

# **THE SCHOOL LUNCH PROGRAMME**

## **ORGANISATION AND OUTCOME**

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**And**

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**MINISTRY OF EDUCATION**

**GOVERNMENT OF INDIA**

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This experience of studying and working out the essentials of organising, conducting and evaluating the outcomes of a school lunch programme for primary school children within the resources available, has been an enriching and fascinating one. The outcomes of the school lunch on the allround development of school children as revealed by the findings of this study, we hope, will inspire and encourage all those who are sponsoring or likely to organise school lunch programmes.

The authors are grateful to the Government of India, Ministry of Education for having agreed to publish the book, particularly Sri Hingorani, Deputy Educational Adviser, and Sri J. P. Naik, formerly Adviser, Primary Education, now Member-Secretary, the Education Commission, and to Dr. K. Ramakrishna, Director, Central Health Education Bureau, Union Ministry of Health, for going through this work.

We are thankful to Sri T. S. Avinashilingam, Founder, Sri Avinashilingam Home Science College, who enthused us to undertake this study, gave constructive suggestions, and has kindly written the foreword. To numerous others we are immensely thankful particularly Miss G. Memaprabha, headmistress and her colleagues, the pupils and parents of the school whose implicit faith in and cooperation for the project proved a great asset; the donors and members of the Social Service Association of the College and the Government of Madras for the finances; UNICEF and CARE for the skim milk powder. Mrs. Godavari Kamalanathan

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If this publication can be of some use in the school lunch programmes and stimulates further studies, we will feel amply rewarded.

**Rajammal P. Devadas**

**A. Radharukman**

## FOREWORD

This book on School Lunch Programme is one of the first efforts of M.Sc. nutrition programme of the Sri Avinashilingam Home Science College. We are annually spending many crores of rupees for school lunch for primary school children. Providing a good, clean, healthy and well balanced lunch is of the essence of this very big programme. This publication gives clearly the essential knowledge that will be necessary for all those who participate in this programme.

In this connection the pioneering work done by the Government of Madras must be appreciated. Almost all the primary schools in the Madras State have instituted this programme on this basis of local help and aid from the State Government. Our experiences have also shown that if we are to reap the full benefits from this programme, we must educate the teachers, parents and pupils with the basic knowledge necessary for this purpose. Such a programme of nutrition education will include: the necessary elements of a balanced diet, the proper methods of preparation, the standards of cleanliness to be maintained and above all the pleasantness with which the meals should be served. Unless these educational aspects are attended to, the programme may degenerate into a dull and drab, and sometimes an insanitary, one. This book, I hope will serve to spread the much needed knowledge for that purpose.

In the School Lunch Programme conducted by the Sri Avinashilingam Home Science College, we have observed the smartness and joy of the pupils who are

participating in it. What began as school lunch for the poor at first considered *infra dig* for the well-to-do, has now become popular with even well-to-do children. In addition to giving them a well balanced meal, it also trains them in good habits, such as clean serving, eating without wastage, developing tastes in the proper kinds of foods and most important above all the co-operative living. We have found further that a good school lunch programme helps to reform the homes also through the children, in the cultivation of healthy food habits, avoidance of wastage and habits of cleanliness.

Recent researches have proved that balanced diet provided after the weaning stage, that is, from about the age 2 to 5 is most important for the building up a good mind and physique for the child. Nutrition studies all over the world have revealed that whenever the food needs of this age group has been neglected, the consequent bad health and detriment to the body, could never be corrected sufficiently in later years. Therefore, along with good school lunch programmes in the primary stage, adequate feeding programmes for the nursery school stage also should be implemented. The needs of the nursery school stage has not been realised sufficiently, as the number of nursery schools in India are few and many of those are conducted for the well-to-do by levy of fees. In any national system of education, it is essential to provide a large number of nursery schools with provision for good lunch programmes suited to the needs of that age group. The Applied Nutrition Programme which has been recently started in some blocks in different states through the cooperation of the Government of India and the UNICEF is well aware

of this problem. But those efforts have to be coordinated with the educational system of the country and wherever possible nursery schools should be opened along with primary schools and good school lunches provided for them.

We are glad that the Government of India, Ministry of Education, have come forward to publish this work. We hope that the book will reach all those who deal with School Lunch Programmes and be of some use to them.

Our thanks are due to the authors of this publication, Dr. Rajammal P. Devadas and Miss A. Radharukmani and particularly to the former whose interest in the subject has been infectious and fascinating, in inducing many studies to be made in this important subject

T. S. AVINASHILINGAM

Sri Ramakrishna Mission  
Vidyalaya, Coimbatore,  
January 13, 1965





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## PREFACE

The education of the child, particularly during the early years of his formative stage, is of the greatest importance, as in the words of our late Prime Minister, "Out of this child will grow the man and woman of tomorrow and the new India that we seek to build". Our Constitution enjoins on the State to provide free and compulsory education to all children up to 14 years. Although we have yet to reach this target, considerable strides have been made in this direction. By way of accelerating development of education at the elementary stage, the Government of India have been extending necessary help to State Governments for providing mid-day meals to children in elementary schools. Experiments conducted by a few states for initiating School Lunch Programmes have proved very helpful. There is, however, further scope for streamlining these programmes on proper lines for maximum results.

The study conducted by Sri Avinashilingam Home Science College, Coimbatore, it is hoped, will be able to form public opinion and indicate the guide-lines on which similar programmes could be suitably adopted by other institutions. The Ministry of Education have, therefore, undertaken to publish this study in the form of a small brochure entitled "School Lunch Programme—Organisation and Outcomes", co-authored by Dr. Rajammal P. Devadas and Miss A. Radharukmani of that college.

The free school lunch programme was organised by the college for five months for 30 children of 5

to 7 years of age to assess the effects of the school lunch on the nutritional and health status, nutrition education, food habits, social developments, attendance and performance of children in the school. For purposes of comparison a control group was selected. Nutritional and health status was appraised through techniques like anthropometric measurements, clinical examinations, biochemical methods and dietary surveys. Other outcomes like nutrition education, children's social development and their food habits and performance in school were judged on scientific bases. The study reveals that on all these points the school lunch programme does have a significant and far reaching effect.

Two chapters, one on 'School Lunch Programmes in Other Countries' and the other on 'Some Experiments with Supplementary Feeding in India' give the accumulated experience in the field. The chapter on 'Organisation and Effects of School Lunch Programmes' will prove handy for those willing to launch similar programmes.

While there are no two opinions about the guiding principles on the organisation and administration of school lunch programme spelt out by the authors, the specific conclusions, drawn as these are on a limited sample and time interval, are their own and do not necessarily, reflect the views of the Government of India.

I take this opportunity of recording my appreciation of the pioneering effort made by Sri Avinashilingam Home Science College in conducting this study and presenting its valuable conclusions to the people at large. If this small brochure could inspire others in the field to undertake school lunch programmes for

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providing a good, clean, healthy and well-balanced, yet cheap, lunch, it would have proved its worth.

**PREM KIRPAL**  
Educational Adviser  
Government of India  
Ministry of Education

New Delhi, 1965



## CHAPTER I

### Introduction

Children are the most cherished possession in our society from time immemorial. A home is considered sacred and complete only when it is blessed with children. Thiruvalluvar, the great poet of Tamil Nad, whose works have been translated in many languages of the world, had said that children were the "Jewels" of the family.

"The worth of wife is man's good fortune,  
His jewels are his good children".

Dr. Radhakrishnan, the President of India has stressed that the prosperity or poverty, strength or weakness of our nation, depends on the care with which children, the future citizens of the country are brought up. Jawaharlal Nehru, the late Prime Minister of India urged that the community should give priority to the care of children and offer them affection and proper training. The late Dr. Rajendra Prasad, former President of India stressed, "The child is the father of man' and if his childhood is well spent and well regulated and well organised, the better will he be to take up responsibilities of a full grown citizen".

Childhood is the period of rapid physical and mental growth, and development. Children are constantly building up new tissues and replacing 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 function, to repair the tissues already formed, and to supply energy for work. If children are not provided with the nourishment they need, under nutrition and malnutrition of one type or other will inevitably

result, the type and degree depending on the nutrients lacking in the diet.

'Undernutrition'—refers to inadequacy of calories\*, while the term '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. Malnutrition is caused by a variety of factors and is not a disease due to the deficiency of a single factor or caloric deficiency. Dr. W. R. Aykroyd, one of the eminent nutrition workers, expressed. "The tragedy of malnutrition in children in India is so much, that it not only leads to high mortality, but also cripples and permanently damages the growing generation. Among the many crippling effects of malnutrition probably the most dangerous is the impairment of vision in children. Malnutrition is dangerous also as a very important cause of the high mortality rates among children in India."

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

In spite of the importance given to children in our literature and society, they are the most neglected group in our population with regard to nutrition,

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\*Calories are the measurement of the energy values of foods and one of the criteria for determining the quantitative adequacy of diets.

health and education. The dietary surveys carried out in India between the years 1936 and 1958 under the auspices of the Indian Council of Medical Research show that the diets of children are deficient in calories and the essential nutrients, proteins, vitamins and minerals. Their nutritional status was low not merely due to extraneous factors, such as hook-worm infestations, but also due to severe malnutrition. Aykroyd, Patwardhan, Gopalan and other pioneer nutrition workers in India have repeatedly pointed out that children in India, who constitute the major part of the vulnerable group of the population manifest deficiencies of proteins, calcium, vitamins A and B complex. Thus malnutrition is a serious problem among children.

The problem of malnutrition affects not only the health of children, but also their attendance and performance in schools. Improperly or inadequately fed children cannot concentrate on their studies. In many parts of India, it is the custom for children to have a meal before they leave for the school and have no food until they return home in the late afternoon. Even more serious is the condition of children, of whom there are doubtless many, who come to school with empty stomachs. Therefore, many who attend schools are not able to study their lessons with interest and enthusiasm.

These problems have challenged the attention of the Government of India, State Governments, educationists and social and nutrition workers. Realising that the health of children is the most important asset to the community, the Government of India has given a prominent place to Child Welfare in the Community Development Programme. The Ministry of Education has provided three crores of rupees through the Central Social Welfare Board, exclusively for schemes for child welfare and primary education and a sum of Rs. 16.625 million for the Integrated Child Welfare Services in the Third Five Year Plan. The essential services for children under these schemes

includes nutritional programmes and school meal services. A sum of about Rs. 470 million has been earmarked in the Third Plan, for the midday meals scheme alone. The recent appointment by the Government of India of a National School Health Council whose functions among others include assisting school meal programmes, augurs well for the future of children. Thus the midday meals scheme as a part of the programme in Child Welfare has come to occupy a prominent place in our national plans.

The international organisation like UNICEF\* and CARE\*\* have come forward to strengthen this programme through the contributions of protective foods, such as skim milk, butter oil and wheat and pulses. The largest school feeding programme in the world is now being administered by CARE in India, through which 4.15 million children are being fed daily utilising nearly 105 million pounds of food commodities in the States of Kerala, Madras, Punjab, Andhra Pradesh, Rajasthan, Bombay and Mysore. UNICEF has reserved 10.258 million pounds of skim milk powder for school feeding in India. The Meals for Millions Association\*\*\* also helps selected school feeding programmes through the supply of the Indian Multipurpose Food (IMF). India is an economically poor country with an annual per capita income of Rs. 291.50. A great majority of the people are agriculturists, with both fathers and mothers working in the fields with little time to attend to the needs of their children. Therefore, the meals supplied in the schools, even when inadequate, are important and form the main meal of the day for thousands of school children.

While the chief purposes of the mid-day meals schemes are to supply children an inexpensive meal

\*For details regarding the UNICEF—The United Nations International Children's Fund—see Appendix I(a).

