THE SCHOOL LUNCH PROGRAMME

ORGANISATION AND OUTCOMES

By

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FOREWORD

Children have been the most cherished possession in the Indian society from time immemorial. However, it is unfortunate that most of them are victims of malnutrition, which affects not only their health, but also their attendance and performance in school.

The provision of school lunch in the primary school is a right step to prevent malnutrition. Providing a good, clean, healthy and balanced lunch to the needy school going children is the objective of the Tamil Nadu School Lunch Programme. The state and central governments are spending annually many crores of rupees for providing lunch in the primary schools. It is important that teachers and administrators concerned with the planning, operating and evaluating the school lunch programme are well informed about the basic essentials of the programme. Toward this end, researches have been undertaken in Sri Avinashilingam Home Science College for Women, Coimbatore. The findings of the studies were published in the year 1966, by the Government of India as a book, 'School Lunch Programme: Organisation and Outcomes'. The book explained in detail the objectives, steps in implementation and evaluation of the programme in primary schools.

In every state, the policies are continuously changing. New dimensions are fast growing, and research findings are also mounting up. This publication carries the new findings and changes in the school lunch programme.

The spiralling rise of prices of all commodities poses many difficulties in continuing the school lunch scheme and in managing the feeding programmes within the monetary limitations. Teachers need help to use money saving methods and new, indigenous and even raw foods that are received from different sources and organisations for the school meal. They need to be educated on the use of alternative foods in the place of the CARE commodities, if and when they are not available. In the light of the knowledge gained in these areas during the past 14 years, at the request of the Ministry of Education, Government of India, this new publication has been prepared. The information given in this book

is based on the work done by nutrition scientists of Sri Avinashilingam Home Science College under the guidance of Dr. Rajammal P. Devadas in the campus primary school, as well as in several primary schools in Coimbatore District. It is hoped that the fresh knowledge carried by this book on school lunch programme will reach all those who deal with this important nutrition intervention effort.

Our thanks are due to Dr. Rajammal P. Devadas for her leadership, original contribution and work on this subject and to her colleagues Smt. S. Premakumari and Dr. Usha Chandrasekhar for this revision. The Ministry of Education and Social Welfare, Government of India deserves our appreciation for sponsoring this publication.

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The book—"School Lunch Programme : Organisation and Outcomes" was first published in the year 1966 by the Ministry of Education, Government of India. During the past 14 years, the school lunch programme has developed vastly, and considerable information has accumulated through research. Hence the first edition of the book has been completely recasted incorporating recent knowledge.

The author is grateful to the Government of India, Ministry of Education for coming forward to publish the revised book, particularly to Sri S. Sathyam, I.A.S., Joint Secretary for his valuable help.

The author is thankful to Sri T. S. Avinashilingam, Founder-President, Sri Avinashilingam Home Science College for his sustained enthusiasm in the programme, constructive suggestions and foreword.

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COIMBATORE-641043 RAJAMMAL P. DEVADAS

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CHAPTER—I

INTRODUCTION

Nearly 2000 years ago the reputed Tamil Poet, Saint Thiruvalluvar, who is the author of the immortal classical work Thirukkural said:

> "Of all the blessings one may have we deem naught as of worth
>
> Except the gift of children full of wisdom on this earth".

Children are not only divine gifts but also the mirror of a nation and the hope of the world. They are the country's biggest human investment for development.

Childhood is a period of rapid physical and mental growth and development. Children are building up new tissues constantly and replacing the old ones. Their nutritional requirements are higher per unit of body weight than those of adults. Good food, adequate in quality and quantity, is essential to stimulate and maintain their growth, to regulate their body functions, to repair the tissues already formed and to supply energy for work. If children do not receive the nourishment they need, undernutrition and malnutrition of one type or other will inevitably result, the type and extent depending on the type and quantity of nutrients lacking in the diet.

Surveys carried out in different parts of India show that the diet and nutrition of a large majority of the people are inadequate in several aspects. Consequently, varying types of nutritional deficiencies result. Today malnutrition is the most debilitating health problem affecting millions of children. Thirty per cent of children of the pre-school age in rural India suffer from different manifestations of Protein Calorie Malnutrition (PCM), also known as Energy Protein Malnutrition (EPM) which criples growth and leads to heavy child mortality.

Mortality in India accounts for 8.5 million deaths in a year. Among these, 4.7 million are children. Malnutrition of varying grades is the direct or indirect cause of death of 4.2 million children. At any given time, about one million children suffer from

extreme manifestations of malnutrition such as marasmus and marasmic kwashiorkor.

Undernutrition generally refers to inadequacy of calories, while malnutrition is associated with poor quality of meals. Undernutrition indicates that just more food is the prominent need, whereas malnutrition means that the diet is lacking in one or more essential nutrients, proteins, vitamins and minerals and or calories also.

Malnutrition which is the scourge of the nation, is caused by a variety of factors such as low food production, poor income, poverty, population explosion, ignorance, poor environmental sanitation and undesirable social customs, traditions and habits.

Malnutrition is not a pathological condition due to the deficiency of a single nutrient or calories, but a consequence of several interacting factors. W. R. Aykroyd, one of the eminent nutrition workers in India, had expressed that the tragedy of malnutrition in children in India is that it not only leads to high mortality, but also criples the growing generation and damages them permanently. Among the many cripling effects of malnutrition, the most dangerous is the impairment of vision in children.

Due to inadequate and improper feeding, retardation of growth in children manifests itself as the early and unmistakable sign of malnutrition. A malnourished child is dull, inactive, restless, unhappy, irritable and listless. His appetite, sleeping habits and posture are poor. He fails to grow. The slowing of the rate of growth leads to stunting and emaciation. In contrast, an adequately nourished child possesses self-confidence, vitality, vigour, poise, a well developed body and good posture. His skin is smooth, colour healthy and hair glossy. He enjoys good appetite and digestion.

Malnutrition affects not only the health of children, but also their attendance and performance in the school. Improperly/ inadequately fed children cannot concentrate on their studies.

Hungry and malnourished children do not learn, or learn badly. In many parts of India, children have a meal before they leave home for the school, and have no food until they return in the late afternoon. Even more pathetic is the condition of children, of whom there are several millions, who come to school with empty stomaches. Therefore millions who attend schools are not able to study their lessons with interest and enthusiasm.

Hence much of the teaching effort spent on them is wasted. Malnutrition at this age stunts both physical and mental growth for a life time, making the victims an economic burden upon the family and country. Even their span of life is shortened.

Millions of children have been brought into this kind of life, though no fault nor responsibility of their own. They are physically and mentally defenceless. They are dependent upon those who are responsible for their care and maintenance.

Realising the staggering dimensions of the malady of malnutrition in childhood, the central and state governments have embarked on several nutrition and health intervention programmes. One such programme is the widely operating school lunch or midday meals. Because the primary school is the only institution available in every corner of the country with day-to-day contact with most, if not all, families in the vicinity, it has become a feasible venue for one of the nutrition intervention programmes. School feeding is a direct approach to improve the nutritional status of children who are in the stage of rapid growth and development, requiring special nutritional protection.

No feeding programme however efficient it may be, can effect lasting improvements if it operates in isolation. It may give some emotional satisfaction to the sponsors but cannot prove rewarding in the long run, unless a viable nutritional component is built into the foundation. Hence the concept of school lunch programme for children as a built-in measure of the primary school is laudable.

The beneficial outcomes of school lunch have been studied from different angles by Devadas and coworkers since 1961 when the school lunch programme was initiated in the Sri Avinashilingam Primary School. The school lunch is being used as the medium for improving the nutritional knowledge, nutritional status and food habits of children. Several short term and longitudinal studies have been conducted to find out the outcomes of the school lunch.

This publication is an effort to present the findings of the various studies conducted in the school lunch programme of Sri Avinashilingam Primary School. It is hoped that the evaluation studies would help in improving the health and nutritional status of young children and their eating habits and in imparting nutrition education in the primary schools of the country.

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CHAPTER II

IMPORTANCE OF GOOD NUTRITION AND THE SUPPLY OF NUTRIENTS FROM FOODS

Healthy children are the foundation for a healthy nation. Maintenance of health is basic to happy and productive life. The World Health Organization (WHO) has defined health as a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity.

Two factors which influence the health of a person are: (1) the internal factors which include the thoughts, imagination, feelings and emotional status and (2) external factors which include food, clothing, shelter and economic and environmental conditions. Among the external factors which affect human health, food plays a prominent role.

Food is essential to sustain growth and to maintain the health of children and adults at an optimum level. Food satisfies hunger, and renews strength. Good nutrition helps the child to develop his inborn potentialities to the fullest extent. A well nourished child whose emotional needs are satisfied, tends to be vigorous and interested in what he does. His eyes are bright and his expression happy. In contrast, a malnourished child who does not get the food and nutrients his body needs, is small for his age, lacks the vigour and stamina of the well nourished child, and manifests a general appearance of fatigue and peevishness.

Foods are classified as cereals, pulses, fruits, vegetables, milk and milk products and flesh foods. These different kinds of foods are made up of a number of components called nutrients, namely, carbohydrates, proteins, fats, minerals, vitamins and water. These nutrients are needed in different quantities by different age groups, for the proper functioning of the human body.

Basically, foods can be divided into three major groups—(1) energy providing foods, (2) growth promoting foods and (3) protective foods. All foods yield energy, which is measured in terms of calories, but carbohydrates and fats are the main sources of calories. Foods rich in protein promote growth of the body. Foods which furnish minerals and vitamins produce immunity, help to protect the body from diseases, and regulate several of the body processes. Water and roughage help in the digestion of food and

excretion of the waste materials accruing from digestion, absorption and metabolism. Table I gives the nutrients supplied by different categories of foods.

TABLE I

Nutrients Supplied by Different Categories of Foods Commonly Consumed

No.	Nutrients	Foods rich in the nutrients
1.	Carbohydrates and sugar	Cereals such as wheat, rice, bajra (Cambu), jowar (Cholam), ragi and maize, pulses, sugar, jaggery and honey.
2.	Fat	Oils, milk, ghee, butter, fleshy foods, nuts and oil-seeds.
3.	Protein	Legumes and pulses, nuts and oil-seeds, oil-seed cakes, milk and milk products, egg, fish and other flesh foods.
4.	Minerals	
	a. Calcium	Milk and curds, egg yolk, green leafy vegetables, ragi and gingelly seed.
	b. Iron	Fleshy foods, liver, egg yolk, green leafy vegetables, ragi and jaggery.
5.	Vitamins	
	a. Vitamin A	Yellow and orange coloured vegetables and fruits such as carrot, yellow pumpkin and papaya, egg yolk, milk, curds, butter and green leafy vegetables.
	b. Vitamin B_1 (Thiamine)	Handpounded rice, wheat, gingelly seeds, milk, curds, vegetables, bran, yeast and groundnut.
	c. Vitamin B_2 (Riboflavin)	Green leafy vegetables, other vegetables, milk, liver, fleshy foods, groundnut and egg.
	d. Vitamin C	Vegetables that can be consumed without cooking, greenleafy vegetables, citrus fruits such as lemon, orange, sweet lime, tomato, amla and sprouted grams.

Feeding children with an adequate diet rich in all the nutrients is a real art. Teachers with devotion, can help greatly in this task through the school lunch. They need to be oriented in their training with the necessary nutrition knowledge.

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CHAPTER III

COMMON DEFICIENCY DISEASES IN CHILDHOOD

When calories or nutrients or both, either singly or in combination, are not supplied in adequate amounts, deficiency diseases result leading to undernutrition and malnutrition. The details of such deficiency conditions are presented in Table II.

TABLE II

Deficiencies Resulting from Inadequacies in Calories and Nutrients

S.No.	Nutrients	Results of deficiency
1.	Carbohydrate and fat	Weight retardation/reduction, emaciation and loss of strength.
2.	Protein	*In children between 2 to 5 years.*
		Kwashiorkor
		Kwashiorkor results in extreme conditions of deficiency of protein, while the calories may be adequate in the diet. The symptoms are: weight loss and growth retardation, diarrhoea, dermatitis, oedema, browning of hair, anaemia, weakness, forgetfulness, irritability and crying.
		Marasmus
		Marasmus results when both calories and protein are deficient in the diets of children. Symptoms are weight loss, emaciation, flaky faint dermatosis, browning of hair and enlargement of stomach and liver. Between kwashiorkor and marasmus there are a series of stages of growth failures. (Figures 1 and 2)
3.	Calcium	*In children above 5 years of age*
		Growth failure, indigestion and diarrhoea rickets with retarded growth, osteoporosis or osteomalacia, pigeon chest, weakening of bones, teath and gums, and obstruction in the normal functioning of heart.

Fig. 1 Child Suffering from Marasmus

Fig. 2 Child Suffering from Marasmic Kwashiorkor

Fig. 3 Eye with Bitot's Spot

S.No.	Nutrients	Results of deficiency
4.	Iron	Paleness, anaemia and loss of weight and strength.
5.	Vitamin A	Sore eyes, poor sight and night blindness, loss of glow in the eyes, Bitots spots (Figure 3), skin diseases, poor growth and poor resistance to disease and blood changes.
6.	B Complex vitamins	Loss of appetite, ulceration of mouth and tongue, body pain, dermatitis, colour changes in skin, vascularisation of the cornea falling of hair and early greying.
7.	Vitamin C	Bleeding gums, weakness of the bone, slow healing of wounds, internal haemorrhage, blood changes and poor resistance to diseases.
8.	Many nutrients	Growth retardation, dullness and slow understanding, loss of resistance to infections and continuous illness, irritability, laziness, inability to do work and loss of vigor.

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CHAPTER IV

NEED FOR INTERVENTION PROGRAMMES FOR SCHOOL GOING CHILDREN

School going children form an important vulnerable segment of the nation's population. They constitute 20 to 25 per cent of the total population in India. School age is a dynamic period of physical growth and development, when the child undergoes rapid mental, emotional and social changes.

The number of school children in Tamil Nadu state alone is 5.8 million of whom 4.06 million have been classified as undernourished. A recent United Nations' study in India indicates that two of every five persons are undernourished. The hazardous extent to which malnutrition affects the health and development of school children has not been appreciated fully. Malnutrition prevents children from realising their full genetic potential for development. It causes often permanent mental retardation.

Diet and nutrition surveys carried out in different parts of the country point out the existence of widespread malnutrition among the poor segments of the population. The worst sufferers are children and women in the reproductive period.

Malnutrition is associated with shortages in food, population expansion, poor weaning practices, lack of suitable food substitutes, failures to use properly the available foods, poverty, ignorance, traditional beliefs and customs. It is tragic to note from health statistics that 7 to 8 per cent of the total deaths in India occur among the age group 5 to 14 years. At any point of time, atleast 300 million children are victims of malnutrition.

The percentage of morbidity in the school age is estimated to be 24, a big proportion of which, is due to malnutrition. Blindness caused by vitamin A deficiency is common in the southern and eastern parts of the country. Geographical distribution of vitamin A deficiency is frequently found to overlap with those of Protein Energy Malnutrition and nutritional anaemies. A large percentage of children in the age group of 5 to 12 years develop vitamin A deficiency, and suffer from its consequences of retarded growth, night blindness and even permanent blindness.

The school children are, therefore, in need of health promotion, health appraisal and health restoration. Their nutritional

status can be ensured only by improving the economic conditions of their parents to a level at which they can afford adequate diets. Organised feeding programmes undertaken by the state can never provide a permanent solution to the problem of malnutrition. The attainment of a level of socio economic development which will make feeding programmes unnecessary must be the national goal. Unfortunately today the economic conditions of a large proportion of the people are such that they simply cannot afford even the least expensive diets. Under these circumstances, intervention by the state through feeding programmes such as the school lunch, to correct and mitigate the imbalances and inadequacies due to malnutrition becomes essential.

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CHAPTER V

OBJECTIVES OF THE LUNCH PROGRAMME IN THE PRIMARY SCHOOL

The school lunch programme occupies an important place in the overall educational structure. Since its aim is to furnish nutritionally adequate meals to children in the school, in order they can be healthy, well nourished and vigorous and grow up to their full stature physically, mentally and socially, it makes a distinctive contribution to the nation's development. Besides supplying the nutritional needs and laying the foundation for health, the school lunch, as an integral part of the healh programme, can fulfil some of the educational goals in the school curriculum. It can serve as a medium for nutrition education of the pupils and parents towards the proper selection and provision of inexpensive, nourishing and attractive meals suited to individual needs. The school lunch room is a laboratory, where the teacher can evaluate the adequacy of her teaching health and nutrition.

The important objectives of the lunch programme in the primary school are to:

1. Promote the growth and health of children by providing an adequate meal in the school which will meet atleast one third of the daily requirement of calories and nutrients.
2. Enable children attend the primary school regularly.
3. Increase the enrolment in the primary schools.
4. Prevent drop-outs from the primary schools.
5. Help children understand the relationship between good food, health and happy life.
6. Increase the ability of children to study well and retain the lessons in memory.
7. Give opportunities to children for social interaction with each other, ignoring differences due to caste and creed and share the same food with all, in a clean and cheerful setting.
8. Inculcate good food habits in children.

9. Teach children simple activities such as cutting vegetables, cleaning the utensils, cleaning and arranging the dining place and serving food in a clean and pleasant manner.

10. Impart knowledge of nutrition along with serving nutritious meal.

11. Help children disseminate nutritional information to their families.

12. Stress the importance of a pleasant atmosphere during meal time, to enhance the appetite, intake and digestion of food.

13. Inculcate in pupils good manners, sociability and consideration for others, and

14. Develop in children habits of sanitary handling of food

A school lunch programme which functions with these objectives can form a strong base for the improvement of health and growth of the younger generation. The school lunch programme is one of the best means to educate the young minds. The values of affection, self-reliance, getting along well with others, self-satisfaction and good character can be inculcated in children through their participation in the school lunch programme.

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CHAPTER VI

SCHOOL LUNCH PROGRAMME IN INDIA

Since 1925, supplementary school feeding programmes have been in operation in different parts of India. Midday meal programmes are now provided to poor children on a modest scale in several states. The coverage in 1978 was 13 million children in the country. This is likely to increase by 4 million by the end of 1983. The total cost of both the midday meals programme and the supplementary nutrition programme is estimated to be Rs. 174.5 crores during 1978-83.

There is no uniformly organised system of school meals programme in most of the states. Even in the states where school meals are served, they are restricted to certain districts.

The Government of Tamil Nadu was the first to give momentum to the scheme by coming forward with a substantial grant in 1957, after observing the good results of people's participation and contributions to the midday meals programme in many centres. This scheme is in operation in all the 34,000 primary schools throughout Tamil Nadu. Over two million children are now being served by this programme, which is the largest in India.

The origin and development of school lunch programme in the different states of India are reviewed below:

Andhra Pradesh

The midday meal programme was initiated in Andhra Pradesh in August 1962 and included both rural and urban areas. In the urban areas, about 25,000 children attend over 300 primary schools. About 40 to 60 per cent of these children are included as beneficiaries of the school lunch programme. The selection of a school for feeding programme is based on the backwardness or the needs of the area. CARE is assisting the scheme from 1962 onwards with supplies of Corn-Soya-Meal (CSM), vegetable oil, beans and milk powder to cover 9,60,000 children throughout the state.

Bihar

Bihar, runs a midday meal scheme for its schools, in which two slices of bread or three biscuits and butter weighing 7 to 15

grams and fruit are provided per child per day. CARE started assisting the midday meal programme in Bihar from the year 1968. The number of beneficiaries covered in 1969 was 6,10,000. The CARE supplements in 1969-70 consisted of 85 g of Balahar/ CSM and 14 g vegetable oil per child per day yielding 425 Kcals and 17.1 g protein.

Goa, Daman and Diu

The school lunch programme was launched in 1965-66. The Department of Education is in charge of implementing this programme. The feeding is being conducted for 200 days in the year. The number of pupils covered in 1979-80 was 21,674 through 317 schools. The food items provided are locally available foods such as biscuits, bread, cake and bananas. Thirty paise per child are sanctioned for the food supply.

Total outlay for school lunch programme for the year 1979-80 was 5.4 lakhs.

Gujarat

The midday meal programme in Gujarat is sponsored by the Department of Education. Children in the age group of 6 to 11 years are fed in the programme. The total number of midday meal centres in Gujarat State is 4,784 and 2,37,000 children are participating in this programme. The cost of a meal per child per day is 18 paise and the non-feeding cost comes to 5.5 ps/child per day. The prepared items such as Uppuma, Sheera, Sukhadi and Vada are served in the school lunch.

Haryana

The midday meal scheme is Harayana was started in 1961 with the help of CARE and the Department of Education. In 1979-80 the programme covered 4.23,000 children from 3,900 schools. The CARE food distributed consists of 80 grams of grains (soy fortified corn/corn soya meal) and seven grams of oil per beneficiary per day. Through this programme 320 calories and 12 grams of protein are supplemented to each child for a period of 180 days in a year. The total cost of the programme accounted to Rs. 34 lakhs in the year 1979-80.

Himachal Pradesh

In Himachal Pradesh, midday meal scheme has been run by its Directorate of Education. The scheme is in effect from the

year 1974-75 with the objective of providing midday meals to the needy and poor school going children who are undernourished. As approved by the Government of India, this scheme is meant for the children belonging to backward classes and Scheduled Castes/Scheduled Tribes and studying in first and second primary classes.

The meal costs 20 paise per child per day. Children are fed for 200 working days in a year. It is run with the help from the District and Block level Education Officers and teachers of the schools. The purchases are made by the District Education Officer for the whole district under his control and then distributed amongst the Block Education Officers, who in turn, transport the material to the selected schools where midday meal is provided to the children through the teachers concerned. This is a hilly area. Due to non availability of proper transport facilities it is very difficult to provide the materials, well in time.

In spite of the hurdles, the scheme is found to be beneficial to the children. During the period 1979-80, from tribal and other areas 22,500 children constituting 4 per cent of the total population of children going to the school benefited by this programme. The financial commitment for the year 1979-80 for this programme was Rs. 9,00,000.

Karnataka

A midday meal scheme was introduced in Bangalore city in 1946 to provide meals consisting of eight ounces of cooked rice and four ounces of curds. It was introduced in the rest of the state in 1957-58 by the state government. The government contributes five paise per child for 24 days in a month, and the school authorities match an equal sum. Preference is given to children coming from distant places. The CARE started assisting the midday meal programme from the year 1964. The number of beneficiaries was 1,62,000 covered during the year 1969. The lunch is served for five days in a week. This programme in villages is supported and directed by the Village School Betterment Cimmittee which included representatives of the village council (Gram Panchayat) as members.

Kerala

The school lunch programme in Kerala was started in 1941. During the year 1961-62, the state had midday meal programme operating in all the schools, departmental and aided, in the entire state. The meals ordinarily consist of rice or wheat kanji

with a side dish of pulses or cooked tubers. There is an executive committee for every school or a group of schools to administer the scheme. The non-recurring expenditure was borne by the executive committee, while the recurring expenditure was shared by the community, the state and the central government in the ratio 1: 1: 1.

In 1962-63, this scheme was superseded by the CARE feeding programme which covered 1,70,000 children daily. The CARE feeding consisted of 240 ml of liquid milk prepared from 28 grams of full cream milk powder and 240 ml of water, and uppuma prepared out of 56 grams of cornmeal and 14 g of vegetable oil or alternatively 240 ml of milk made from 28 grams of milk powder and rice flakes with coconut and jaggery. The CARE organization supplies the state under an agreement, 22,000,000, pounds of milk, 43,000,000 pounds of cornmeal and 6,350,000 pounds of vegetable oil. The Education Department of the state has appointed a Special Officer to cooperate with the CARE-Kerala Administrator based in Trivandrum. The CARE office is set up to coordinate with the education department. CARE field observers visit schools constantly to review the storage of foods supplied by CARE and to report on the preparation of the commodities entrusted to them by CARE.

The fuel and the condiments necessary must be obtained as local contribution by the Head Master of the school. The state department supplies all the necessary cooking utensils required for the school feeding programme. It also pays the cooking charge incurred at each school. The cooking is done under the supervision of the school. It has been found that the midday meals given to children with the materials supplied by CARE, are four times more nutritious than the gruel supplied by the government in earlier years.

A modified scheme is in operation in Alleppey and Kozhikode districts, in which only children who are in need, or suffer from lack of food are provided with the meals. The cost of the meal is 6 ps per child, 80 per cent of which is met by the state government. During the year 1970-71 the number of children covered was 20,84,000.

Lakshadweep

The midday meal scheme was launched in the year 1956 and has been run by the Department of Education of Union Territory of Lakshadweep. The main objective of this programme is mainly to feed all the children of the islands coming under this territory,

studying from first to seventh standards. The target number of feeding days is 180 per year. No other agency helps this programme other than the U.T. Department. The children are fed 130 g of rice and curry in the midday meal programme. The meal usually costs around 35 to 50 paise per child per day.

Madhya Pradesh

In the State of Madhya Pradesh, the feeding programme which commenced during the drought period in 1965 continues in the schools in the tribal areas as an important nutritional and attendance stabilization programme. The main aim of the midday meal programme has been to supplement the home food of school children, particularly those belonging to the lower socio-economic classes.

