8	0.5	28	--	0.002	0.1
Papaya	24.4	8	0.2	4.2	0.1	271	0.01	0.06	13.9
Oil	1.0	9	--	--	--	--	--	--	--
Buttermilk	12.1	2	0.1	3.6	1.0	--	--	--	--
Total		863	27.8	149.5	16.79	634	0.916	0.674	95.4

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 3

GROUP:- SL-(School Lunch)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	VitaminA I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Cholam	67.7	236	7.0	16.6	3.9	54	0.25	0.16	--
Rice,Parboiled Milled	37.3	129	2.4	3.5	1.5	--	0.08	0.03	--
Wheat	45.5	157	5.4	18.7	2.2	49	0.21	0.06	--
Bengal gram	10.5	38	1.8	21.2	1.1	33	0.03	0.05	0.3
Black gramdhal	3.1	11	0.7	4.8	0.3	2	0.01	0.01	--
Cow gram	5.3	17	1.4	4.2	0.6	3	0.03	0.03	--
Redgram dhal	7.6	26	1.7	5.5	0.4	17	0.03	0.04	--
Bengal gram dhal	1.0	4	0.2	1.0	0.1	2	0.002	0.01	--
Amaranthus	1.0	1	--	3.9	0.3	92	--	0.001	1.0
Onion,Small	6.0	4	0.1	2.4	0.1	2	0.005	0.001	0.1
Potato	2.8	3	0.1	0.3	0.02	1	--	--	0.4
Bittergourd	1.0	--	--	0.2	0.03	2	0.001	0.001	0.9
Brinjal	3.4	1	0.1	1.0	0.03	4	0.001	0.004	0.4
Cho-cho	1.3	--	--	1.8	0.01	--	--	0.001	0.1
Nellikai	5.7	3	--	2.8	0.07	1	0.002	0.001	34.0
Ridge gourd	23.2	4	0.1	9.3	0.37	13	0.014	0.002	1.0
Chillies green	3.5	1	--	1.1	0.04	10	0.009	0.014	4.0
Chillies Dry	1.3	3	0.2	2.1	0.03	8	0.012	0.006	1.0
Tamarind	2.3	7	0.1	4.0	0.3	2	--	0.002	--
Papaya	21.4	7	0.1	4.0	0.1	238	0.01	0.054	12.0
Oil	1.0	9	--	--	--	--	--	--	--
Buttermilk	11.4	2	0.1	3.4	0.1	--	--	--	--
Jaggery	9.2	35	--	7.4	1.1	--	0.012	--	--
Total		698	21.5	119.2	12.70	533	0.708	0.477	55.20

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 4

GROUP: SL (School Lunch)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	Vitamin A I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Cholam	46.8	163	4.9	11.7	2.7	37	0.17	0.13	--
Rice, Parsoiled Milled	137.7	475	8.8	12.4	5.5	--	0.29	0.12	---
Rice Puffed	11.4	37	1.0	2.6	0.8	--	0.02	0.01	--
Wheat	85.6	296	10.1	35.1	4.2	93	0.39	0.10	--
Black gram dhal	6.0	21	1.5	9.2	0.6	4	0.03	0.02	--
Bengal gram dhal Roasted	3.9	14	0.8	2.3	0.4	7	0.08	0.02	--
Cow gram	2.4	8	0.1	1.9	0.3	1	0.01	0.01	--
Red Gram dhal	19.1	64	3.9	13.9	1.1	42	0.09	0.10	--
Drumstick leaves	1.8	2	0.1	7.9	0.1	203	0.001	0.001	4.0
Cabbage	3.4	1	--	1.3	0.03	68	0.002	0.001	4.2
Onion Small	5.1	3	0.1	2.0	0.1	1	0.004	0.001	0.1
Potato	5.5	5	--	1.0	0.04	2	0.001	0.001	0.9
Carrot	11.9	6	0.1	9.5	0.3	375	0.01	0.002	0.4
Brinjal	2.9	1	--	0.1	0.03	2	0.001	0.003	0.4
Field beans	4.7	2	0.1	9.9	0.1	15	0.001	0.003	0.4
Snake gourd	10.1	2	0.1	5.1	0.1	16	0.004	0.01	--
Coconut	5.2	32	0.4	20.8	0.44	--	0.004	0.003	0.4
Groundnut Roasted	2.1	14	0.7	1.1	0.01	--	0.01	0.003	--
Chillies Green	8.0	2	0.2	2.4	0.10	23	0.02	0.003	8.9
Tamarind	2.5	7	0.1	4.3	0.3	3	--	0.002	0.1
Buttermilk	12.9	2	0.1	3.9	0.04	--	--	--	--
Total		1157	33.1	158.4	17.29	892	0.938	0.543	19.8

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 5

GTOUP: -SL-(School-Lunch)-

Foodstuff	Amount	Calories	Protein	Calcium	Iron	Vitamin A	Thiamine	Riboflawin	Ascorbic acid
	g.	---	--g.	mg.	mg.	-I.U.	mg.	mg.	mg.
Cholam	51.9	181	5.4	12.9	3.0	41	0.19	0.15	--
Rice,Parboiled, Milled	113.6	393	7.3	10.2	4.5	--	0.24	0.10	--
Rice Puffed	10.7	35	0.8	2.5	0.7	--	0.02	0.01	--
Wheat	55.4	191	6.5	22.7	2.7	60	0.25	0.07	--
Bengal gramdhal Roasted	2.9	10	0.7	4.5	0.3	6	0.01	0.02	--
Blackgramdhal	2.2	7	1.0	1.3	0.2	1	0.01	0.01	--
Cowgram	2.5	8	0.3	2.0	0.3	2	0.01	0.01	--
Redgramdhal	32.5	109	7.3	24.0	1.9	72	0.15	0.17	--
Cabbage	5.4	2	0.1	2.1	0.04	108	0.003	0.002	6.7
Drumstick leves	2.0	2	0.1	9.0	0.14	23	0.001	0.001	4.4
Carrot	11.0	5	0.1	8.8	0.24	347	0.004	0.002	0.3
Onion Small	12.0	7	0.2	4.8	0.14	3	0.002	0.002	0.2
Potato	4.7	5	0.1	1.0	0.03	2	0.01	0.001	0.8
Brinjal	3.1	1	--	0.7	--	4	0.001	0.003	0.4
Snake gourd	9.3	2	0.1	4.7	0.10	15	0.004	0.006	--
Coconut	3.9	26	0.3	15.6	0.11	--	0.003	0.002	0.3
Groundnut Rosted	2.1	12	0.7	1.1	0.01	--	0.01	0.003	--
Chillies Green	5.8	2	0.2	1.7	0.007	17	0.01	0.023	6.4
Tamarind	2.7	8	--	4.6	0.29	3	--	0.002	0.1
Buttermilk	12.7	2	0.10	3.8	0.10	--	--	--	--
	Total	1009	81.3	138.0	14.87	704	0.928	0.587	19.6