\*\*For details regarding CARE—The Cooperatives for American Remittances Everywhere—see Appendix I(c)

\*\*\*Appendix I(e)

in the school and help them have balanced diets, there are other important additional benefits such as, inculcating in children proper dietary habits and overcoming food prejudices. The school meals also help children develop socially, and be friendly with all, regardless of caste, creed and differences in social and economic status, thus facilitating the emotional integration of the nation.

Only a few studies have been made on how far the present school lunch programmes in our country help to achieve these purposes. The School Health Committee refers to some "Supplementary feeding" experiments which had been carried out to combat under nutrition by the Poonamallee Health Unit, Madras, Nutrition Research Laboratories, Hyderabad, the Central Food Technological Research Institute, Mysore, and the All India Institute of Hygiene and Public Health, Calcutta. Time is now ripe to evolve certain guiding principles on the organisation and administration of school lunch programmes based on scientific studies. There is need to collect information about the factors involved in organising good school lunch programmes and to determine how far such programmes can help in overcoming malnutrition, and in promoting good health.

This publication is an effort in that direction. It is based on the findings of a five month study conducted in a newly organised school lunch programme for thirty children of Sri Avinashilingam Basic (Elementary) School, to evaluate some of the ways the school lunch helps in improving the health and nutritional status, in establishing good eating habits, and in imparting nutrition education to young children. It is hoped that the details given with regard to the organisation and administration of the lunch programme to provide nutritious lunch within the cost of 10 paise per meal in the school will be of help to similar programme.

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## CHAPTER II

### School Lunch Programme in Other Countries

The origin and development of school lunch programmes in the different countries reveal the universal concern all over the world for the welfare of growing children. The need for school lunch programmes as part of a sound educational system has been realised in most countries. In many parts of the world, 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 as can be seen from the following account.

**Austria.** In Austria, the needy children were provided with meals even before the Second World War. For a period of three years from 1947, the UNICEF provided supplies for supplementary feeding programmes organised for the refugee children. The school children were receiving  $\frac{1}{4}$  litre of fresh milk, and bread or a roll equivalent to 37 grams of flour supplied by the Government. This meal provided 400 calories. Nearly 1,15,000 children were receiving such meals.

**Belgium.** The school feeding programme was not successful in Belgium when it was first introduced. When the surveys of the National Nutrition Committee of Ministry of Public Health showed the beneficial effects of school lunch on the heights, weights, and general physical conditions of children, popular interest in the programme was aroused. Due to the financial difficulties of the post-war period, it was now resumed after the war. There is no legislation on school feeding.

**Bolivia.** In Bolivia the school meal programme was begun in La Paz in 1933, by the Association of Women Employees, who petitioned to the Ministry of Education to make the movement national in scope. In 1940, about 86 school children were provided with meal in La Paz and six other towns. By 1949, the number of meals supplied daily had risen to 23,140 throughout a school year of approximately 200 days. UNICEF began its assistance by supply of skim milk from 1950. The programme is meant exclusively for children in the primary standards under the department of School Social Assistance.

**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—400 calories each. From 1950 UNICEF started supplying milk powder. Approximately three million children received milk enriched with flour through the national services.

**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 participated in the feeding programme.

**Canada.** There is no national school feeding programme in Canada. However, in some Provinces, there are a few projects large and small, operated by parent's committees, local school boards, trustees and individual teachers. The emphasis is often placed on improving the lunches carried to schools rather than on the provision of complete meals in the school. In 1947 cod liver oil and cocoa milk powder were distributed to all schools.

**Central America.** Until 1949, little progress had been made in Central America with regard to organising school feeding programmes. In 1949 UNICEF



made available dried milk for the feeding of children. The investigation made by the International Child Health Programmes (INCHP) gave valuable information for planning school feeding programmes on a sound basis.

**Ceylon.** The mid-day meals in Ceylon was started in 1935, by the Commission for Poor Relief during the malaria epidemic period. The scheme administered by the Ministry of Education was expanded in 1948 to provide meals for 80 per cent of the children attending schools. The state provided six cents per meal in rural areas. In the urban areas, the local authorities contributed four cents in addition to the six cents given by the state Government. In each school, the headmaster was responsible for the accounts and operation of the feeding programme under the supervision of inspectors. The meal consisted of wheat bun, some vegetable curry or fruit. The officers of the department of health and education work closely with each other with regard to the health care of the school child, and practically every medical officer devotes one day in the week for work in the schools. At a conservative rate, the cost of supplementing the diets of the malnourished children alone who are attending the clinics, comes to 13 million rupees.

**Chile.** In Chile, the Public Health Services cooperate with the Ministry of Education to supplement the diets of school children. Fifteen million milk and breakfast rations, and more than 10.9 million lunches were supplied in 1940 through the primary schools. In the same year the Department of Nutrition of the Ministry of Health conducted an experiment and demonstrated the superior effects of a whole milk supplement as compared to a condensed milk supplement. From 1948, it was decided that whole milk should be the basis of school feeding. Nearly 200,000 children are being provided with supplementary foods including milk.

**Columbia.** In 1935, the Ministry of National Education in Columbia organised school feeding restaurants in a number of primary schools. In 1948, the

Division of Nutrition of the Ministry of Hygiene put forward plans for organising two types of programmes, one for the urban and another for the rural areas. A snack of the 'Oslo'\* type was provided in the mornings for urban schools, since it was customary for those children to take their lunches at home. Food supplies were sent to the schools from a central distribution centre. In the rural areas, complete mid-day meals were provided for 5,000 children who could not go home for lunch.

**Cuba.** In Cuba, the Department of Dietetics and School Nutrition was supplying school breakfasts with a cereal consisting of wheat and corn products reinforced with supplements of iron, calcium, malt and milk. Children from the poorest families were selected to benefit from the feeding programme, which operated for about 120 days in a year. In 1948, 37 per cent of the school population were participating in the programme. . . . .

**Denmark.** Free feeding programme for the needy and poor children was started in Denmark in 1902. Through the Social Welfare Act of 1933, the local authorities were allowed to start school feeding programmes. In February 1948, it was legislated that meals must be given to all children, who wanted them irrespective of their economic position. In 1950, more than 17 per cent of school going children were participating in the school lunch programme. Milk with sandwiches, or a hot meal constituted the lunch. The School Lunch Act of 1951 modified the provisions to offer meals from the month of November to April in the school year, and to give complete meals only to children in the six lower classes.

**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

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\*The Oslo Breakfast originated in Oslo, Norway to give a substantial meal to school children—consisting of milk, sandwiches, cheese, margarine, raw carrot and fruits.

'School Meals Act' was passed in 1906. Most of the meals were provided by voluntary schemes supported by government. They were simple consisting of porridge 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. The School Health Service in Britain reports that the local education authorities provide 1/3 pint of milk free of cost for all children, and school meals at subsidized prices for all the needy children.

**Finland.** In Finland, provision of meals to children in elementary schools was made obligatory from August 1948. By the summer of 1949, almost half million school children were receiving 1/5 to 1/3 litre of milk daily. The 'School Feeding Law' stipulated that such school should have a garden looked after by the children under the supervision of the teachers, where vegetables can be grown for the school kitchen to reduce the cost of meals.

**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 mid-day meals. These children were selected according to income. The lunch time was planned to be pleasant 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 dessert (often a fruit) cheese and milk.

**Germany.** The school feeding programme in Germany was started by voluntary groups before the First World War. At that time 20 per cent of the children

from six to ten years of age, and 15 per cent of those between 10 to 12 years, were benefitting from the school lunch. School feeding was introduced on a wider scale after the war period. The needy children were selected through surveys and were served meals which provided approximately 350 calories. It is estimated that more than 50 per cent of the school going children are participating in the school feeding programme.

**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.

**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.

**Indonesia.** In 1949 the Nutrition Research Institute in Indonesia carried out a survey which indicated the need for supplementary feeding of children. A programme was initiated with 14,000 children participating in it. In two central kitchens, the UNICEF dried milk was made into a porridge with green gram and maize meal provided by the government, and supplied by trucks to all the schools.

**Ireland.** In Ireland, local authorities were given powers to provide meals for children attending the

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\*UNRRA : United Nation's Relief and Rehabilitation Administration which was temporarily established soon after the Second War, to give relief in the war devastated areas of Europe.

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 County 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 school.

**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.

**Japan.** There is a comprehensive school meal programme in Japan, covering the entire school going population. It was started regionally before the last war and extended nation-wide in 1946. In the beginning, milk was the main item in the lunch, but from 1950 bread was added to make the school lunch more complete.

In 1954, the 'School Lunch Law' was enacted. The objective of the School Lunch Law is the broad adoption of the school feeding programme all over the country for sound development of the minds and bodies of pupils. All schools of compulsory education, the primary schools, junior high schools, and schools for the blind, deaf and dumb are covered by this law. The Prefectural and the National Governments subsidize part of the expenses to propagate the school lunch programme. In 1962, there were 19,251 schools serving a total of 9,312,636 lunches. Fifty six per cent of the primary schools serve lunches to 73.2 per cent of the total population of children. Of these 86 per cent

receive complete lunches, and the rest milk and other foods. The nutritient content of the lunches show that they supply more than one third of the daily requirements of nutrients. From 1962, the Ministry of Education is providing under a five-year programme, complete school lunches for the primary schools.

**Malaya.** The school feeding programme in Malaya was started in 1945. During 1947-48 about 250,000 children were receiving from  $\frac{1}{3}$  to  $\frac{1}{2}$  pint of cocoa or skim milk powder, and yeast biscuits.

**Netherlands.** The school feeding programme was never popular in the Netherlands, because of the belief 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.

**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. The elementary school pupils are provided with Oslo Breakfast regardless of their economic or social status.

**Pakistan.** In Pakistan the feeding programme was begun in 1950 in the schools of Karachi. 2,900 children who were participating in the programme received a whole wheat bun enriched with dried skim milk.

**Poland.** The school feeding programme was started in Poland before the Second World War, organised by parents' committee and regional authorities. After

the war, the UNICEF aided the programme. Thereafter, the school lunch became the responsibility of the Ministry of Education, which allotted 25 per cent of the total educational budget for improving the health of children.

**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.

**Thailand.** In Thailand, the school lunch programme was started in 1950. Children receive milk, soya-bean milk and biscuits made from soya-bean and wheat.

**United States of America.** The school feeding programmes in the United States were started as early as 1920. In New York City, the programme was first introduced in 1931. The allowances included two ounces of cheese, meat, fish or one egg or four tablespoons of peanut butter, two teaspoons of fortified margarine of butter,  $\frac{3}{4}$  cup of fresh fruit of vegetable or a combination of both, one slice of bread fortified with dried milk powder, and one quart milk. The U.S. Congress passed in 1946 the National School Lunch Act which has subsequently undergone several revisions. The Act provides for the Federal Government sanctioning grants-in-aid to states to match such funds from their resources. The Department of Education of the State government is responsible for distributing the funds, and ensuring that the participating schools comply with the provisions of the Act. The Secretary of Agriculture is responsible nationally for the administration of the school lunch programme, but he delegates this power to the Production and Marketing Administration of his Department. The school lunches served under this programme must meet the minimum requirements prescribed by the Secretary of Agriculture.

The National School Lunch Act has prescribed the following requirements for three types of lunches : A type, B Type and C Type. Type A lunch shall contain as a minimum :

- (i) One-half pint of fluid whole milk as a beverage.
- (ii) Two ounces (edible portion as served) of lean meat, poultry, or fish, or two ounces of cheese; or one egg; or one-half cup of cooked dry beans or peas; or four tablespoons 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.
- (iii) Three-fourth cup serving of two or more vegetables or fruits, or both. Full strength vegetable or fruit juice may be counted to meet not more than one-fourth cup of this requirement.
- (iv) One slice of whole-grain or enriched bread; or a serving of cornbread, biscuits, rolls or muffins, made of whole-grain or enriched meal or flour.
- (v) Two teaspoons of butter or fortified margarine.