The State Department of Tribal and Harijan Welfare is responsible for implementing the programme. CARE-India assists the State Government by providing the required food commodities free of cost. The state government has the necessary administrative and the fiscal control states over this programme.

Under the programme, a child receives a meal prepared from 80 grams of grains and 7 grams of oil providing 312 calories and 14 grams of protein per day for 180 days in a year. During 1977-78 the Tribal and Harijan Welfare Department (TWD) budgeted Rs. 36,35,000 for this programme. CARE's input was 4,140.64 metric tonnes of food valued at Rs. 13,453,290 to cover 264,322 children. The TWD also budgeted Rs. 14,400,000 for its own indigenous grain input and operational costs to cover an additional 310,857 school children. Thus over the years, the programme has expanded and it now covers 575,179 children in 10,463 schools in 21 districts. In fact, all the accessible Tribal welfare schools in these districts have been covered.

For the storage of the commodities in the state, 40 godowns have been constructed at 38 storage locations with a government grant and CARE assistance. The commodities from these godowns are despatched to 671 pay-centre godowns at the block level. The organiser, headmaster, or a senior teacher collects the allocated ration for his centre. Transport consists mainly of cycle rickshaw, head load, horse back and bullock-cart.

The educational and nutritional benefits of the midday meal programme which have accrued over the years in the Tribal Welfare primary schools in the 21 districts have been evaluated by a study. Data were collected by interviewing school midday meal

programme organisers, the programme participants, and their mothers by seven teams each consisting of a CARE field officer, two female home science or social science graduates and one male medical graduate.

The study has gathered sufficient evidence that the food actually reached the target group and having done so the supplementary feeding has had its desired effect. The meal provided in the school leads to an increase in the intake of food. The children have a better diet on the days they receive food in the school. Additionally, the major portion of the school meal supplements the home food. The home calorie intake of the children is well below the recommended allowance. The school meal given thus help to narrow the gap between the home meal, and the recommended standards.

Maharashtra

A free midday meals scheme was started in Bombay in the year 1942 to encourage the attendance of children. The distribution of UNICEF skim milk powder through organised centres had been one of the main items of ameliorative measures for undernourished children below 14 years, and expectant and nursing mothers. In the earlier period, there was prejudice against the use of skim milk powder. With the passage of time, more and more persons particularly, those in charge of charitable institutions and social workers began to accept the measure as practical and beneficial to supplement the inadequate diets usually consumed by the poor.

The Bombay-CARE school feeding programme was inaugurated in February 1963. It covered about 250,000 children in municipal schools daily, involving the distribution of 4,500,000 pounds of milk each year.

At present the school feeding programme in this state is sponsored by the Maharashtra State Rural Development Department and Maharashtra Small Scale Industrial Development Corporation. Through this programme, 2,38,000 children 6 to 11 years of age, are benefitting in the state. CARE supplies sukhadi. corn soya milk, corn soy blend, soy fortified bulgar and salad oil for the programme. Hundred grams of food is supplied per beneficiary per day for 300 days in a year. The feeding cost is 12 ps/child/day.

With the CARE Commodities, the midday meal consists, of a glass of milk and a plate of uppuma, from the daily rations of 2

ounces of cornmeal, ½ ounce of oil and an ounce of milk powder per child. It is served for five days in a week. This programme is supported directly by a 'Village School Betterment Committee' which includes representatives of the village council (Gram Panchayat) as members.

Orissa

The school lunch is an integral part of the "Expanded Nutrition Programme" (ENP) in the state of Orissa. The ENP was sponsored in 1959, jointly by the FAO, the WHO, the UNICEF and the Government of India for a two-year period. It included 80 villages during the first year, and 240 villages during the succeeding year in selected National Extension Services (NES) Blocks. The overall objective of the Expanded Nutrition Programme (ENP) was to help the people develop local leadership for promoting activities which would result in the production of an adequate food supply, and a willingness to include the necessary variety of foods in family diets, specially for the vulnerable groups.

The specific objectives of the ENP were (1) increasing village, school and home production of nutritionally valuable foods such as, poultry, eggs, fish, fruits and vegetables; (2) nutrition education through schools, mothers' clubs, health services, Community Development and National Extension Service Blocks; (3) improvement of the nutritional status of needy, pregnant and nursing women and young children, and (4) training local personnel. For increasing food production, land, seeds, saplings, equipment and technical help were made available for the school gardens free of cost. Pupils were required to look after the gardens as a part of school activities, and the produce was used in the midday meals. Children were encouraged through class room activities to eat the available nutritious foods. During vacations, the gardens were tended by volunteers from the villagers.

School teachers, mukya sevikas, gram sevikas (Home science extension workers), doctors, nurses, social education organisers, and local leaders were trained to participate in the programme. Encouraging results of this programme prompted the sponsoring organisations to initiate similar programmes in the other states under the name, 'Applied Nutrition Programme'.

Pondicherry

The midday meal scheme was started in the year 1947 under the guidance of Directorate of Education, Pondicherry. The aims of this programme are to increase the enrolment and attendance

in the primary schools, to enhance the nutritional status of the children and to minimise the dropouts. All the school children aged 6 to 11 years who are willing to take midday meals are fed for 180 days in the year. In the year 1979-80 eighty per cent of the children that is 45,200 children in 244 schools were covered.

The CARE supplies 100 g bulgar wheat/Balahar, and 10 g salad oil per child per day for 108 days and the state department supplies rice to this feeding programme for 72 days in the year. The total annual expenditure incurred for CARE and the state Government are Rs. 3,78,000 and Rs. 10,08,000 respectively. The average cost of a meal with the assistance of CARE is 10 paise, and without the assistance of CARE, 40 paise.

There is one central godown for the storage of lunch food at Kurusukuppam, Pondicherry under the personal custody of the teacher-in-charge. The midday meals are cooked by the cooks and assistant cooks in thatched kitchens specially built for this purpose and served to children in the school premises itself. The midday meals scheme is governed by the Director of Education and the Deputy Director at state level, the Chief Educational Officer at district level, the Deputy Inspector of schools at Block level and the headmaster and the teachers at the feeding centres.

Punjab

For a long time no school feeding programme was in operation in Punjab. But skim milk supplied by the UNICEF and other voluntary organisations such as the Red Cross, was distributed to school children. There is now a CARE school feeding programme which was started in the year 1962, through which approximately 13 million pounds of milk are being distributed to one million children in 81 Community Development Blocks. This scheme is only for milk which is served in liquid form during the mid-morning break. The programme is administered by the Planning Department in coordination with the CARE office in Chandigarh. Hence the Block Development Officers and the village Panchayats, rather than the education department officials are in charge of the programme.

Rajasthan

Rajasthan began its school feeding programme for 5,00,000 children in the year 1962. The programme is being assisted by CARE from the year 1968 onwards. The village council helps to raise local funds to provide utensils, fuel and other accessories. At present, 3.37 lakhs of children in 7,016 centres benefit by this

programme. The age range of beneficiaries is 6 to 11 years. Eighty grams of grains and seven grams of oil per child per day are supplied by CARE and the non feeding cost comes around 5 ps per head per day.

Sikkim

The midday meals programme in Sikkim is run by the Department of health and Family Welfare of the Government of Sikkim. This programme was launched on 2nd October, 1976 to supplement the dietary intake of the children. The meal is provided to 38,249 children of 6 to 11 years age from 400 schools for 200 working days in a year. The total expenditure for the year 1979-80 incurred towards food and transport charges was Rs. 5.1 lakhs. This programme is activated under the guidance of State Nutrition Officer, District Nutrition Educator cum Inspector, Head Master and the school teachers.

Biscuits and buns prepared at the local biscuit factory and bakeries are distributed to the children. Nutrition surveys are carried out by the Food and Nutrition Board, Government of India.

Tamil Nadu

The pride of starting the free midday meals scheme in elementary schools in the country goes to Tamil Nadu Government. The scheme was started as a humble measure in Madras city to feed 500 children in the year 1925. Thereafter it has grown to a very large scale. It feeds currently 2.03 million children in 33,306 primary schools with substantial assistance from the CARE which supplies 80 g of bulgar wheat and 20 g of Balahar per child per day for 100 days and 4-8 g of salad oil per child per day for 200 days in a year. Under this programme children are fed free lunch for 200 days, a year. A detailed account of the development of this scheme is given in Chapter VIII.

Tripura

School meal scheme was taken in the meeting of the Council of Ministers held in 1979. The midday meal scheme was introduced in the state with effect from 3rd March 1980. It covers all the pupils, in classes I to V outside municipal and notified areas except the pupils of primary classes of middle and secondary schools running in the same shift. The meal is supplied to all attending students for 180 days in a year.

The schools are required to provide dry foods such as bread, biscuits, muri or chira and seasonal fruits such as banana, apple as far as possible. If possible khichuri consisting of rice, pulses and vegetables may be provided occasionally and the items of food may be changed at suitable intervals for a change of taste.

The machinery is organised at four levels, namely, school, block (inspectorate), district and state and the operational procedures are spelt out by the Department to implement the programme. They are as follows:—

A midday meal Committee consisting of five members formed in consultation with the Gaon Pradhan will implement the programme at the school level. The Headmaster/Teacher-in-charge of the concerned primary school section is the Member-Secretary of the Committee. The Committee receives necessary grants from the government for meeting recurring expenditure of 50 paise per pupil per day including all incidental expenses for day-to-day implementation. Non-recurring expenditure will be outside this ceiling for recurring expenditure.

The Director of School Education places fund at the disposal of the Inspector of schools for providing grant-in-aid to the Committees. The Inspector of Schools is the sanctioning authority for the grant-in-aid to the Committees for the purpose. The quantum of grant-in-aid depends on the estimated number of pupils in the particular school. The grant-in-aid is sanctioned in advance on quarterly basis so as to enable the Committee to incur necessary expenditure for the implementation of the scheme.

The Committee should furnish necessary statements and utilization certificate to the Inspector of Schools within four months from the commencement of the programme. Thus, the third quarterly instalment is released in time only after the receipt of utilization certificate for the first quarter. Under this arrangement, the school Managing Committees will have no difficulty for the fund provided they submit their statements and utilization certificates in due time.

The proposal for the expenditure to be incurred for a quarter by a school should be submitted at least 45 days ahead of the commencement of each quarter to facilitate the placement of funds in time. The Inspectors of Schools undertake necessary supervision to ensure successful implementation of the programme and also utilization of Government grants advanced to the Committee through them.

Block level Advisory Committees are also constituted to supervise and to implement the scheme at the Block level. The committee has eight members including the B.D.O. one Medical Officer, one Gaon Pradhan, one Headmaster of High/H. Sc. School, one President of the School Managing Committee and the Inspector of Schools. The Inspector of Schools is the Member-Secretary of the committee and the B.D.O. its Chairman.

One post of Asstt. Inspector of Schools and one post of U.D. Clerk have been sanctioned at the Block level under the scheme to assist the Inspector of Schools to implement the programme in his block.

The average cost per pupil per year worked out to Rs. 73.36 that of other costs to Rs. 2.92 and that of total cost to Rs. 76.28 during 1980-83.

About 75 per cent of total enrolment of the primary stage was covered by the scheme during 1980-81. It is intended to cover the remaining part during the Sixth Plan period (1980-85).

An outlay of Rs. 974.05 lakhs has been proposed to implement the scheme during the Sixth Plan period (1980-85) against a proposed outlay Rs. 3,998.63 lakhs for the development of elementary education during the said period. This forms 24.4 per cent of the total outlay.

Uttar Pradesh

Since 1953, a scheme had been in operation in the state on voluntary basis covering 1,20,000 pupils. The meals initially consisted of boiled, roasted or sprouting grams, groundnut, puffed rice, boiled rice, boiled potatoes, or seasonal fruits. In the year 1961 school feeding was started as part of the Applied Nutrition Programme (ANP). Each child was given 240 grams of 'khir' prepared out of 30 grams of wheat or 20 grams of rice, 30 grams of jaggery and 240 grams of reconstituted milk.

Apart from the Applied Nutrition Programme, the 'midday meals scheme' was launched in November 1961 on a purely voluntary basis. The 'Prarambik Pathashala Prabandhak Samiti' (Elementary School Oraganising Committee) of each primary school was responsible for organising and running the scheme at the school level. The 'Shitatra Upsamiti' (Sub-Committee) of the 'Kendra Samiti' (Central Committee) helped in running the scheme.

From the year 1963 another scheme was in operation in 17 districts to cover 1.5 lakh children. A sum of Rs. 295,200 was sanctioned for that scheme for the year 1963-64.

At present in Uttar Pradesh, the midday meal programme is sponsored by the Department of Education. Through this programme 4.7 lakhs of children of 6 to 11 years are being fed the midday meals. The feeding cost is around 25 to 29 ps/child/day. Eighty grams of grains and seven grams of oil are supplied per head for every meal.

West Bengal

In Calcutta there are three different feeding programmes namely (1) city bread programme (2) child nutrition programme and (3) state plan both in rural and urban areas started in 1965, 1966 and 1974-75 respectively to increase school enrolment and literacy and to reduce the incidence of malnutrition among children. CARE contributes bulgar wheat and salad oil to the city bread programme and child nutrition programme. The food is served for 180 days in the year to the beneficiaries. City bread programme and child nutrition programme serve 75 g of bread and 80 g of bulgar wheat per day per beneficiary. Under the state plan, 75 g of bread is served per beneficiary per day for 114 days in a year. The cost of the meal is 30 paise and 25 paise/day/beneficiary without and with the assistance of CARE respectively. Appreciable changes in health, improvements in attendance and literacy of children have been observed in the children who participated in the feeding programme.

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CHAPTER VII

THE SCHOOL LUNCH PROGRAMME IN OTHER COUNTRIES

The origin and development of school lunch programmes in different countries reveal the universal concern all over the world for the welfare of growing children. The need for school lunch programme as part of a sound educational system has been realised in most countries.

In many parts of the world the school lunch programmes have been organised for two reasons: distance of home from school and financial circumstances of the parents. In a few cases the purpose of improving the nutrition of children is also evident. Some countries have school feeding programmes on a nation wide scale, while others have them confined to certain areas or localities owing to financial limitations.

In the following pages the status of school lunch in some Asian and other countries are reviewed.

1. Australia

The nutrition level of the Australian people in general is high. Therefore it has not been thought necessary to introduce government funded free school lunches. There is no free school food service in Australia. But inexpensive lunches are supplied through school tuck-shops (canteens). The state schools incorporate and pay for the design and building of these tuck-shops when new schools are erected. The only financial contribution to school feeding programme by the Australian Government other than building tuck-shops in state schools, it is the free milk scheme. The States Grant Act of 1950, aims at supplementing the diet of all school children under 13 years of age with one third of a pint of milk daily. The cost of the milk, and half the capital and the incidental expenses are reimbursed by the Federal government to the states.

2. Brazil

The undernourished children in Brazil were provided with school meals before the Second World War by philanthropic and women's organisations. School funds also played a part in the

development of the programme. In 1946, ten per cent of the children attending school were receiving meals which provided 350 to 400 calories each. From 1950, UNICEF started supplying milk powder. Approximately three million children receive milk enriched with flour through the national services.

3. Bulgaria

The school feeding programme in Bulgaria was started after the Second War, through the joint efforts of the Ministry of Social Welfare and the UNICEF. The children were chosen according to their economic and health status. More than 500,000 children participate in the feeding programme.

4. China

In China, most school children and teachers bring their lunches to school. In 1957, it was found that some of the children in mountain areas either brought no lunch or brought very little food. A pilot school lunch project was initiated in five mountain schools. Since then, the project has been gradually extended to schools in the salt, fishing, mining and rural areas. During the initial period (1957-64) donations of wheat flour and milk powder were received from external welfare foundations. From 1964 to 1969, non-fat milk powder, wheat flour, bulgar wheat and vegetable oil were provided by the USAID under the United States Public Law 480. Between 1969-'72 similar food aid was given by the World Food Programme. At present the number of children covered under the school lunch programme is 229,784 which is 11.1 per cent of the total number of school going children. In schools without lunch programmes, the pupils bring their own lunch boxes and the schools provide facilities to steam the food. In some schools, hot soup is also provided. In schools offering the lunch programme a hot lunch is provided. The meal usually consists of baked or steamed bread (145 g), soup and one dish of meat, fish, egg, soybeans or peanuts cooked with vegetables.

The average nutrient content per meal is 820 calories, 30 g protein, 18 g fat, 200 mg calcium, 280 mg phosphorus, 5 mg iron and 1800 I.U. vitamin A. The cost to each student per day is 15 to 20 US cents. The neediest 10 per cent of all the pupils are provided free lunch, through the government funds.

5. England

The school lunch programme was developed rapidly in England in the 1900's. Anxiety about the national physique was

the motive to develop the school feeding programmes in England. The first 'School Meals Act' was passed in 1906. Most of the meals were provided by voluntary schemes supported by the government. They were simple, consisting of porridges or gruel, bread, jam and a little milk. Since 1940, the provision of meals increased rapidly. The lunches consisted of boiled vegetables, salad, steak and pudding.

Before the Second World War approximately 250,000 meals were served a day. By October, 1942 one million children (19 per cent of pupils) had their dinner at school. In 1943, the government called for an accelerated programme of expansion with a target of providing for 75 per cent of children attending grant-aided schools. By 1945, nearly two million dinners (1,832,000) were provided daily to 39.6 per cent of pupils.

In 1941, after an appeal for better allowances, the Ministry of Food asked the Board of Education's technical officers to draw up a diet which they considered satisfactory for children. This was done and a diet was planned to provide an energy value of 1.000 kilocalories, 20 to 25 g of animal protein, 30 g of fat, 2450 I.U. vitamin A, 230 I.U. vitamin B_1, 54 mg vitamin C, 5.7 mg available iron, and 425 mg calcium. So was born the concept of nutritional standard for the school meal, a concept which has held good until the present day, although it is now being questioned. The midday meal was considered to be the main meal of the day for nearly all children and it was considered that most of the necessary animal protein and of the fat must be obtained in this meal.

Until 1945, legislation giving local authorities power to provide school meals had been permissive; in 1945, it became a compulsory duty. The Provision of Milk and Meals Regulation 1945 required that midday dinners adequate in quantity and quality so as to be suitable as the main meal of the day for the pupil, well prepared and cooked, and served decently and in good condition should be provided on all school days for pupils. The regulations also gave local authorities power to require teachers to supervise pupils at dinner. This later became a great bone of contention.

The years 1945 to 1965 were a time of consolidation and expansion during which standards readily rose. To all outward appearances the service was firmly consolidated into education departments and into the life of the schools. As early as 1914. the central government gave the authorities a 50 per cent grant for school feeding, and when it was decided during the war to

expand the service as quickly as possible, the grant was increased to about 80 per cent. The government also pays all the capital costs for equipment and buildings. From 1979, the government is paying all the operating costs as well as the capital costs subject to certain safeguards. It is an extremely interesting feature of the relationship between central government and local government that the latter is allowed to carry out this large and complicated catering service at the entire expense of the central government funds.

The school meals service is administered at the Central Office in London by the special services branch, which is also responsible for school milk and the school medical services. There is a Staff Inspector of School Meals, who with 14 expert colleagues, is responsible for inspecting the arrangements made by the local education authorities. In addition, all of this Majesty's Inspectors of Schools take a keen interest in the service from the educational angle.

In the countries and towns each local education authority is required to employ an organiser of school meals, holding high qualifications and possessing good experience. Under the chief education officer the organiser is the responsible technical officer of the service. The duties are numerous and include planning the development of the system, the appointment and training of canteen staff, the purchase of food, and menu making.

In 1967, the separate grant for school meals, which had remained at 100 per cent since 1947, was abolished. At the same time the rate support grant was introduced.

In 1968, the Provision of Meals and Milk Regulations were amended to remove the statutory duty of teachers to supervise meals. As a result teachers withdrew from this duty in considerable numbers. In 1969, the Provision of Milk and Meals Regulations 1945 were revoked and replaced by much briefer ones which no longer used the term 'school meals service'. Prescribed nutritional standards continue to be a feature of education catering but somewhere along the time, the practice of monitoring these by the Department of Education and Science has been quietly dropped. The school meals service no longer seems to be in tune with the times.

In the financial year 1976-77, the price of a school meal was 15 p, and the gross running cost per meal was three times as much, 45.3 p. The cost of food, however, accounted for only one third of this cost; salaries and wages accounted for 55 per cent

The gross expenditure on school meals in 1978-79 was £ 617 million (at 1978 survey prices) and the income from charges was £ 202 million—making the net expenditure £ 415 million. Nearly half of this net expenditure went on providing free meals. The remainder (£ 225 million) represents the subsidy given to school meals that are paid for. It is most, or all, of this subsidy that would be removed under the government's plans. The school meals statistics is given in Table III.

TABLE III

Summary of School Meals Statistics (England) from a Census Taken on a Day in Autumn, Spring and Summer Terms in 1977-78

Details	Number in Millions				
	May. 77	Oct. 77	Jan. 78	May. 78	Oct. 78
Pupils attending	7.983	7.878	7.720	7.825	7.729
Paid meals as percentage of attendance	4.565 (57.2)	3.929 (49.9)	3.865 (50.1)	3.722 (47.6)	4.022 (52.0)
Free meals as Percentage of attendance	0.821 (10.3)	0.927 (11.8)	1.094 (14.2)	1.151 (14.7)	1.074 (13.9)
Total meals as percentage of attendance	5.386 (67.5)	4.855 (61.7)	4.960 (64.3)	4.873 (62.3)	5.096 (65.9)

6. Fiji

In most Fiji schools, children bring packed lunches or go home for lunch or buy meals at schools. The meals in the schools are generally prepared by the mothers in the Mother's Club. Meals are sold at as low a price as possible. The menu is prepared with consideration given to variety and nutritive values of food.

7. France

The credit of starting the first school meal programme in the world in the year 1865, goes to a Frenchman, Victor Hugo. The meals were provided both on free and payment basis. In 1868, it was enacted that all the Communes in France should establish

School Fund Committees to provide meals for the poor and needy children. After the war in 1945, the number of school feeding canteens increased from 8,000 to 10,900, through which 14 per cent of the school going children numbering 8,12,000 were receiving midday meals. These children were selected according to income. The lunch time was planned to be pleasent and conducive to learning good manners. A typical lunch provided 1,000 to 1,200 calories. It consisted of a large bowl of vegetable soup. fish, meat or eggs, or a combination of these to provide 18 to 20 grams of animal protein, simple desert (often a fruit) cheese and milk.

8. Greece

The school lunch programme in Greece was started before the Second World War. After the war, the International Relief Agencies, UNICEF and UNRRA* assisted the programme. In 1950, the "School Breakfast Programme" was developed by the Ministry of Education as a public health measure to correct the deficiencies which were prevalent among the school population. The school meal consisted of a cup of milk, cocoa, and a slice of raisin-milk bread, providing about 550 calories. The children are selected on the basis of health and economic status.

9. Hong Kong

School meals are not provided in the majority of schools in Hongkong because many schools in Hongkong are bisessional. Moreover malnutrition among school children is not a problem in Hongkong.

10. Hungary

The school feeding programme in Hungary was organised before the Second World War, and expanded subsequently. Children are selected on the basis of family income. Funds are provided by the state for the school lunch programme.

11. Indonesia

School feeding had never been tried in Indonesia until 1969 when CARE started a school snacks programme for children in the nursery and elementary schools. The school snack consisted of imported food Corn-Soy-Milk for two or three years and it

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United Nations Relief and Rehabilitation Administration which was temporarily established soon after the second war, to give relief in the war devasted areas of Europe.

was discontinued for lack of control. It is difficult to plan for a school feeding programme in Indonesia, because there are too many children in the school age group. Of the 132 million inhabitants, 42.2 per cent belong to the school age group and only 57 per cent of this group are able to go to the school. Because of the great demand, schools are run in two or three shifts. Under these circumstances, although school feeding programmes are desirable. it would be beyond the capacity of the government to fund such a programme.

12. Ireland

In Ireland, the local authorities were given powers to provide meals for children attending the National Schools. A free milk scheme initiated in 1933, was designed to meet the needs of sickly children mainly in the pre-school group. The School Meals Acts of 1930 and 1933 authorised the Country Councils to provide meals for children attending the National Schools in certain rural areas. The cost was shared equally by the state and local authorities. In Dublin Schools, sandwiches of meat, cheese or jam were supplied together with one-third litre of milk. The proportion of children participating in the school meal during the year 1948-49, the most recent period for which data are available, was approximately 18 per cent of the children attending schools.

13. Italy

In Italy, a number of towns provided school meals in the early years of the century through voluntary effort. After the Second World War, wide-spread feeding programmes were made possible by the UNICEF and UNRRA. The school meals supply 75 per cent of the child's daily requirements of protein and fat.