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 1

Croup: NSL (Home Diet)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	VitaminA I.U.	Thiamine mg.	Riboflawin mg.	Asocrobic acid mg.
Rice,Parboiled, Milled	123	424	8.0	11.1	4.9	--	0.26	0.11	--
Wheat	4	14	0.5	1.6	0.2	4	0.02	0.01	--
Wheat flour	9	31	1.1	4.3	1.0	4	0.04	0.03	--
Bengalgram dhal Roasted	1	4	0.2	0.6	0.1	2	0.002	0.01	--
Blackgram dhal	5	17	1.2	7.7	0.5	3	0.02	0.02	--
Red gramdhal	2	7	0.5	10.5	0.1	4	0.01	0.01	--
Beetroot	6	3	0.1	12.0	0.1	--	0.002	0.01	5.28
Carrot	14	7	0.1	11.2	0.3	441	0.01	0.003	0.42
Onion Small	7	4	0.1	2.8	0.1	2	0.01	0.001	0.14
Potato	7	7	0.1	1.0	0.1	3	0.01	0.001	1.19
Brinjal	5	1	0.1	1.0	0.1	6	0.002	0.01	0.6
Field beans	8	4	0.3	16.8	0.1	25	0.01	0.01	0.54
Coconut	6	40	0.4	8.0	0.1	--	0.01	0.004	0.42
Chillies, Green	2	1	0.1	0.6	0.02	6	0.004	0.01	2.22
Chillies dry	3	7	1.0	4.8	0.1	17	0.02	0.01	1.5
Tamarind	5	14	0.2	8.5	1.0	5	--	0.004	0.15
Tomato	6	1	0.1	2.9	0.02	35	0.01	0.004	1.62
Curds	35	21	1.1	52.2	0.11	36	0.02	0.06	0.35
Buttermilk	65	10	0.5	19.5	0.5	--	--	--	--
Total		617	15.7	168.1	9.45	563	0.460	0.317	14.43

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 2

GROUP: NSL (Home Diet)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	Vitamin A I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Cholam	49	171	5.1	12.3	2.7	39	0.18	0.14	--
Rice, Parboiled, Milled	80	276	5.1	7.2	3.2	--	0.17	0.07	--
Blackgramdhal	3	10	0.7	4.6	0.2	19	0.01	0.01	--
Cowgram	12	49	3.0	9.5	1.3	7	0.06	0.06	--
Green gram	5	17	1.2	6.2	0.4	8	0.02	0.02	0.05
Red gramdhal	14	47	3.1	9.2	0.8	31	0.06	0.07	--
Onion Small	9	5	0.2	3.6	0.1	2	0.01	0.002	0.18
Field beans	10	5	0.4	21.0	0.2	31	0.01	0.01	0.90
Ridge gourd	30	5	0.2	12.0	0.5	17	0.02	0.003	1.50
Chillies Green	8	2	0.2	2.4	0.1	23	0.02	0.01	8.9
Tamarind	2	6	0.1	3.4	0.22	2	--	0.001	0.06
Oil	2	18	--	--	--	--	--	--	--
Jaggery	4	15	0.00	3.2	0.5	--	0.001	--	--
Coconut	5	33	0.34	20.0	0.14	--	0.004	0.003	0.35
Brinjal	3	1	0.04	0.5	0.03	4	0.001	0.003	0.36
Total		660	19.68	115.1	10.39	183	0.566	0.402	12.30

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 3

GROUP: NSL (Home Diet)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	VitaminA I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Rice, Parboiled Milled	50	173	3.2	4.5	2.0	--	0.11	0.05	--
Cholam	90	314	9.4	22.5	5.2	80	0.33	0.25	--
Black gramdhal	5	17	1.2	7.7	0.5	3	0.02	0.02	--
Green gram	13	43	3.1	16.0	1.0	21	0.06	0.05	0.13
Red gram dhal	15	50	3.4	10.9	1.0	33	0.07	0.08	--
Onion small	9	5	0.2	3.6	0.1	2	0.01	0.002	0.18
Field beans	10	5	0.4	21.0	0.2	31	0.01	0.01	0.90
Brinjal	5	1	0.1	11.0	0.05	6	0.002	0.01	0.60
Ridge gourd	25	4	0.1	10.0	0.4	13	0.02	0.003	1.25
Chillies green	8	2	0.2	2.4	0.1	23	0.02	0.01	8.9
Tamarind	2	6	0.06	3.4	0.22	2	--	0.001	0.06
Oil	2	18	--	--	--	--	--	--	--
Jaggery	4	15	--	3.2	0.5	--	0.001	--	--
Coconut	5	33	0.34	20.0	0.14	--	0.004	0.003	0.35
Total		686	21.70	126.2	11.41	214	0.657	0.487	12.46

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 4

GROUP: NSL (Home Diet)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	Vitamin A I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Rice, Parboiled Milled	183	631	11.7	16.5	7.3	--	0.38	0.17	--
Wheat	17	58	2.0	7.0	0.8	18	0.08	0.02	--
Bengal gram dhal	1	4	0.2	0.6	0.1	3	0.003	0.01	--
Blackgramdhal	18	63	0.4	27.7	1.6	12	0.08	0.07	--
Green gram	2	7	0.5	0.8	0.2	3	0.01	0.01	--
Red gramdhal	8	27	1.8	5.8	0.5	18	0.04	0.04	--
Bengal gramdhal Roasted	5	19	10.0	2.9	0.5	10	0.01	0.03	--
Carrot	11	5	0.1	9.0	0.2	347	0.004	0.002	0.1
Onion Small	14	8	0.3	5.6	0.2	3	0.01	0.003	0.3
Potato	5	5	0.1	0.15	0.04	2	0.01	0.001	1.0
Raddish pink	2	1	--	1.0	0.01	--	0.001	--	0.3
Brinjal	11	3	0.2	2.0	0.1	14	0.004	0.012	1.3
Field beans	5	2	0.2	10.5	0.3	16	0.01	0.003	0.3
Chillies green	1	3	--	0.3	0.01	3	0.002	0.004	1.1
Chillies dry	1	3	0.2	1.6	0.02	6	0.01	0.004	0.5
Carriander dry	4	12	0.6	25.2	1.0	63	0.01	0.03	--
Cumin seeds	1	4	0.2	11.8	0.31	9	0.01	0.004	--
Tamirind	2	6	0.1	3.4	0.22	2	--	0.001	--
Banana	14	15	0.2	1.4	0.1	17	0.001	0.024	1.0
Oil	5	45	--	--	--	--	--	--	--
Curds	19	11	0.6	28.3	0.06	19	0.01	0.01	0.1
Buttermilk	18	3	0.1	0.5	0.02	--	--	--	--
Agathe	6	6	0.5	67.8	0.2	54	0.13	0.01	10.1
Coconut	8	53	0.5	32.0	0.2	--	0.01	0.01	0.6
Mutton	49	95	9.1	73.5	1.23	15	0.1	0.13	--
Total		1089	39.6	226.4	15.02	634	0.925	0.5984	16.7