In 1947, the first year of operation of the National School Lunch Act, about 6 million children participated in the School Lunch Programme. Since then, there has been a steady year-to-year growth in the number of children participating, quality of meals served, and amount of food used. In 1955, approximately, 11 million children in 59,000 schools were served 180 million meals.

The percentages of children participating in school lunch programme in the different countries are : Belgium 70 per cent in secondary school; England 50



per cent; Italy 33 per cent; Japan 64 per cent in primary school and 10 per cent in middle school; North Ireland 50 per cent; Scotland 33 per cent; Sweden 70 per cent; United States 33 per cent and Yugoslavia nearly all. These school lunch programmes are financed in a variety of ways. Some get extensive national government grants as in England, Wales, North Ireland, Panama, Scotland and Sweden; others get partial assistance from the national government as in the U.S.A., while still others are financed locally as in Italy. In most countries, children who can afford pay a reasonable price for the meals, but those who cannot, are fed free. Every national attempts to serve nutritionally balanced and attractive meals based on the eating habits and staple foods of the country. For example, in many European countries, the staple food is potatoes, whereas in the Asian Countries, it is rice. Menus are planned using these staples supplemented with protective foods.

In some countries, attempts are made to raise school gardens for the feeding programme. In Yugoslavia, an effort is made to acquaint children with a wider variety of important foods unfamiliar to them. There is evidence that the school meals help children and parents to learn to eat nutritious foods which are not ordinarily included in the family diet.

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## CHAPTER III

### 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, notably in Madras, Kerala, Andhra Pradesh, Mysore and Orissa. However, 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 Madras 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. Through this grant, the Government pays six paise towards the cost of a meal which is expected to the cost 10 paise per head, while the local donors contribute 4 paise per meal. This scheme has been extended to schools throughout the state. Nearly 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 Department of Education of the government of Andhra Pradesh runs a free midday meals scheme for 12,000 children of 5 to 14 years of age, with the help of the nutrition officer and the school medical officer. The meal usually costs around 16 to 25 p. The government pays a subsidy of 16p. per meal, while the balance is met by the local community.

The CARE School Feeding Programme was inaugurated in July 1962. This programme covers

nearly 9,60,000 children involving distribution of 10 million pounds of milk powder, 30 million pounds of cornmeal, 7.75 million pounds of vegetable oil, and 10 million pounds of beans in a year.

**Assam.** Assam has instituted a midday meals scheme only in the Kamalabani Development Block.

**Bihar.** In Bihar, the East Indian Railway Administration runs a midday meal scheme for its schools through which two slices of bread or three biscuits,  $\frac{1}{4}$ — $\frac{1}{2}$  ounce butter and fruit are provided per child per day. The state government envisages that 50 per cent of its primary school children would be provided with free midday meals by the end of the third Five Year Plan. The state government will donate 6 p. per child per working day and the local community will give an equal amount.

**Gujarat.** Midday meals programme is in operation in Dangs district in Gujarat. The meal costing 12 p. consists of Nagli (a ragi malt preparation), jaggery, groundnut and skim milk powder, providing 625 calories and 20.5 gm. protein per pupil per day.

**Kerala.** The school lunch programme in Kerala was started in 1941. During the year 1961-62, the state had midday meals programme operating in all the schools, departmental and aided, throughout 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 is borne by the executive committee, while the recurring expenditure is 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 covers 1,70,000 children daily. The CARE feeding consists of 8 ounces of liquid milk prepared from one ounce of full cream milk powder and eight ounces of water, and uppuma prepared out of two ounces of cornmeal and  $\frac{1}{2}$  ounce of

vegetable oil; or alternatively eight ounces of milk made from one ounce of milk powder or 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 Kerala 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 headmaster of the school. The state department supplies all the necessary cooking utensils required for the school feeding programmes. It also pays the cooking charges 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 p. per child, 80 per cent of which is met by the state government.

There are plans to coordinate the UNICEF aided programme of Expanded Nutrition with the school feeding programme in the state.

**Madras.** The midday meals scheme in Madras was started in 1925, by the Corporation of Madras as a remedy to solve two problems: (a) Children attending the corporation's elementary schools from families of poor socio-economic status were suffering from malnutrition and avitaminoses, and (b) The poor socio-economic conditions of the families forced the children

to work without attending school. The scheme was intended for children of families earning below Rs. 50 per month as an incentive to improve the attendance in the schools. Initially started to feed 500 pupils, the programme made rapid progress with the number of meals increasing from 30,000 in 1929 to 75,000 in 1961. Meals are prepared in various centres early in the morning and transported to the different schools for distribution in vans by 12 noon.

When first started, the Corporation of Madras followed a stereotyped meal pattern containing 12 ounces of cooked rice, and eight ounce of sambar with one vegetable. The menu was changed in 1959 to include :

Mondays and Fridays	.. ..	Rice 12 ounce (cooked) and sambar eight ounces.
Tuesdays	.. ..	Rice with curds 16 ounces, and kootu two ounces.
Wednesdays	.. ..	Tamarind bath 15 ounces, and sambar eight ounces.
Thursdays	.. ..	Kadambam rice 12 ounces, and sambar eight ounces.

The Government of Madras took up the midday meals programme in 1957, inspired by the response given by the public. It issued precise and detailed rules for the working of the school meals scheme as given in Appendix II aimed at securing the cooperation and active participation of the local public. According to these regulations, the midday meals programme must be run in the elementary schools by the voluntary contribution of the public at the rate of 4 p. per meal together with the government aid which is equal to the amount actually spent in excess of the public contribution of 4 p. per meal per pupil, subject to a ceiling of 6 p. per meal per pupil. The meals generally consist of cooked rice served with sambar or curds, and vegetables or pickles. The scheme has brought about a social consciousness drawing into the school, thousands of children who had been kept off on account of poverty. It has also prevented children leaving school in the middle of the class hours to help

their families. It has contributed towards more effective education of children who were no longer hungry and listless in the classroom.

The larger Municipalities in the state also take interest in the school feeding programme. In the Coimbatore Municipality, since 1961, the free midday meals committee of the Municipal council has approved and set apart a sum of Rs. 76,000 from its general fund for the 'Coimbatore Municipal Midday Meals Scheme'. There are 39 municipal elementary schools, under the scheme feeding nearly 26,000 children. The average cost of a meal comes to 12½ p. towards which the state government makes a contribution of 6 p.

At present, out of the 23,501 elementary schools under the department of education in the Madras state, the midday meals programme is in operation in 21,347 schools, the number of pupils fed being 7,45,000. In addition, the scheme is functioning in 269 corporation elementary schools and 853 Harijan Welfare Schools, the number of pupils fed in these schools being 1,17,448. The scheme is also functioning in 416 night schools on a purely voluntary basis, feeding nearly 11,760 pupils.

The Madras scheme is eligible for central assistance up to 50 per cent of the cost. A sum of Rs. 164.77 lakh has been provided in the third Plan. A sum of Rs. 35 lakh spent by the government in 1958-59 and Rs. 60.70 lakh during 1959-60 to provide free meals to five lakh poor children. It is estimated that during the third Five Year Plan an additional 14,73,000 pupils will be fed.

In 1961, the government of Madras received aid from CARE for supplementing its school feeding programme. The CARE programme in Madras is coordinated with the state department of education which has appointed a Special Officer to work with the CARE-Madras Administration. The sub-offices of the education department at the district and range level are responsible for the receipt and distribution of CARE donated supplies. Initially, the CARE aid in Madras was

designed to cover 500,000 children. Now it covers approximately 1.2 million children daily. The commodities used are : 10 million pounds of milk powder, 3 million pounds of vegetable oil, 21.5 million pounds of cornmeal, some bulgar wheat (parboiled wheat) and special type of rice. A system of rotating menus has been set up so that each day children receive a different fare, prepared with the various CARE commodities.

**Maharashtra.** A free midday meals scheme was started in Bombay in 1942 to encourage the attendance of children. The distribution of UNICEF skim milk powder through organised centres has 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. There has been a remarkable increase in the activities of the UNICEF skim milk powder distribution scheme in the state during the recent years. At present UNICEF is supplying 12,68,00 lbs. of milk for distribution to 39,765 children.

In the primary schools run by the Bombay Corporation 40,000 malnourished children receive a glass of toned milk and a piece of 'chikki' which is a toffee made from groundnut, gram and jaggery. Under the third Five Year Plan, a sum of Rs. 57,13,000 has been allotted for such school feeding.

The Bombay-CARE School Feeding Programme was inaugurated in February 1963. This project covers about 250,000 municipal school children daily involving the distribution of 4,500,000 pounds of milk each year. The CARE programme in Bombay is different from that prevailing in other states. Unlike all the other programmes, in Bombay, only milk is distributed in bottled form. The milk powder is sent



directly from the docks to the Worli Dairy godown, where it is reconstituted, enriched with a small portion of whole milk, bottled capped and sent to 844 Bombay Municipal schools for the children to drink in mid or late morning. The administration of this programme is the responsibility of the Bombay Municipal Corporation, CARE, and the Worli Dairy. The Bombay Municipal Corporation pays all the bills for bottling, processing and distribution, nearly Rs. 40 lakh a year or a little more than one rupee per child per year.

**Mysore.** A mid-day meal scheme was introduced in Bangalore City in 1946 to provide meals consisting of eight ounces of cooked rice and four ounces of curd. 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 has plans to supply 62.5 lakh pounds of milk powder, 125 lakh pounds of butter oil free of cost. When the CARE commodities are made available the midday meal will consist of a glass of milk and a plate of uppuma, from the daily rations of 2 ounces of cornmeal,  $\frac{1}{2}$  ounce of oil and an ounce of milk powder per child. It will be served for selected beneficiaries on five days in a week. This programme will be supported and directed by a 'village school betterment committee' which will include representatives of the village council (Gram Panchayat) as members.

**Orissa.** The school lunches are integral parts 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 over-all 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 are (a) increasing village, school, and home production of nutritionally valuable foods such as, poultry, eggs, fish, fruits and vegetables; (b) nutrition education through schools, Mothers' Clubs, health services, Community Development and National Extension Services Blocks; (c) improvement of the nutritional status of needy, pregnant and nursing women and young children, and (d) training local personnel. For increasing food production, land, seeds, sapplings, equipment and technical help have been made available for school gardens free of cost. Pupils should look after the gardens as a part of school activities and the produce must be used in the midday meals. Children are encouraged through class room activities to eat the available nutritious foods. During vacations, the garden are tended by volunteers from the villagers.

School teachers, gram sevikas, mukhya sevikas, (home science extension workers) doctors, nurses, social education organisers, and local leaders are trained to participate in the programme. Encouraging results have prompted the sponsoring organisations to initiate similar programmes in the other states under the name 'Applied Nutrition Programme'. The UNICEF has supplied 1,60,44,331 pounds of milk powder from 1957 onwards for this programme.

**Pondicherry.** In Pondicherry, free midday meals are supplied to 80 per cent of the children studying in the government primary schools. A single meal consists of rice, sambar with vegetables, vegetable curry and rasam. Fish or mutton is served once in a month.

**Punjab.** For a long time no school feeding programme was in operation in the Punjab. But skim milk supplied by the UNICEF and other voluntary

organisations such as the Red Cross, was being distributed to school children. This is now a CARE school feeding programme which was started in 1962, through which approximately 13 million pounds of milk are being distributed to 1 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 feeding programme for 5,00,000 children in 1962. The programme is assisted by CARE. It covers 1 million children, involving 13 million pounds of milk. The village council helps to raise local funds to provide utensils, fuel and other accessories.

**Uttar Pradesh.** There is no state government scheme for midday meals in Uttar Pradesh. Since 1953, a scheme has been in operation on voluntary basis covering 1,20,000 pupils. The meals consist of boiled, roasted or sprouting grams, groundnut, puffed rice, boiled rice, boiled potatoes, or seasonal fruits.