14. Japan

The first school lunch in Japan was served to needy children in 1889. In the early 1900s lunch was served in the schools not only for charity purposes, but also to improve the conditions of malnutrition and weak constitution. The present system, which was adopted in 1947 covered all school going children, without any discrimination against regions and personal circumstances. A survey conducted in May 1975 shows satisfactory development of the system, reaching 14,917,727 children who constitute 84.4 per cent of the total number of school children in Japan. The standard

for required nutritional quantity in school lunch has been established from time to time. The existing standard prescribed on April 1974 is as follows:

Calories and Nutrients	*Quantity*
Calories	650
Animal protein (g)	26.5
Fat (g)	18.5
Calcium (g)	0.35
Vitamin A (I.U.)	1000
Vitamin B_1 (mg)	0.55
Vitamin B_2 (mg)	0.65
Vitamin C (mg)	19.5

There are three expense categories for accounting the money spent in the operation and administration of the school lunch programme. (1) equipment and facilities, (2) labour of cooking personnel and (3) materials and supplies for the meals. Of these, those for materials and supplies are borne by parents and the rest by the establishers of schools. The charges on materials and supplies for school lunch are different among individual schools and regions. Children (6-11 years) are fed at school five times a week or for 180 to 200 times a year. Free lunches are provided from funds of government and local authorities to needy children and pupils who number approximately, 5,50,000 in total. All children in school are provided with the lunch for equality.

The Government subsidizes the school lunch programme in Japan for its sound development and popularization, taking care of the following items of expenditure.

(1) Facilities and equipment necessary for operating the school lunch programme (11.0%).

(2) Free school lunch for needy children and for those who study in evening schools (19.5%).

(3) Adjusting supply demand situations of materials (2.7%).

(4) Materials used for the school lunch programme such as wheat flour and milk (44.8%) and

(5) Salaries for nutritionists who are in charge of the school lunch programme (22.0%).

Today the school lunch programme in Japan is one of the finest in the world in terms of concept, philosophy, coverage and outcomes. It is a requirement by national law.

15. Korea

The Republic of Korea received food supplies from 1953 to 1973 from sources outside the country for utilization in various ways for feeding school children. The school feeding programmes thus for implemented have been only partially effective. The programme failed to reach the desired levels of fulfilling the nutritional requirements of children. Not all elementary schools of the country were included. Nutrition education and training components of the programmes showed only limited development. The discontinuation of foreign food supplies in 1973 brought about a huge decrease in the school lunch programme. For budgetary reasons, the Ministry of Education of Korea is not yet able to compensate for this loss, although the government budgetary allocations have increased significantly since 1973.

For the purpose of experimentation and exploration with the objective of establishing the best and most economic method of developing a nationwide, community supported feeding and nutrition education programme, the Ministry of Education undertook a pilot programme in 33 rural and 21 urban schools in 1972. Although the legislative enactments have not yet been made, the Ministry of Education has set forth the following as its programme objectives: (1) to improve health and physical development through a school feeding and nutritional education programme (2) to contribute to the national campaign for food production improvement and for a family pattern of food consumption. During the year 1976, the school lunch programmes covered 3,70,000 children. Out of these, 31,000 children were covered under the self sufficient pilot feeding programme, (staple and side dishes served for five times a week) 1,80,000 children under semi self sufficient feeding programme, (staple and side dishes served for three times a week) and 1,59,000 children under the general feeding programme, (staple item served for 5 times a week). The lunch which consists of a staple food and side dish is provided for three to five times a week. Each lunch provides about 680 k calories and 12 g of protein per day.

16. Netherlands

The school feeding programme was never popular in the Netherlands, because of the beliefs that it was incompatible with

the family traditions and habits of the country, although the Netherlands was the first country to give legal recognition to the School Food Service. The Netherlands Education Act of 1960 authorised all municipalities to provide meals to poor children.

17. New Zealand

School food service does not exist in New Zealand on government subsidy. In some cases, parents have organised a meal service on a voluntary basis and it is not compulsory for the children. Most schools run effcient and practical cafeterias, canteens or tuck shops. These are usually manned by voluntary labour from Parent Teacher Association representatives or senior pupils. The profits go towards amenities for the school such as extra sports equipment, library books and finance for school field visits.

18. Norway

During the early part of this century many urban communities in Norway provided hot meals for needy children. In 1925, a survey showed that the meals were unsatisfactory from the nutritional stand-point. Therefore the 'Oslo Breakfast' was introduced. It consisted of milk with sandwiches made of rye biscuits or bread, vitaminised margarine, whey cheese, cod liver paste, raw carrot and an apple or orange according to the season. The meals were designed to provide maximum nutrients. They were easy to prepare and serve. All the elementary school pupils were provided with the Oslo Breakfast regardless of their economic or social status in 1972, however, the menu of the school lunch was reduced to milk and vegetables or fruits and from 1977 the "school lunch" has consisted only of a quarter of milk. The reduction is due to financial reasons. Some of the secondary schools have canteens, where the pupils and staff buy sandiwiches and beverages.

19. Philippines

School feeding has always been an integral part of the ancillary services in the Philippine school system, receiving considerable input in terms of time, effort and money. The school food service programme has three objectives: to (1) provide improved nutrition to school children, (2) serve as a teaching laboratory for nutrition and (3) encourage selective food production. As the government cannot support fully the school supplementary feeding programme, it welcomes foreign food assistance, but does not aim to perpetuate such dependence on foreign assistance and food.

Several feeding schemes are used in the schools. A daily snack feeding programme consists mainly of nutribuns baked from flour donated by CARE and Catholic Relief Services. Priority is given to underweight children. Each nutribun used in this scheme supplied 300 calories.

A modification of this scheme is now gaining popularity. It is the serving of mid morning or mid afternoon snacks consisting of locally produced food and CARE/CRS commodities. Examples of this type are cream of mango soup utilizing mango harvested from the school and or home gardens together with a 250 calorie nutribuns baked from flour, a donated food commodity, pansit using noodles made by the teacher and parents from flour and leafy vegetables from the school and or home gardens and a small amount of meat or dried shrimp brought from the market with cash contributions of parents or at times donated by meat and or fish vendors and guinatan utilizing root vegetables from the garden eaten with nutribun donated by CARE/CRS.

Another type of midmorning or afternoon snack consists generally of boiled carrot or other root crops, boiled banana or mixed vegetable dishes served to pupils at least two or three times a week gradually increasing the frequency of feeding to five times a week and increasing the number of beneficiaries until such time when all pupils are served.

Midmorning or afternoon snacks can be served daily, consisting purely of CARE or CRS commodities four days a week and one feeding consisting of dishes made from locally produced vegetables or fruits. Hot lunch supplements consists mainly of hot soups or vegetable dishes with a small amount of fish, shrimps or meat to supplement the packed lunch brought to school by the pupil which consists generally of rice and fish or sometimes a small piece of meat.

Hot lunch also may be complete nutritious meal served to children and students who remain in school during the noon break. These hot lunches are sold at the school cafeteria and or hot lunch kitchenettes. The local government takes care of the maintenance.

Funds for the maintenance of the food service scheme and the improvement of the food service centre are raised through Teacher-Parent Associations. School personnel contribute cash or kind. Donations from civic/religious organisations, partial government subsidy whenever feasible, and proceeds from the children's counterpart are the other sources of funds for the school feeding.

20. Samoa

Under the World Food Project 741, a midday meal is given to school children, some of whom travel considerable distances away from their homes. About 40,000 children benefit from this programme. In view of the present lack of utensils and other facilities for the preparation of meals, in most schools the government has requested New Zealand, wholemilk biscuits to be supplied.

21. Singapore

Schools in Singapore are in two sessions—morning or afternoon. Children either attend morning school from 7.30 a.m. to 12.30 p.m. or the afternoon school from 1.00 noon to 6.00 p.m. Because of this shift system, Singapore schools do not provide food service in the form of school lunches, since the meal would be eaten at home either before or after school.

Within the five hours session at school, there is a recess of 20 minutes. During this break the school children may buy food, drinks at the school or at the tuck-shop, in which variety of food and drinks are sold.

Under the World Food Programme Project 725, the undernourished primary school children in Singapore are provided with a high protein, vitamin enriched food called Wheat Soy Blend (WSB). This is mixed with dried skimmed milk and sugar and is given as a beverage at recess time. The drink provides 10 per cent of calories, 25.1 per cent of protein and 104 per cent of iron requirements of the nine year old school child. Thirty thousand children are benefitting from this scheme.

Needy, undernourished school children are supplied also with fortnightly food ration by the School Health Services, each ration consisting of 500g full cream milk powder, 110g Ovaltine, 500g sugar, 500g groundnuts and 10 eggs. In 1957, the number of children receiving such rations, was 1297. After six months of receiving such rations, the children are assessed and if necessary transferred to monthly supplies of WSB supplements, which consists 1kg WSB and 150g dried skimmed milk per pack. During 1975, 5102 children received these packets.

The Ministry of Education has a milk scheme to improve and upgrade the nutritional intake of primary school children. Pupils who participate in this scheme buy flavoured milk drinks at low cost. Needy pupils are provided free milk. Funds for the needy pupils are obtained from the individual school advisory committee.

22. Switzerland

In Switzerland by the close of the 19th century meals were provided in the schools by private agencies. In 1930, milk was supplied to many schools, replacing the former soup meals. The milk supply was on both free and payment basis. During 1945-46, about 60 per cent of the primary school children were participating in the school lunch programme. The cost is met partly by the parents and partly by the state government.

23. Thailand

Records are not available on what has been done in Thailand in the past as far as the school lunch service is concerned. But at present the Ministry of Education and the Ministry of Interior, which control elementary education have recognised the importance of school feeding and encourage the schools to set up lunch programmes.

A committee which is composed of a group of people from various institutions have raised fund for school lunch through various ways such as donations and selling book markers. Meals in Thai schools are mostly served at noon except in boarding schools. The potions contribute less than one third of the children's daily requirement. The elementary schools do not have kitchen. Some schools have a dining hall, a small part of which is used for food preparation. The cost of one meal is from 5 to 15 U.S. cents. Certain number of needy children is receiving free lunch in many elementary schools. The difficulties encountered in school feeding programmes are lack of adequate funding, and the low economic status of the school children.

24. USA

In the USA (United States of America) the school food service was in operation, in 15,000 school districts, with 90,000 kitchens serving 25,700,000 lunches per day for 180 days, in 1976. Free or reduced price meals comprised 10.9 million of this total. As early as 1890, school feeding of a kind had been recorded, but the modern movement of school food service was born in 1946. Recognising that poor food habits, begun at an early age and continued throughout life, has a major adverse bearing on the development of individual, the U.S. officials realised that the most effective way of improving the health and eating habits of the nation was through the school lunch programme. Only through school lunch, could the largest number of individuals be reached at an early teachable age in a natural atmosphere of learning.

A second reason for starting the National School Lunch programme was, there were farm surpluses, and it looked a school lunch programme would be helpful to the farmer. On June 4, 1946, the US Congress passed Public Law 79-396, known as the National School Lunch Act, to "...safeguard the health and well-being of the nation's children and to encourage the domestic consumption of nutritious agricultural commodities and other foods". This Act is the basic authority for the present national school lunch programme and provides assistance in the form of cash and food.

Then as now, the three requirements for the school lunch programme participation are to (1) operate a non-profit lunch programme (2) serve lunches that meet the nutritional standards established by the Department of Agriculture (the "Type A" lunch) and (3) provide free or reduced-cost lunches to pupils.

The National School Lunch Act (Public Law 79-396) permanently authorised the school lunch programme in 1946. It established cash grants to states to aid non-profit school lunch programmes in public and non-public schools. Payments to states were made on a three-to-one matching basis. On October 1, 1946, rules and regulations governing the distribution and use of commodities to the state for school lunch programmes by the federal government were set forth in the agreements on donated commodities between the State Boards of Education and the U.S. Department of Agriculture (USDA). In 1954, the special milk programme granted cash subsidies for milk served in schools. Public Law 91-248 clarified the intent of Congress that needy children receive lunches free of cost or reduced price. For that purpose specific guidelines for determining eligibility for free and reduced-price lunches were added.

Schools participating in the lunch programme are required to execute agreements with the state education agencies. These agreements provide that the sponsoring agency for the school will be responsible for the three programme requirements as specified below.

(1) *The Type A lunch* meets one third of the child's minimum daily requirements for nutrition and includes a food from each of the basic four food groups*. It is the responsibility of each

*The basic four food groups as specified by the USDA are: (1) Milk group (2) Meat group (3) Vegetable fruit group and (4) Bread cereal group.

school district to plan menus which conform to the requirements of the Type A pattern, which include:

(a) *Meat and meat alternative.*—Two ounces (edible portion as served) of lean meat, poultry, or fish; or two ounces of cheese; or one egg; or one-half cup cooked dry beans or peas; or four table spoons of peanut butter; or an equivalent quantity of any combination of the above listed foods. To be counted in meeting this requirement, these foods must be served in a main dish or in a main dish and one other menu item.

(b) *Vegetables and fruits.*—Three fourth cup serving consisting of two or more vegetables or fruits or both, in raw or cooked form. A serving (one-fourth cup or more) of full strength vegetable or fruit juice may be counted to meet not more than one fourth cup of this requirement.

(c) *Bread.*—One slice of whole-grain or enriched bread; or a serving of other breads such as corn bread, biscuits, rolls, muffins, etc., made with whole grain or enriched meal or flour.

(d) *Milk.*—One and a half pint milk as a beverage (whole, lowfat, skim, buttermilk or flavoured).

Over the years, the Type A pattern has been very useful in menu planning in the schools. Every day in the United States of America, at noon time, 25,700,000 pupils come to eat a Type A lunch.

During the latter part of the 1960s, there had been a great push to look for an improved way to plan menus that would provide for greater assurance that needed nutrients were actually being served; increased flexibility in menu planning; increased acceptability; decreased waste; and easier use of fortified foods. As a result, new systems of feeding are in operation today.

Thirty years ago when the National School Lunch programme was born, the school dining rooms were in the basement. Now they have been moved from the basement to attractive quarters on the ground level. Frightened, bewildered amateurs handling the lunch in house dresses have become the confident professionals through education and training. There has been an upgrading image resulting in public awareness of the benefits of the school lunch programme. Acceptance by the school lunch people of the new operating methods, modern technology and new techniques are evident. The 'School Food Service' is one of the largest food operations in the USA and a market for the farm products. By

the year 1971 the big push for finding ways to feed large numbers gave impetus for the present system, the numbers fed swelled, including almost every pupil enrolled. The increase in the number of working mothers, availability and acceptance of foreign foods, expansion of use of frozen foods, notably frozen baked desserts, entrees, and vegetables, more snacking and less traditional meals, especially breakfast are some outstanding changes, which have led to the increase in the number of participants in the school lunch. Inflation is exerting its impact on changing systems in school feeding. Hence school food service in the United States today has caught up in a squeeze of high costs in food, labour and equipment. Therefore school districts want food service departments to be self supporting and they hesitate to make up deficits. Parents with paying children are reluctant to pay increased school lunch prices. All this adds up to a need for the most productive and efficient systems possible to feed the school pupils in the United States. Old concepts and methods will have to be abandoned and new and better ways must be found.

In recasting food systems, there is almost an endless variation of combinations, but currently the following five basic food service systems are used in school feeding in the USA.

(a) The on site system.

(b) The central kitchen-preplated lunch distribution system.

(c) The central kitchen-bulk pack lunch distribution system.

(d) The cold-packaged lunch system and the

(e) Cup-can system.

(a) *The on-site system*

The *on-site* kitchen is the oldest and still the most widely used of all the systems. This conventional system has a kitchen with production, service and clean-up personnel. Food of all types is received, raw food, convenience food, canned food and frozen food. These are prepared or processed on the premises and served.

(b) *The central kitchen preplated lunch*

The central kitchen is known by many names, such as processing kitchen and production kitchen. It is defined as any centrally located kitchen where preparation of food is done for serving other locations. A school that serves other schools can be defined as a central kitchen, or it can be a kitchen designed for the primary purpose of producing food to be served elsewhere.

From one central kitchen, hot and cold packs are prepared. The hot packs which include: entree and vegetables are packaged in foil or paper oven ware containers and covered with aluminium foil or polyfilm. The cold packs which include; salad, fruit, dessert and buttered bread in relevant utensils along with napkins are packaged in clear plastic trays or cold pack trays and overwrapped with clear film. All containers and utensils are completely disposable. Permanent ware is not used in this system.

(c) *Bulk pack lunch*

The bulk pack lunch system is predicated on food being produced in a central kitchen and being shipped to schools in bulk. The portioning of the food is done on the serving line in the receiving school. The food may be sent either hot or cold.

(d) *Cold-packaged lunch*

The cold-pack lunch system is also known as the brown bag lunch, vita-lunch, vita pak and astro-pak. When the cold packaged method is used institutionally to provide lunches in the school, sanitation aspects limit what can go into the lunch, how long it can be held and at what temperature it must be held. The lunch consists of a sandwich, raw vegetable, fruit and milk.

(e) *Cup-can lunch*

The cup-can or econo-lunch system is a hot lunch programme where individual service-size canned food is used.

Hawaii

In Hawaii islands which is part of the USA, food service for pupils in the public schools has been a reality for nearly 70 years. Today school lunch is provided in all the 220 schools and also breakfast in more than 30 schools.

Daily 1,40,000 pupils (87 per cent of average daily attendance) participate in the lunch programme, paying a charge of 25 US cents. Pupils eligible to receive free reduced price lunch are served without charge. Seventy six per cent of the pupils pay for lunch, 10 per cent receive free lunch, and 6 per cent pay reduced price.

'Wiki-Wiki' means quck in Hawaiian. To cope with crowded Cafeteria and short lunch periods, many principles of secondary schools have redesigned mid morning recess as a lunch period. Menus designed for quick preparation (two tacos, french fries, and milk) and quick service permit thousands of pupils to eat a nutritious

lunch within a short period of time. In addition, 28 per cent of average daily attendance are served breakfast. The percentage of students paying for breakfast is 27. The balance are served breakfast at no charge.

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CHAPTER VIII

ORIGIN AND GROWTH OF SCHOOL LUNCH PROGRAMME IN TAMIL NADU

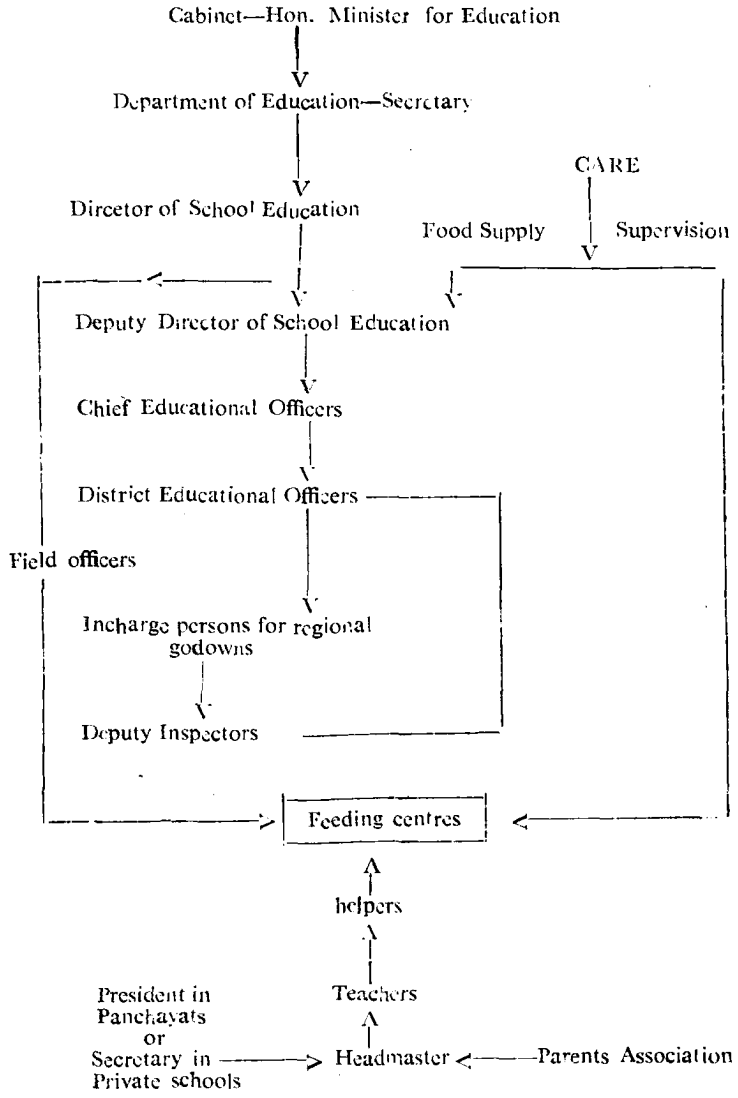
A good proportion of school children in Tamil Nadu, as elsewhere in India come from the less privileged sections of the population mostly from the rural areas. These children are generally those who have just managed to survive the ravages of malnutrition in early childhood. Millions still carry scars of nutritional deprivation. They manifest different types of nutritional deficiency diseases, growth retardation and a general lack of concentration in studies and other activities. Their motivation to study is nil or reduced markedly as they are worried about the next meal. These children often dropout as incompetent in the schools.

As an immediate remedial measure to alleviate this situation school lunch programme was first introduced in the state of Tamil Nadu during the year 1925-26 by the Corporation of Madras. Today the school lunch programme in the state of Tamil Nadu is one of the Major nutrition intervention programmes.

The Madras corporation's programme in 1925 aimed to solve the two problems (1) children attending the corporation elementary schools from families of poor socio economic status were suffering from malnutrition and avitaminosis and (2) the poor socio economic conditions of the families forced the children to work without attending school. The scheme thus initiated was intended for children of families with an income of below Rs. 50 per month as an incentive to improve attendance in the schools.

Subsequently, philanthropists and voluntary organisations were urged to start free school lunch centres in the villages and towns all over Tamil Nadu. The school lunch programme launched in July 1956, as a 'people's movement' for organised charity as part of the 'School Improvement Efforts' which comprised : school uniform, school amenities and school lunch. Impressed by the response given by the public, the Government of Tamil Nadu (erstwhile Madras) took up the school lunch programme in November 1957 and issued precise and detailed rules for the working of the school lunch programme. This has been revised several times (Appendix A). It aimed at securing the cooperation and active participation of the local public and parents.

The administrative chart of school lunch programme in Tamil Nadu is given below.



Administrative Chart of School Lunch Programme in Tamil Nadu

According to the regulations, the school lunch programme must be run in the elementary schools by the voluntary contribution of the public at the rate of four paise per meal together with the government aid which is equal to the amount actually spent in excess of the public contribution subject to a ceiling of six paise per meal per pupil. Appreciating the progress in Tamil Nadu, the central government extended an assistance upto 50 per cent of the cost. When the school lunch programme was started first in the Madras Corporation, a stereo type meal pattern containing "12 ounces" of cooked rice and 8 ounces of sambar with one vegetable was served. The menu was changed in 1959 for the corporation schools as follows:—

Mondays and Fridays	:	Cooked rice 12 ounces and Sambar eight ounces.
Tuesdays	:	Curds rice 16 ounces and Kootu two ounces.
Wednesdays	:	Tamarind rice 15 ounces and Sambar eight ounces.
Thursdays	:	Kadambam rice 12 ounces and Sambar eight ounces.

These meals are prepared in various centres and transported to different schools through vehicles.

In the year 1961 the Government of Madras started receiving the CARE food commodities for feeding 5,00,000 children through the school lunch programme. The CARE programme in Madras was coordinated with the State Department of Education which appointed a special officer to work with CARE Madras administration. The commodities chosen were milk powder, vegetable oil, corn meal, bulgar wheat and a special type of rice. Currently CARE provides a daily supplement of 300 calories and 12 g protein to school children through a supply of 80g bulgar wheat and 20g of Balahar or 100g of Balahar per child for 100 days and 4 to 8g of oil per child for 200 days in a year.

On 31st December, 1962, the then Government of Madras modified the rules so that one third of the number of pupils on rolls of I to VIII, as against classes I to V, in every school could participate in the school meal.

The number of children participating in the school lunch programme had increased to 1.86 million in 32,000 schools in the year 1978. This had further increased in 1980-81 to about 2.03 million children in standards I to VIII of Elementary Schools (33,306) including 1.65 lakhs fed in schools run by the Adi Dravidar Welfare and Backward Classes Departments. Out of this four lakhs are in

Central kitchen areas and the rest in non-central kitchen areas. Because of the spiralling rise in the price of all commodities the Government of Tamil Nadu came forward to increase the cost of school lunch from 10 paise to 15 paise in the year 1975 and continued its grant of 60 per cent cost. Hence the Government at present provides 10 paise per meal per child to meet the cost of school lunch. The provision for the Midday Meals scheme in the budget for 1981-82 is Rs. 5.55 crores.

The concept of this growing school lunch programme is laudable. More attention needs to be paid to make implementation aspect a more purposeful one so that the real educational impact of the programme would become obvious on a lasting basis.

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CHAPTER IX

ROLE OF CENTRAL KITCHENS IN SCHOOL LUNCH PROGRAMME

That every primary school must have the infrastructure to run the school lunch programme is attractive and encouraging. Every school may not be in a position to organise the programme, since several hurdles hinder its smooth and successful implementation.