AVERAGE DAILY NUTRIENT INTAKE OF SUBJECT NO: 5

GROUP: NSL (Home Diet)

Foodstuffs	Amount g.	Calories	Protein g.	Calcium mg.	Iron mg.	VitaminA I.U.	Thiamine mg.	Riboflawin mg.	Ascorbic acid mg.
Rice, Parboiled Milled	202	697	12.6	18.2	8.1	--	0.42	0.18	--
Wheat	17	59	2.0	7.0	0.8	18.0	0.08	0.02	--
Bengal gram dhal	1	4	0.3	0.6	0.1	2.0	0.01	0.002	--
Black gramdhal	19	66	4.6	29.3	1.7	12	0.08	0.07	--
Green gram	2	7	0.5	2.5	0.2	3	0.01	0.01	--
Redgram dhal	9	30	2.0	6.6	0.5	20	0.04	0.05	--
Bengal gramdhal Roasted	6	22	1.4	3.5	0.6	11	0.01	0.03	--
Agathi	8	7	0.7	90.4	0.3	720	0.02	0.01	13.8
Carrot	28	13	0.3	22.4	0.6	882	0.01	0.01	0.8
Onion	16	9	0.3	6.4	0.2	4	0.01	0.003	0.3
Potato	5	5	0.1	0.5	0.04	2	0.01	0.001	0.8
Raddish (Pink)	3	1	0.0	1.5	0.02	--	0.002	0.001	0.5
Brinjal	10	2	0.1	1.8	0.1	12	0.004	0.011	1.2
Field beans	3	1	0.1	6.3	0.1	9	0.003	0.002	0.3
Ladies finger	2	1	--	1.3	0.03	2	0.002	0.003	0.3
Corriander (Dry)	3	9	0.4	18.9	0.5	47	0.01	0.01	--
Cumin seeds	1	4	0.2	10.8	0.3	8	0.01	0.004	--
Tamarind	3	9	0.1	5.1	0.3	3	--	0.002	0.1
Banana	14	15	0.2	1.4	0.1	17	0.001	0.024	1.0
Mutton	48	93	8.9	72.0	1.2	15	0.09	0.130	--
Oil	2	18	--	--	--	--	--	--	--
Curds	19	9	0.4	28.3	0.6	19	0.01	0.03	0.2
Sugar	1	4	--	0.1	--	--	--	--	--
Coconut	10	67	0.7	40.0	0.3	--	0.01	0.01	1.0
	Total	1152	36.3	374.9	16.69	1806	0.842	0.613	20.3

APPENDIX - D

RECORD OF MONTHLY HEIGHTS OF CHILDREN IN THE THREE GROUPS

HEIGHTS IN CENTIMETRES

Period in Months

GROUP:SLG

S.No.	1	2	3	4	5	6	7
1	127.8	128.0	128.3	128.6	128.8	129.4	129.9
2	128.6	128.8	129.4	129.6	129.8	130.0	130.6
3	131.1	133.2	133.7	134.0	134.1	134.8	135.2
4	131.0	131.8	132.1	132.9	133.4	133.8	134.2
5	126.0	126.4	126.6	127.0	127.2	127.8	128.2
6	129.8	130.2	130.4	131.5	131.8	132.0	132.6
7	123.2	123.6	124.0	124.2	125.8	125.0	125.3
8	131.8	132.8	133.5	134.0	134.3	134.7	135.3
9	127.9	128.3	128.7	129.2	129.8	130.4	130.9
10	135.9	136.3	136.7	137.2	137.6	138.2	138.7
11	137.9	138.1	138.9	139.6	140.3	141.0	141.7
12	114.8	115.1	115.9	116.2	116.9	117.3	117.9
13	124.6	125.1	126.0	126.8	127.4	127.9	128.4
14	116.8	117.3	117.8	118.6	119.4	119.9	120.4
15	127.6	128.3	129.1	129.9	130.4	130.8	131.5
16	130.0	130.6	131.1	131.5	131.9	132.4	132.8
17	123.3	123.9	124.2	124.8	125.5	126.0	126.5
18	114.3	115.4	115.9	116.7	116.9	117.4	117.8
19	116.0	116.8	117.4	118.2	119.9	120.4	120.9
20	122.4	122.9	123.6	124.5	125.1	125.8	126.3
21	127.0	127.6	128.5	129.1	130.0	130.5	131.1
22	124.0	124.9	125.6	126.5	127.4	127.9	128.4
23	125.2	125.8	126.4	127.2	127.9	128.3	128.9
24	123.2	123.8	124.4	125.3	125.8	126.3	126.7
25	126.0	126.6	127.3	127.8	128.5	129.0	129.6
26	130.2	130.6	131.3	132.1	132.9	133.4	133.9
27	122.4	123.2	123.9	124.3	125.2	125.8	126.2
28	109.2	111.1	111.9	112.6	113.2	113.8	114.3
29	113.7	114.4	115.2	115.9	116.6	117.2	117.8
30	130.4	131.3	132.1	132.9	133.6	134.1	134.9

Period in months

GROUP : I - S. L. G.

S.No.	1	2	3	4	5	6	7
31	120.6	121.4	122.2	122.9	123.7	124.2	124.8
32	118.5	119.1	119.9	120.6	121.4	121.9	122.4
33	112.7	113.3	114.1	114.9	115.7	116.3	116.9
34	116.4	117.0	117.8	118.4	119.2	119.8	120.4
35	115.5	116.4	117.3	118.1	118.9	119.4	119.8
36	126.9	127.6	128.3	129.2	130.0	131.6	132.1
37	118.0	118.9	119.7	120.4	121.3	121.8	122.4
38	116.6	117.3	118.1	118.9	119.4	120.0	120.7
39	111.8	112.6	113.4	114.3	115.2	115.8	116.3
40	110.3	111.2	112.1	113.0	113.8	114.3	114.9
41	105.6	106.3	107.2	108.1	109.0	109.6	110.1
42	118.5	119.3	120.0	120.9	121.4	121.8	122.3
43	115.6	116.0	116.7	117.4	118.1	118.8	119.3
44	110.0	110.6	111.5	112.1	112.8	113.3	113.8
45	114.5	115.3	116.1	116.9	117.4	117.9	118.4
46	119.4	120.1	121.8	122.6	123.3	123.8	124.3
47	110.6	111.3	111.9	112.5	113.3	113.7	114.5
48	112.5	113.3	114.1	114.8	115.3	115.8	116.4
49	108.0	108.7	109.5	110.2	110.8	111.3	111.8
50	116.4	117.0	117.8	118.5	119.4	119.9	120.4
51	127.8	128.4	129.2	129.9	130.6	131.1	131.7
52	116.0	116.6	117.2	117.8	118.3	118.7	119.2
53	107.0	107.7	108.3	109.1	109.9	110.5	111.1
54	123.6	124.2	124.9	125.5	126.2	126.7	127.2
55	119.6	120.3	120.9	121.4	122.2	122.8	123.3
56	110.6	111.2	112.0	112.9	113.5	114.1	114.7
57	119.1	119.8	120.4	121.0	121.6	122.2	122.8
58	108.8	109.4	110.2	111.1	112.0	112.7	113.2
59	101.0	101.7	102.4	103.3	104.1	104.8	105.4
60	107.1	107.7	108.2	108.8	109.3	109.7	110.2