School feeding, as part of the Applied Nutrition Programme (ANP) was started in 1961. At present 79 feeding centres are serving 3,950 children daily. Each child is given eight ounces of 'khir' prepared out of one ounce of wheat or 2/3 ounce of rice, one ounce of jaggery and eight ounces 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 Organising Committee) of each primary school is responsible for organizing and running the scheme at the school level. The '*Shitatra Upsamiti*' (Sub-Committee) of the '*Kendra Samiti*' (Central Committee) helps

in running the scheme. The scheme is now in operation in 8,765 primary schools feeding 572,950 children. The public has donated a sum of Rs. 27,919 and food-grains worth Rs. 84,175 for the scheme.

From 1963 another scheme is 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. Milk powder is supplied at the rate of 16 pounds per child per annum. The milk feeding programme supplements the existing midday meals scheme in the state with the help of the local community on voluntary basis.

**West Bengal.** As early as 1928, a scheme of compulsory midday tiffin for school boys was started in Calcutta by the Keshay Academy. Substantial food at low cost was served to all pupils who paid a per capita fee of four annas per month. This school is still maintaining its tradition and now charges Re. 1 per head per month for the tiffin.

The Government of West Bengal and the Board of Secondary Education give special tiffin grants to those schools taking up the feeding scheme. As a result, some government and private schools of Calcutta have started supplying tiffin to their pupils. The Government schools charge Rs. 2 per head per month as tiffin fee.

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## CHAPTER IV

### Objectives of School Lunch Programmes

The school lunch programme can occupy an important place in the overall educational programme, if aimed at furnishing nutritionally adequate meals so that children can be healthy, well nourished and vigorous, and grow up to their full stature physically, mentally and socially. Besides supplying the nutritional needs and laying the foundation for health, the school lunch, as an integral part of the school health programme can fulfil educational goals in the school curriculum. It can serve as a medium for nutrition education for 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.

Good nutrition and nutrition education are the main objectives of the school lunch programmes. Through sound school feeding programmes pupils are helped to understand and appreciate the nutritional, social and aesthetic values related to eating.

The U. S. Department of Education gives the principal educational outcomes of the school lunch programmes as follows:

Helping pupils: Establish good habits of good selection.

Understand the importance of storing, handling, and preparing food in such a way as to protect its nutritive value and safeguard it against contamination.

Obtain the cooperation of parents to apply what they have learnt about foods.

Develop citizenship through appreciations of and responsibility for making the school lunch a social situation; inculcate a sense of responsibility for the lunch room: and the realization that good practices contribute to family and community health and well-being.

In some studies conducted in the U.S.A., pupils who participated in the school lunch programmes had registered significant increases in weights, other physical conditions, attendance and morale, and significant decreases in absences. The meals served at school were responsible also for the improvement of the lunches brought from home to school. This effect on the family meals was perhaps the most important effect. Both children and parents increased their consumption of milk. As a result of the experience, the teachers were motivated to become more effective in handling the school lunch programmes. Several schools had also started their own gardens.

Through these findings, the objectives of school lunch programmes can be stated as:

Children get some understanding of:

- 1 The characteristics of an adequate diet;
- 2 The relationship between diet and health;
- 3 The importance of a pleasant atmosphere to enhance appetite and digestion;
- 4 Good manners and consideration for others;
- 5 Sanitary handling of foods;
- 6 Satisfaction of working with others in carrying forward a successful project;
- 7 Relation between waste of food and waste of human labour, and
- 8 Significance of food in maintaining world peace.

The home, community and numerous socio-economic cultural factors influence food habits. The school lunch programme offers a unique opportunity to blend all these forces towards developing good food habits in children. The school meal room can serve as a laboratory for unearthing food fallacies, and help in establishing good habits not only in eating, but also in personal manners. Thus the school lunch is an effective tool to teach nutrition, desirable food habits, social living and harmony.

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## CHAPTER V

### The Nutritional Status of Children in India

Since 1936 the Indian Council of Medical Research has sponsored many investigations on the nutritional status of children through the study of the heights weights, ACH (Arm-Chest-Hip) measurement and clinical examinations in several states. These studies have revealed that a large majority of children manifested symptoms of deficiency diseases such as, angular stomatitis (white sores at the corners of the mouth) popularly known as 'mynah mouth', Bitot's spots (spots in the eyes); phrynoderma (rough skin) dental decay and mal-occlusion of teeth. The incidences of dental carries was found to be the highest in the upper socio-economic groups. . . . .

Dietary surveys carried out in the Nilgiris and Kerala revealed that the boys and girls eating tapioca were found to be smaller and lighter than children in other parts of South India where rice formed the staple food. This might have been due to the low intake of protein from tapioca diets. The incidence of phrynoderma in an orphanage in Coonoor was highest among younger children. Pellagra (rough skin and symmetrical redness and sores on the exposed portions of the body such as the palms) was prevalent in Vizagapatam due to the consumption of highly milled and polished raw rice as the staple food.

The results of a study conducted in Madras showed that children were undersized, with poor musculature and deficient subcutaneous tissue, and were suffering from under nutrition. In a great majority of the children, the skin was dry, lustreless and in-elastic; the haemoglobin levels of 2015 children were found to be between 1 gram to 2 gram per 100 ml; night blindness and nutritional edema were common; cases of xerosis (Inflammation of the eyes and the conjunctiva)

and Bitot's spots were relatively high. Incidences of angular stomatitis, angular conjunctivitis (sore eyes) glossitis (sore tongue), bleeding gums, phrynodermia, enlarged liver and fungal infections were also observed.

In a study of the nutritional status of 4,191 children within the age range of three to ten years in Assam, it was found that the physical development of the children was reasonably satisfactory. However, cases of xerophthalmia (dry and inflamed eye-particularly the cornea) dry skin and phrynodermia were common.

The diets of children of lower middle class families in Bombay state, particularly those of the school children in Dangs district were low in animal proteins and other protective elements. In an examination of 189 boys in an industrial school in Bombay, it was found that 169 of them had linear pigmentation of the conjunctiva and 137 had defective vision in one or both eyes.

Thus it has been observed, that the diets of children in almost all parts of India are deficient in calories and many essential nutrients such as proteins, vitamins and minerals.

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## CHAPTER VI

### Some Experiments with Supplementary Feeding in India

During recent years, considerable interest has been shown in our country towards evolving and using suitable supplementary foods from indigenous resources for improving the nutritional status of the vulnerable groups of the population, especially children of the pre-school and school going age. In view of the wide prevalence of protein malnutrition among children, it has become a matter of urgent necessity to utilise all the available foods rich in protein such as oil-seed meals as supplements to their diet.

The Central Food Technological Research Institute, Mysore has prepared vegetable milk from groundnut and soyabean fortified with minerals and the amino acid, methionine as a substitute to milk. Experiments were conducted on the nutritional status and general health of school children on diets supplemented with that vegetable milk and curds. Daily supplementation of 12 ounces of vegetable milk showed significant improvement on the growth and nutritional status of South Indian children, as revealed by their increases in weights, heights, higher retention of nitrogen, calcium and phosphorus.

Addition of fresh skimmed milk and milk reconstituted from skim milk powder to the diets of school children, produced enhancement of growth and improvement in the general conditions. Supplementation of soyabean protein with the amino acid methionine and of groundnut protein with the amino acids lysine and methionine also effected similar improvements.

The addition of a low cost protein food consisting of a blend of groundnut flour, Bengalgram flour and coconut meal in the ratio 2 : 1 : 1 and skim milk

powder to tapioca rice diets has been observed to produce a marked improvement in the growth promoting value of the tapioca rice diet. Furthermore, a composite protein food based on blends of coconut meal, groundnut flour and Bengalgram flour, fortified with calcium phosphate and vitamins has proved to be a good supplement to the poor rice diet. The effects of supplementation of 2 ounces of coconut meal to the diets of children resulted in their retaining significantly greater amounts of nitrogen, calcium and phosphorus as compared with those who did not receive the supplementation.

Supplementation of two ounces of the Indian Multi-purpose Food, consisting of a mixture of three parts of groundnut cake grits, and one part of Bengalgram grits enriched with vitamins and minerals also exerted a significant and beneficial effect on children of four to 12 years of age.

### **The Indian Multipurpose Food (IMPF)**

The Indian Multi-Purpose Food is a supplementary protein rich food manufactured scientifically with the groundnut meal as the base, using a formula evolved at the Central Food Technological Research Institute, Mysore, at the request of the Meals for Millions Association of USA. It is a mixture of groundnut flour and Bengalgram dhal flour fortified with the calcium carbonate and vitamin A acetate, thiamine hydrochloride riboflavin (B-2) and vitamin D (calciferal). The MPF furnishes most of the essential nutrients present in egg, milk curds and vegetables at a low cost. Two ounces (10 tea-spoonfuls) of MPF is equivalent to  $\frac{1}{4}$  lb. of meat, 2 cups of milk and one plateful of peas in its protein value. Two ounces of MPF provide a third of daily requirements of proteins, vitamins and minerals for adults, and half of the requirements of children.

Investigations carried out by the Nutrition Research Laboratories, Hyderabad, CFTRI, Mysore; and several

hospitals have shown that the MPF is highly effective in curing Kwashiorkor, the protein deficiency disease among children.

All the studies show that protein rich foods of vegetable origin, such as milk substitutes, balanced malt foods, nuts, biscuits, Multi-purpose food and protein food containing coconut meal could be probably used as good supplements in feeding programmes.

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## CHAPTER VII

### Methods of Teaching Nutrition to Children

Nutrition education is important in the pre-school and primary school because life time food habits are established during childhood. Teaching good nutrition at this stage influences 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 small quantities in a school lunch room where a cheerful atmosphere is maintained with comfortable 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. Adults should not expect children to consume fixed quantities or proportions of foods.

The following are some of the methods through which children can be taught good selection, eating habits and manners :

1. Telling interesting stories
2. Animal feeding experiments
3. Displaying posters attractively
4. Cultivating vegetable gardens
5. Surveys
6. Discussions on and planning menus
7. Marketing for food
8. Visits to kitchens to see the cooking food, and cooking and serving means
9. Dramatisation

10. Keeping records of weights and heights and such.

1. *Telling stories.*—Children are very fond of stories. Stories of animals or other children of their own age appeal to them a great deal. In such narratives children often identify themselves with the main characters in the story. This may be used to advantage to communicate information on good food habits.

2. *Animal feeding experiments.*—All children want to grow well and be healthy. Therefore children 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. Moreover, when children themselves, observe their weights and growth periodically, they develop an interest to learn about the different foods and their effects on growth. Once children are convinced that food influences their growth, they become vitally interested in consuming adequate diets.

3. *Displaying posters attractively.*—Posters aid in covering nutritional information in a simple but arresting manner. They leave a permanent impression in the minds of children. Like story telling this method also exploits the innate interest of children.

4. *Cultivating vegetable gardens.*—School gardens afford another opportunity for children to observe growth in living organisations. Growing plants help children to understand that growth needs nourishment. When children enjoy the fruits of their own labour from the garden, they appreciate better the importance of foods. Further more raising a school garden serves as an incentive to have gardens at home and thus promotes the consumption of fresh, raw vegetables and fruits in the families.

5. *Diet surveys.*—Children's existing food habits, needs and problems must be studied through questionnaires and dietary surveys. Whether or not they include the important food items in their diets need to be elicited. Thereafter discussions on the different menus, their nutritive values, marketing for foods, and planning meals should follow.

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

7. *Marketing for food.*—Visits to the markets would enable children to become familiar with a variety of foods available and create in them a curiosity to know how the different foods would taste. This experience makes the introduction of new foods in the school lunch easy.

8. *Visits to kitchen to see the cooking of foods and serving meals.*—The thrill of observing the various processes involved in cooking food and of participation in some aspects of the cooking procedures may arouse the interest of children to look forward to enjoy eating the food items they had cooked or observed. Serving food helps to develop appreciation for hygienic handling of food, keeping the dining room tidy, aesthetic arrangements and being gracious hosts.