The major problems that school authorities face in the organisation of the school lunch programme are financial adequacy, supervision of cooking and distribution, storage of provisions, purchases, transportation of provisions and lack of experience in account keeping and in regulating the nutrient content of the foods prepared. Quite frequently, the regularity of cooking is interrupted by irregular work and absenteeism of the cooking staff, inadequate cooking utensils, lack of kitchen facilities and the irregular mobilisation of the funds.

Under these circumstances, one solution to these problems appeared to be the centralisation of food preparation, that is, the establishment of large catering facilities, which centrally procure, store and prepare food for the ultimate use at several distribution points. The prepared food is distributed to the different schools through proper transportation agreements. With these considerations the government of Tamil Nadu has started the central kitchen movement, with the assistance of CARE.

Thus the central kitchens help to avoid most of the problems faced by the teachers in the individual schools. All that the teachers have to do is to collect the food that comes to the school and supervise its service at noon. Thus setting up of separate cooking establishments in each school has been avoided.

Central kitchens supply food for five days in a week. Now, central kitchens are functioning in the districts of Chengalpattu, South Arcot and North Arcot. The food cooked in the kitchens is transported to the surrounding schools, in as economical a manner as possible utilising bullock carts, cycles etc., and, where absolutely necessary motor vehicles. The 97 central kitchens in these districts, established with CARE assistance at a total cost of about Rs. 2 crores also receive CARE food as in the non-central

kitchen areas. They serve four lakhs of pupils in these three districts. In central kitchen areas, the entire cost of the scheme is met from the Government funds and the local body contribution is credited to State Government funds. The cost of a meal is around 15 paise.

In some of the towns, the municipalities run central kitchens to avoid separate establishment in every school under its control. For example in Coimbatore town, a central kitchen is run by the municipality, which has been converted into a corporation. On three days soya fortified bulgar, and Balahar uppuma are prepared, and for the remaining days tomato rice, dhal rice or tamarind rice is prepared and the food is transported using lorries or tractors. Each vehicle makes two or more trips for the food supply to the schools allotted.

This system of organising the school meal programme through central kitchens however suffers from the following drawbacks:

1. In several places the food distribution is depending mainly on the functioning of motor vehicles. Vehicle breakdown is a perpetual problem faced by the schools.
2. For the cost of 15 paise/child/day, only one preparation is prepared and sent. This creates monotony and food dislikes among children. At the same time, if food is prepared in individual centres for the same cost, it is possible to provide a cereal item, a kootu, a beverage and perhaps a fruit. Hence the food supplied by the central kitchen is not always well balanced.
3. The food becomes too cold and or stale by the time the children are served the meals in some distant centres.
4. There is no component of nutrition education in this programme and
5. The likes and dislikes of the children are not taken into account.

If some modifications are introduced in the operation of the existing central kitchen organisation, the disadvantages could be overcome and the advantages increased and improved. Efforts should be made to operate the central kitchens on a smaller scale in the rural areas. These kitchens should cater to the needs of the primary schools within 5 to 7 km distance so that the transportation of food could be managed with the help of bullock carts. Efforts must be made to include one side dish and a fruit in the menu.

The contributions of the school gardens and the Applied Nutrition Programme* (ANP) could be utilised for the midday meals. The suggestions of the school teachers should be checked and considered from time to time and incorporated for the improvement of the meals. If the food is prepared for about 10 schools in one centre and distributed to these schools the problem of kitchen facilities, procurement of foods from town, lack of utensils and irregularities of the funds could be overcome to a great extent. The time spent by the teachers in monitoring the programme without looking after the class in precious morning hours could also be prevented.

*ANP is a programme underwhich the production of animal foods, vegetables and fruits is promoted through poultry units, fisheries, home gardens, school gardens, community gardens etc. The produce from the school gardens and community gardens could be utilised for supplementing the school lunch.

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CHAPTER X

ORGANISATION OF THE SCHOOL LUNCH PROGRAMME

This chapter is based on the school lunch programme organised in Sri Avinashilingam Primary School which is being conducted with the cooperation of the administrators, teachers, parents and pupils following the norms presented by the Education Department of the Government of Tamil Nadu.

Organisation of the school lunch programme involved the following steps:

1. Securing financial assistance.
2. Finding space for the kitchen, lunch room and wash place.
3. Procurement of equipment.
4. Selecting children.
5. Planning menus and estimating quantities of foods to be cooked.
6. Procurement and storage of provisions.
7. Standardisation of recipes.
8. Training the cook.
9. Standardisation of servings and methods of serving.
10. Recording observations on children and their food intakes.
11. Recording the heights, weights and other parameters of the nutritional status of children.
12. Maintenance of cleanliness in the lunch room; and
13. Conducting nutrition and health education activities.

1. Securing financial assistance

The school lunch programme or the midday meal scheme as it is popularly known in Tamil Nadu, is offered free of cost in the

5—1 M of E&C/ND/83

Fig. 4 School Lunch Kitchen and Store Room.

primary schools. Therefore securing financial assistance on a continuing basis is of a vital importance. The sources of assistance are: parents, local Mahalir Manrams, Mathar Sangams, Mahila Mandals, other voluntary organisations, particularly, service clubs such as the Rotary and Lions, philanthropists in the community, state and central governments and international agencies. Assistance for this programme was received from donations in cash, kind and labour by the community and other sectors, pupils participation and teachers' contributions in terms of service and materials.

2. Finding space for the kitchen, lunch room and wash place

The space for the school lunch programme should include: kitchen for cooking, provision for serving the lunch, for storing foods and utensils, and for washing utensils, and hands. The kitchen should be well ventilated, adequate in dimensions, providing exit for cooking smells and smoke, work platforms at a convenient working height of 75 cm, consisting of areas for food preparation, cooking and washing of foods, and sinks and drain boards (Figure 4). Built-in shelves should be located conveniently to keep the daily provisions and cooking utensils. Additional storage space for keeping the serving utensils, plates and glasses, should be

provided. The counter for serving food is a valuable provision. All these provisions must be within minimum space and cost. Based on these criteria the school lunch space at Sri Avinashilingam Primary School was planned within an area of 2251.5 sq. ft. as a room attached to the class room. Its plan is presented in Figure 5.

The lunch room should be spacious and well ventilated. The floor should be smooth and easily cleanable. The walls can be white. They should lend themselves for displaying effectively pictures and posters to interest children in nutrition information. When the lunch room adjoins the kitchen and pantry, food service becomes convenient, efficient and quick. The surroundings of the lunch room must be pleasant. Where the primary school does not have space for a dining room, as is the case with a majority of the primary schools in the country, a class room can be used for the purpose during the lunch interval. In Sri Avinashilingam Primary School, a classroom to which the school kitchen is attached, is used as the dining hall (Figure 6).

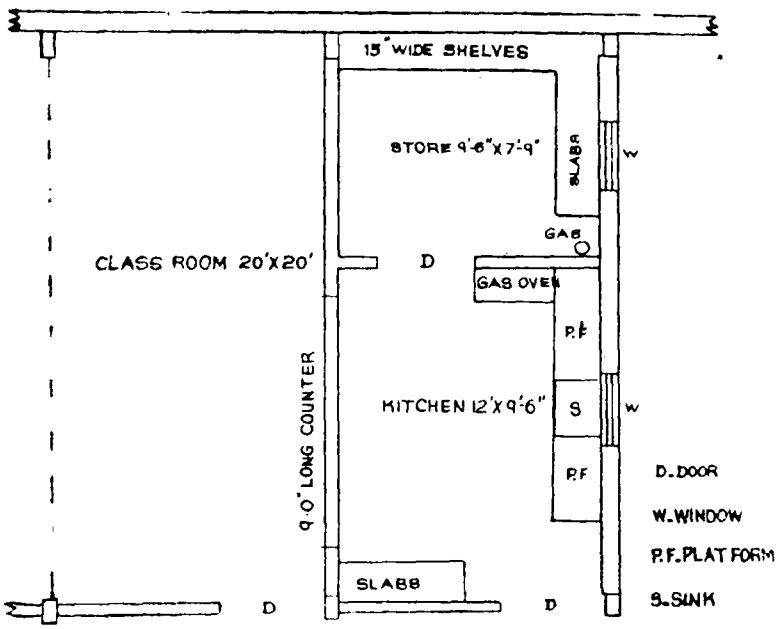

Fig. 5 Plan of School Lunch and Kitchen at Sri Avinashilingam Primary School.

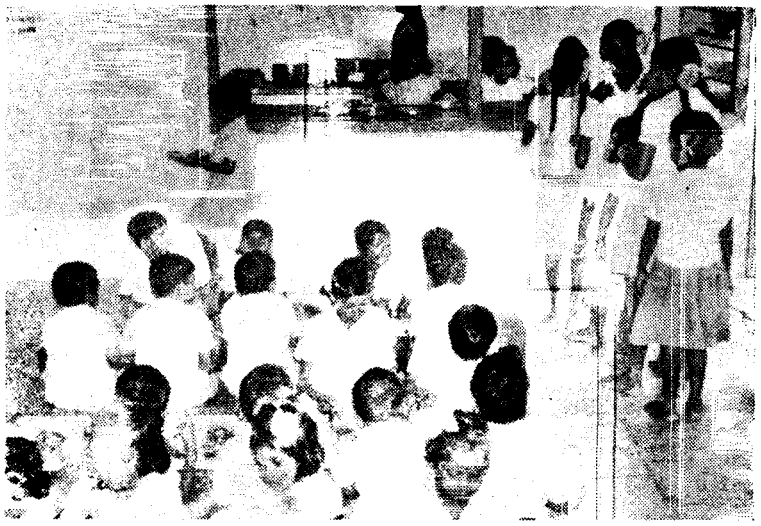

Fig. 6 Class Room Used as Dining Hall.

Fig. 7 Wash Place for Children.

The wash place or room adjoining the lunch room enable pupils wash their hands and plates conveniently before and after the lunch. The water taps should be at a height easily reachable by pupils. Drainage facilities and racks for putting away the plates should be provided. Figure 7 shows the arrangement made for this purpose in the school.

3. Procurement of equipment

Equipment is required for the following purposes:

a. Storing provisions

b. Preparing meals

c. Measuring and weighing foods, and

d. Serving foods. Keeping these in view the equipment needed for the lunch programme were procured. The details of the equipment purchased for the lunch programme for 100 children are given in Table IV.

TABLE IV

Equipment Needed for a School Lunch Programme for 100 Children

S.No.	Utensils	No. needed	Use of the equipment for	Cost in Rs. ps * Medium cost	Low cost
1	2	3	4	5	6
1.	Stove or choola	1	Cooking	20.00	20.0
2.	Vessel with lid 50 cm × 72 cm	1	Cooking cereal	250.00 (Brass)	75.0 (Aluminium)
3.	Vessel with lid 30 cm × 45 cm	1	Cooking dhal	100.00 (Brass)	35.0 (Aluminium)
4.	Vessel with lid 30 cm × 45 cm	1	Preparing payasam	100.00 (Brass)	35.00 (Aluminium)
5.	Vessel without lid 45 cm × 60 cm	1	Serving	75.00 (Brass)	30.00 (Aluminium)
6.	Laddles	2	Mixing	12.00	10.00
7.	Rice spoon	1	Serving	3.50	3.50

TABLE IV—Contd.

1	2	3	4	5	6
8.	Kettle	2	Serving water	38.00	38.00
9.	25 cm square wooden board	1	cutting vegetables	3.00	3.00
10.	Knife	1	Cutting vegetables	6.00	6.00
11.	Vanali	100	Seasoning	7.50	7.50
12.	Aluminium plates	100	Serving	250.00	250.00
13.	Aluminium tumblers	100	Serving	75.00	75.00
				940.00	588.00

* As per the prices prevailing in Coimbatore in March 1980.

4. Selecting children

The procedure that is being adopted in Sri Avinashilingam Primary school, for the selection of children is to send a circular to all the parents extending an invitation to their children to join the school lunch programme. On the basis of the replies from the parents (regardless of the economic need or other conditions) the children are selected. Normally the parents with higher income do not opt for their children joining the school lunch programme. This may be due to the popular notion that the midday meal programme was for feeding "the poor".

Thus the selection of the 'School Lunch' group is made on the basis of the voluntary responses of the parents regardless of their economic need or other conditions.

5. Planning menus and estimating quantities of foods to be cooked

Planning is the key for the success of the school lunch programme. The lunches must be psychologically and nutritionally satisfying. Therefore the menus for the school lunch must be planned carefully for:

(a) Nutritional adequacy;

(b) Use of available inexpensive foods;

(c) Minimum cost;

(d) Minimum expenditure of time and labour in cooking and serving;

(e) Novelty in order to be exciting and interesting to the pupils and at the same time not drastically different from the familiar food patterns; and

(g) Attractiveness and appetising qualities.

The steps involved in planning the school lunch are:

(a) Calculation of the nutritional requirements;

(b) Selection of foods to supply the nutritional requirements;

(c) Planning menus using the selected foods; and

(d) Estimating quantities of foods to be cooked.

(a) *Calculation of the nutritional requirements*

From the allowances recommended by the Indian Council of Medical Research (ICMR) for children in the age range 6 to 10 years, one third of the daily requirements are computed as the nutrients and calories to be supplied by the school lunch.

(b) *Selection of foods to supply the nutritional requirements*

The next step is to select the foods which will provide the nutrients needed, giving priority to local low cost nutritious foods.

Parboiled rice*, Jowar (cholam), ragi, bajra (cambu) or atta can be the staple food depending upon the locality. The foods supplied by CARE, namely, bulgar wheat, corn soya milk and Balahar are given in the place of the staple food. They are used on alternate days in receipes, which are simple, attractive, tasty, and easy to cook and serve. The pulses used are red gram or green gram dhal as they are familiar to the children and could be used in recipes combined with rice.

Green leafy vegetables are included daily because of their rich nutrient content, availability throughout the year, low cost and feasibility for children to grow them in their own homes or school garden. Clusterbeans and other types of beans are the

*Parboiled rice is prepared from paddy soaked in water and boiled or steamed for about 30 minutes, dried and dehusked. Parboiled rice is superior to raw rice in its vitamin and mineral contents.

other vegetables used because of their higher nutritive content. As per condiments such as chillies, coriander seeds, mustard seeds, asafoetida and turmeric powder in only very small quantities are used along with oil and salt to season the food preparations.

The nutritive value of the foods used for the midday meals: *Cereals*

Rice: Rice being the staple food of more than half the population in India is quantitatively the most important of the cereals. Although the protein content of rice is lower than that of many other cereals, the proteins of rice are of good quality. It has been proved that the Biological Value (BV)* and Digestibility Coefficient (DC)** of rice proteins are higher than those of any other cereal mixtures in terms of their supporting growth and maintenance. Parboiled rice contains valuable amounts of B vitamins, thiamine, pantothenic acid and pyridoxine. The nutrient content of whole cereal grains including rice is higher than that of the corresponding milled grains. Parboiled rice retains a considerable proportion of its thiamine and phosphorus content. This is because some of the vitamins contained in the germ and pericarp (bran) diffuse into the grain during the parboiling process. Therefore parboiled, handpounded or under-milled rice is nutritionally superior to highly milled raw rice.

Wheat: Wheat is another important cereal grown in India, coming next to rice and the millet, jowar (cholam). Whole wheat contains more proteins than rice. Wheat proteins have higher digestibility and Biological Values than millets.

Bajra, jowar and ragi: These are the next main cereal grains consumed by majority of people in India. They are the cheapest sources of calories. These millets contained 7 to 12 per cent protein. But when compared to that of rice the amino acid namely lysine content of these millets are deficient in quantity but the mineral content especially of calcium and iron is more than that of rice.

The nutritive value of commonly used cereals is given in Table V.

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*The Biological Value (BV) of a protein is the efficiency with which body proteins are replaced by food protein.

**The Digestibility Coefficient (DC) of a protein is the percentage of the ingested protein in which gains entrance into the body.

TABLE V

Nutritive Value of Commonly Used Cereals per 100 g.

S.No.	Cereals	Energy	Protein	Calcium	Iron	Carotene	Thiamine	Riboflavin	Niacin
		Kcal	g	mg	mg	μg	mg	mg	mg
1.	Bajra(cambu)	361	11.6	42	5.0	132	0.33	0.25	2.3
2.	Jowar (cholam)	349	10.4	25	5.8	47	0.37	0.13	3.1
3.	Ragi	328	7.3	344	6.4	42	0.42	0.19	1.1
4.	Rice (Parboiled, milled)	346	13.3	9	4.0	—	0.21	0.05	3.8
5.	Rice (raw milled)	345	6.8	10	3.1	—	0.06	0.06	1.9
6.	Wheat	346	11.8	41	4.9	64	0.45	0.17	5.5

Pulses

Red gram dhal and green gram dhal, contain a high percentage (23.79 to 29.75%) of protein. Red gram or green gram dhal along with rice gives a protein mixture which is adequate for growth and maintenance. Pulse proteins, however, are of relatively low Biological Value because of the deficiency of the essential amino acid, methionine. Redgram protein is deficient in the amino acid tryptophan also. However, pulse proteins are rich in lysine and they are, therefore, of good supplementary value to cereal diets.

Amaranth

Amaranth, the green leafy vegetable is rich in calcium, iron, riboflavin, vitamin A, and vitamin C. The Biological Value of the protein of amaranth is superior to those of wheat, rice or other cereals and dhals.

Jaggery

Jaggery is less expensive than refined cane sugar and provides some blood forming nutrients such as iron which cane sugar lacks.

Oils

Gingelly oil, groundnut oil and saled oil of CARE are among the commonly used vegetable oils for cooking purposes. Coconut, linseed and mustard oil are also used in different states. All oils, contain almost 100 per cent fat, and are therefore energy rich foods.

Condiments

Condiments are the flavouring ingredients in meals. In small quantities, they are useful for increasing the flavour and palatability of meals. Some condiments are rich in minerals and other nutrients. Salt, cumin seeds, coriander seeds, chillies, onions and mustard seeds help to make foods palatable.

Planning menus

At present CARE supplies 80g of soy fortified bulgar wheat and 20g of Balahar or 100g of Balahar per day per child and 4 to 8g of oil per day per child for all the school lunch programmes in Tamil Nadu and in some other states. Apart from these, the Government of Tamil Nadu has apportioned 15 ps per child per day towards the cost of providing school lunch in all the 33,306 primary schools. Within these premises, the primary schools provide rice based meal and bulger wheat based meal on alternate days for 200 days in the year.

The menu pattern given in Table VI has been evolved for a week of six days by Sri Avinashilingam Primary School.

TABLE VI

School Lunch Menu

Days	Menu
Mondays, Wednesdays, and Fridays	Bulgar wheat uppuma or Kitchedi/Greens and dhal kootu Balahar Payasam Papaya/Tomato/Nellikai (Amla)
Tuesdays	Tamarind rice/Greens kootu with dhal /Balahar Payasam Papaya/Tomato/Nellikai (Amla)
Thursdays	Dhal rice, Greens and dhal kootu Balahar Payasam Papaya/Tomato/Nellikai (Amla)
Saturdays	Lime rice Greens and dhal kootu Balahar Payasam Papaya/Tomato/Nellikai (Amla)

This menu pattern provides variety and attractiveness. The ingredients are within the stipulation of total cost of 15 ps per child per day. The cost and quantity of ingredients used per child per day through the above menu are given in Table VII and a plate of school lunch is shown in Figure 8.

TABLE VII

Quantities and Cost of Foods Included in the School Lunch Under the Tamil Nadu Midday Meal Scheme.

S.No.	Foods	Quantity g	Cost when CARE foods and garden produce are not priced paise	Pricing CARE foods paise
1.	Rice parboiled, milled	90	17.0 (8.5) *	
2.	Soy fortified bulgar	80to 90	free from CARE	25.0 (12.5) *
3.	Horsegram and Red gram dhal	15	2.5	2.5
4.	Green leafy vegetables	50	Free from garden	garden
5.	Balahar	20	Free from CARE	0.5
6.	Jaggery	10	2.0	2.0
7.	Tomato/Nellikkai/ Papaya	20	Free from garden	garden
8.	Oil	8	Free from CARE	0.8
9.	Seasonings	—	0.5	0.5
10.	Fuel (firewood)	—	0.5	0.5
11.	Salary for the cook	—	1.9	1.0
	Total		15.0	32.8

*Cost for calculation considering that rice and soy fortified bulgar are given on alternate days.

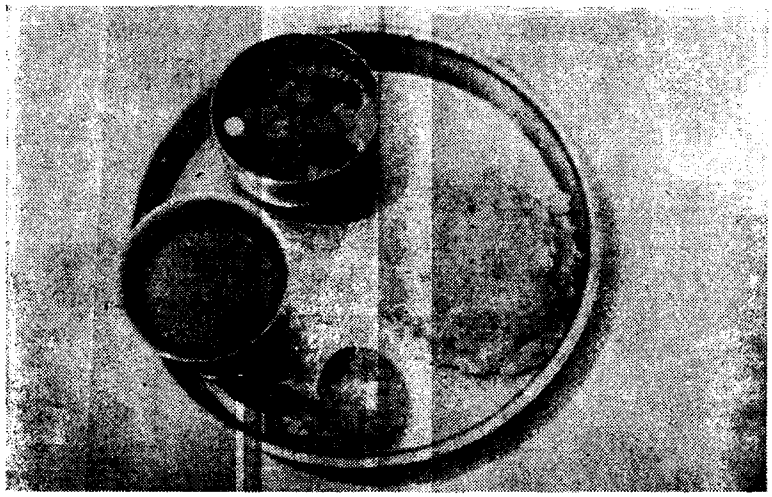

Fig. 8 A School Launch Palte.

The nutritional contribution of this food pattern is given in Table VIII.

TABLE VIII

Nutritive Value of the School Menus (When Rice and Soy Fortified Bulgar are used in Alternate Days)

Nutrients	Quantity of nutrients from school lunch	1/3 of the day's recommended allowances of ICMR
Calories (Kcal)	604	600
Protein (g)	15.5	10.7
Calcium (mg)	289	133—167
Iron (mg)	20.6	5—7
βCarotene (μg)	3004	578
Riboflavin (mg)	0.44	0.3
Thiamine (mg)	0.69	0.33
Ascorbic acid (mg)	83.6	10—17

The lunch helps to provide more than one third of the nutritional requirements of children of the age group 5 to 10 years. Addition of local millets and cereal combinations will not reduce the nutritive contribution of the school lunch.

The cost of this menu when the CARE commodity, soy fortified bulgar wheat is substituted by a local millet is given in Table IX.

TABLE IX

Cost of a Meal When Different Cereal Substitutes are Included in Place of Soy Fortified Bulgar/Balahar

Foods	Quantity	Cost in paise (year, 1980)		
		When maize is used on alternate days	When ragi is used on alternate days	When maize and rice are used on alternate days
1. Rice (Parboiled, milled)	90	17.0 *	17.0 *	17.0 *
2. Maize	90	13.5 *	—	—
3. Ragi	90	—	8.1 *	—
4. Maize + rice 1 : 1	90	—	—	15.3 *
5. Horse gram or Redgram dhal	15	2.5	2.5	2.5
6. Greens	50	Free from garden	Free from garden	Free from garden
7. Balahar	20	5.0	5.0	5.0
8. Jaggery	10	2.0	2.0	2.0
9. Tomato/ Papaya/ Nellikkai	20	0.5	0.5	0.5
10. Oil	8	8.0	8.0	8.0
11. Seasonings	—	0.5	0.5	0.5
12. Fuel	—	0.5	0.5	0.5
13. Cook	—	1.0	1.0	1.0
Total		35.3	37.6	36.2

*As these are given on alternate days, in calculating the cost per day, average of the two basic cereals is taken.

The cost of the low cost indigenous menus works out to be 33 to 36 paise per child per day when no food is gifted.

6. Procurement and storage of provisions

Buying provisions is one of the important aspects in the organisation of the school lunch. Great care must be exercised in the estimation of quantities, selection, purchasing and storage of the ingredients required.

The estimated quantities of the ingredients are classified as those which would be purchased monthly, fortnightly, weekly and daily, depending upon their storability and the containers available for storing.

Rice, wheat, rava, millets, redgram dhal, greengram dhal, and the dry condiments are purchased monthly; jaggery fortnightly; and vegetables daily, besides those grown in the school garden.

The quantities of foods that are purchased monthly are given in Table X.

TABLE X

Quantity of Foods Purchased per Month for 100 Children

S.No.	Foods	Quantity for 100 children/day kg	Quantity for 100 children/month kg	Cost per month Rs. ps.
1.	Rice Parboiled, milled *	9.0	90	180.00
2.	Horse gram *	1.5	15	45.00
3.	Redgram*	1.5	15	75.00
4.	Jaggery**	1.0	20	90.00
5.	Mustard seeds	0.025	0.5	3.00
6.	Soy fortified bulgar	8.0	80	Free from CARE
7.	Balahar **	2.0	40	
8.	Oil **	0.8	1.6	
			Total	393.00

*These are used only on alternate days. Hence the total number of days of use is only 10.