HEIGHTS IN CENTIMETRES

GROUP: SL

Period in months

S.No.	1	2	3	4	5	6	7
1	123.4	124.1	125.8	126.3	127.0	127.4	127.9
2	128.7	129.3	129.9	130.4	131.0	131.6	132.2
3	118.2	118.9	119.3	119.9	120.6	121.1	121.6
4	120.8	121.3	121.9	122.6	123.4	124.0	124.5
5	132.6	133.0	133.6	134.2	134.7	135.4	135.8
6	137.7	138.6	139.1	139.7	140.2	141.4	142.0
7	125.6	126.5	127.3	127.9	128.6	129.2	129.8
8	118.7	119.3	119.8	120.3	120.9	121.4	121.8
9	111.2	111.8	112.3	112.9	113.4	114.1	114.8
10	113.8	114.3	114.9	115.6	116.0	116.5	117.0
11	106.3	106.9	107.5	108.1	108.8	109.4	110.0
12	115.8	116.7	117.6	118.1	118.8	119.4	120.0
13	113.2	113.8	114.3	114.9	115.4	115.9	116.5
14	122.2	122.9	123.5	124.1	124.7	124.9	125.2
15	124.9	125.7	126.2	127.7	128.3	128.9	129.5
16	123.9	124.6	125.1	125.8	126.3	126.9	127.5
17	117.7	118.1	118.6	119.1	119.8	120.4	121.0
18	108.7	109.5	110.1	110.6	111.1	111.7	112.2
19	126.3	126.9	127.3	127.8	128.4	129.0	129.5
20	116.3	116.9	117.4	117.9	118.5	119.1	119.7
21	114.8	115.4	115.9	116.5	117.1	117.7	118.2
22	118.7	119.3	119.9	120.5	121.1	121.8	122.3
23	112.4	112.9	113.5	113.9	114.4	115.0	115.6
24	121.5	122.1	112.7	123.2	123.8	124.3	124.8
25	115.8	116.3	116.9	117.4	118.1	118.8	118.3
26	121.9	122.4	122.9	123.4	123.9	124.3	124.8
27	103.4	103.9	104.5	105.1	105.8	106.3	106.8
28	122.6	123.1	123.6	124.1	124.8	125.4	125.5
29	105.4	105.9	106.4	106.8	107.3	107.8	108.3
30	116.4	116.9	117.5	118.1	118.7	119.2	119.7
31	100.6	101.2	101.8	102.3	102.9	103.5	103.9
32	102.8	103.1	103.7	104.2	104.7	105.3	105.9

GROUP: SL

S.No	Period in months 1	2	3	4	5	6	7
33	105.4	106.1	106.8	107.3	107.9	108.5	109.1
34	116.7	117.2	117.8	118.3	118.8	119.3	119.8
35	115.6	116.1	116.7	117.2	117.8	118.3	118.8
36	117.2	117.8	118.3	118.8	119.2	119.7	120.3
37	108.4	108.9	109.5	110.1	110.7	111.2	111.6
38	109.4	110.1	110.8	111.3	111.8	112.4	112.9
39	99.6	100.2	100.8	101.3	101.7	102.3	102.9
40	99.3	99.8	100.4	100.9	101.5	102.1	102.7
41	101.6	102.1	102.7	103.3	103.8	104.3	104.8
42	105.6	106.2	106.8	107.3	107.8	108.3	108.7
43	104.3	104.8	105.3	105.8	106.2	106.8	107.3
44	102.3	102.8	103.4	103.9	104.3	104.8	105.3
45	105.3	105.9	106.5	107.1	107.7	108.3	108.7
46	102.4	102.9	103.4	103.9	104.3	104.8	105.3
47	103.4	103.9	104.4	105.1	105.8	106.3	106.8
48	105.4	106.1	106.8	107.4	107.9	108.4	108.9
49	107.3	107.8	108.3	108.9	109.4	109.9	110.5
50	103.8	104.3	104.8	105.3	105.9	106.5	107.1
51	105.6	106.1	106.8	107.3	107.8	108.2	108.8
52	111.8	112.3	112.7	113.2	113.8	114.3	114.8
53	103.2	103.8	104.3	104.9	105.4	105.9	106.4
54	101.8	102.3	102.8	103.4	103.9	104.5	104.9
55	106.3	106.9	107.4	107.8	108.3	109.0	109.5
56	105.2	105.8	106.3	106.9	107.4	107.9	108.4
57	98.2	98.7	99.3	99.8	100.3	100.8	101.4
58	106.6	107.2	107.9	108.4	108.9	109.3	109.3
59	98.3	98.8	99.3	99.9	100.4	100.9	101.4
60	98.6	99.2	99.8	100.3	100.9	101.4	101.8

HEIGHTS IN CENTIMETRES

GROUP:N.S.L.