9. *Dramatization.*—Children love to act. This is yet another innate trait of children. Dramatization of a theme or a story creates lively interest amongst the spectators. The dramatic moments and scenes make lasting impacts. Dramatization of stories in nutrition fulfils two tasks enjoyment plus nutrition education.

10. *Keeping records of weights and heights.*—The weights and heights of the children can be taken

regularly for each child and plotted as a graph. Children are always eager to watch their individual growth curves. They will then endeavour to keep the weight record on the upward trend. Regular noting of weights, and keeping growth records will help to stimulate interest in health practices. Comparison of signs good and poor nutrition is another method of teaching nutrition to children.

### **Enlisting Cooperation of Various Agencies**

In the successful implementation of nutrition education programmes cooperation from numerous agencies is necessary. First of all the active cooperation of the school teacher is essential for the success of the programme. She must be convinced about the important role of the school lunch programme help in the preparation and distribution of the meal. The school lunch and nutrition education must be integrated with the school curriculum as an important part of the health education programme.

Formation of committees on which managements, administrators, teachers, pupils, parents, and teachers in charge of school feeding are represented is conducive to planning useful educational programmes. Such representation stimulates concern for the success of the undertaking and makes for better programmes, since it takes note of different points of view. Establishment of Parent Teacher Associations will facilitate greatly the fulfilment of the purposes of nutrition education programmes. Workshops on nutrition education need to be organised for teachers who are involved in the conduct of the nutrition projects. Sponsoring joint nutrition projects between the health and nutrition agencies in the community is effective in planning and carrying out nutrition education programmes.

The Central Health Education Bureau of the Union Ministry of Health has published useful pamphlets

and visual aids for teaching nutrition. Some food industries extend assistance for furthering nutrition education through their staff and information materials such as booklets, pamphlets and films. The extension workers in Community Development offer unlimited opportunities for promoting nutrition education through their activities such as group meetings, exhibits, village camp, melas, display of posters and other teaching aids and distribution of literature. Mass media techniques such as the radio, movies, books, magazines, comics and newspapers are of great value in teaching group.

In the nationwide Applied Nutrition Programme started by the Union Ministry of Community Development with the collaboration of FAO-UNICEF-WHO and State governments special emphasis has been placed on the proper organisation of school feeding programmes. They regard that school feeding should be the responsibility of the panchayats and executed through the help of the mahila samities. The benefits of the Applied Nutrition Programme should be extended beyond the school to the homes and the community to supplement the nutrients lacking in the diets given in the homes.

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## CHAPTER VIII

### **Requirements for Organising School Lunch Programmes**

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

- (A) Adequacy of the meals,
- (B) Sound management,
- (C) Educational emphasis, and
- (D) Well-trained lunch personnel.

#### **(A) Adequacy of the Meals**

For a majority of children in our country, 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 (1) understanding the nutritional needs of children, and (2) providing meals to fulfil their nutritional requirements.

#### *(1) 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; he is 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 the preschool and early school years. The period between the weaning time and the beginning of adolescence is one steady growth when all the nutritional requirements, protein, carbohydrates, fats, vitamins and minerals should be met adequately in order to sustain growth, and for

\*Stuart, Children's needs during growth and development, J. A. D. A., Vol. XXV, 1949, p. 934.

achieving maximum development and resistance to disease.

The nutritional requirements of children have been determined carefully for the various age groups by the Nutrition Advisory Committee of the Indian Council of Medical Research, as shown in the Table I.

TABLE I

*Recommended daily nutritional allowances for Children 5—11 years age, as recommended by the N. A. C. India*

Age group years	Calo-ries	Pro-tei-n gm.	Cal-cium gm.	Iron mg.	Vita-min A. I.U.	Thia-min mg.	Ribo-fla-vin mg.	Vita-min C mg.
5-7	1400	60	1.0	10	3000	.5	2	30
			to 1.5	to 30	to 4000	to 1.0	to 2.2	to 50
7-9	1800	50	1.0	10	3000	.5	2.2	30
			to 1.5	to 30	to 4000	to 1.0		to 50
10-12	2100	50	1.0	10	3000	.5	2.2	30
			to 1.5	to 30	to 4000	to 1.0		to 50

The caloric requirements of children have been calculated on the basis of age, size, activity and rate of growth. The quantity of the protein required by growing children is much greater per kilogram of body weight than that required by 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 calories, vitamins and minerals present in the diet, the physiological state and the quality of the protein itself. Calcium, though occurring in small quantities in the body, is important for bone formation, muscular contraction, regulations of nervous functions and the working of the heart muscle. Calcium plays a unique part in promoting growth.



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 utilisation 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 characterise growth in children, they need higher quantities of thiamine and riboflavin than adults.

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

While developing criteria for appraising the management factors in a school lunch programme high priority must be given to the nutritive value of the lunches served.

## 2. *Providing meals to fulfil the nutritional requirements*

Those responsible for planning school lunch menus must be 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 must be included in the menus in interesting combinations, to reduce cost.

Low cost balanced menus for school lunch programmes have been published by the Nutrition

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

Research Laboratories\* and by the CFTRI\*\*. The School Health Committee has also compiled menus suitable for school lunch programmes in the different parts of India. Some standardised low cost recipes, using the locally available foods and skim milk suitable for school lunches to supply one third of the daily nutritional requirement are given in Appendix III. These menus do not require elaborate cooking. They can be easily achieved with locally available resources at reasonable costs.

### (B) Sound Management of the Lunch Programme

The factors essential for the successful management of school lunch programmes are: (1) The administrative set up, and (2) Physical requirements.

#### 1. *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 accounting system should be simple, sound and accurate. The location of the lunch room should be within the school buildings.

#### 2. *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 student labour used, assistance provided by persons

\*Nutrition Research Laboratories, Coonoor, South India, Ministry of Health, Govt. of India. Menus for low Cost Diets and School Lunch Programmes suitable for South India. New Delhi, Central Health Education Bureau, Directorate General of Health Service, Ministry of Health, Govt. of India, 1958, pp. 6-37.

\*\*Central Food Technological Research Institute. Balanced Diets and Nutritive Value of Common recipes, Mysore, 1960, pp. 17-53.

and parents who are not directly connected with the food production and service, the amount and type of equipment available, training of personnel, experience and work habits of workers, and the supervision of workers.

The lunch room must be a cheerful place. The construction of the lunch room and equipment should be sanitary and easy to clean. The walls and floors of the lunch room should be safe and functional to permit work and conversation without confusion. The furniture should be sturdy and of the correct height and other dimensions for comfortable use by children. Good planning of the lunch room is essential to achieve success. In such planning the location, size, space and construction, lunch room and its equipment are important. The furnishings must make the room bright, attractive and easily cleanable. The equipment must be adequate and satisfactory. Labour saving devices should be used to 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 establishments must be sunny 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 available near the lunch-room.

The following points should be considered specifically, while planning school lunch room.

(i) *Location*.—The pattern of the entire school building should determine the most convenient location of the school lunch room and the best arrangement for it.

(iii) *Space requirements*.—Ample space should be 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 must be made available. Deliveries of supplies and services must be made at the school.

(iv) *Equipment—durability of materials.*—To get maximum returns for the money expended, the materials used for the manufacture of equipment should be functional and durable.

(v) *Sanitation.*—The construction of the lunch room and the equipment procured should be sanitary and easy to keep clean. They should be of such material and make that harbouring of redents, vermin, or infection will not be possible. Sanitary facilities for the storage of dry foods and perishable products are essential.

(v) *Environments.*—Cleanliness, good lighting, cheerful colours, proper ventilation, noise control, convenient electric connections, provision of space for bulletin boards and educational exhibits all add to the attractiveness of the school lunch room and help pupils, employees and the country to develop pride in the set up.

### (C) Educational Emphasis

The quality of management is reflected in the educational emphasis given to the school lunch programme. It depends on the training given to school lunch workers. A well organised school lunch programme needs to have a trained and experienced manager with the assistance of the headmistress, the home science teacher, and other interested teacher participants, she can render immense service to the programme.

The success of the school meal programmes depends on the ability of the teacher in-charge. She must possess the following essential qualities :

Sound knowledge about food, ability to plan menus with nutritious foods and educate children in good

food selection and capacity to train the cooks and the servers.

Training programmes must be planned for teachers in charge of school lunches based on developing their skills and influencing attitudes. The objectives for such training should be:

Giving and understanding of the services the lunch room renders to the community;

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

Stimulating an interest in nutrition through food preparation and service;

Acquiring knowledge and developing desire for good work habits, high standard of sanitation, safety and participation.

## CHAPTER IX

### Organisation and Efforts of the School Lunch Programme

*(This part of the book describes the school lunch programme which was organised in Sri Avinashilingam Basic School)*

The Avinashilingam Basic School which was started in June 1962 situated on the college campus under the same management, was selected for this study on the organisation of the school lunch programme, because of the facilities available, the interest evinced by the administrators, and the cooperation extended by the teachers. The organisation of the school lunch programme consisted of the following steps :

- 1 Selecting the sample of children for the study
- 2 Securing financial assistance for the school lunch
- 3 Finding space for the lunch room and the kitchen
- 4 Procurement of equipment and furniture
- 5 Planning menus and estimating quantities of foods to be cooked
- 6 Procurement and storage of provisions
- 7 Standardisation of recipes
- 8 Training the cooks
- 9 Standardisation of servings and methods of serving
- 10 Recording observations on children, and their food intakes
- 11 Recording of heights, weights and other details on the nutritional status of children
- 12 Maintenance of cleanliness in the lunch room

13. Conducting nutrition education activities, and
14. Evaluation of the results.

### 1 Selection of the Samples of Children for the Study

Seventy-eight pupils 5 to 9 years old, were enrolled in the school, 40 in the first grade and 38 in the second grade. The teachers were in charge of these grades. The distribution of the children according to sex and steps:

	Boys	Girls	Total
I Class	16	24	40
II Class	9	29	38
<b>TOTAL</b>	<b>25</b>	<b>53</b>	<b>78</b>

The procedure adopted for selecting the experimental or the school lunch sample was as follows:

A circular was sent on 10th of August, 1962 to all the parents extending an invitation to their children to join the school lunch programme which was planned to start free of cost from the first of September, 1962. On the basis of the replies received from the parents, a sample consisting of 30 children including 17 girls, 5 to 7 years of age, all of whom happened to be in the first grade, was selected for the 'School Lunch' sample. A corresponding group of 30 children in the same class and age range, with identical sex distribution was selected as "Control" or "Non-School Lunch" sample, to compare the effects of the school lunch programme. Thus the selection for the 'School Lunch' group was made on the basis of the responses of the parents regardless of the economic need or other conditions. However, it was interesting to note that the average monthly income of the parents of the children in the "School Lunch" group was Rs. 117/- per month, while that of the parents of the children in the 'Control' group was Rs. 159/- per month. Thus parents with higher income did not opt for their

children joining the school lunch programme. This may be due to the popular notion that the free midday meal feeding was for feeding "the poor".

## **2. Securing Financial Assistance**

The school lunch programme or the 'midday meal scheme' as it is popularly known, is offered free of cost in most schools in the country. Therefore securing financial assistance on a continuing basis is of vital importance. The sources of assistance are: local Mahila Mandals (Mathar Sangams), voluntary organisations, and philanthropists in the community, state and central governments, and International agencies. The assistance comes in many forms donations in cash, kind and labour by the community: pupils' participation and teacher contributions in terms of service and materials. In this study, the assistance available from the Madras Governments' Midday Meal Scheme was utilised by taking the following steps:

### **Formation of the Donor's Committee . . . . .**

As per the rules laid by the Government of Madras given in Appendix II a 'Donor's Committee' should function in a school for becoming eligible to receive the matching grant of 6 paise per meal from the State Government, the Donor's Committee meeting at least 4 paise per meal. The Donor's Committee consists of all the members who contribute towards defraying the expenses of the school lunches in cash, kind or labour. The Donor's Committee is responsible for selecting the pupils for the school lunch programme, collecting donations, maintaining accounts, preparing menus and supervising the lunch programme.