**These items are used on all the feeding days (20 days/ month).

7. Standardisation of recipes

Standardisation of recipes means determining accurately the quantities of foods to be cooked in relation to the servings required and working out the cooking procedures so that the same combinations of food produce the expected products, when the standardised cooking procedures are applied. Some recipes thus standardised for the school lunch are given in Appendix B.

8. Training the cook

Training the cook is another important aspect of the midday meals programme. The cook was trained to become familiar with the accepted cooking procedures, and the special methods recommended for preparing the various items to conserve nutrients, such as washing the vegetables before cutting, cutting the vegetables into large pieces (approximately one to two cu cm) using just the right amount of boiling water, washing rice with minimum water and the "absorption method of cooking" for preparations involving rice and wheat rava. The cook must also be examined medically so that she is not a carrier of any disease.

9. Standardisation of serving and method of serving

The provisions required for the daily lunch according to the menus planned on the basis of the number of pupils present are given for cooking. After the completion of cooking the weight of the cooked dish noted for the individual preparation and the weight of a serving is determined and served. In the case of the main item, the cereal preparation the average serving is further divided into two portions in order to serve it in smaller quantities. Because children like smaller servings to begin with and later additional servings of the cereal preparation are given if desired. The sweet preparation with Balahar is given in between two servings in order to ensure its consumption as otherwise if greater quantities of the other items are consumed first, children might feel full and refuse the beverage. The intake of water during the meal time is also minimised for the same purpose.

The school meal is served attractively in small quantities in a school lunch room where a cheerful atmosphere is maintained with comfortable seating arrangements with adequate plates and dishes. The cleanliness of the dining room is scrupulously observed. It is a very essential need in the school lunch programme. The plates with the serving of the items of the menus are arranged on the counter. Children participate in this activity (Figure 9).

Fig. 9 Children Helping in Serving.

10. Recording observations on children and their food intakes

In order to record the quantities of foods served to, and consumed by the children, and also the observations on their eating habits, the services of their teachers are utilized. Each 'observer' observes six children daily and records the observations on the detailed observation schedule drawn out for the purpose, as given in Appendix C. The schedule includes information on the name of the child, class, date, observations on general appearance, state of cleanliness on his arrival at the lunch room, before going to the wash room, participation in saying grace, disposition at the wash room, disposition at lunch time, acceptance of the preparations served, attitude towards asking for more food, eating habits, time taken for eating, conversation and sociability during lunch time, the amounts of the different food preparations in the menu consumed, his comments on the foods served, washing hands and plates and putting back the plates and glasses. A new form is given every day so that the observers could make their entries without being biased by the recording of the previous day's observations.

11. Recordings of heights, weights and other parameters of the nutritional status of children

The nutritional status of children is assessed through:

(a) Anthropometric measurements,

(b) Clinical examinations,

(c) Biochemical methods, and

(d) Dietary surveys.

(a) *Anthropometric measurements*

The anthropometric measurements taken are (i) weights, and (ii) heights. These are taken every month, always after breakfast between 10 a.m. and 12 noon.

The weights are taken on a precise weighing scale, graduated in kilogram, after the pupils had emptied their bladder, removed all garments except the under clothes. The weights of the children are recorded to the nearest 0.1 kg. (Figure 10).

The heights are taken with the children standing against a wall on which a graduated paper scale is pasted, heels together, the occiput back, buttocks and heals touching the wall and the head held in such a manner that the line of sight is horizontal. A wooden flat ruler is placed at right angles to the wall just touching the head (Figure 11) and the height recorded to the nearest half centimetre.

(b) *Clinical examinations*

Clinical examinations are made once in six months using the schedule given in Appendix D. The schedule calls for observations on the general appearance, condition of the eyes, tongue, mouth, gums, hair, skin and teeth, evidence of oedema, enlargement of the liver, and heart and musculature.

(c) *Biochemical methods*

Since biochemical methods involve drawing of blood about which children are always frightened, a friendly approach is necessary. As the haemoglobin content of the blood is most useful biochemical parameter, it is estimated once in six months.

Fig. 10. Measurement of Weight

Fig. 11. Measurement of Height

(d) *Dietary survey*

A dietary survey is carried out for three days in randomly selected families each from the 'School Lunch' and 'Control'* groups using the dietary survey schedule shown in Appendix E to obtain data on the number, age and sex of the members in the family, income and other particulars regarding the family, the daily menu and the quantities of foods used. The average daily consumption of the child is then calculated. Along with the above survey, a food weighment survey** is also carried out on a selected group of children participating and not participating in the lunch programme.

12. Maintenance of cleanliness in the lunch room

Maintenance of cleanliness involves daily and weekly cleaning of the (a) kitchen, (b) lunch room, (c) wash place, and (d) utensils used for cooking and serving.

(a) *Kitchen*

The kitchen is swept daily before the commencement of cooking. After the completion of the lunch the floor is swept and washed thoroughly with soda, and the sinks cleaned every day.

(b) *Lunch room*

Since a classroom is used as the lunch place cleaning of the lunch room includes quick sweeping the floor, dusting the windows and tables and arranging the tables. After the lunch the tables are cleaned with a wet cloth and wiped with a dry duster. The floor swept, mopped and dried. Children help in this task (Figure 12).

(c) *Wash place*

Cleaning of the wash place include scrubbing the water tap with tamarind and sand using coconut fibre, scrubbing and washing the sink, emptying the garbage can and cleaning, washing and drying the floor. Children help in this proces·

*Control group indicates a comparable group of children not participating in the school lunch programme.

**Weighment survey included weighing of the raw foods used and cooked foods prepared at home for each meal for three consecutive days. The weight of the cooked foods consumed by the children at each meal was measured. Meals taken outside the home and the prepared foods purchased and consumed were also taken into account. From cooked foods consumed the raw equivalents and their nutrient contribution was calculated.

Fig. 12. Children Engaged in Class Room Cleanliness Before Lunch

(d) *Utensils used for cooking and serving*

The brass utensils used for cooking are washed with tamarind and ash, wiped with a clean cloth, and kept in the shelves adjoining the food preparation area. The plates washed by the children are washed again with soapnut powder and sterilised by dipping them in boiling water for two minutes, and then placed in the racks to dry.

During the weekly cleaning, the ceilings of the lunch room, the kitchen and pantry are dusted, and the windows washed using cleaning powder to remove oil stains and deposits of smoke, dust and cobwebs. The floors are mopped with detergents and sprayed with an insecticide like 'Flit'.

13. Conducting nutrition education activities

The school lunch is one of the most powerful tools for nutrition education. Practical feeding programmes in the school are not only tools for education, but also make substantial contribution to the learning abilities of children. The school children are less fussy about their food habits than adults. Learning new ideas

about food fit the concepts of schools as agents and places of change. The primary school setting offers innumerable possibilities for conveying nutrition information to children. Hence teaching nutrition during school years will leave an indelible mark on the minds of children and influence them throughout a life time.

In order to capture and sustain the interests of the children and to effect learning, a variety of teaching methods are used. Details of the various methods of nutrition education that are adopted while teaching health and nutrition to the primary school children are presented in Chapter XII. In order to give prominence to nutrition, teachers are helped to become aware of local nutrition problems and their prevention. Effective nutrition education in the primary school has its 'carryhome' and 'feed back' results. Parents and others in the household are stimulated thereby.

CHAPTER XI

REQUIREMENTS FOR SUCCESSFUL OPERATION OF THE SCHOOL LUNCH PROGRAMME

The requirements for the successful operation of a school lunch programme are:

1. Adequacy of the meals;
2. Sound management of the lunch programme;
3. Educational emphasis; and
4. Well-trained lunch personnel.

1. Adequacy of the meals

For a majority of children in the primary school, the school lunch is the only complete meal. For others, it replaces the main meal of the day in the home. Therefore the adequacy of the meals is of utmost importance. The adequacy of the school meals depends upon—

(a) understanding the nutritional needs of children, and

(b) providing meals to fulfil their nutritional requirements.

(a) *Understanding the nutritional needs of children*

The growth and development of children, their needs for food and feeding problems are inter-related. That "the young individual is not only small, but he is growing; not only immature, but he is developing; not only inexperienced, but he is learning*" must be taken into account while feeding children.

The period from birth to twelve years is one of rapid growth, particularly during the preschool and early school years. The period between the weaning time and the beginning of adolescence is one of steady growth when all the nutritional requirements, protein, carbohydrate, fats, vitamins and minerals are met adequately. Under such conditions growth is sustained and maximum development and resistance against diseases are achieved.

*Stuart, Children's needs during growth and development. J. Amer. Dietet. Asso., Vol. XXV, 1949, p. 934.

The food and nutritional requirements of children have been determined carefully for the various age groups by the Indian Council of Medical Research (1968) as shown in the Tables XI and XII. The calorie requirements of children have been calculated on the basis of age, size, activity and rate of growth. The quantity of the protein required by the growing children is much greater per kilogram of body weight than that required by the adults. Proteins are necessary for the building up of body tissues. They form the warp and the woof of all protoplasm in the living system. The protein requirements are influenced by the quantities of calories, vitamins and minerals present in the diet. Calcium, though occurring in small quantities in the body, is important for bone formation, muscular contraction, regulation of nervous functions and the working of the heart muscle. Calcium plays a unique part in promoting growth.

TABLE XI

Daily Food Allowances for the Children of 4 to 12 Years Age (ICMR, 1981)

Foods	4–6 years		10–12 years boys		10–12 years girls	
	V	N.V	V	N.V	V	N.V
	grams					
Cereals	270	270	420	420	380	380
Pulses	5	17.5	45	22.5	45	22.5
Green leafy vegetables	50	50	50	50	50	50
Other vegetables	30	30	50	50	50	50
Roots and tubers	20	20	30	30	30	30
Milk	250	250	250	250	250	250
Fats and oils	25	30	40	45	35	40
Meat, fish and egg	—	30	—	30	—	30
Sugar and jaggery	40	40	45	45	45	45

V—Vegetarian diet

N.V—Non Vegetarian diet

TABLE XII

Daily Nutritional Allowances for Children of 4—12 Years Age (ICMR, 1981)

Age group years	K.Calories	Protein	Calcium	Iron	Vitamin A	Thiamine	Riboflavin	Vitamin C
		g	mg	mg	μg	mg	mg	mg
4—6	1720	29.4	400 to 500	20 to 25	300	0.9	1.0	40
7—9	2050	35.6			400	1.0	1.2	
10—12	2420	42.5			600	1.2	1.5	

Vitamin A requirement increases with the rate of growth and size. Liberal allowances of vitamin A are necessary during early life for increasing resistance to infection. Thiamine and riboflavin are essential for growth and for the utilization of food in the body.

Their requirements are influenced by the nature of the diet, that is the proportion of carbohydrates, proteins and fats present, the quantity of food consumed, and the Basal Metabolic Rate* of the individual. Because of increased tissue formation and accelerated metabolic activities which characterize growth in children, they need higher quantities of thiamine and riboflavin than adults.

Vitamin C plays an important part in all the growth processes. It is needed in adequate quantities to maintain the active growing tissues in children. Vitamin D facilitates the absorption of calcium, but also exerts a direct influence on calcification in the body.

When developing criteria for appraising the management factors in the school lunch programme in Sri Avinashilingam Primary School, high priority is given to the nutritive value of the lunches served.

*Basal Metabolic Rate is the rate of energy expenditure when the body is at rest, with only the vital organs functioning.

(b) *Providing meals to fulfil the nutritional requirements*

Those responsible for planning school lunch menus are aware of the recommended dietary allowances for children of the various age groups, and provide well balanced and nutritious meals to supply the recommended allowances. Inexpensive foods of high nutritive value are included in the menus in interesting combinations to reduce cost. Some standardised low cost recipes, using the locally available foods suitable for school lunches to supply one-third of the daily nutritional requirements are given in Appendix B. These menus do not require elaborate cooking. They can be easily achieved with local resources at reasonable cost.

2. Sound management of the lunch programmes

The factors essential for the successful management of school lunch programmes are:

(a) The administrative set up, and

(b) Physical requirements.

(a) *Administrative set up*

A successful school lunch programme necessitates a stable, scientific and efficient administrative set up which is seized with the significance of the school meals. Economically it should be self-sufficient. Financial security is necessary for ensuring the continuity of the programme. The objectives and philosophy of the programme should be clearly stated. The location of the lunch room should be within the school buildings. The accounting system should be simple, sound and accurate.

(b) *Physical requirements*

The factors which determine the efficiency of the school lunches are: the objectives and ideas of the school, the number of meals served, the extent of pupil labour used, assistance provided by persons and parents who are not directly connected with the food production and service, the number and type of equipment available, training of personnel, experience and work habits of workers and the supervision of workers.

The lunch place is a cheerful place. Good planning of the lunch space is essential to achieve success. The contruction of the lunch space and equipment must be sanitory and easy to clean. The walls and floors of the lunch place should be safe and functional to permit work and conversation without confusion. The furniture

must be sturdy and of the correct height and other dimensions for comfortable use by children. In such planning, the location, size, space and construction, and equipment are important. The furnishing if any, must make the room bright, attractive and easily cleanable. The equipment must be adequate and satisfactory. Labour saving devices should be used to the extent feasible, reduce cost of meal preparation and enhance the quality of meals. Buying should be planned carefully and executed locally, as far as possible.

The kitchen being the heart of the establishment must be bright and well ventilated. Necessary provision must be made for the storage, preparation, cooking and serving of food, washing and sanitizing the utensils and disposal of waste, to facilitate the preparation, and serving of attractive, sanitary, wholesome and nutritious meals. Hand washing facilities must be made available near the lunch room.

The following points have been considered specifically in Sri Avinashilingam Primary School while planning the school lunch space:

(i) *Location.* The pattern of the entire school building has determined that the most convenient location of the school lunch room is at one end of the building with easy access to the children, with the best arrangement possible.

(ii) *Space requirements.* Ample space has been allowed to provide for satisfactory participation in the lunch by the pupils.

(iii) *Availability of utilities and services.* Assistance of utilities such as fuel, water and cleaning has been made available. Deliveries of supplies and services are made at the school itself.

(iv) *Sanitation.* The construction of the lunch room and the equipment procured are sanitary and easy to keep clean. They are of such material to make harbouring of rodents, vermin or insects impossible. Sanitary facilities for the storage of dry foods and perishable products have been provided.

(v) *Environment.* Cleaniness, good lighting, cheerful colours, proper ventilation, noise control, convenient electric connections, provision of space for bulletin boards and educational exhibits has been ensured. These add to the attractiveness of the school lunch room and help pupils, employees and the community to develop pride in the set up.

3. Educational emphasis

The quality of management is reflected in the educational emphasis given to the school lunch workers. A well organised school lunch programme needs to have a trained and experienced manager with the assistance of the headmistress, the teachers, and other interested participants, who can render immense service to the programme. In Sri Avinashilingam Primary School, the professor of nutrition of the sister College in the campus is the manager of the lunch programme and the Headmistress of the school has worked towards the sucess of the school meal programme.

4. Well trained personnel

The teachers incharge, are able and trained. They possess the following essential qualities: knowledge about food, ability to plan menus with nutritious foods, educate children in good food selection and capacity to train the cooks and the servers.

Training programmes have been planned not only for the teachers incharge of the school lunch to develop their skills and influence their attitudes towards food, but also the cook. The objectives for such training are:

Making the school lunch place a cheerful and restful one in which pupils can enjoy good food and wholesome companionship;

Stimulating in pupils an interest in nutrition through food preparation and service; and

Helping pupils acquire knowledge and develop desire for good work habits, high standard of sanitation, safety and participation.

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CHAPTER XII

METHODS OF TEACHING NUTRITION TO CHILDREN

Nutrition education is important in the preschool and the primary school, because life time food habits are established during childhood. Teaching good nutrition at this stage influence children permanently.

One of the most favourable situations for imparting education in nutrition is the school lunch programme. Good eating habits can be fostered through attractive meals served in adequate quantities in a school lunch room where a cheerful atmosphere is maintained with appropriate seating arrangements and suitable plates and dishes. Nutrition education measures will be effective if the meal time is made comfortable and happy by helping children get rest and relaxation before eating and also by stimulating pleasant and interesting conversations.

The following are some of the methods available to teach nutrition in the primary school:—

1. Integrated curriculum
2. Use of audio-visual aids
3. Animal experiments
4. Recreation—music, dance and stories
5. Dramatisation
6. School garden
7. School lunch
8. Field trips
9. Scoring diets
10. Discussions on planning menus and
11. Keeping records of weights and heights.

1. Integrated curriculum :

Nutrition education should be an integral part of classroom instruction throughout the primary school period. Nutrition education should not remain an isolated subject in the school curriculum but should become one of the threads of the fabric of the curriculum. Hence efforts were taken in Sri Avinashilingam Primary School to incorporate nutrition concepts in all the subjects of the school curriculum.

Lesson plans incorporating nutrition and health concepts wherever possible were first developed. Language, Science, History, Geography, Mathematics and Crafts are the subjects into which nutrition concepts have been incorporated easily. In English classes, nouns, verbs, singular and plural concepts are taught using foods and food preparations. In the Science area, the classification of foods and nutrients, importance of each nutrient in the human body, food spoilage, food preservation and dental care are included. In History, a study of the life of the kings, warriors, labourers and other people of ancient and modern times, the foods they had eaten and comparison of the diet of the early pioneers with the foods consumed by people today are built-in. In Geography, areas where different foods are produced and their importance in nutrition are considered. The different ways in which foods are transported, packaged and marketed are also included. In Arithmetic, multiplication and division are taught by using foods and the different nutrients each food contains. In Arts and Crafts classes, children draw pictures of various foods and write on their importance for the human body. Some detailed lesson plans for III, IV and Vth standards incorporating nutrition education are given in Appendix F.

2. Use of audio-visual aids

Use of audio-visual aids in teaching has been recognised as an effective method for children and grown-ups. Audio-visual aids are tools and devices which facilitate communication of ideas between persons and groups in various teaching and training situations. Audio-visual aids help to make teaching vivid and learning pleasant and, bring about concomitant changes in the behaviour of pupils.

The audio-visual aids used to impart nutrition education to children in Sri Avinashilingam Primary School are:

(a) Flannel graphs;

(b) Flash cards;

(c) Filmstrips and slides;

(d) Models;

(e) Puppets;

(f) Exhibits; and

(g) Demonstration.

These aids have helped to create interest and also sustain it and make an emotional impact for motivating change.

(a) *Flannel graphs*

Flannel graphs are visual aids, the operation of which, is based on the fact that materials with rough surface tend to adhere to each other. A flannel graph consists of pictures, words or other illustrations backed with coarse featured cloth or similar material. When pressed on to a sloping board covered with rough material they will not slide off (Figure 13). Flannel graphs are used in the following ways for imparting nutrition education to children.

(i) Bar graph or other symbols of magnitude;

(ii) Pictures of family members with the pictures of the foods they require, placed opposite; and

(iii) Symbols for body building, protective and fuel foods against which the audience can place the appropriate food picture.

(b) *Flash cards*

Flash cards are a series of cards with drawings or photographs which are shown to the viewers one at a time in their logical order. They are best suited for showing to a small group of not more than 30 pupils at a time. Several stories conveying different themes on nutrition education have been formulated and shown with the help of flash cards.

(c) *Filmstrips and slides*

A filmstrip is a series of pictures joined together on a film to illustrate a story or a lesson. It differs from a moving film in that each picture is projected one at a time, and there is no motion. Several filmstrips and colour slides have been prepared and used in the primary school.

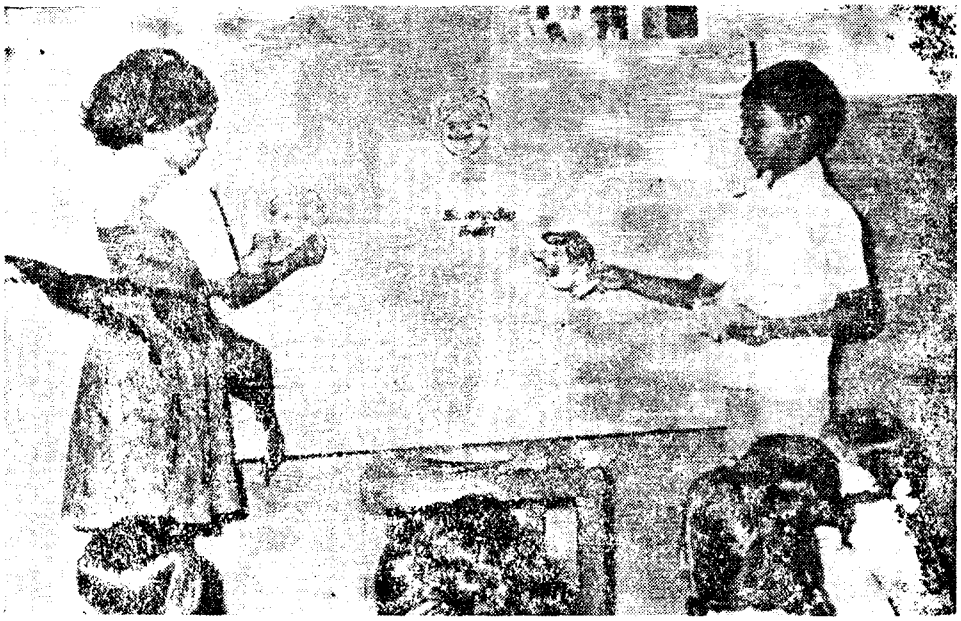

Fig. 13. Flannel Graph

(d) *Models*

Models hold some fascination for young and old alike because of their strong visual appeal. They are made with clay and other materials by the children themselves. During Durga Pooja and Navarathri seasons traditions of foods are used in educating the children in nutrition.

(e) *Puppets*

Puppetry is well known as a medium of entertainment. Puppets have proved to be effective teaching devices (Figure 14). They are powerful motivational forces also. The messages conveyed through this medium have been well accepted by the children.

(f) *Exhibits*

Exhibition is a systematic display of models, specimens, charts, information, pictures and posters in a sequence to effect learning

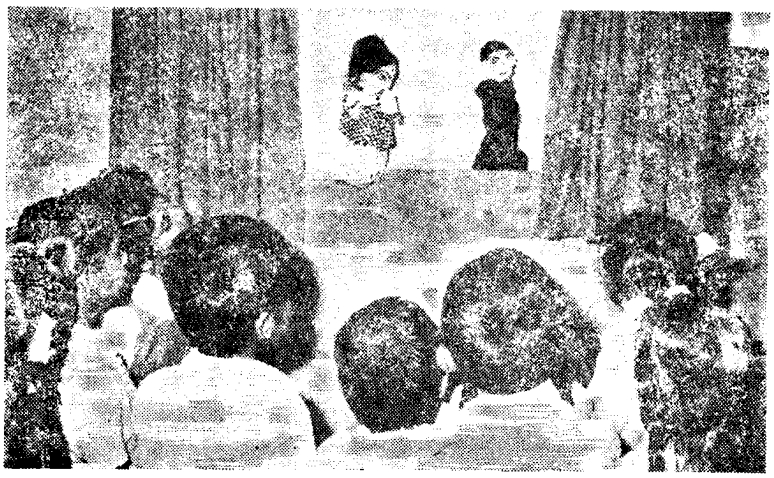

Fig. 14 Puppet Show

Fig. 15 Exhibition as a Tool for Nutrition Education

Fig. 16. Demonstration of Preparation of a High Protein Food.

or create interest in the participating members. Children of Sri Avinashilingam primary school have organised several nutrition exhibits for their parents (Figure 15).

(g) *Demonstrations*

Demonstrations offer opportunities for nutrition educationists to explain concretely ideas and terms. They provide children experience to see, some times take part, and then identify themselves with the learning situation (Figure 16).

3. Animal experiments

Children want to grow well and be healthy. Therefore they are always interested in growing animals. Animal feeding experiments provide an opportunity for children to observe the growth of animals when fed different combinations of foods. Furthermore when children themselves, observe their weights and growth periodically, they develop an interest to learn about the different foods and their effects on growth (Figure 17). Once children are convinced that food influences their growth, they become vitally interested in consuming the right types of foods and adequate diets.

Fig. 17 Children at Animal Experiment.

4. Recreation: music, dance and stories

Music, dance and stories have been found helpful in teaching nutrition. Two songs stressing the need for keeping the hands clean and eating good foods are given below.

Clean Hands

Hands are meant for working

Hands are meant for play

Hands are used a hundred times

On every simple day

Hands get dirty

As every one can tell—

So don't forget, before you eat

Be sure to wash them well.

Healthy Foods

Carrots are good for eyes
So we eat them daily
Tomatoes are good for gums
So we eat them happily
Greens are good for blood
So we eat them daily
Milk is good for bones
So we drink it happily.

Songs and dances related to subjects of foods and nutrition give enjoyment and nutritional knowledge to children (Figure 18). Stories create lively interest amongst the spectators. Children are very fond of stories. Stories of animals or other children of their own age appeal to them greatly. In such narratives, children often identify themselves with the main characters in the story. This is used to advantage to communicate information on good food habits.