S.No.	PERIOD IN MONTHS						
	1	2	3	4	5	6	7
1	135.6	136.3	137.1	137.9	138.6	139.3	139.9
2	133.2	134.0	134.6	135.2	135.8	136.8	136.3
3	131.0	131.8	132.6	133.2	133.9	134.3	134.7
4	142.0	142.8	143.6	144.2	144.8	145.3	145.8
5	139.9	140.3	141.1	141.8	142.4	142.7	143.2
6	136.3	137.1	137.8	138.5	139.3	139.8	140.3
7	142.4	143.2	144.1	144.9	145.2	145.7	146.2
8	126.6	127.2	127.9	128.4	129.2	129.8	130.3
9	128.4	129.2	130.1	130.8	131.4	131.6	132.3
10	121.6	122.3	123.1	123.8	124.4	124.9	125.4
11	131.9	132.5	133.1	133.9	134.4	134.8	135.3
12	131.8	132.4	133.3	134.2	135.1	135.7	136.3
13	145.5	146.2	146.9	147.4	148.1	148.7	149.5
14	132.5	133.0	133.6	134.3	135.1	135.8	136.3
15	130.1	130.9	131.5	132.1	132.8	133.3	133.9
16	142.4	143.2	143.6	144.5	145.1	145.8	146.3
17	140.8	141.5	142.1	142.8	143.3	143.8	144.2
18	133.1	133.8	134.2	134.8	135.4	135.9	136.3
19	118.0	118.7	119.3	120.1	120.7	121.2	121.8
20	122.6	123.2	123.8	124.3	125.1	125.6	126.1
21	142.9	143.6	144.2	144.9	145.3	145.7	146.2
22	121.3	121.8	122.2	122.9	123.5	124.1	124.7
23	125.2	125.8	126.3	126.9	127.3	127.8	128.3
24	133.4	134.2	134.8	135.2	135.8	136.3	136.7
25	131.4	131.9	132.5	133.2	133.8	134.5	134.9
26	127.1	127.7	128.2	128.8	129.4	129.8	130.3
27	127.2	127.8	128.2	128.9	129.4	129.9	130.5
28	125.3	125.9	126.4	126.9	127.3	127.8	128.3
29	117.2	117.8	118.2	118.7	119.3	119.7	120.3
30	121.4	121.9	122.4	122.8	123.3	123.8	124.4

GROUP: N.S.L.

Period in Months

S.No.	1	2	3	4	5	6	7
31	126.1	126.8	127.3	127.9	128.5	129.1	129.8
32	113.5	114.0	114.6	115.2	115.9	116.4	116.9
33	117.1	117.7	118.4	119.2	119.8	120.4	120.9
34	116.7	117.3	117.9	118.4	119.0	119.6	120.1
35	125.1	125.7	126.2	126.8	127.4	127.9	128.3
36	124.0	124.6	125.1	125.7	126.3	126.9	127.4
37	128.1	128.6	129.2	129.8	130.5	131.1	131.7
38	128.4	129.0	129.6	130.1	130.9	131.4	131.9
39	132.4	132.9	133.3	134.0	134.7	135.2	131.8
40	124.4	125.1	125.9	126.3	126.9	127.3	127.8
41	117.2	117.9	118.4	118.9	119.3	119.8	120.3
42	118.0	118.7	119.3	119.8	120.4	120.9	121.3
43	117.2	117.8	118.2	118.7	119.3	119.9	120.4
44	133.2	133.7	134.3	134.8	135.3	135.8	136.3
45	124.1	124.7	125.2	125.8	126.4	127.0	127.5
46	126.1	126.8	127.4	127.9	128.3	128.8	129.3
47	112.2	112.7	113.2	113.8	114.3	114.9	115.5
48	102.4	102.8	103.3	103.7	104.3	104.8	105.3
49	108.8	109.4	110.2	110.8	111.4	111.9	112.5
50	115.2	115.7	116.3	116.9	117.4	117.8	118.3
51	112.9	113.4	114.0	114.6	115.2	115.7	116.2
52	115.3	115.8	116.3	116.7	117.3	117.8	118.3
53	108.4	108.9	109.4	109.8	110.3	110.9	111.5
54	106.6	107.2	107.9	108.4	108.9	109.4	109.9
55	105.6	106.3	106.9	107.5	108.0	108.5	109.1
56	98.4	99.1	99.8	100.4	101.1	101.8	102.3
57	111.5	112.0	112.6	113.1	113.7	114.2	114.7
58	116.5	117.2	117.9	118.4	119.1	119.8	120.3
59	108.2	108.7	109.3	109.8	110.3	110.8	111.4
60	110.0	110.8	111.2	111.8	112.4	112.9	113.4

APPENDIX

DETAILS OF STATISTICAL ANALYSIS

't' TEST FOR THE INCREASE IN HEIGHTS BETWEEN GROUPS, SLG, SL & NSL

Groups	Mean	Standard deviation
SLG	3.86	.2924
SL	3.37	.2397
NSL	3.47	.0711

't' Value for groups is calculated by using the formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{1^2 + 2^2}{2n - 2} \times \frac{2}{N}}} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{1^2 + 2^2}{n - 1}}}$$

Where x_1 and x_2 are the mean values for the comparable groups, 1^2 and 2^2 are the standard deviation in the two groups compared and n is the number of subjects in each group which was 60 for all the three groups. This formula was used for the analysis all the records of Height, Weight and Halmoglobin levels. (Venkatasan, K. 1965)*

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* Venkatasan, K. Statistics, The National Publishing Company, Madras: 1965. pp. 335 - 376

The 't' value for SLG and SL:

$$= \frac{3.8 - 3.6}{\sqrt{\frac{.2924 + .2397}{60}}} = 2.$$

The value is significant at Five per cent level

The 't' value for SLG and NSL:

$$= \frac{3.8 - 3.3}{\sqrt{.00606}} = 7$$

The value is significant at one per cent level

The 't' value for SL and NSL:

$$= \frac{3.6 - 3.3}{\sqrt{\frac{.2397 + .0711}{60}}} = 4.1$$

The value is significant at one percent level.

't' TEST FOR THE INCREASE IN WEIGHTS BETWEEN GROUPS SLG, SL, & NSL

Groups	Mean	Standard Deviation
SLG	1.0	.7604
SL	0.7	.1644
NSL	0.5	.7298

't' Value for SLG and SL:

$$= \frac{1.0 - .7}{\sqrt{\frac{.7604 + .1644}{60}}} = 2.5$$

The value is significant at Five per cent level

't' Value for SLG and NSL:

$$= \frac{1.0 - .5}{\sqrt{\frac{.7604 + .7298}{60}}} = 3.1$$

The value is significant at one per cent level

't' value for SL and NSL:

$$= \frac{.7 - .5}{\sqrt{\frac{.1644 + .7298}{60}}} = 1.6$$

The value is insignificant

't' TEST FOR THE INCREASE IN HAEMOGLOBIN BETWEEN GROUPS SLG, SL AND NSL

Groups	Mean	Standard Deviation
SLG	1.32	.3688
SL	1.18	.1304
NSL	0.92	.4028

The 't' value for SLG and SL:

$$= \frac{1.32 - 1.18}{\sqrt{\frac{.3688 + .1304}{60}}} = 1.5$$

The value is insignificant

The 't' value for SLG and NSL:

$$= \frac{1.32 - .92}{\sqrt{\frac{.3688 + .4028}{60}}} = 3.6$$

The value is significant at one per cent level

The 't' value and SL and NSL:

$$= \frac{1.8 - .92}{\sqrt{\frac{.1304 + .4028}{60}}} = 2.8$$

The value is significant at one per cent level.