An appeal was made in the month of August 1962 to all the students and pupils of Sri Avinashilingam Education Trust Institutions, parents and well-wishers in the community, through the Social Service Association of the college for raising donations. The response was spontaneous and generous in that 203 students and 37 members from the public contributed a total sum of Rs. 1349 within a month. A meeting of all



the donors was convened in November to elect the office bearers to the Executive of the "Doctor's Committee". At that meeting the purposes and functions of the school lunch programme were explained to the members. Thereafter, the newly elected Executive Committee undertook the entire responsibility of securing financial assistance for organising and operating the school lunch programme.

### 3. Finding Space for the Lunch Room and the Kitchen

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 hands. The lunch room used in this study is shown in Figure I.

The kitchen of this lunch room is well ventilated, adequate in dimensions provided with exit for smoke through the smokeless chulas, work platforms at a convenient working height of 30", consisting of areas for preparation, cooking and washing of foods, and sinks and drain boards. Built-in shelves are conveniently located to keep the daily provisions and cooking utensils. The pantry with its built-in shelves gives additional storage space for keeping the serving utensils, plates and glasses. The counter for serving food is useful for arranging the plates of served foods.

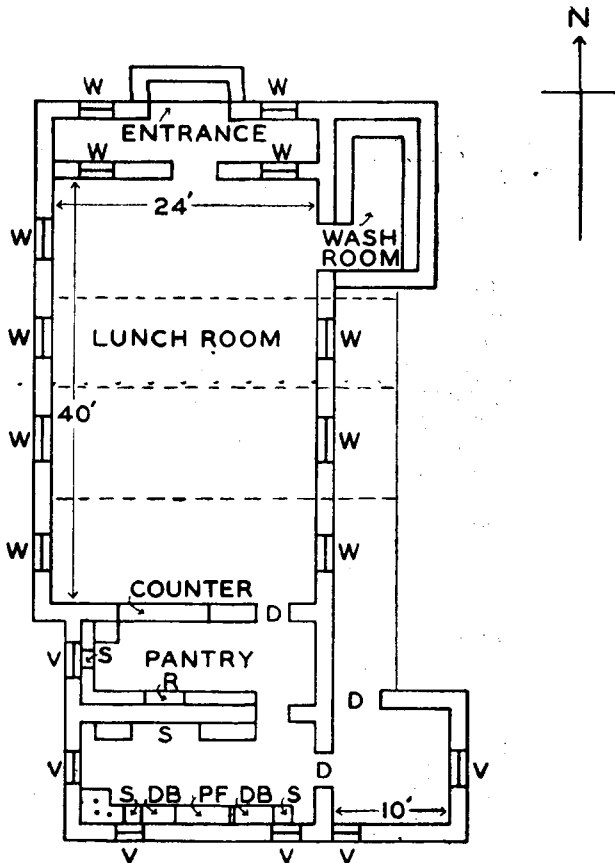
#### The Lunch Room

The lunch room in Figure I is spacious, well ventilated and adequate in area. The floor is smooth and easily cleanable. The walls are white in colour (can be in light colour also). They are useful for displaying effectively the pictures and posters to interest children in nutrition information. When the lunch room adjoins the kitchen and pantry as shown in Figure I, food service becomes convenient, efficient, and quick. The surroundings of the lunch room must be pleasant.

#### Wash Place

As shown in Figure I, the wash place or room adjoins the lunch room to enable pupils wash their

SRI AVINASHILINGAM HOME SCIENCE COLLEGE  
 PLAN OF THE SCHOOL LUNCH ROOM & KITCHEN



KEY	}	D.	DOOR
		W.	WINDOW
		V.	VENTILATOR
		R.	RACKS
		S.	SINK
		D.B.	DRAIN BOARD
		P.F.	WORK PLAT FORM

Figure 1

hands and plates conveniently before and after the lunch. The water taps are at a height easily reachable by pupils. Drainage facilities and racks for putting away the plates are provided.

#### 4. Procurement of Equipment and Furniture

Equipment is required for the following purposes: (a) storing provisions, (b) preparing meals, (c) measuring and weighing foods, and (d) for seating pupils and serving foods. Keeping these in view, the equipment needed for this lunch programme was purchased. The details of the member, the material of which they are made for durability and the sizes are given in Table II.

TABLE II

*List of equipment and furniture used in this lunch programme for thirty children*

Purpose	Equipment	Number	Cost	Material	For
(1)	(2)	(3)	(4)	(5)	(6)
(a) For storing provision	Containers-large	4	Rs. P. 24.00	Aluminium	
	Containers-medium	4	16.00	Aluminium	Redgram dhal, green gram dhal, jaggery, and chillies.
	Containers-small	10	5.00	Zinc	Condiments
	Condiment box	1	5.00	Wood	Condiments for daily seasoning
	Can with a spout	1	1.00	Zinc	Gingelly oil
	Porcelain jar with a lid	1	3.00	Porcelain	Salt
	Cane basket	1	1.00	Cane	Vegetable and onion
			55.00		

(1)	(2)	(3)	(4)	(5)	(6)
(b) For preparing meals	Big 'adukku' (degshi)	3	27.00	Brass	Rice, payasam, and vegetables
	'Vanali' (Kodali)	1	2.00	Iron	Seasoning
	'Degshi' covers	3	9.00	Brass	Covering cooking utensils
	Spoons	6	3.00	Stainless steel	Taking out condiment
	Ladles (for stirring)	3	1.00	Wooden	Stirring during cooking
	Knives	2	8.00	Stainless steel	Cutting vegetables
	Water container	1	10.00	Zinc	Drinking water
	Cutting board	1	1.00	Wood	Vegetables
	Bucket	1	4.00	Aluminium	Water
	Dust-bin	1	5.00	Tin	Garbage
			70.00		
(c) For measuring and weighing	Weighing Scale (small, metric, spring, or ordinary)	1	75.00	Steel	Weighing foods
	Standard measuring cups or similar measures	One set of four consisting of 1 cup $\frac{1}{2}$ cup $\frac{1}{3}$ cup $\frac{1}{4}$ cup	4.00	Aluminium	Measuring ingredients and volumes of servings.

(1)	(2)	(3)	(4)	(5)	(6)
	Standard measuring spoons	One set of four 1 table spoon 1 tea-spoon $\frac{1}{2}$ tea spoon $\frac{1}{4}$ tea spoon	1.00	Aluminium	Measuring condiment
			80.00		
(d) Seating pupils and serving meals	Mats (Small)	30	15.00	Straw	Seating children
	Tables	6	90.00	Wood	Serving lunch
	Plates	30	300.00	Stainless steel	-do-
	Waterpot	1	30.00	if aluminium	Storing water
	Glasses	30	60.00	if brass	Serving pay- asum
	Glasses	30	90.00	stainless steel	
	Glasses	30	15.00	if aluminium	Water
	Glasses	30	30.00	Brass	
	Foot mats	2	15.00	Iron	Wiping feet
	Pictures	4	10.00	Card-board	Nutrition education
			610.00	if stainless steel plate and glasses are used	
			265.00	if aluminium plates and glasses are used	

*Summary of total cost :*

Rs.

(a) Equipment for storing provisions	. 55.00
(b) Equipment for preparing meals	. 70.00

c) Equipment for measuring and weighing . . . . .	80.00	
(d) Equipment for serving meals	610.00	
<b>TOTAL</b> . . . . .	<u>815.00</u>	if stainless steel utensils are used for serving
	or	
	470.00	if aluminium utensils are used for serving.

### 5. Planning menus and Estimating Quantities of Foods to be Cooked

Planning is the key for the success of school lunch programme. The lunches must be satisfying psychologically and nutritionally. Therefore the menus for the school lunch must be carefully planned 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) pleasing colour, texture, taste and flavour, (f) novelty in order to be exciting and interesting and at the same time not drastically different from the familiar food patterns, (g) attractiveness and appetising qualities. The steps involved in planning the school lunches are:

- (i) Calculation of the nutritional requirements
- (ii) Selection of foods to supply the nutritional requirements
- (iii) Planning menus using the selected foods
- (iv) Estimating quantities of foods to be cooked

#### (i) Calculation of the Nutritional Requirements

Form the allowances recommended by the Indian Council of Medical Research for children of age group 5 to 7 years, one-third of the daily requirements must

be computed as the nutrients to be supplied by the school lunch, as shown in Table III.

**TABLE III**

*Recommended Nutritional Allowances and 1/3 of the Recommended Allowances for 5—7 years old children (ICMR)*

Calories and nutrients	Amount per day	One third of the daily allowances
Calories . . . . .	1500	500
Proteins (gm.) . . . . .	60	20
Calcium (gm.) . . . . .	1	0.333
Iron (mg.) . . . . .	10	3.33
Vitamin A (IU) . . . . .	3000	1000
Thiamine (mg.) . . . . .	500	167
Riboflavin (mg.) . . . . .	2.2	0.730
Niacin (mg.) . . . . .	15	5
Vitamin C (mg.) . . . . .	30-50	10-16

Care must be taken to ensure that the lunches furnish a little more than the amounts of nutrients given in the above Table III to allow for losses which are likely to occur in cooking and serving.

**(iii) Selection of Foods to Supply the Nutritional Requirements**

The next step is to select the foods which will provide the nutrients needed, given priority to locally available protein rich inexpensive foods. For example in this study, the nutrients given in Table III obtained from combinations of the commonly available foods listed below.

Parboiled rice\* and whole wheat rava were selected as the staple foods for the meals. They were used on alternate days in recipes which were simple, attractive, tasty and easy to cook and serve. The pulses used were greengram dhal as they were familiar to the children and could be used in recipes combined with rice. The Indian Multi-Purpose Food which is being furnished free by the Government of Madras and CARE milk powder supplied free and distributed for the midday meal schemes by the State Government were included to enrich the protein content of the meals. Skim milk, being a protein rich-calcium food, became an indispensable item of the daily lunch.

Green leaf vegetables were added because of their rich nutrient content, availability throughout the year, and feasibility for children to grow them in their own school gardens. Beans, clusterbeans and other types of bean were the other vegetables used because of their comparatively higher nutritive value. Jaggery was selected to sweeten the skim milk beverage because of its slightly higher nutritive value and lower cost as compared to sugar. Small quantities of condiments such as chillies, coriander seeds, mustard seeds and turmeric powder were used along with gingelly oil and salt to season the food preparations.

### **The Nutritive Values of the Foods Used for the Midday Meals in this Study**

*Rice.*—Rice being the staple food of more than half the human race is quantitatively the most important of the cereals. The main constituent of the daily diet of people in countries such as India, Ceylon, Southern China, and several others in the South East Asian region, is rice.

Although the protein content of rice is lower than that of many other cereals, the proteins of rice are of food quality. It has been proved that the Biological

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\*Parboiled rice is prepared from paddy soaked in water and boiled or steamed for about thirty minutes, dried, and husked.



value\* (BV) and Digestibility Co-efficient (DC)\*\* of rice proteins are higher than those of any other cereals mixtures in terms of their supporting growth and maintenance. Rice contains valuable amounts of the 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 phosphorous content even when highly milled. This is because some of the vitamins contained in the germ and pericarp 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, cholam. Whole wheat contains more proteins than rice. Wheat proteins have superior digestibility and higher biological values than those of millets.

*Pulses.*—Red gram dhal contains a high percentage, 23.54 of protein, and green gram dhal 23.79 to 29.75 per cent. Red gram dhal along with rice and skim milk powder gives a protein mixture which is sufficient both for growth and maintenance. The proteins of a mixture of green gram, rice and skim milk, show greater efficiency in supporting growth and maintenance than when they are consumed alone.