5. Dramatisation

Children love to act. Their innate trait of love for dramatics helps them to learn through dramatisation of a theme. Dramatisation catches the eye and leaves a lasting impact on the minds of the learners. Dramatisation of stories impart enjoyment with nutrition education. Hence dramatisation is used generously in Sri Avinashilingam Primary School (Figure 19). An example for dramatisation is given below.

Food Makes Health

Smt. Lakshmi and Smt. Seetha are very good friends from their childhood. When they got married they went to different cities and settled there with two kids each. For a long time they could not meet each other. One day Lakshmi happened to come down to Seetha's place and she happily visits Seetha. They start chatting about everything and discuss about all the matters. While talking, Lakshmi notices Seetha's children and starts thinking why the children are looking so dull, thin and restless. She diverts her conversation about this matter.

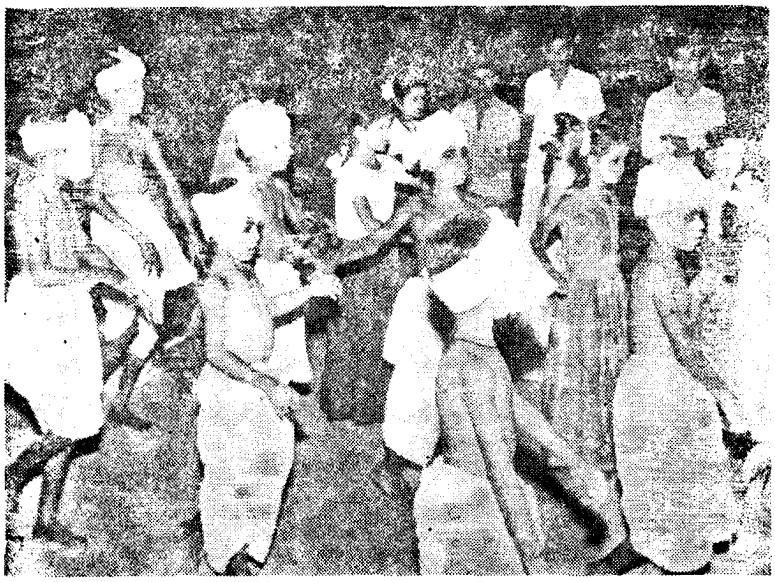

Fig. 18 Nutrition Education Through Folk Method

Fig. 19 Nutrition Education Through Dramatisation

SCENE I

Lakshmi: Seetha! why are your children looking very tired and restless? Didn't they sleep well yesterday during the journey?

Seetha: No! No! They are like this always. I have tried my best to improve their health. But nothing seems to be working.

Lakshmi: How did you try to improve your children's health?

Seetha: I have done a lot for this! I have spent a lot of money in the form of doctor's fees, poojas, medicines, tonics etc.

Lakshmi: We must take proper care of our children Seetha! Poor health in childhood, spoils their entire future. (Noting Rama's eyes) If you do not take serious action on Rama's eye sight it may become permanently destroyed.

Seetha: Is it so? Would you be kind enough to tell me what I should do?

Lakshmi : Listen Seetha! For a happy life we need healthy food. For good food you need not go in for costly foodstuffs. You see, the cheapest green leafy vegetables are very rich in nutrients and they are good for health. They provide an important mineral namely iron which is necessary for our blood. For good eye sight we need vitamin A which is abundantly present in greens as well as in carrots, mangoes, papaya and other green and yellow vegetables and fruits. They are rich in other vitamins and minerals too!

Seetha: You mean to say that if we eat all these vegetables we will be healthy.

Lakshmi: Yes! Not only vegetables but also fruits, cereals, pulses, milk and milk products, nuts and oil seeds should be consumed every day in adequate quantities to maintain health.

Seetha: O. K. Should we eat all these every day? How much should we consume? Please tell me clearly.

Lakshmi: Every day we should include one or more items from each of these food groups.

(She shows a chart and explains the quantities of foods to be given to children every day).

Seetha: (Surprisingly) Oh! really you seem to know a lot Lakshmi!

Lakshmi: It is not enough if you know quantities of foods to be given to children, you must also follow some good principles while cooking. You should not cut the vegetables into very small pieces and you should not discard the cooking water. By discarding the water, you waste all the nutrients present in the food. Above all your surroundings should be clean and tidy. That will give a mental piece and better health to all the family members. For more information please read this book and understand the principles of nutrition (Lakshmi gives a book to Seetha).

Seetha: Thank you so much Lakshmi! I shall go through this book and write to you. It is getting late now. I am leaving tonight to Madras. I shall see you after five months when I come for holidays.

Lakshmi: O.K. Bye!

(Screen)

SCENE II

Lakshmi and Seetha meet after five months. Seetha goes to Lakshmi's house with her children. There is much improvement in her childrens' health.

Lakshmi: Hello Seetha! How are you! When did you come?

Seetha: Just this morning. Since I wanted to see you without any delay I have come immediately after arriving.

Lakshmi: Welcome! Anything special Seetha?

Seetha: I am following your advise very carefully and it has helped me a lot. I thank you very much for making me understand the principles of nutrition. My children are now protected from diseases and are hale and healthy.

(The children run out to play happily) the friends go inside happily chatting on other matters.

Screen

Fig. 20 Education through School Garden

6. School garden

The school garden and school lunch room are the twin laboratories for practical application of the nutrition lessons taught in the class room. School garden affords another opportunity for children to observe growth in living organisms—the plants. Teaching children to eat and like foods that are essential for healthy growth assumes reality when they plant, care for and later eat the vegetables from their own school garden and drink the milk provided through their supplementary feeding programmes.

A well planned garden, as shown in figure 20, is an asset to Sri Avinashilingam Primary School. Vegetables such as tomatoes, beans, drumstick and papaya are grown in the school garden and help to teach children the basic principle of agriculture and nutrition. The selection of vegetables and plants grown in the school garden help children to learn the nature of plants and develop a taste for mixed diets, thus familiarising them with and translating the lessons in nutrition into actual practices. Furthermore, raising a school garden serves as an incentive to have gardens at home and thus promotes the consumption of fresh, raw vegetables and fruits by the families.

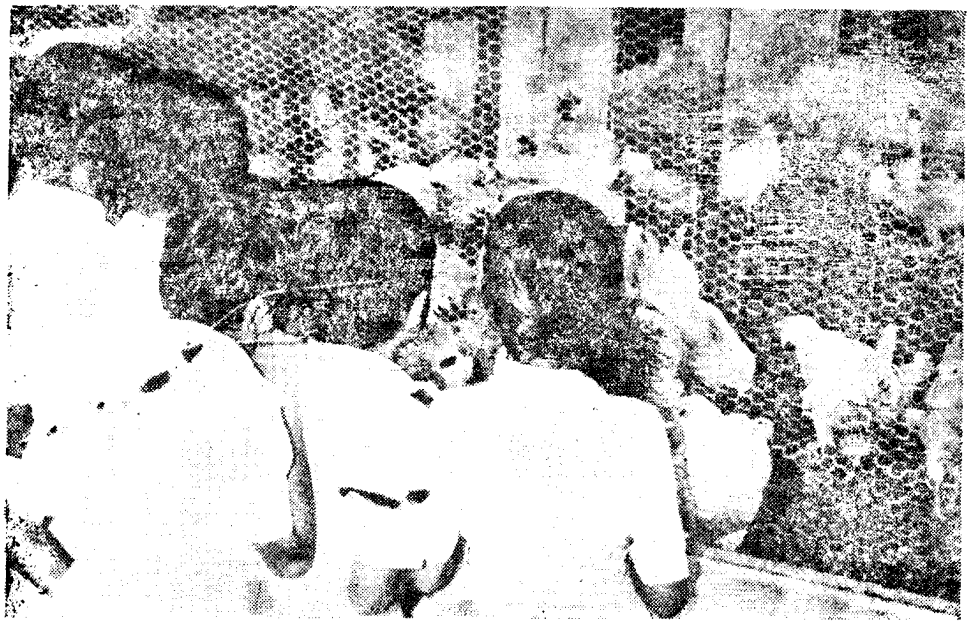

Fig. 21 Field Trip to Poultry Farm.

7. School lunch

School lunch is a good teaching medium. Practical feeding programmes in the school are forceful tools of nutrition education. They also make substantial contribution to the learning capability of the child. The school meal is planned to supply not only good nutrition, but also education in table manners and desirable social habits. The school feeding programme has helped pupils develop a liking for nutritious foods and to overcome food prejudices. By participating in the good school lunch programme, children have been guided in food selection and familiarized with the essentials of an adequate diet.

8. Field trips

Field trips are very helpful in teaching nutrition. A trip to the dairy to observe the milking of cows, and the subsequent pasteurization and bottling of the milk has been a very informative

nutrition lesson for young children. Similar visits to centres like food preservation units, poultry farms and the like influence favourable attitudes in the pupils towards food and eating (Figure 21). The thrill of observing the various processes involved in cooking food and of participation in some aspects of the cooking procedures have helped to arouse the interest of children to look forward to enjoy eating the food they had cooked or observed being cooked.

Visits to the food markets have enabled children to become familiar with a variety of foods available and created in them curiosity to know how the different foods would taste. These experiences make the introduction of new foods in the school lunch easy.

9. Scoring diets

Children's existing food habits, needs and problems could be studied through questionnaires and dietary surveys and scored. Whether or not they include the important food items in their diets were elicited and scored. Every child is deeply interested in the score she/he has obtained. Thereafter, discussion on the different menus, their nutritive value, marketing for food and planning meals could follow.

10. Discussions on planning menus

Children help also in planning menus. In that process they discuss the different food items that can be included for highest nutritive value and the advantages and disadvantages of the different food preparations.

11. Keeping records of weights and heights

The weights and heights of the children are taken regularly every month and plotted as a graph. Children are always eager to watch their individual growth curves. They endeavour to keep the weight record on the upward trend. Regular noting of weights and keeping growth records have thus helped to stimulate interest in health practices. Comparison of signs of good and poor nutrition is another method of teaching nutrition to children.

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CHAPTER XIII

THE IMPACT OF THE SCHOOL LUNCH PROGRAMME ON THE ALL ROUND DEVELOPMENT OF CHILDREN

The school lunch programme in Sri Avinashilingam Primary School is an educational programme. Along with providing nutritious meals, it aims at providing nutrition education to the children and their parents. Children help in the various activities of the programme like serving foods, washing utensils, cleaning the lunch room and gardening. The impact of the school lunch programme on the pupils of Sri Avinashilingam Primary School is discussed in this chapter.

The staff and post-graduate students of the nutrition department of the college help in running the programme in a satisfactory nutritional, hygienic and educational environment and the school lunch programme is evaluated periodically using a proforma given in Appendix G.

The school lunch is a medium for improving the nutritional knowledge, nutritional status and food habits of children. It helps to improve the attendance and class performance of children. Several studies have been carried out to assess the impact of school lunch programme on the nutritional status of children. The findings of these studies are discussed under the following heads:

1. School lunch programme and all round development of children
2. Role of green leafy vegetables in school lunch programme and
3. Supplementation studies.

1. School lunch programme and all round development of children

The studies on the impact of the school lunch programme on the nutritional status of children and development used body height, weight, blood haemoglobin level, school attendance, performance and nutritional knowledge as criteria. The results show that the children participating in school lunch programme

are better than their counterparts (control) who are not participating in the school lunch programme. In order to find out whether or not the good organisation of the feeding programme in Sri Avainashilingam Primary School leaves any special impact on the nutritional status of the children, the effects were compared with those of two other selected schools in the neighbourhood, all operating under the Tamil Nadu Midday Meals Scheme. The results revealed that the provision of lunches in the primary schools even when not nutritionally adequate did help to some extent in improving the nutritional status, attendance, performance and social development of children, besides supplementing their home diets. However, only good organisation of the school lunch programme, brought the full impact on the development of children.

Longitudinal records on heights and weights of children participating in the school lunch programme over a period of five years, showed that children participating in the well organised lunch programme recorded significantly greater heights and weights over the control group, as can be seen in Table XIII and figures 22 and 23.

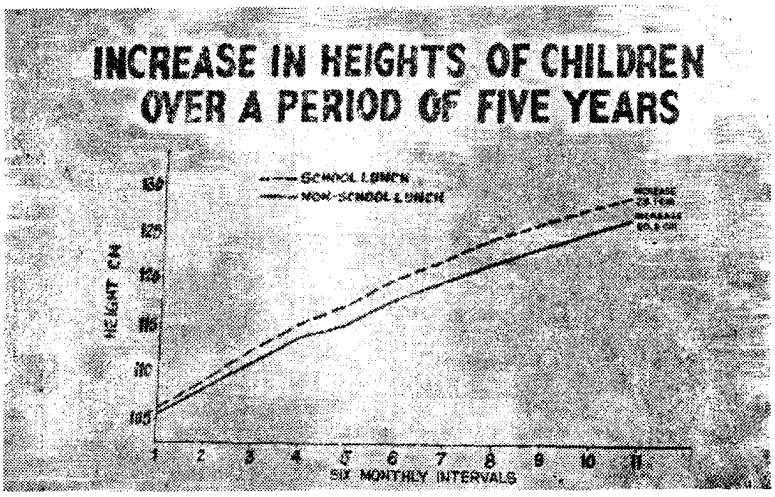

Fig. 22. Increase in Heights of Children Over a Period of Five Years.

TABLE XIII

Mean Six Monthly Heights and Weights of Children Over a Period of Five Years

(No. 73 in each group)

Groups	Six monthly intervals											Difference (Mean ± S.D)	Groups compared	't' value
	1	2	3	4	5	6	7	8	9	10	11			
							Height (cm)							
School lunch	106.3	108.8	111.9	114.7	116.7	119.5	121.4	123.9	125.2	127.9	129.4	23.1 ± 2.12	School lunch Vs Non-school lunch	7.97**
Non-school lunch	105.9	108.2	110.9	113.3	114.8	117.2	119.1	121.3	122.6	124.2	126.1	20.2 ± 2.38		
							Weight (kg)							
School lunch	16.8	18.7	18.9	20.1	21.7	23.2	25.2	26.2	27.2	29.2	30.7	13.9 ± 2.44	School lunch Vs Non-school lunch	7.48**
Non-school lunch	16.0	17.0	18.3	18.7	19.9	21.1	21.8	23.1	24.6	25.8	26.9	10.9 ± 2.38		

**Significant at one per cent level.

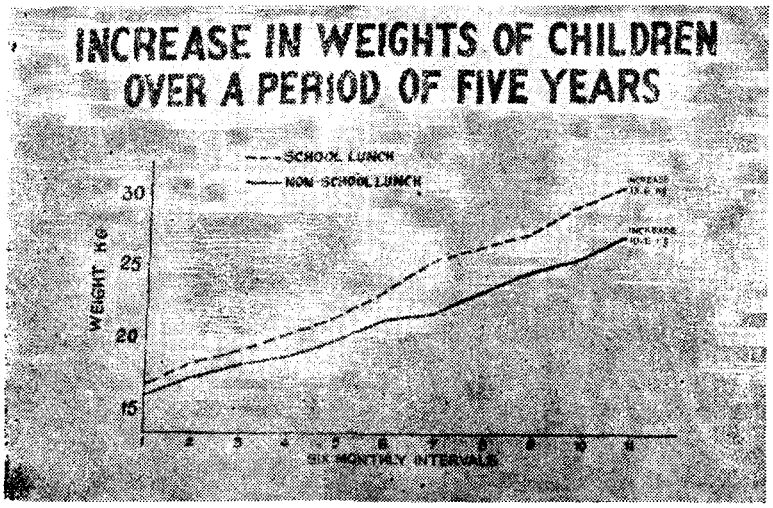

Fig. 23. Increase in Weights of Children over a Period of Five Years.

The mean blood haemoglobin levels of children who participated in the programme continuously for periods of five years, four years, three years, two years and one year was compared with that of comparable groups of children not participating in school lunch. The results are presented in Table XIV.

TABLE XIV

Mean Blood Haemoglobin Levels of Children After Different Periods of Participation

(No. 25 in each group)

S.No.	Group	Years of participation				
		5	4	3	2	1
		(Haemoglobin level g/100 ml)				
1.	School lunch	10.32± 0.43	10.26± 0.89	9.96± 0.90	9.42± 0.91	9.29± 0.49
2.	Non-school lunch	9.83 ± 0.74	9.78 ± 0.61	9.38± 0.48	8.83 ± 0.62	8.59± 0.48

The blood haemoglobin levels in the five groups of school lunch children ranged from 9.29 to 10.32 g/100 ml whereas in the non school lunch children it ranged from 8.59 to 9.83 g/100 ml blood.

The clinical symptoms observed in children who participated in the programme for five consecutive years is presented in Table XV.

TABLE XV

Clinical Picture of Children Participating and not Participating in the School Lunch Programme

(No. 25 in each group)

Clinical symptoms	Percentage of children in the five years study	
	School lunch group	Non school lunch group
Angular stomatitis	—	8
Bleeding gums	—	12
Anaemia	4	12
Dry and rough skin	—	8

The children in non school lunch groups were suffering from more deficiency symptoms than their counterparts in school lunch groups.

When the five groups were put together, the school lunch children attended the school for 93.78 per cent days while the non school lunch children attended for 91.39 per cent days.

The percentage of failures were more in each non school lunch group when compared with the corresponding experimental group. The percentage of failures ranged from 1.3 to 2.7 in school lunch groups whereas it ranged from 2.5 to 5.4 per cent in the non school lunch groups.

One of the benefits of the school lunch programme is its 'carry home' effect on nutritional information. Children carry

home the knowledge they gain in the school and introduce some desirable changes in the food habits of the family. This is evident from a study on the impact of the school lunch programme on the dietary habits of 100 selected families in Coimbatore city. Among the two schools selected, nutrition education had been conducted only in one school. Parents of the school lunch group where nutrition education was conducted had a greater knowledge of nutrition than the parents of the school where no nutrition education was given.

In another study which was longitudinal a questionnaire was administered to parents of the school lunch children, who were classified into five groups, according to the number of years of participation of their children in the school lunch programme. It was administered also to 25 parents from non school lunch group to compare against the school lunch group. The data are presented in Table XVI.

TABLE XVI

Nutritional Knowledge of Parents of School Lunch and Non School Lunch Children

(No. 25 in each group)

Questions	Answers	Years of participation					Non school lunch
		5	4	3	2	1	
1	2	3					4
		number stating					
Why should we consume green leafy vegetables?	1. For good health	20	12	18	10	10	3
	2. For health	11	12	—	2	—	—
	3. To purify the blood	7	6	8	10	7	4
	4. To avoid constipation	3	—	—	—	2	—
Which foods are to be consumed daily?	1. Cereal preparations	12	14	8	5	6	6
	2. Fruits and vegetables including green leafy vegetables	15	10	10	8	5	6
	3. Milk and milk products	11	11	8	7	5	6
	4. Non vegetarian foods	2	4	2	1	—	—

1	2	3					4
How do you cook rice?	1. Absorption method	22	20	20	15	14	10
	2. Draining the water	3	5	5	10	9	15

This revealed that the participation of children in the school lunch programme with nutrition education had influenced the nutritional knowledge and practices of their parents favourably.

The Municipal schools in the Coimbatore city receive cooked lunch from the central kitchen and distribute the food to children during the lunch hour. The effect of that programme was evaluated. Five hundred children were randomly selected from four Municipal schools and their heights, weights, hygienic practices, nutrient intake, nutritional knowledge, attendance, class performance, and parents' opinion about the school lunch programme were studied in comparison with a group of children participating in a well organised school lunch programme in the privately managed Sri Avinashilingam Primary School. The results of this study revealed that the private school was practising all the hygienic practices whereas they were absent in the Municipal schools. The supply of nutrients by the Municipal schools was deficient in calories, protein, calcium, vitamins A and C. The mean height and weight increments of children in the private school were greater than those in the Municipal schools. In all the schools, parents expressed positive opinions regarding the school lunch programme.

Apart from measuring the physical development of children research has also been carried out to find out the mental ability and certain behavioural aspects of school children who participate in the school lunch programme. The proforma used is given in Appendix H. To further evaluate the long standing benefits of the school lunch programme, the same tests were conducted on a group of 47 children in the high school who had earlier participated in the lunch programme when they were in the primary school and a comparable group of children who had never participated in any school lunch programme served as control. The changes in habits observed in children by the parents because of their children's participation in the lunch programme were also assessed and the results are presented in Table XVII.

TABLE XVII

Changes in Habits as Observed by the Parents Due to the Participation of the Children in the School Lunch Programme

(No. studied—150)

S.No.	Change in habits	Percentage of parents
1.	Increased consumption of greens and vegetables	92
2.	Better habits of selection of foods	88
3.	Increased willingness to share responsibilities at home	78
4.	Avoids waste in eating	76
5.	Takes meals punctually	72
6.	Is punctual, regular and systematic in work	66
7.	Has improved sociability	64
8.	Tolerance and cooperativeness	60
9.	Cleaning plates and tumblers	46

The school lunch programme resulted not only in significant physical development but also in greater mental ability and better behavioural aspects such as tolerance, obedience and general cleanliness. A well organised school lunch programme has the potential to bring out the best in the growing generation. Its effects are long standing as evidenced long after the children had left the primary school.

2. Role of green leafy vegetables in school lunch programme

Green leafy vegetables furnish liberal quantities of iron in the diets. They are easily available throughout the year, at low cost. The beneficial effect of supplementing diets with green leafy vegetables have been demonstrated by Devadas and co-workers through the investigations carried out on the utilisation of iron from leafy vegetables in the school lunch programme.

In one of the earlier studies, the effect of incorporation of leafy and non leafy vegetables in the school lunch was studied on two groups of children. The children in the school lunch group were divided into two groups of 16 children each. One group was supplied with 42 g of leafy vegetables daily while the other group was supplied with 42 g of non leafy vegetables every day. There was a comparable group of children to serve as control, who were not participating in the lunch programme.

After six months, the nutritional status of the pupils receiving leafy vegetables in the school lunch was significantly higher than that of the pupils who received non leafy vegetables in the school lunch. The former had registered significantly higher increases in weight and haemoglobin levels. In another study in two villages, the children of Pannimadai village school were given daily 25 g of the green leafy vegetables namely drumstick leaves on two days and amaranthus on three days obtained from their school garden in the form of 'kootu' to supplement the school lunch whereas the programme in Thaliyur village did not supply green leafy vegetables in the diet. The programme was evaluated after a period of six months. It showed that the nutritional status of children receiving the green leafy vegetables had registered significantly greater heights, weights and mean blood haemoglobin levels over the group which was not receiving the green leafy vegetables. These studies emphasise the need for the daily inclusion of green leafy vegetables in the school lunch programme.

The iron content of amaranthus cooked in an iron utensil was found to be greater than that in a sample cooked in aluminium or brass utensils. Hence a study was attempted to evaluate the availability to children of iron from amaranthus cooked in iron and aluminium utensils when supplemented to a school lunch over a period of six months. Children participating in the school lunch programme at Sri Avinashilingam primary school were divided into three groups of 35 children each. A comparable group of control was also selected and designated as follows:

Group	I	— Control group
Group	II	— Basal diet
Group	III	— Basal diet and 37.5 g amaranthus cooked in aluminium utensil
Group	IV	— Basal diet + 37.5g. amaranthus cooked in iron utensil

At the end of six months, the evaluation showed that children receiving amaranthus cooked in iron utensil had improved their nutritional status significantly better than the other groups, particularly with regard to haemoglobin levels ($p < 0.01$). Inclusion of greens, whether cooked in aluminium or iron utensil had definitely a beneficial effect.

In a three year study, the availability of iron from amaranthus was compared to that from an iron tablet 'fersolate' and an iron tonic 'colliron' in the school lunch programme. The basal school lunch provided seven milligrams of iron which is one third of a

day's requirement. The supplements, namely, amaranthus, iron tonic and iron tablets were introduced to provide 13 mg of iron thus making a total of 20 mg which is a day's requirement for children. All the three experimental groups were evaluated for their physical measurements, blood picture and clinical assessment. The contribution of the other nutrient components namely calcium and ascorbic acid present in amaranthus were also studied.

These studies revealed greater beneficial effects from amaranthus, an inexpensive supplement over the iron salts in the form of tablets and tonic as iron supplements. When calcium and ascorbic acid were given in the form of tablets along with iron tonic, the haemoglobin level increased to a greater extent although not to the same extent as that of amaranthus supplementation.

3. Supplementation studies

India has been receiving a great deal of food for the school lunch programme from CARE. However, it will not be wise to depend for ever upon food gifts from CARE to conduct the national feeding programmes. The challenge is therefore to produce and evaluate the efficiency of indigenous foods in promoting the nutritional status of school children. The studies conducted along this line are described in the following pages.