APPENDIX - F

RECORD OF MONTHLY WEIGHTS OF CHILDREN IN THE THREE GROUPS

WEIGHT IN KILO GRAMS

Period in Months

GROUP: SLG

S.No#	1	2	3	4	5	6	7
1	22.2	22.5	23.0	23.5	24.0	24.0	24.5
2	20.0	20.5	20.0	21.5	21.5	22.0	22.5
3	25.1	25.0	25.0	25.0	24.5	24.0	23.5
4	25.0	25.5	25.5	25.0	24.5	25.0	25.5
5	25.0	24.5	24.0	24.5	25.0	25.5	25.5
6	22.8	23.0	22.5	22.5	23.0	23.5	24.0
7	23.7	24.0	24.5	25.0	25.5	26.0	25.5
8	28.0	28.5	28.5	29.0	29.5	30.0	29.5
9	23.5	24.0	24.5	25.0	25.5	26.0	26.0
10	27.0	27.0	26.5	27.0	27.0	27.5	27.0
11	25.7	26.0	25.5	25.5	25.0	25.5	26.0
12	18.2	18.5	18.0	17.5	18.0	18.5	19.0
13	20.9	21.0	21.0	21.5	22.0	22.5	23.0
14	20.0	19.0	19.5	20.0	20.5	21.0	21.5
15	24.9	25.0	25.5	26.0	26.0	26.5	26.5
16	22.3	22.0	21.0	21.5	22.0	21.5	22.0
17	19.6	20.0	20.5	21.0	21.5	21.5	22.0
18	18.5	18.5	18.0	17.5	18.0	18.5	18.0
19	20.1	20.0	20.5	20.0	20.5	20.5	21.0
20	20.5	20.0	21.0	21.5	22.0	21.5	22.0
21	23.7	23.0	23.5	23.0	23.5	23.0	23.5
22	21.2	21.0	22.0	22.5	23.0	23.5	24.0
23	21.3	21.5	22.0	21.5	22.0	22.5	23.0
24	21.5	22.0	22.5	22.5	23.0	22.5	23.0
25	20.9	20.5	21.0	21.0	21.5	22.0	21.5
26	24.8	24.5	24.5	25.0	25.5	26.0	25.5
27	20.9	21.5	21.0	21.5	22.0	22.5	23.0
28	16.4	16.0	16.5	16.0	16.5	17.0	17.5
29	17.3	17.5	18.0	17.5	17.5	17.5	17.0
30	25.8	26.0	26.5	27.0	27.0	27.5	27.5

WEIGHTS IN KILO GRAMS

GROUP : SL-G

Period in Months

S.No.	1	2	3	4	5	6	7
31	18.5	19.0	18.5	18.5	19.0	19.5	20.0
32	17.8	17.5	17.5	18.0	18.5	19.0	19.5
33	17.8	17.0	16.5	17.0	17.5	18.0	18.5
34	17.8	18.0	18.5	19.0	19.0	19.5	19.5
35	18.0	18.5	18.0	18.5	19.0	19.0	19.5
36	21.5	22.0	22.5	23.0	23.5	23.5	24.0
37	15.5	16.0	16.0	16.0	16.5	16.5	17.0
38	18.7	18.5	18.0	18.5	19.0	18.5	19.0
39	16.0	16.5	16.5	16.0	16.5	17.0	17.5
40	17.8	17.5	17.5	18.0	18.0	18.5	19.0
41	16.4	16.0	16.0	16.5	16.0	16.0	16.0
42	20.5	19.5	19.0	19.5	20.0	20.0	20.5
43	17.5	18.0	18.5	19.0	19.5	20.0	20.5
44	17.3	17.5	18.0	17.5	18.0	18.0	18.0
45	17.7	17.5	17.0	17.5	17.5	18.0	18.5
46	19.2	20.0	19.5	19.0	18.0	18.5	18.5
47	16.9	17.0	17.5	16.5	16.5	17.0	17.5
48	17.5	18.0	18.5	19.0	19.0	19.5	19.5
49	16.9	16.5	16.5	16.0	16.0	16.5	17.0
50	15.6	16.0	16.0	16.0	16.0	16.5	17.0
51	23.0	23.5	23.5	24.0	24.5	25.0	25.0
52	18.7	18.5	19.0	18.5	19.0	19.0	18.5
53	17.0	16.5	17.0	16.5	16.5	16.0	16.5
54	19.2	19.0	19.5	18.5	18.5	19.0	19.5
55	20.5	20.5	20.0	20.5	20.5	20.0	20.5
56	16.9	16.5	16.5	16.5	16.5	16.5	16.5
57	21.0	20.0	19.5	20.0	20.5	20.5	20.5
58	17.3	17.0	17.5	18.0	18.5	18.0	18.5
59	15.1	14.0	14.5	14.0	14.5	15.0	15.5
60	16.2	16.0	16.5	16.5	17.0	17.0	17.5

GROUP : SL

Period in Months

S.No	1	2	3	4	5	6	7
1	21.8	21.0	20.5	20.0	20.5	21.0	21.5
2	22.3	23.0	22.5	22.0	22.5	23.0	23.0
3	21.8	21.0	20.5	20.0	20.0	20.0	20.5
4	21.0	20.5	20.0	19.5	20.0	20.5	21.0
5	21.4	21.0	20.5	20.5	21.0	20.5	20.0
6	30.1	30.0	29.5	30.0	30.0	30.5	31.0
7	22.3	22.0	21.5	21.0	20.5	21.0	21.5
8	19.9	20.0	20.5	21.0	21.5	21.5	21.5
9	16.8	16.5	16.5	17.0	16.5	16.5	17.0
10	17.0	16.5	16.0	16.5	17.0	16.5	16.5
11	17.4	17.0	16.5	15.0	15.5	16.0	16.5
12	18.9	19.0	19.5	19.5	19.0	19.5	20.0
13	18.8	18.5	19.0	19.5	20.0	20.5	20.0
14	18.7	18.5	18.5	19.0	19.5	20.0	20.5
15	22.6	22.0	22.5	23.0	23.5	24.0	24.0
16	23.4	22.5	22.5	22.0	22.0	22.0	22.5
17	19.8	19.5	20.0	20.5	20.0	20.0	20.5
18	15.9	15.5	16.0	15.5	15.0	15.5	15.5
19	20.8	20.5	20.5	21.0	21.5	22.0	22.0
20	19.0	19.5	20.0	20.0	20.5	20.5	21.0
21	19.8	19.5	20.0	20.0	20.5	21.0	21.0
22	19.3	19.5	19.5	20.0	20.5	21.0	21.0
23	16.8	16.5	17.0	17.5	18.0	18.0	18.0
24	18.3	18.5	18.0	18.5	19.0	18.5	19.0
25	18.8	18.0	17.5	17.0	17.5	17.5	17.5
26	21.9	21.5	21.0	20.5	20.0	20.5	21.0
27	11.9	11.5	12.0	12.0	12.5	13.0	13.5
28	19.2	20.0	20.5	21.0	21.5	21.0	21.0
29	16.0	15.5	15.0	15.5	16.0	16.5	16.5
30	17.3	17.0	17.5	18.0	18.0	18.0	18.5