*Amaranth.*—The leaf green vegetable is rich in calcium, iron, riboflavin, vitamin A, vitamin C and other nutrients. The biological value of the proteins of amaranth are superior to those of wheat, rice or other cereals and dhals.

*Indian Multi-Purpose Food (IMPF).*—The Indian Multi-Purpose Food consists of low fat ground-nut

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

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

flour and Bengal gram flour fortified with calcium phosphate, vitamins A and D, thiamine and riboflavin. The supplementary value of MPF to rice diets is of a high order.

*Skim Milk.*—Milk is an outstanding food because it contains most of the essential nutrients. It represents the most economical and efficient conversion of the protein of field crops and the pastures into human food of high nutritional efficiency, rich in proteins, calcium and other minerals and riboflavin. The best proteins for supporting growth are those available from milk and egg. The protein of milk, namely, the lactalbumin, has greater biological value than any other purified protein known. Skim milk powder is inexpensive as compared to whole milk, although it retains in a concentrated form all the valuable nutrients, the body building materials, vitamins, mineral salts, and the non-fat milk solids which are present in fresh milk. A combination of rice and skim milk powder is highly efficient for growth and for improving the nutritional status of school children. Since getting fresh milk is beyond the means of many families, at least reconstituted skim milk should be provided in all school feeding projects, so that children will receive a meal that will supply the needed quantities of nutrients for the day. The FAO Seminar on School Feeding recommended that milk which is the most important food for children, should form the basis for school feeding programmes and that imports of powdered skimmed milk in countries which do not have adequate milk supplies and where nutritional problems exist among the vulnerable groups, particularly school children, should be encouraged.

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

*Gingelly Oil.*—Gingelly oil is one of the vegetable oils commonly used in India for cooking purposes. Coconut, groundnut, linseed and mustard oil are the other

oils. They contain almost 100 per cent fat and are therefore energy giving 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, coriander, chillies, onions and mustard seeds were the condiments used in the study to make the foods palatable.

### (iii) Planning Menus Using the Selected Foods

Utilising the food listed above, four different types of menus were planned as shown below:

*Type I consisting of:*

- 1 A cereal preparation.
- 2 A combined dhal plus leafy vegetable preparation.
- 3 A milk preparation called payasam with skim milk powder, jaggery, and IMPF.

*Type II consisting of:*

- 1 A combined cereal plus dhal preparation.
- 2 A leafy vegetable preparation.
- 3 A milk preparation called payasam with skim milk powder, jaggery and IMPF.

*Type III consisting of:*

- 1 A combined cereal plus vegetable preparation.
- 2 A leafy green vegetable preparation.
- 3 A milk preparation called payasam with skim milk powder, jaggery and IMPF.

*Type IV consisting of:*

- 1 A combined cereal plus dhal plus leafy green vegetable preparation.

2 A milk preparation called payasam with skim milk powder, jaggery and IMPF.

The menus thus planned for a week of 6 days in this study are given in Table IV.

**TABLE IV**  
**The Weekly Menus Planned for this School Lunch Programme**

Days	Menu
(1)	(2)
1. Monday .. .. .	(i) Lime rice (ii) Dhal and greens K'cotu'* (iii) MPF payasam
2. Tuesday .. .. .	(i) Wheat kitchadi (ii) Greens 'pugath'* (iii) MPF payasam
3. Wednesday .. .. .	(i) Rice kitchadi (ii) Greens pugath (iii) MPF Payasam
4. Thursday .. .. .	(i) Uppuma (ii) Dhal and greens kochu (iii) MPF payasam
5. Friday .. .. .	(i) Sambar rice (ii) Greens pugath (iii) MPF payasam
6. Saturday .. .. .	(i) Wheat kitchadi (ii) Greens pugath (iii) MPF payasam

\*Vegetable preparations.

#### (iv) Estimating the Quantities of Foods to be Cooked

The cost and quantities of foods calculated to supply one-third of the daily nutrients per child, and for 30 children through the school lunch are given in Table V.

TABLE V

*Cost and Quantities of Foods required for Furnishing one third of the daily Nutritional Allowance for thirty children 5—7 years old*

Foodstuff	For one child		For 30 children	
	Quantity gm.	Cost paise	Quantity gm.	Cost paise
Rice or wheat rava .. ..	56	2	1,680	60
Green dhal or red gram dhal ..	14	1	420	30
Greens (amaranth) .. ..	42	1	1,260	30
Jaggery .. ..	16	1	480	30
Oil .. ..	10	1	300	30
Condiments .. ..	2	1	60	30
Indian Multi-Purpose Food ..	11	2 (free of cost in Madras)	330	60
Skim milk powder .. ..	19	free of cost	570	free of cost
Fuel .. ..		1		
		10		270

The cost of the food stuffs included in the school lunch per child per day amounted to 7 paise without MPF and 9 paise with MPF. Adding the cost of fuel and services, the cost comes to 10 paise which is within the ceiling prescribed by the Madras Government for purposes of grant. The nutrients supplied by the quantities of foods included in the weekly menus for the school lunches, as calculated from the figures given in the ICMR Special Report 42, are given in table VI.

TABLE VI

*The nutrients furnished by the School Lunches*

Days of the week	Calo- ries	Protein gm.	Cal- cium mg.	Iron mg.	Vita- min A I. U.	Vita- min B micro- gram	Vita- min B micro- gram	Niacin mg.	Vita- min C mg.
Monday .. .. .	521	20.81	680	14.80	3,405	353.33	416.0	43.4	74
Tuesday .. .. .	521	24.26	702	15.55	3,459	541.33	503.00	44.0	74
Wednesday .. .. .	521	21.06	580	13.75	3,394	455.00	399.00	42.9	74
Thursday .. .. .	521	24.01	702	15.60	3,467	539.33	529.00	43.5	74
Friday .. .. .	527	21.31	694	15.30	3,468	375.33	433.00	42.8	82
Saturday .. .. .	520	24.21	702	15.55	3,459	541.00	520.00	44.0	74
Average per day .. .. .	522	22.61	673	15.10	3,442	467.50	465.02	43.0	75
One third of the daily require- ments .. .. .	500	20.00	333	3.33	1000.0	167	730	5.0	10 16

## 6 Procurement and Storage of Provisions

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

The total number of lunches to be served in this study was first calculated based on the number of days the meals were to be supplied. From the total number of lunches required to be served, the quantities of ingredients needed were calculated based on the food allowances given in table V. The estimated quantities of the ingredients were then 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, redgram dhal, greengram dhal, and the dry condiments were purchased monthly, jaggery, fortnightly; gingelly oil, weekly; and vegetables daily, besides those grown in the school garden.

Rice, wheat and the dhals were cleaned, dried in the sun, and stored in large containers. The condiments were cleaned and stored in small containers. Jaggery was stored in a dry porcelain container. Gingelly oil was stored in a jar with a sput to facilitate pouring. Salt was stored in a porcelain jar covered with a lid.

## 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, produced the expected products, when the standardised cooking procedures are applied. A series of preliminary experiments were conducted to standardise the recipes for the menus planned and the cooking procedures. Appendix III gives the details of the recipes, quantities of ingredients, and the procedures as finalised.

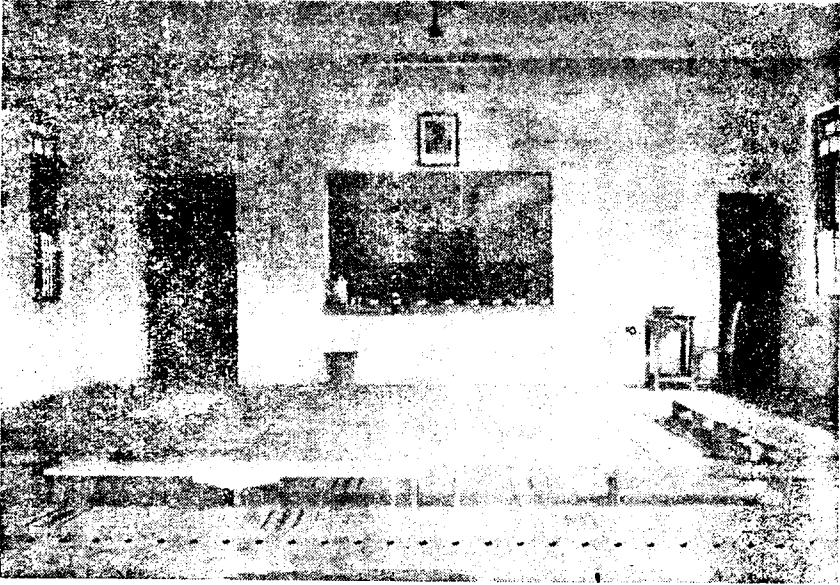


Fig. 2. Arrangements of Plates and Timblers on the counter.



Fig. 3. A Lunch Plate



## 8. Training the Cook

Training the cook is another important aspect of the midday meals programme. The cook needs 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 vegetable before cutting; cutting the vegetables into large pieces (approximately one inch square sizes); using just the right amount of boiling water for cooking vegetables so that no cooking water will be thrown away; washing rice with minimum water, the "absorption method of cooking" for preparations, with rice and wheat rava. These methods were first demonstrated to the cook and opportunities provided for her to practise them. Periodic evaluation on the methods of food preparation practised by the cook facilitated her learning.

## 9. Standardisation of Services\* and Methods of Service

The provisions required for the daily lunch according to the menus planned on the basis of the calculations given in table V were weighed on a metric scale and given for cooking. After the completion of cooking, the weight of the cooked dish was noted for the individual preparations and the weight of a serving computed by dividing the total cooked weight by the number of children to be served. In the case of the main item, the cereal preparation, the average serving was further divided into two portions, in order to serve it in smaller quantities. The plates with the serving off the items of the menus were arranged on the counter as shown in Figure 2.

For the purpose of recording in this study, children were given plates which were numbered. For example, the plate with the number one was always given to the pupil whose assigned number was one,

\*Such standardisation is necessary in a research study and not for a normal school lunch programme.

and so on. Throughout the study the children were very particular about their own numbers, and helped the investigator to see that no one got a plate other than his. When all the children had taken their assigned places, the plates served with the lunch items as shown in Figure 3, were placed on their tables. When all the children had received their plates, they said prayers (grace) and started eating. When they had consumed the portions served first, the milk preparation, namely, the MPF Payasam, was served along with the second half of the first serving of the cereal preparation. Additional servings of the cereal preparation were given, if desired, only after the children had consumed the milk preparation. Some children stopped with the first portion of the cereal, some with the second, and a few requested even third or fourth portions. The milk preparation was given in-between two servings in order to ensure its consumption, as otherwise if greater quantities of the other items were consumed first, children might feel full and refuse the payasam which carried the valuable food, milk. The intake of water during the meal time was also minimised for the same purpose.

When the pupils finished the lunch, those with clean plates proceeded to the wash room with their plates. Those who had left some food or payasam were requested to leave their plates and glasses on the table and go for washing their hands. The left over foods were then weighed and recorded. The food intake was computed by subtracting the amount of plate waste from the amounts served.

The Mukhya Sevika trainees\* of the college assisted in serving the lunches, since experience in midday meal programme was a requirement in their curriculum. They came in small groups every day at lunch

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\*The Mukhya Sevikas are the women Social Education (extension) workers in Community Development Blocks. These procedures were outlined in order to make available the experience to the Mukhya Sevika trainees. Otherwise these bases can be carried out by pupil-teacher participation.

time : 12-30 p.m. to serve the lunches. The steps and procedures involved in serving were explained to them. They were : cleaning the lunch room, washing all the plates and glasses and rinsing them in boiling water, arranging the tables, spreading the seating mats, arranging the plates and glasses in the numerical order on the counter, weighing and measuring the items of the menu according to the calculations given by the investigator, setting the foods into pleasing shapes attractively, serving the first portion of the cereal preparation on all the plates, and the side dish in small cups, weighing and distributing the milk preparation MPF payasam in the glasses meant for the purpose, filling the other glasses to half volume with drinking water (the amount of water was restricted to help children consume maximum lunch), serving additional portions, helping in the collection of plate waste, washing the



Fig. 4. Children during the Lunch Hour

plates and glasses after the meals were over, cleaning the lunch room, kitchen and all the used equipment after the meals, and leaving the lunch room in order for the next day.