(a) *Indian Multipurpose Food (MPF)*

The effects of the Indian Multipurpose Food, skim milk and their combination (1:1) on the nutritional status of children participating in the school lunch programme were studied. Out of the 20 g of protein supplied by the school lunch, 8 g were supplied by each of these supplements. The study revealed that the children receiving the combination of the Indian MPF and skimmed milk registered the greatest increase in weight, height and haemoglobin level evidencing the possible biological complementation of protein. The differences between the children on Indian MPF and skim milk were not significant with regard to weight, height and haemoglobin content. The effects of incorporating skim milk alone and in combination with MPF or roasted red gram flour in a school lunch were also studied. A combination of red gram dhal and skim milk in the protein ratio of 1:1 was found to be an efficient substitute for an equal quantity by protein content from skim milk or from the combination of Indian MPF and skim milk in the same proportion.

(b) *Neera (Palm juice)*

The effect of Neera (Palm juice) as a supplement to the school lunch was studied in two primary schools. One hundred ml of Neera contain 9.6 g total sugars, 2.2 mg calcium, 0.2 mg iron, 0.1 mg thiamine, 18.5 μg riboflavin and 12 mg ascorbic acid. A group of 70 children was given 225 ml of Neera supplement along with school lunch while a comparable group of 70 children did not receive the Neera supplement. These groups were compared against a non school lunch control, at the end of six months. The physical measurements, blood picture and clinical scores were found to be the highest for the group receiving Neera.

(c) *Corn Soya Milk (CSM)*

CARE introduced a new high protein product, namely, Corn Soya Milk in 1968 in the place of skim milk. How far the CSM supplied can replace skim milk was a pertinent question. A study on the comparison of the newly introduced CSM against skim milk was undertaken through the school lunch. Six experimental groups of 25 children each were selected. Groups B and B_1 received 30 g CSM which provided 6 g protein. In order to provide the same amount of protein 15 g skim milk were given to groups A and A_1. Enhanced allowances of 60 g of CSM and 30 g of skim milk respectively were given to groups B_2 and A_2. There were controls, one receiving the normal school lunch without supplement and the other non school lunch group. In order to study the supplementary effects of green leafy vegetable, 15 g of drumstick leaves were supplied to groups A_1 and B_1.

The findings revealed that the children who had received skim milk (A) had shown higher increases in height, and lower increases in weight than the group B who had received CSM. Children who had received double the quantity of CSM showed higher increases in height and weight than their counterparts, who had received double the quantity of skim milk. The addition of greens to skim milk had stimulated further increase in the heights and weights and addition of greens to CSM stimulated greater increase in weight but not in height.

(d) *Low Cost Indigenous Mixture-I*

Effort was directed also towards the formulation of new low cost indigenous food mixture to supplement the school lunch in the place of the American gift CSM. Among the several combinations formulated, two selected mixtures were good for school

lunch. (1) Corn-Green gram—Soyabean—Mixture in the proportion 50:25:25 and (2) Corn—Horse gram—Soyabean—Sesame mixture in the proportion 35:40:20:5. The protein contents of mixtures were similiar to that of CSM. At the end of six months of feeding, it was encouraging to note that there was no significant difference between the mixtures and CSM.

(e) *Sunflower meal*

Combinations were also evolved based on a novel source of protein, namely, sun flower meal. Out of the mixtures computed, the one having sun flower meal, maize, roasted Bengal gram flour and sesame meal in the proportion 65:15:10:10, which had the highest chemical score, was tested in the school feeding programme. At the end of six months, the group receiving sun flower meal showed greater potential to improve their heights, weights and haemoglobin levels than the group receiving the normal school lunch diet.

(f) *Low Cost Indigenous Mixture-II*

A nutritious supplement made of low cost indigenous foods such as rice (20 g), cow pea (20 g), horse gram (10 g), amaranthus (30 g) and ground nut oil (15 g) was fed to 200 rural primary school children in the form of three preparations, namely, uppuma, sundal and payasam (a sweet beverage) for a period of 10 months. The improvement in the nutritional status of the children was studied through the physical measurements, blood picture and clinical assessment. The results were so encouraging, that snacks can be made out of local foods to improve the nutriture of children.

The feasibility of incorporating inexpensive food items, namely maize, green gram whole and palm jaggery, in the place of rice, red gram dhal and cane jaggery was investigated in a school lunch programme. This study was undertaken mainly to reduce the cost of the school lunch which is the most felt need. The low cost meal thus planned brought down the cost to 27.7 paise/meal from 43.3 paise. The study showed that there was no significant difference in the increases in heights, weights and haemoglobin level of the children who received the newly formulated menu and the normal basal menu. Further efforts are needed to popularise such low cost menu to suit both the urban and rural areas.

That the school lunch improves the nutritional status, growth rate and intellectual performance of its beneficiaries offers great

scope for research. The inclusion of green leafy vegetables improves definitely the blood picture and reduces the incidence of anaemia. This should be an eye opener to all involved in carrying out the school lunch programme in the country. Research on several low cost indigenous food combinations is of global interest.

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CHAPTER XIV

MEASURES TO MINIMISE THE FOOD EXPENDITURE FOR SCHOOL LUNCH PROGRAMME

The price levels of foods keep on spiralling up due to increase in population inflation, scarcity, seasonal availability and demands. According to the fluctuations in price levels, school lunch menus need to be planned, choosing wisely foods which are less expensive and easily available. The food expenditure can be reduced, considerably if easily growing green leafy vegetables, drumstick, papaya, guava, gooseberry and other foods can be cultivated in the school garden and included in the lunch. This will also help to improve the quality of the diet.

The cost of two foods may vary vastly. Still both may supply similar quantities of nutrients. In such cases, one needs to prefer only the cheaper food for use in the school lunch programme. For example, both green leafy vegetables and oranges are rich in vitamin C. But green leafy vegetables are far less expensive than oranges.

Table XVII gives the price levels of different foods supplying similar quantities of nutrients.

TABLE XVIII

Price Levels of Foods Supplying Same Amount of Nutrients

Nutrients and foods	Amount of foods	Amount of nutrients supplied	Cost Rs. Ps.
1. *Calorie yielders*			
Rice	1 kg	3450 kcal	2·50
Ragi	1 kg	3280 kcal	2·00
2. *Protein foods*			
Red gram dhal	1 kg	223 g	4·75
Horse gram	1 kg	220 g	2·50
3. *Vitamin A rich foods*			
Carrot	110 g	2079 μg	0·30
Drumstick leaves	30 g	2034 μg	0·05
Mango fruit	75 g	2057 μg	0·50
Papaya	300 g	1998 μg	0·25
4. *Vitamin C rich foods*			
Orange	200 g	60 mg	0·50
Amla	10 g	60 mg	0·05

One kilogram rice and ragi contribute nearly the same amount of calories. But, there is a wide difference in their cost. When the price of ragi is Rs. 2/- kg., the price of rice is Rs. 2.50/- kg. Similarly the cost of one kg. of red gram dhal and one kilogram of horse gram dhal varies much though they both supply similar quantities of protein.

The quantity of vitamin A supplied by 30 paise worth of carrot can easily be obtained from five paise worth of amaranthus or drumstick leaves. Vitamin A supplied by mango fruits costing 50 paise can easily be obtained by the cheaper papaya. When compared to oranges, gooseberries are extremely cheaper. Along with such foods, when raw sprouted gram is included in the lunch, the vitamin C content of the diet gets greatly increased and the standard of the meal enhanced.

Apart from increasing food production and selected low cost locally available foods application of proper cooking methods should also be followed as measures to minimise the food expenditure for school lunch programme. For example hay box which is a convenient inexpensive labour saving device could be used to save time and fuel consumption. Hay box is an insulated box where hay is used to surround food which has been partially cooked so as to allow cooking to proceed with the heat already produced by the fire and to retain the food heat until required. The box costs five rupees.

Studies at Sri Avinashilingam Home Science College has revealed that when hay box was used 58 per cent of the cooking time and 44 per cent of the money spent on fuel were conserved while cooking rice and dhal.

Hence growing trees such as drumstick, papaya and gooseberry in the school garden is highly beneficial. Greens grown on the edges, will not only beautify the garden but also supply greens for the school lunch. Organisations such as the United Nations Organisation, United Nations Children's Fund, Cooperatives for American Relief Everywhere and central and state governments render help to raise school gardens. That help must be availed of fully by the Primary Schools. Labour, time and money saving procedures need to be followed while preparing school lunch.

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CHAPTER XV

ROLE OF PARENTS AND TEACHERS IN THE CONDUCT OF THE SCHOOL LUNCH PROGRAMME

The role of parents and teachers in the successful conduct of the school lunch programme is vital. Each teacher should evince a genuine interest in the health of his pupils. He should not be satisfied with mere serving of meals to the children but he should pay equal attention towards improving their nutritional knowledge and inculcating good food habits. Special efforts should be taken by the teachers in maintaining a profitable school garden. They should also participate in gardening work along with the children to encourage them. Children feel extremely proud and happy when the produce of their effort in the school garden is utilised for their lunch itself. Gardening also gives the group work experience, enjoyment in the outcome of the work done and knowledge in agriculture and nutrition.

Teachers must consider the spread of nutritional information to parents as an important educational objective. They should establish a Parent Teacher Association, and through it encourage the parents to participate in the school lunch programme. Other opportunities through which the Association can take part in the school activities are:

1. Filmshows on nuritional information
2. Celebrations of Children's day
3. Maintenance of school garden
4. Pongal festival
5. School lunch meeting with parents
6. Arranging competitions and exhibitions
7. Conducting entertainments and discourses
8. Organising debates
9. Giving opportunity to parents to attend important functions and meetings and
10. Making arrangements to have discussions between parents and teachers over the radio.

On occasions of parents meetings, teachers should utilise the opportunity to explain to the parents the health condition of their children, their nutritional needs and measures to be taken to improve their health. The teachers can also demonstrate the desirable method of cooking different foods, use of recipes, and other facts.

Parents' role does not stop with sending their children to school. Availing the opportunities given by the school, they should get to know the teachers, have healthy discussions with them and be helpful to the school in as many ways as possible. When the Association is very strong, the parents can be utilised in assisting the programme in the following ways:

Food preparation

1. Purchasing and storing the foods
2. Cleaning the foods
3. Cutting the vegetables
4. Supervising the cleanliness of the kitchen
5. Helping in preparing new recipes and
6. Serving food in an attractive way.

Assessment of nutritional status of children

Help to measure the heights and weights of children every month and maintaining records.

Spreading the nutritional knowledge

1. Help to maintain the school lunch garden and produce vegetables and fruits
2. Help to take children on excursion
3. Tell stories and sing songs
4. Tell other parents, the benefits derived by their children through the school lunch programme and
5. Come forward to change the existing food habits, accept new ideals and educate others.

Helping the programme with cash and kind

1. Parents can contribute their garden produce towards preparing the school lunch. For example during seasons, if one brinjal per head is contributed by a family, the total amount received will be more than what is actually needed. The age old custom of handful of rice contribution can also be utilised in this effort.

2. If each family contributes one paise per day that itself will become a large sum.

3. With all the contributions received, a permanent endowment should be established by the school and the interest received from that amount should be utilised for the school lunch only. If this is achieved sucessfully, the teachers need not strain to collect money every time and

4. Contributing land for school garden. The parents should contribute as much as possible in one or more ways for the successful conduct of the school lunch programme.

Chapter XVI

PROBLEMS IN IMPLEMENTING THE SCHOOL LUNCH PROGRAMME

Several problems are faced by the people involved in the organisation of the school lunch programme. Unless these problems are overcome the smooth running of the programme is not possible. The problems of the school lunch programme as assessed by Sri Avinashilingam Home Science College from different points of view are given below.

Absence of ideology, commitment and dedication to the cause which leads to lack of priority in planning for child nutrition is the greatest problem.

Local financing is a problem keenly felt by all the cadres. Absence of nutrition education for all those who deal with the feeding programme is another pressing problem.

Apart from paucity of funds, there are many difficulties encountered in mobilizing public contribution and local participation on a continuing basis, on which the school meal programme has been developed. Equally harassing are the problems in transporting, stocking, storing and utilizing the gift food from CARE.

1. Lack of community participation
2. Lack of adequate and safe storage facilities in the school
3. Difficulties in maintaining school gardens during vacations
4. Lack of cooking facilities and personnel
5. Difficulties in finding funds for appointment of coods and
6. Damages and losses during transit and storage due to defective packing.

The District Educational Officer and Inspector of Schools who supply CARE food materials and the Health Inspectors who supervise the sanitary aspects of the school meal programme find that

1. Headmasters do not produce correct accounts with regard to money and CARE provisions.

2. There is no facility for transporting the food materials to the schools. Therefore, they have to wait for the teachers to come. They do not arrive in time and
3. Headmasters return the old bags of CSM saying that they are infested with weevils. They do not check them in time nor do they use them properly.

The officers involved in the supervision and food production aspects of the school meal find that

1. They are expected to supervise without authority.
2. All Panchayats (Village councils) are not able to meet the contribution
3. Lack of time and co-operation to mobilise the villagers to raise money as local contribution
4. Frequent transfers among the personnel discourage them and their efforts in different blocks and
5. Many schools have no kitchen space or facilities.

In one of the studies 35 teachers from the Perianaickenpalayam Block and 164 teachers from the District revealed the following problems:

1. Inadequacy of funds, grant from the government are inadequate and some schools are in debt because of meeting the expenditure.
2. Lack of steady supply of funds, collection of funds and contributions from the public who cannot be enthusiastic all the time is a heavy burden.
3. Carrying water from the well
4. Scarcity of water from the well.
5. Scarcity of water and unhygienic supply of water.
6. Need for teachers to cook food which takes away their attention from teaching which is their legitimate duty and responsibility.
7. Involving pupils for cooking, serving and washing. This practice takes them away from the classes, makes them tired and inattentive in the class.

8. Failure of panchayat to meet their obligations. Therefore, schools are in debt and they are forced to maintain false accounts.
9. Infestation of CARE foods with weevils and other insects.
10. Transportation of CARE food to the village from the district centre is difficult. The expenditure of time, money and effort involved are enormous.
11. Often the supply of CARE food is delayed and not regular.
12. Inadequacy of space and utensils. Thatched sheds, class-room or verandahs are used for cooking and serving food.
13. Non-acceptability of new foods by pupils.
14. Lack of training for teachers in running the school meal programme.
15. No facilities like land, water, fertilisers and pesticides for school gardens.
16. Lack of storage facilities and infestation by rodents.
17. Lack of provision to feed all the hungry children.
18. Lack of cooperation from parents and the public.

Thus although the feeding programme have been planned with sound and well thoughtout objectives at the higher levels with the help of international agencies and experts there are several loopholes. Hence the feeding programme does not appear to achieve the expected, permanent results.

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CHAPTER XVII

SUMMARY

This book has presented the steps and procedures involved in the successful conduct of school lunch programme from the experience of Sri Avinashilingam Primary School utilising the whole programme as a rich educational experience. When the school lunch is properly conducted and the experience utilised well for education the links between the teachers, parents and the community will be strengthened, their enthusiasm and educational standards improved and the all round growth of children promoted. Newer and more innovative ways of educating children are bound to emerge and pave the way for the revival of eduction.

Within 15 paise, attractive and nutritious meals can be served. In order to augment the lunch fruit trees such as amla, papaya and guava and leafy vegetables such as drumstick, agathi and chekurmanies should be planted in the school garden.

Teachers should adopt the practice of using hay box to cook rice. This would conserve time, fuel and nutrients. Green leafy vegetables and sprouted grams or fruits should be included in the lunch to ensure an adequate supply of minerals and vitamins. Teaching nutritional information to the young children is as important as providing meals to them. Such information should reach the parents at home and bring desirable changes in the society. Teacher's concern, conviction and competence are essential to realise this goal.

Teachers need to be oriented to the school lunch during their training period. The teacher training curriculum should be revised accordingly. There should be periodical refresher courses for teachers who should be helped with newer methods and latest knowledge and trends in child growth and nutrition. The school should provide full scope for the teaching of nutrition integrated with the curriculum through many different methods. The linkage of the school with the parents must be established for regular interacts and mutual strength. May the teachers put forth the hard work necessary and their endless dedication help the children learn effectively and become good citizens as in the case of the research studies presented in the publication on school lunch.

APPENDIX A

RULES AND REGULATIONS OF THE MADRAS GOVERNMENT REGARDING THE MIDDAY MEALS SCHEME TO THE POOR PUPILS.

SUBJECT: Elementary Education - Rules and Regulations regarding the Midday Meals Scheme to the Poor Pupils.

REFERENCE: R.O.C. 453 P×D 1/56, dated 12.11.1957 in Proceedings G.O.P.S.No.1850, Education, dated 8.11.1957 regarding.

G.O.Ms.No. 2135, Education, dated 17.8.1962
G.O.Ms.No. 3116, Education, dated 31.12.1962
G.O.Ms.No. 1804, Education, dated 21.10.1974
G.O.Ms.No. 1863, Education, dated 28.9.1979

THE MIDDAY MEAL SCHEME FOR FEEDING POOR PUPILS IN THE ELEMENTARY SCHOOLS

1. **Name:** The scheme shall be called the 'Poor Feeding Midday Meal Scheme for Elementary School Children'.

2. **The date of its origination:** The scheme shall come into existence from the date on which the meal is served to the pupils in an elementary school after the first of November, 1957.

3. **Meaning:** In this context, the term, "Elementary School" implies the combined unit which consists of the basic and non-basic elementary schools and the elementary school sections of the High School, Junior Basic School and the Senior Basic School.

4. **Aim:** The aim of the scheme is to conduct free midday meal programme for the poor children*, with the help of grants received from the Government and the donations in cash and kind given by the public. The food will be served only on working days.

5. **Operation:** This scheme shall be operative wherever there is public cooperation.

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*The D.P.I. will fix from time to time as to who can be considered as poor children.

6. **Implementation:** The scheme shall be implemented under the supervision of the members of the 'General Committee' and the 'Executive Committee'.

7. **Committee:** The donors of cash and kind will form the 'Donors' or 'General Committee'. The General Committee will elect the members of the Executive Committee and frame the rules and regulations.

8. **The Executive Committee:**

The Executive Committe shall consist of the following:

(a) Chairman of the General Committee. He will be the Chairman for the Executive Committee as well.

(b) A Secretary, who shall be the Headmaster of the school. He shall be Secretary of the General Committee also. If there is a common Executive Committee for more than one school, the Headmaster of the particular school may be elected as Secretary of that school. The Executive Committee will decide and empower the Chairman or any other responsible member of the Executive Committee to make correspondance with the eductional officers and to receive the Government grants. These are the minimum office bearers. The number may be modified by the Executive Committee, as and when necessary.

9. **Functions of the Committee:**

(a) *The General Committee*: The General Committee may meet at regular intervals and transact business.

(b) *The Executive Committee*: The functions of the Executive Committee are:

(i) Collecting donations in cash and kind for the food.

(ii) Supervising the preparation and serving of meals which are entrusted to responsible persons.

(iii) Selecting children for the scheme. There should be at least ten children in a scheme.

(iv) Appointing persons to prepare, serve and supervise the food.

(v) Obtaining permission of the D.E.O. to increase the number of children.

(vi) Fulfilling all the obligations of the school.

10. **Recognition:** All the committees thus formed should be recognised and approved by the Deputy Inspector of Schools who is the concerned educational authority.

11. **Execution of the scheme:**

(a) *Selection of Children*: The Executive Committee shall select children on the basis of necessity and poverty under rule 4.

The strength of beneficiaries should not exceed one-third of the number of pupils on rolls in classes I to V in each panchayat union areas or municipal area or corporation area as the case may be (G.O.Ms. No. 2135, Education, dated 17-8-1962).

From 31st December 1962 this has been modified i.e., the strength of beneficiaries should not exceed one-third of the number of pupils on rolls in classes I to VIII except Nilgiris where 1/2 of the pupils on the rolls in classes I to VIII were fed. If necessary additional number of children over and above the ceiling can be fixed provided the extra cost is met by raising local contribution and no subsidy is claimed from the Government (G.O.Ms. 3116, Education, dated 31-12-1962).

(b) *Food*: Curd rice or sambar rice or butter milk rice with vegetable or pickles will be served. The Committee may give even food of higher quality if it so desires.

(c) The Executive Committee will directly supervise preparing and serving of food. This should not be left on contract.

(d) *Expenditure*: The cost of the utensils, preparation of food and other non-recurring expenses must be met only by the Executive Committee. For recurring expenses a grant of 10 ps. per meal may be collected on the basis of 15 ps. per meal sanctioned by the Government. (G.O.Ms. No. 1804, Education, dated 21-10-1974).

The following are the recognised items for purposes of matching the Government grant.

(i) Cost of the food stuff.

(ii) The remuneration paid for cooks and other servants.

(iii) Sundry expenses for preparing and serving food.

(iv) The garden produce of the school may be used and the cost of the same may be considered as the income.

12. Registers to be maintained :

(a) List of names of the members on the General and Executive Committees.

(b) Minutes of the meeting.

(c) List of the names of the pupils selected for the scheme.

(d) Daily attendance register.

(e) Daily cash book.

(f) Correspondence file containing all the Government records received. The Secretary should number all the receipts and bills. The counterfoils should be preserved safely.

13. Chairman or a person appointed by the Chairman from the Executive Committee should help the Secretary in the careful maintenance of the accounts and vouchers.

14. Financial returns: All the financial returns should be sent on the dates due.

Rules for receiving grants: The rules may be called, "The rules for the payment of grant towards the supply of school meals to pupils in elementary schools".

Amount and rate of grant: With effect from 1st November 1957, or such later date as may be fixed by the D.E.O., the Executive Committee of every school meal centre may be paid a grant calculated at the rate of the amount equal to the amount by which actual expenditure exceeds 4 ps. per meal per pupil, or 6 ps. per meal per pupil whichever is less. D.E.O. is the sanctioning authority.

In 1974, the Govt. revised the pattern of financing the midday meal scheme as follows with effect from 1st October, 1974.

State Government Grant—10 paise per pupil for 200 days.

Local body contribution—a minimum of 5 paise per pupil for 200 days.

The Madras corporation alone has been excluded from the purview of these orders because it does not get from the State Government 10 paise grant for the midday meal scheme in its own elementary schools. In non central kitchen areas the contribution shall be paid by the local body directly to the Midday Meal committees regularly every quarter. In central kitchen areas, the contribution shall be remitted to Government account every quarter (G.O.Ms. No. 1863, Education, dated 28-9-1979).

To whom payable: The grant shall be paid to the Chairman of the Executive Committee. The D.E.O. shall draw the grant in the prescribed form for the withdrawal of teaching grants of Aided Elementary Schools and endorse it for payment to the person authorised. Alternatively, in case of remote places, if the Chairman so desires, the D.E.O. may remit the grant by M.D. deducting the commission from the grant.

The grant may be sanctioned in advance for each quarter. For the purpose of this rule, the quarter will cover a period of three months, ending with 31st March, 30th June, 30th September, and 31st December of each year. The Chairman of the Executive Committee shall apply to the Deputy Inspector of Schools concerned for the quarterly advance of the grant giving the number of working days on which school meals were provided, and his estimate of the grant due for the purpose. The Deputy Inspector shall scrutinise the particulars with reference to the number of pupils fixed by the D.E.O., and recommend the payment of the advance at specified rates. On receipt of his recommendation the D.E.O. shall sanction the grant. The grant paid in advance for a quarter shall be adjusted before sanctioning the grant for the succeeding quarter.

Monthly Returns: A monthly return in such form as may be prescribed by the D.E.O. shall be furnished by the Chairman of the Executive Committee to the Deputy Inspector of Schools concerned. It shall contain information regarding the grant received in advance for the quarter, the amount adjusted upto the end of the month, the number of pupils fed during the month and the grant payable. The return shall be signed also by the Headmaster of the school concerned.

Debit Head Account: The grant sanctioned under these rules shall be debited to the budget head "37-Education-Miscellaneous Scheme under the second Five Year Plan—Grants for school meals to elementary school pupils".

APPENDIX B

Recipes for low cost school lunch menus

Maize Uppuma

Ingredients	*Quantity in g*
Maize rava	40
Bulgar wheat rava	40
Greens	50
Tomato	10—15
Salad oil	5
Onion	2
Mustard	a few
Turmeric powder	a small pinch
Salt	to taste
Curry leaves	a few

Procedure

1. Cut the tomatoes and onion into small pieces
2. Season with onion, mustard and curry leaves
3. Add tomato to the seasoning oil and turn over
4. Boil water and add tomatoes, greens, turmeric powder and salt
5. When cooked add maize and bulgar wheat rava and stir continuously
6. Keep in the fire till properly cooked

Note: Jowar uppuma is prepared by following the same procedure

Kozhukattai

Ingredients	*Quantity in g*
Roasted rice flour	40
Powdered bulgar wheat	40
Salad oil	5
Onion	2
Mustard	a few
Salt	to taste
Curry leaves	a few

Procedure

1. Mix the rice flour and bulgar wheat flour
2. Season it with onion, mustard and curry leaves
3. Add salt to the water
4. Mix the flour with water to a very thick batter
5. Take small quantities and shape it by pressing slightly with the palm
6. Steam it in a cloth tied to a wide mouthed vessel

Tapioca pittu

Ingredients	*Quantity in g*
Roasted tapioca flour	40
Powdered bulgar wheat	40
Salad oil	5
Onion	2
Mustard	a few
Salt	to taste
Curry leaves	a few

Procedure

1. Mix well tapioca flour and bulgar wheat flour
2. Add salt to water
3. Mix the flour for pittu by sprinkling water till the desired consistency is reached
4. Steam it in a cloth tied to a wide mouthed vessel
5. Season it with onion, mustard and curry leaves

Note : The same method is followed for maize, ragi and jowar pittu.