IN KILOGRAMS

GROUP : SL

Period in Months

S.No.	1	2	3	4	5	6	7
31	11.8	11.5	12.0	12.0	12.5	12.5	13.0
32	15.8	16.0	16.0	16.5	17.0	16.5	16.0
33	14.8	15.0	15.0	14.5	15.0	15.0	15.5
34	16.8	16.5	17.0	17.5	18.0	18.0	18.0
35	20.5	21.0	21.0	21.5	21.5	21.0	21.5
36	16.7	16.5	17.0	17.5	18.0	18.0	18.0
37	18.3	18.0	18.5	18.0	17.5	17.0	17.5
38	15.8	16.0	16.5	17.0	17.0	17.0	17.0
39	13.8	14.0	14.5	14.5	15.0	15.5	15.0
40	13.3	13.5	14.0	14.0	14.0	14.5	14.5
41	13.3	13.5	14.0	14.5	15.0	14.5	15.0
42	16.9	16.5	17.0	16.5	16.5	16.5	17.0
43	16.9	16.5	16.0	15.5	15.0	15.5	16.0
44	14.9	14.5	14.0	13.5	13.0	13.0	13.5
45	14.9	14.5	15.0	15.5	15.5	16.0	16.5
46	14.9	15.0	15.5	16.0	16.0	16.0	16.5
47	16.0	16.5	16.5	16.5	17.0	17.0	17.5
48	16.5	16.5	16.5	17.0	16.5	17.0	17.5
49	16.8	16.0	15.5	15.0	15.5	15.5	16.0
50	14.8	15.0	14.5	14.0	14.5	14.5	15.0
51	14.9	15.0	15.0	14.5	14.5	15.0	15.5
52	15.9	16.0	16.5	17.0	16.5	16.5	17.0
53	15.1	15.5	16.0	16.0	16.5	16.5	16.5
54	11.8	12.0	12.5	13.0	13.0	13.5	14.0
55	15.9	15.5	16.0	16.5	16.5	16.5	17.0
56	15.5	15.5	16.0	16.0	16.5	16.5	17.0
57	13.4	13.5	13.0	13.5	13.5	14.0	13.5
58	11.9	12.0	12.5	12.5	13.0	13.5	13.5
59	11.8	12.0	12.5	12.5	13.0	13.0	13.5
60	10.9	11.0	11.5	12.0	12.5	12.5	13.0

GROUP: NSL

Period in Months

S.No.	1	2	3	4	5	6	7
1	26.9	26.0	26.0	26.0	26.5	26.0	25.5
2	26.4	26.0	25.5	25.5	26.0	26.0	26.5
3	22.0	22.0	21.5	21.0	21.5	22.0	22.5
4	29.5	30.0	30.5	31.0	31.0	31.0	31.5
5	31.4	30.5	30.0	30.5	31.0	31.0	31.0
6	28.0	28.5	28.5	29.0	29.5	30.0	30.0
7	28.9	30.0	30.0	30.5	30.5	30.5	31.0
8	22.3	22.0	21.5	22.0	22.5	22.0	22.5
9	26.4	26.0	25.5	26.0	26.5	26.0	25.5
10	20.1	20.0	20.0	20.0	20.5	20.5	20.0
11	26.0	25.5	25.5	26.0	25.5	25.5	26.0
12	26.3	26.0	26.5	26.5	27.0	27.0	27.0
13	39.0	39.5	39.0	38.5	38.0	37.5	37.0
14	23.4	23.0	23.5	24.0	24.0	24.5	25.0
15	24.6	25.0	25.0	25.0	25.0	25.5	25.5
16	34.4	35.0	35.0	35.5	36.0	36.5	36.5
17	28.2	28.0	27.5	27.0	27.5	27.5	27.5
18	26.6	25.5	25.5	26.0	26.5	26.5	27.0
19	21.0	20.5	20.0	20.5	21.0	21.0	20.5
20	20.5	20.0	20.0	20.0	20.0	20.0	20.0
21	34.2	34.5	34.0	34.0	34.0	33.5	34.0
22	18.6	18.0	18.5	19.0	18.5	18.5	19.0
23	21.0	21.0	21.5	21.5	21.0	21.0	21.5
24	25.3	26.0	26.5	27.0	27.0	27.5	27.0
25	25.5	25.5	25.5	25.5	25.5	25.0	25.5
26	26.0	26.0	25.5	26.0	26.5	26.0	26.5
27.0	22.7	23.0	22.5	22.5	23.0	22.5	23.0
28	21.9	21.5	21.0	21.0	21.5	21.5	22.0
29	21.8	21.5	21.0	21.0	21.5	22.0	22.5
30	21.9	21.5	21.0	20.5	21.0	21.0	21.5

WEIGHTS IN KILOGRAMS

GROUP: NSL

Period in Months

S.No.	1	2	3	4	5	6	7
31	24.6	24.5	25.0	25.0	25.0	25.0	25.5
32	17.5	17.0	17.5	17.5	18.0	18.5	19.0
33	20.1	20.5	20.5	20.5	21.0	20.5	21.0
34	17.3	17.0	17.5	18.0	18.5	18.5	18.0
35	22.3	22.5	22.0	22.5	23.0	23.5	23.0
36	19.2	20.0	20.5	20.5	21.0	21.0	21.5
37	23.2	23.5	23.0	23.5	24.0	23.5	24.0
38	22.8	23.0	23.5	24.0	24.5	24.5	24.5
39	25.1	25.0	25.5	26.0	26.5	26.5	26.0
40	19.2	20.0	19.5	20.0	20.0	20.5	21.0
41	18.2	18.5	19.0	19.5	19.5	20.0	20.5
42	21.0	20.5	21.0	21.0	21.0	21.0	20.5
43	23.7	24.0	24.0	24.0	24.5	24.5	25.0
44	26.0	25.5	25.0	25.5	26.0	25.5	25.5
45	18.7	19.0	19.5	20.0	20.5	20.0	20.5
46	23.7	23.0	23.5	23.5	24.0	23.5	23.5
47	16.9	16.5	16.0	16.5	17.0	17.5	18.0
48	16.4	16.0	15.5	15.0	15.5	16.0	16.5
49	16.8	16.0	15.5	16.0	16.5	16.5	16.5
50	18.0	18.0	17.5	18.0	18.5	18.5	18.0
51	17.8	17.0	16.5	17.0	17.5	17.0	17.5
52	18.3	18.0	17.5	17.0	17.5	18.0	18.5
53	19.0	19.0	19.0	19.0	19.0	18.5	19.0
54	16.8	16.5	16.5	17.0	16.5	17.0	16.5
55	17.8	17.0	17.5	17.0	17.5	17.5	18.0
56	18.3	18.0	17.5	17.0	17.5	18.0	18.5
57	17.7	17.5	18.0	18.5	18.0	18.0	18.5
58	20.9	20.0	20.5	21.0	21.5	21.0	21.5
59	16.9	16.0	16.0	16.5	16.5	16.0	16.5
60	17.8	17.0	17.0	16.5	17.0	17.0	17.5