Gooseberry rice

Ingredients	*Quantity in g*
Rice	8
Gooseberry	15
Salad oil	5
Onion	2
Mustard	a few
Turmeric powder	a small pinch
Curry leaves	a few

Procedure

1. Wash and boil the gooseberry well in the salt
2. Smash it well and remove seeds
3. Season onion, mustard and curry leaves
4. Put the smashed gooseberry in the oil and cook for some time
5. Cook rice by absorption method and add salt
6. Mix the cooked rice and gooseberry.

Note: The same method can be used for making tomato rice. Tomatoes should be cut into pieces before cooking and need not be smashed.

Vegetable rice

Ingredients	*Quantity in g*
Rice	80
Greens	50
Tomato	10
Salad oil	10
Onion	2
Turmeric powder	a small pinch
Curry leaves	a few

Procedure

1. Wash and cut tomatoes and greens
2. Season onion, mustard and curry leaves
3. Add tomato and turmeric powder to the oil and turnover
4. Cook greens separately
5. Cook rice by absorption method and add salt
6. Mix well the tomatoes, greens and rice.

Rice kitchadi

Ingredients	*Quantity in g.*
Rice	80
Green gram dhal	15
Salad oil	5
Cumin seeds	1
Pepper	1
Salt	to taste

Procedure

1. Wash the rice in water
2. Roast green gram dhal slightly
3. Add dhal and rice to boiling water to cook
4. Cook the rice-dhal mixture for one hour
5. Fry the rice-dhal mixture
6. Fry the cumin seeds and pepper slightly with three grams of oil and powder
7. When dhal-rice mixture is cooked add the powdered cumin seeds and pepper. Stir occasionally
8. Remove from fire and serve hot.

Sambar rice

Ingredients	*Quantity in g*
Rice	80
Green beans	30
Dhal	15
Salad oil	8
Chilly powder	8
Black gram dhal	8
Tamarind	5
Onion	2
Mustard seed	1
Curry leaves	a few
Asafoetida	a few
Turmeric powder	a pinch
Salt	to taste

Procedure

Sambar

1. Wash the dhal and cook in three cups of boiling water, add turmeric powder and half the salad oil. Boil for 40 minutes
2. Wash the beans, cut them into one inch long pieces
3. Add the cut beans, chilly powder, cut onion and salt to the boiling dhal
4. Cook till the dhal and beans or vegetables are tender for 10 minutes
5. Extract the tamarind juice, adding one cup water and add to the vegetable dhal mixture
6. Allow to boil for five minutes
7. Season with mustard, blackgram dhal, curry leaves and dry chillies.

Rice

Cook the rice separately, using 7 cups of water and the remaining oil by the absorption method and remove from the fire when it is well cooked.

Sambar rice :

Add the sambar to the rice, mix well and serve.

Wheat kitchadi

Ingredients	*Quantity in g*
Bulgar wheat rava	80
Greengram dhal	15
Salad oil	8
Cumin seeds	1
Pepper	1
Common salt	to taste

Procedure

1. Roast the greengram dhal to golden brown colour
2. Boil the water
3. Clean the bulgar wheat rava and add the rava and washed dhal to boiling water
4. Cook the rava and dhal
5. Fry the condiments slightly with the oil and powder them
6. When the rava is cooked add the powdered cumin seeds and pepper
7. Remove from the fire and serve hot.

Bulgar wheat uppuma

Ingredients	*Quantity in g*
Bulgar wheat	80
Salad oil	8
Blackgram dhal	5
Bengal gram dhal	5
Onion	2
Chillies	1
Common salt	to taste
Curry leaves	a few

Procedure

1. Heat the oil
2. Fry the mustard, blackgram dhal, Bengal gram dhal, chopped onions, chillies, and curry leaves in the oil
3. Add water and salt, and boil
4. When the water starts boiling add the rava gradually stirring constantly to prevent lumping
5. Cook till all the water is absorbed
6. Remove from fire and serve.

Lime rice

Ingredients	*Quantity in g*
Rice	80
Lime fruit	20
Salad oil	8
Dry chillies	1
Blackgram dhal	1
Bengalgram dhal	1
Mustard seeds	1
Common salt	to taste
Curry leaves	a few
Turmeric powder	a pinch

Procedure

1. Clean and wash the greens
2. Boil in very small quantity of water
3. Add the greens and salt to boiling water
4. Cook for 12 minutes
5. Heat oil and fry the mustard, blackgram dhal, Bengalgram dhal and chillies
6. Add the cooked greens
7. Remove from fire and serve.

Dhal amaranth Kootu

Ingredients	*Quantity in g*
Amaranth	50
Green gram dhal	20
Oil	5
Chillies	0·5
Coriander seeds	0·5
Curry leaves	a few
Mustard	a few
Turmeric powder	a pinch
Common salt	to taste

Preparation

1. Clean and wash the dhal
2. Boil water
3. To the boiling water add the washed dhal, turmeric powder and a little oil
4. Cook the dhal till it is soft
5. Clean, wash and cut the amaranth
6. Add the amaranth, powdered cumin, coriander seeds and salt to the cooked dhal
7. Cook for ten minutes
8. Heat the oil and fry mustard seeds, black gram dhal, curry leaves and chillies. Add the dhal to the seasoning and keep for two minutes
9. Remove from the fire and serve hot.

CSM/Balahar paysam

Ingredients	*Quantity in g*
CSM/Balahar	20
Jaggery	10

Procedure

1. Add the water to the CSM and make a batter
2. Add water to the jaggery, boil and make a syrup
3. Add the CSM batter to the jaggery syrup
4. Cook it well and remove from fire.

Instead of CSM or balahar any one of the following 11 mixtures could be prepared as per the proportions indicated below and recipes could be prepared and served in school lunch.

Mixtures		*Quantity in g*
I.	Corn	40
	Horsegram	30
	Soyabean	30
II.	Corn	40
	Horsegram	30
	Soya bean	20
	Groundnut	10

Mixtures		*Quantity in g*
III.	Jowar	40
	Horsegram	30
	Soya bean	20
	Groundnut	10
IV.	Bajra	40
	Horsegram	30
	Soya bean	30
V.	Jowar	30
	Horsegram	50
	Soya bean	20
VI.	Corn	35
	Horse gram	40
	Soya bean	20
	Seasame	5
VII.	Corn	30
	Horsegram	50
	Soya bean	20
VIII.	Corn	30
	Horsegram	30
	Soya bean	30
	Groundnut	10
IX.	Jowar	40
	Horsegram	50
	Soya bean	10
X.	Corn	40
	Horsegram	20
	Soya bean	30
	Groundnut	10
XI.	Corn	50
	Green gram	25
	Soya bean	25

APPENDIX C

School Lunch Programme Observation Schedule

Name of the child :

Date : Class :

1. **Appearance :**
   (a) Very neat and tidy
   (b) Neat and tidy
   (c) Dirty
   (d) Shabby
2. **General attitudes :**
   (a) Happy disposition
   (b) Unhappy disposition
   (c) Indifferent towards everything
   (d) Lethargic
3. **Cleanliness before eating :**
   (a) Heads and feet washed
   (b) Hands and feet improperly washed
   (c) Hands and feet washed only after somebody had reminded
   (d) Head alone washed even after instructions
4. **Participation in prayers before eating:**
   (a) Sings the prayer song with interest
   (b) Does not concentrate
   (c) Feels shy to sing
   (d) Never sings
5. **Acceptance of dishes served:**

Dish	Acceptance
1. Cereal Preparation	(a) Eats willingly (b) Eats with relish : (i) without leaving (ii) with leaving

Dish	Acceptance
	(c) Eat indifferently: (i) without leaving (ii) with leaving
	(d) Does not touch at all
2. Vegetable Preparation	(a) Eats willingly
	(b) Eats with relish : (i) without leaving (ii) with leaving
	(c) Eats indifferently: (i) without leaving (ii) with leaving
	(d) Does not touch at all
3. CSM/Balahar Payasam	(a) Eats willingly
	(b) Eats with relish : (i) without leaving (ii) with leaving
	(c) Eats indifferently: (i) without leaving (ii) with leaving
	(d) Does not touch at all

6. Attitude towards asking more food:

(a) Asks for additional food freely

(b) Feels shy to ask, but accepts when served

(c) Waits till a neighbour asks for more food

(d) Answers only when asked by the servers

7. Eating habits:

(a) Eats neatly without spilling

(b) Eats hurriedly (takes.....minutes)

(c) Eats slowly (takes.....minutes)

(d) Wastes food

8. Sociability:

(a) Converses freely with others while eating

(b) Never talks with others while eating

(c) Talks only to a selected few

(d) Feels shy to talk freely

9. Consumption of food:

Dish	Amount served (g)	Amount left (g)	Amount consumed (g)

10. After eating:

(a) Washes the hands:

properly

improperly

(b) Washes the plate:

properly

improperly

(c) Puts back the plate:

in a tidy manner

in an untidy manner

(d) Plays :

happily

never plays

APPENDIX D

Schedule for Clinical Assessment

Name : Date :

Age | | Sex | |

Standard | | Division | |

Height in cm | | Weight in kg | |

Grade I

Healthy and free from any nutritional deficiency symptoms

Grade II

(a) Poor musculature

(b) Deficient subcutaneous fat

(c) Lack of interest in the surroundings

(d) Mild signs of the following specific nutritional disorders

(1) Xerosis or pigmentation of conjunctiva

(2) Bitot's spot

(3) Dry and/or rough skin

(4) Crazy pavement skin

Grade III—Significant malnutrition

(a) Nutritional oedema

(b) Gross muscular wasting

(c) Xerosis of the Cornea

(d) Angular conjunctivitis

(e) Angular stomatitis

(f) Bleeding gums

(g) Red and/or raw tongue

Special remarks if any

APPENDIX E

SCHEDULE FOR DIETARY SURVEY OF FAMILIES

1. Name of the Child: Sex :
   Age :
2. Address :
3. Caste/Community : Mother tongue:
4. Occupation :
5. Total income per month:
6. Approximate income spent on food per month:
7. Type of family :

   Nuclear ☐ Joint ☐

8. Family

Age in years	No. of males	No. of females	Total
Below 2½			
2½ — 5			
6 — 15			
16 — 18			
19 — 50			
51 and above			

9. Three day meal pattern followed

Day	Breakfast	Lunch	Tea	Dinner	Others
1st day					
2nd day					
3rd day					

10. Quantity of foods used and menu

Meal	Menu	Foodstuffs used	Quantity g
Breakfast			
Lunch			
Tea			
Dinner			

Any other remarks :

APPENDIX F

NOTES OF LESSONS FOR THE INTEGRATED CURRICULUM

III Standard

Theme	Contents	Notes of lesson	Aids	Assignments given
I. *Tamil*				
A. Healthy family	Importance of taking bath daily, wearing neat clothes, importance of eating clean, and balanced diet.	Daily we must take bath to protect our body from infections and also to keep it clean. We should eat clean food. A balanced diet is that which contains cereals, pulses, vegetables, greens, fruits and oils. Role of cereals, pulses, vegetables, fruits and milk in the body.	Pictures showing the balanced diet were shown.	Questions were asked regarding the theme.
B. Fruits and vegetables	Importance of fruits and vegetables and the importance of vitamins	Vitamins are important nutrients which are present in fruits and vegetables. There are six vitamins. They are vitamin A, Vitamin B Complex, Vitamin C, Vitamin D, Vitamin E. & Vitamin K. To get these vitamins we should eat a lot of fruits and vegetables.	Actual fruits and vegetables themselves formed the aids. Charts were also used.	Different fruits were shown and the name of the vitamin present in them and their functions in the body were asked.

Theme	Contents	Notes of lesson	Aids	Assignments given
C. Importance of eggs	Importance of eggs in our diet and its nutritive value.	Structure of the egg shell, outer and inner lining, yolk, and white were taught. Its importance as the main source of protein in the body was explained. The protein that is present in egg is the good quality protein and so, we must take eggs daily for the body growth.	Black-board drawing and pictures were used.	Children were asked to draw the structure of the egg and name the parts. Questions regarding the importance of protein were asked.
II. *English*				
Grammar . . .	Singular and plural of foods.	Singular and plural of commonly used foods were taught using the names of the foods.	Charts.	They were asked to write the singular or plural for the taught foodstuffs.
III. *Science*				
A. Housing . .	Importance of keeping the house and the surroundings neat and importance of drinking clean water daily.	The reasons for the infectious diseases were taught and thus the importance of keeping our body, clothes and house neat. Sunlight and air are important for keeping the house clean. Our food and drinking water should be kept clean.	Pictures, charts and posters were used.	Questions regarding the theme were asked.

B.	Living things	Living and non-living things, their characters and the importance of food for them.	The characters of living and non-living things explained. Living things need air, food and water. Importance of these were explained by showing them the experiments. Importance of food for the human body, various foods and their role in the body.	Pictures of a healthy child and an unhealthy child were shown and the plants were used.	Children were asked to list out various foods that are important for the body.
C.	Health and Hygiene	Classification of nutrients. Importance of carbohydrates, fats and proteins for the body.	Energy giving, body building and protective foods were explained. Importance of taking rest, keeping the body clean, dental care and playing were explained. Overall digestion of fats, carbohydrates and proteins were explained.	Charts showing foods rich in carbohydrates, fats, and proteins were shown.	Children were asked to write the names of various foods and their importance in the human body.
IV.	*History & Geography*				
A.	Life of Aryans	Life history of Aryans and their dietary pattern.	Gipsy type of life aryans had. They ate all the vegetables and fruits in raw forms. They ate meat and animal foods. They included milk and milk products in their diets.		
			They were very strong because they got lot of proteins and energy through protein rich foods. So they conquered India.	Maps were shown.	Questions regarding the important nutrients present in various foods were asked.

Theme	Contents	Notes of lesson	Aids	Assignments given
B. Geographical areas of Tamil Nadu	Various food crops that are grown in Tamil Nadu and their importance in the body.	Food crops like millets paddy, sugar cane and groundnuts are produced in Tamil Nadu. Groundnut contains protein and so it is important for the growth. Rice, millets and sugar cane are rich in carbohydrate and so, they give energy. Energy is important for work.	A map of Tamil Nadu showing the areas, where particular crop is cultivated was shown.	Questions were asked regarding the theme.
C. Transport & storage	The different methods of storage and transportation.	Foods are transported from one place to another by trains, lorries, aeroplanes and other vehicles. They are stored in different places. Various methods of preserving the foods were explained.	Map was used to show the concept.	Questions were asked regarding the theme.
V. *Mathematics*				
Addition, subtraction and division	The names of the vegetables, fruits and their nutritive values were used in addition, subtraction and division	1. 100 grams of amla contains 600 mg of vitamin C. So, how much vitamin C will be present in 360 grams of amla?	--	Working out the problem

			2. 100 grams of papaya contains 666 (μg) of B-carotene. If you want to take 1,600 μg of B-carotene, how many grams of papaya should you eat?	..	Working out the problem
VI. *Arts and Craft* . .		Drawing the picture of fruits and vegetables'	Various fruits like tomato and banana and vegetables like carrot and greens were shown and were asked to draw them. They were also asked to write their importance with vitamin present in each fruit and vegetable.	Fruits and vegetables	Drawing
		A song was taught to the children. The song pictured the importance of various foods and nutrients in the body	..	..	Singing
			IV Standard		
I. *Tamil*					
A. Pongal festival .		Importance of cereals in our body, importance of hand pounded rice, fresh fruits, and vegetables, and milk in man's diet	The various foods that are used on pongal thirunal were explained. Importance of handpounded rice due to its vitamin B content was explained.	Foodstuffs and pictures were used.	They were asked to write the foods that are used on pongal festival and their importance.

Theme	Contents	Notes of lesson	Aids	Assignments given
	which are used on pongal day.	Importance of vitamins A, B, C, D, E and K and the foods that contain these were explained. Fresh vegetables like tomato and greens are used for their rich vitamin C and A content. Various nutrients present in milk and importance of these nutrients were explained.		
B. Sugar cane . .	Importance of sugar cane in the body and the various foods that give energy was discussed.	Foods are divided into three classes. They are body builders, energy producers and regulators. Examples of each type was given and their functions in the body were explained.	..	Children were asked to write the foods that day and were asked to write to which class they belonged to.
II. *Science*				
A. Work, power and energy	Classification of foods and nutrients and their relationship to work, power and energy, and the measurement of energy	Foods are classified into three groups. There are five nutrients namely, carbohydrates, proteins, fats, vitamins and minerals present in the foods. Carbohydrates and fats are energy giving nutrients. Protein helps the body in	Charts, pictures, flash cards and black board drawing served as aids.	Questions were asked regarding the theme and they were asked to write the names of the foods and their classification.

		growth. Vitamins and minerals are body regulators. Energy is measured in calories and the children in fourth class should take 1,800 calories daily.		
B. *Health & hygiene* .	Basic four groups, digestion of foods, methods of cooking, food spoilage, protection of foods against spoilage and dental caries.	Digestion of carbohydrates, protein and fats are explained. Various methods of cooking, their advantages and disadvantages, methods of food preservation like pickling, refrigeration, Janatha refrigeration, drying etc. explained. Advantages of cooking foods, and eating raw vegetables and fruits and dental care.	Charts and flash cards were used.	Questions were asked regarding the theme.
III. *History*				
Life history of Asoka and the food pattern in his days	Importance of fresh vegetables and fruits and eating patterns of Asoka.	After the victory in Kalinga war, Asoka became a vegetarian. He ate vegetables and fruits. They are full of vitamins and minerals. He took more of dhal and milk for their protein contents. Comparing those foods with the food eaten by the children.	Pictures of foods were shown.	They were asked to write the importance of such vegetable and their nutritive value.

Theme	Contents	Notes of lesson	Aids	Assignments given
IV. *Geography*				
National resources of Tamil Nadu	Food crops that are grown in Tamil Nadu and Coimbatore District.	The areas where sugar cane, groundnuts are produced in Tamil Nadu and in Coimbatore district and their importance and nutritive value.	Map was shown	Questions were asked regarding the themes.
V. *Mathematics*				
Multiplication, division and subtraction	The sums were given using the names of foods and their nutritive value.	1. 100 grams of red gram dhal and 100 grams of meat when mixed contained 40.8 grams of protein totally. If 22.3 grams of protein is present in 100 grams of red gram dhal how many grams of protein will be present in 100 grams of meat.	..	Working out the problem
		2. If 35 grams of protein is required per day for a child in the fourth class, how may grams of protein should you eat for 10 days?	..	Working out the problem.

VI. *Arts and craft* . .	Drawing and painting the pictures of foods	Actual fruits and vegetables were shown to the children and were asked to draw and write their nutrient content.	Actual foods and Drawing were used	Drawing
		V Standard		
I. *Tamil*				
Agriculture and dams .	Importance of agriculture, and importance of dams for the improvement of agriculture.	Importance of agriculture, various foods that are produced in our country, importance of foods in our body, importance of water for the plants, importance of water for the human body, advantages of drink-clean water daily.	Charts were used	Children were asked to write the answers for the following questions. 1. Why should we eat food daily? 2. Write the importance of drinking clean water daily.
II. *English*				
A. Our country .	Natural resources, customs and traditions and food habits of Indians.	Various tress and plants are grown in various parts of India. They are coconut trees, coffee/tea, pepper, ragi, rice, sugar cane, maize and wheat. People eat several kinds of food. South Indians eat rice and ragi. They make dosai and iddli with rice. In North people eat wheat and maize. They make	Pictures of various foods and maps were used.	Places were shown in the maps and the children were asked to write the food crops produced there.

Theme	Contents	Notes of lesson	Aids	Assignments given
		chappathis with wheat. Some eat meat and fish. Indians grow vegetables and eat them.		
B. Pongal . .	Various foods that are used on the pongal day and their importance in the body	Various foods like sugarcane, hand pounded rice, banana, mango, and jaggery are used on the pongal day. Importance of these foods and the nutrients supplied by these foods, role of these nutrients in the body were taught.	Pictures and flash cards were used.	The names of various foods and the nutrients present in them were asked.
III. *Science*				
A. Work, power and energy	Classification of foods and nutrients and their relationship to work, power and energy.	Foods are classified in to three groups. They are energy producers, body builders and regulators. There are five nutrients present in foods. They are carbohydrates, proteins, fats, vitamins and minerals. The functions of these nutrients were taught.	Charts were used	Names of various foods were given and the children were asked to write their functions in the body.

B. Plants . . .	Various fruits and vegetables were shown and the nutrients present in them and the importance of these nutrients in the body.	Vegetables and fruits are *important sources of* vitamins and minerals. Functions of various vitamins and minerals explained.	..	Questions regarding the theme were asked.
IV. *Mathematics* . .	Multiplications and division taught using the names of foods and nutrients.	1. 100 grams of plums contain 5 mg of vitamin C. If you want to take 50 mg vitamin C how many grams of plums you should eat? 2. Gopal aged 10 years requires 1275 grams of protein per month. So what is his protein requirement per eay?	..	Working out the problem.

APPENDIX G

OBSERVATION SCHEDULE TO EVALUATE THE VARIOUS ASPECTS OF THE SCHOOL LUNCH PROGRAMME

S.No.	Item	Criteria	Evaluation
1.	Menu	Nutritious	
		Colourful	
		Attractive	
		Appearance	
		Adequate in quantity	
		Wastage by children	
2.	Adequacy of cooking equipment	Number	
		Size	
		Appropriateness of the metal	
		Storage space	
		Measuring equipment	
3.	Cooking area	Provision of separate cooking area	
		Adequate space	
		Lighting	
		Ventilation	
		Smoke outlet	
		Cleanliness	
		Storage of equipment	
		Separate washing area	
4.	Dining area	Separate	
		Adequate	
		Lighting	
		Airy	
		Cleanliness of plates and tumblers	
		Dining in the classroom	
5.	Storage facilities	Space	
		Containers	
		Ingredients stored	
		Vegetables stored.	

S.No.	Item	Criteria	Evaluation
6.	Hygienic conditions in the school	Water facilities	
		Separate cloths for wiping the hands of children	
		Washing hands before meals	
		Neatness of the kitchen	
		Neatness of the dining area	
7.	Appearance of children	General health	
		Sickly	
		Grooming	
		Nails cut and clean	
		Conditions of the hair	
		Appearance	
		Dressed properly	
8.	Teachers' attitude towards feeding programme	Encouraging the children to eat	
		Discussion about foodstuffs	
		Forcing the child to eat	
		Checking the wastage of foods	
9.	Nutrition education	Present	
		Adequately	
		Inadequately	
		Not present	

APPENDIX H

Proforma to Elicit Information on the Behaviour Pattern of the Children

Name of the child :

Class

School

Punctuality	Scores
(a) Being in time for school and regular in attendance	5
(b) 75% of the time regular in attendance and punctual	4
(c) 50% of the time regular in attendance and punctual	3
(d) 25% of the time regular in attendance and punctual	2
(e) Very irregular and unpredictable	1
Orderliness	
(a) Sitting straight in the correct posture with full concentration	5
(b) Sitting in position but with less concentration	4
(c) Disorderly	3
(d) Walking around and talking too much in the class	2
(e) Restless	1
Respect for elders	
(a) Readily gets up and wishes the teachers and all elders	5
(b) Slow response in showing respect to teachers and parents	4
(c) Giving respect only to related people	3
(d) Rarely responds in giving respect	2
(e) Never concerned about respecting people	1
Cooperation	
(a) Very cooperative with teachers, parents and classmates	5
(b) Cooperative with teachers and parents only	4
(c) Cooperative with classmates and peer group only	3
(d) Cooperative only with a selected few	2
(e) Non-cooperative and indifferent	1

Sociability	Scores
(a) Converses freely with parents, teachers, classmates and strangers	5
(b) Converses freely with teachers, parents and classmates only	4
(c) Converses freely with classmates and siblings only	3
(d) Converses only with a selected few	2
(e) Does not indulge socialisation	1
Concern for others	
(a) Selfless help and concern for all	5
(b) Very helpful when situation calls for	4
(c) Helpful only to selected people	3
(d) Rarely helpful	2
(e) Never raises upto any occasion	1
Leadership	
(a) Readily and spontaneously accepts responsibility	5
(b) Accepts responsibilities when the situation demands	4
(c) Interested in taking up responsibilities and not competent to carry out	3
(d) Rarely takes up any responsibility	2
(e) Never takes up any responsibility	1
Emotions	
(a) Always calm and composed	5
(b) Takes things calmly but not capable of taking correct decision	4
(c) Takes things with great anxiety	3
(d) Takes things seriously to heart and shows violent reactions	2
(e) Always easily bursts out	1

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