APPENDIX - G

HAEMOGLOBIN LEVELS OF CHILDREN IN THE THREE GROUPS

HAE MO GLOBIW LEVELS OF THE CHILDREN IN THE THREE GROUPS IN GRAMS

	GROUP SLG			GROUP SL			GROUP NSL		
S.No.	Initial	Middle	Final	Initial	Middle	Final	Initial	Middle	Final
1	7.67	9.97	9.85	5.52	6.71	7.15	8.73	9.45	9.85
2	8.73	8.87	9.65	5.52	5.99	6.25	9.97	9.45	9.85
3	9.27	9.56	10.37	6.60	7.23	8.04	7.67	8.63	9.85
4	9.07	9.56	9.85	6.06	7.91	8.22	8.38	9.45	9.11
5	8.38	9.27	9.29	7.49	8.39	9.11	8.91	9.11	9.85
6	6.60	7.49	8.04	7.43	8.38	8.93	8.73	9.56	9.85
7	6.47	7.49	8.04	7.49	8.87	9.11	8.73	9.45	9.85
8	6.60	7.56	7.33	7.67	8.38	9.29	8.73	8.87	8.58
9	6.71	7.49	7.33	5.71	6.47	7.32	8.38	8.63	9.65
10	7.67	8.38	9.29	5.52	6.43	7.15	9.81	9.45	9.85
11	6.47	7.23	8.04	6.06	7.23	7.52	9.97	8.87	9.85
12	6.71	7.49	8.35	7.49	8.39	8.93	8.91	9.45	9.85
13	7.84	8.38	8.95	6.06	6.47	7.15	7.13	7.84	8.04
14	9.27	9.56	9.85	5.52	5.99	6.08	7.84	7.67	8.04
15	8.73	9.27	9.85	5.71	6.47	6.96	8.21	8.38	8.95
16	8.38	9.35	9.97	6.06	6.71	7.15	7.84	7.94	8.95
17	7.13	8.63	8.95	5.52	5.99	6.25	8.91	8.87	8.95
18	6.60	6.47	7.33	5.72	6.47	7.15	8.21	8.63	8.39
19	8.38	9.56	10.37	6.06	6.47	7.15	6.60	7.61	8.04
20	8.73	9.97	9.65	6.60	6.71	7.15	9.81	9.59	9.65
21	8.21	8.87	9.39	6.60	7.23	7.52	7.67	8.87	9.65
22	7.13	8.38	8.39	7.84	8.63	8.93	6.47	7.23	8.04
23	9.81	9.97	10.37	6.06	7.67	8.04	6.71	7.61	8.35
24	7.67	7.91	8.75	7.84	8.39	8.76	7.13	9.59	9.85
25	6.60	7.43	8.75	5.52	6.71	7.32	8.38	8.87	9.29
26	7.67	8.63	8.39	5.71	6.47	7.15	7.13	7.91	8.35
27	9.27	9.97	9.65	5.71	6.71	7.32	8.67	7.91	8.04
28	7.13	8.87	8.95	6.06	6.95	7.15	6.60	7.23	7.61
29	7.43	8.63	9.85	5.71	6.47	6.96	6.47	7.19	7.61
30	6.60	7.23	7.14	6.06	6.47	6.79	8.38	8.87	8.95

HAEMOGLOBIN LEVELS OF THE CHILDREN IN THE THREE GROUPS IN GRAMS

	GROUP SLG			GROUP SL			GROUP NSL		
S.No.	Initial	Middle	Final	Inital	Middle	Final	Initial	Middle	Final
31	6.60	7.43	8.95	5.52	6.43	6.96	8.21	8.63	8.95
32	6.47	7.19	7.61	6.06	7.43	7.52	7.84	8.38	8.35
33	6.71	7.23	8.04	6.06	7.19	7.68	6.71	7.43	8.35
34	7.43	8.38	9.39	5.52	6.43	7.32	6.71	7.23	7.61
35	9.27	9.97	10.37	5.71	6.47	6.96	7.61	8.38	8.95
36	7.13	8.63	8.95	5.52	6.71	7.52	7.84	8.63	9.47
37	9.45	9.56	10.19	7.49	7.91	8.22	7.43	8.38	9.95
38	8.21	8.87	9.29	5.52	6.43	7.32	8.21	8.63	8.75
39	7.91	8.63	9.47	5.71	6.95	7.15	7.13	7.43	7.61
40	7.67	8.38	9.85	7.49	7.91	8.04	8.21	8.87	9.65
41	8.21	8.63	8.75	6.06	6.47	6.96	8.38	8.63	8.79
42	7.13	8.63	9.85	5.71	6.43	7.15	7.91	8.38	8.79
43	8.91	8.38	8.39	5.71	6.95	7.15	7.91	8.38	8.79
44	8.21	8.63	8.75	7.49	8.39	8.36	7.67	8.63	8.95
45	7.13	8.38	8.95	6.60	7.43	8.04	7.13	8.63	8.95
46	7.67	8.63	8.95	5.52	6.43	6.96	8.21	8.63	9.85
47	6.60	7.43	7.14	5.71	6.43	6.79	7.49	7.91	8.04
48	6.71	7.43	8.39	6.06	6.95	7.15	8.91	9.56	10.19
49	7.84	8.21	8.95	5.71	5.89	6.42	7.67	8.63	9.65
50	7.67	8.63	8.95	5.52	6.43	6.96	7.49	7.43	8.04
51	9.45	9.97	10.54	5.71	6.47	6.79	8.91	9.56	9.85
52	7.84	8.63	9.65	5.52	6.43	6.79	6.71	6.61	8.39
53	6.60	7.43	8.57	6.06	6.95	7.15	6.60	7.43	8.20
54	7.49	8.87	9.85	5.71	6.47	6.96	7.67	7.91	8.04
55	7.49	7.91	8.95	6.06	6.95	7.15	7.13	7.43	8.04
56	7.84	8.63	8.95	5.52	6.47	6.96	7.43	8.38	8.04
57	6.06	6.47	7.14	5.71	6.47	6.96	8.21	8.63	9.65
58	7.84	8.87	9.39	6.06	6.95	7.15	6.67	8.63	9.65
59	7.49	9.56	9.85	5.71	6.43	6.96	7.43	7.91	8.20
60	8.73	8.87	9.85	7.67	8.87	8.93	9.45	9.65	9.85