#### 10. **Recording Observation on Children and their Food Intakes**

In order to record the quantities of foods served to and consumed by the children and the observations on their eating habits, the services of their teachers were utilised. Each 'observer' was required to make observations on six children daily as shown in Figure 4 and record them on the detailed observation schedule drawn out for the purpose, as shown in Appendix IV.

The schedule included 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 prayers, disposition at lunch time, acceptance of the preparations served, attitudes 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, putting back the plates and glasses and his activities after meals. A fresh schedule was given every day so that the observers could make their entries without being biased by the recording of the previous day's observations.

#### 11. **Recording of Heights, Weights and other details on the Nutritional Status**

The nutritional status of children was assessed through :

- (a) anthropometric measurements
- (b) clinical examinations
- (c) biochemical methods, and
- (d) dietary surveys

**(a) Anthropometric measurements**

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

The weights were taken on a precise weighing scale, graduated in pounds and ounces, after the pupils had emptied their bladder, removed all garments except the under clothes.

The heights were noted with the children standing against a wall on which a graduated paper scale had been pasted, heels together, the occiput back, buttocks and heels touching the wall and the head held in such a manner that the line of sight was horizontal. A wooden flat ruler was placed at right angles to the wall just touching the head, and the heights recorded to the nearest half centimeter.

**(b) Clinical Examinations**

The clinical examinations were made before the commencement, during the midpoint, and at the conclusion of the experiment by the college physician using the schedule given in Appendix V. The schedule called for observations on the general appearance, condition of the eyes, tongue, mouth, gums, hair, skin and teeth, evidence of oedeme, enlargement of the liver, and heart and musculature. Through assigning numerical scores on declining scale, the scores decreasing as the condition improves, the clinical condition of the pupils was assessed.

**(c) Biochemical Methods**

The biochemical estimations carried out at the beginning, midpoint and conclusion of the experiment included; estimations of haemoglobin content and the red blood cell (RBC) count. Since these examinations involved drawing of blood about which children are always frightened, a friendly approach was first made by the principal of the college whom they respected fondly. She explained to the children in simple

Tamil, that if their desire to grow up as strong men and women was to be fulfilled, it was necessary to see whether or not they had good red blood, and if not, their diet would need improvement. All the children definitely wanted to see their blood, specially because they wanted to defeat the enemy, the Chinese\*. This was followed by the children, witnessing a demonstration on the drawing of blood from the investigator by the doctor. The children were thrilled to see the process, and came forward very willingly to test their blood. Giving sweets after drawing their blood encouraged even the hesitant pupils to come forward. The children were thus very cooperative throughout the examination.

#### (d) *Dietary Survey*

A dietary survey was carried out for three days in ten randomly selected families each from the 'School Lunch' and 'Control' groups using the dietary survey schedule shown in Appendix VI, to obtain data on the number, age and sex of the members in the family, income, other particulars regarding the family, the daily menu and the quantities of foods used. The average daily consumption of the child was then calculated. Along with the above survey, a qualitative survey of the lunches carried to the school by 15 children in the 'Control' group was also made on three consecutive days.

### 12. Maintenance of Cleanliness in the Lunch Room

Maintenance of cleanliness involved daily and weekly cleaning of (a) kitchen (b) lunch room (c) wash-room and (d) utensils used for cooking and serving.

(a) *Kitchen*.—The kitchen was swept daily before the commencement of cooking. After the completion of the lunch, the floor was swept, and washed thoroughly with soda and sinks with sand and ash mixture.

\*While this study commenced, the news of the Chinese aggression was received.

(b) *Lunch Room*.—Cleaning of the lunch room included: sweeping the floor, dusting the windows and tables and arranging the tables. After the lunch, the tables were cleaned with a wet cloth and wiped with a dry duster. The floor was swept, mopped and dried.

(c) *Washroom*.—Cleaning of the washroom included scrubbing the water taps with tamarind and sand using coconut fibre, scrubbing and washing the sink, emptying the garbage can and cleaning, washing and drying the floor.

(d) *Utensils used for Cooking and Serving*.—The brass utensils used for cooking were washed with tamarind and ash, wiped with a clean cloth, and kept in the shelves adjoining the food preparation area. The stainless steel plates which were washed by the children were washed again with soapnut powder, sterilised by dipping them in boiling water for two minutes and placed in the racks to dry.

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

### 13. Conducting Nutrition Education Activities

Nutrition education was imparted to the children in the school lunch group through the following activities:

- (a) Displaying posters and charts
- (b) Story telling
- (c) Raising a school garden, and
- (d) Rat growth experiments

(e) *Displaying Posters and Charts*.—Attractive posters on the essential foods a child needs and should

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eat daily in order to be healthy, strong and happy; and the need to drink milk were displayed in the lunch. They attracted the children who were guided to understand and appreciate the meaning of the posters, which facilitated their comprehending nutritional principles.

(b) *Story telling.*—Story telling was found to be a very useful method for teaching nutrition to young children. Children always like to hear stories and grasp easily the ideas conveyed through them if told effectively. Two stories were written especially in Tamil for the purpose by the investigator as given in Appendix VII. One story was on the importance of good nutrition to study well, grow well, and to be happy. The other was on the need for children to consume milk and green leafy vegetables daily to be bright, smart and beautiful. When these stories were told; the children listened with great enthusiasm, interest and attention and sometimes argued out the conclusions. They were found to be retelling them on several occasions, showing that they had grasped the importance of nutrition to health.

(c) *School Garden.*—The school garden was used as another means of educating the pupils in nutrition. Children showed great interest in cultivating the garden to produce their own vegetables. When they were asked what vegetables may be grown in their garden, 25 out of the 30 suggested, “the green leafy vegetable amaranth”, because they had already known the value of green vegetables. They helped enthusiastically in the preparation of the soil, in sowing the seeds, in watering and carrying for the plants, as shown in Figure 5.

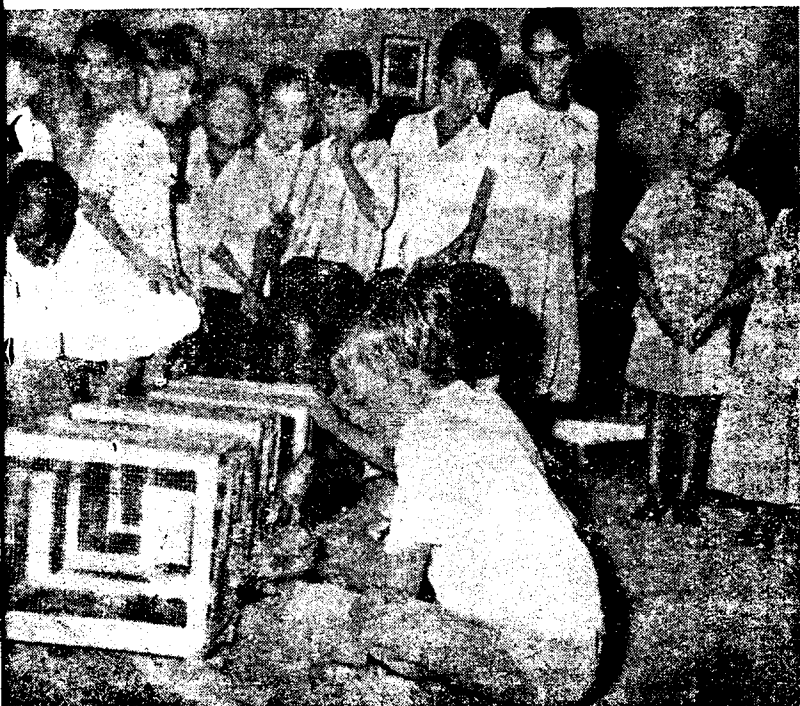
(d) *Rat Growth Experiments.*—Conducting rat growth experiments was another exciting tool adopted for imparting nutrition education. Four male albino rats, 28 days old, all born on the same date to the same mother weighing on an average of 35 gms. were





Fig. 5. Children in the School Garden

Fig. 6. Children Feeding the Rats



selected for the experiment to be fed with the individual and combined items of the school lunch consumed by the children. The children gave them the names: Chandran, Murugan, Balan and Kannan. After taking their lunch, the children fed these rats as shown in Figure 6 with single and combined items of their own lunch. Every day they were keen to note the rate of growth of these rats and commented on their appearance and activity. They showed great enthusiasm in feeding them. The weekly weights were noted as shown.

The effects of the nutrition education programme imparted through all these activities on the children participating in the school lunches were studied and compared with the nutritional knowledge and food habits of the children in the 'Control' group.

#### 14. Evaluation of the Results

At the conclusion of this study, the effects of this school lunch programme on the nutritional and health status of the children were assessed by the differences in heights, weights, RBC and haemoglobin levels. The impact of the nutrition education activities on the children and their parents was evaluated through interviews with the children and their parents using the questionnaire given in Appendix VIII. The changes in food habits, attendance and performances in school, and social development were appraised through the records maintained in the daily observation schedule, interviews with the parents, and teachers' ratings.

## CHAPTER X

### Findings of this Study

The results of this study on the effects of the school lunch programme on the children are presented in the following order:

(1) Effects of the school lunch on the nutritional status of children as revealed by:

- (a) Weights
- (b) Heights
- (c) Clinical examinations
- (d) Blood picture
- (e) Food intakes, and
- (f) Dietary surveys

(2) Observations on the rats.

(3) Knowledge acquired by the children regarding nutritional principles

(4) changes in food likes, dislikes and other food habits

(5) Social development

(6) Attendance in school

(7) Performance in school, and

(8) Parents' opinion about the school lunch programme.

#### 1. The Effects of the School Lunch on the Nutritional Status of Children

The nutritional status of children in this study was assessed on the basis of their (a) weights (b) heights (c) clinical examinations (d) blood picture, and (e) food intakes.

(a) *Weights*: The average fortnightly weights of the thirty pupils in the 'School Lunch' group, and the thirty pupils in the 'Non-School Lunch or Control Group' for a period of five months from September 1, 1962 to January 31, 1963, are given in Table VII.

TABLE VII

*The Average Fortnightly Weights of Children Belonging to the School Lunch and Control Groups*

Groups	Average fortnightly weights in pounds										Average increase in weight	Difference in average increase in weight between the School Lunch and Non-School Lunch or Control group
	1	2	3	4	5	6	7	8	9	10		
School Lunch	32.61	33.48	33.61	34.2	34.65	34.9	35.2	35.62	35.96	36.39	3.78 lbs.	1.59 lbs. This difference is statistically significant.
Non-School Lunch or Control Group	34.81	35.75	35.50	35.70	33.96	26.14	36.4	36.6	36.80	37.00	2.19 lbs.	

As can be seen from the figures in Table VII, the average increase in weights recorded by the children in the School Lunch group during the five-month period was 3.78 lbs., while that registered by the Non-School Lunch group was 2.19 lbs. This difference is significant, considering the fact that the initial average weight of the children in the School Lunch group, was lower than the corresponding weight for the Non-School Lunch group. The higher initial weight of the Non-School Lunch group may be due to the fact that those children belonged to a higher income level and therefore had a better beginning. However, the rate of increase in weights in the School Lunch group was significantly greater than that in the Control group.

(b) *Heights*: The heights of the children taken at the commencement and conclusion of the five month period for the School Lunch and Control groups are given in Table VIII.

TABLE VIII

*Average initial and final heights of the school and control groups*

Group	Average height in cm.			Difference in average increase in height between the school lunch and non-school lunch or control of groups
	Initial	Final	Average increase in height	
School Lunch	105.81	106.53	.72	.98
Non-School Lunch or Control group	106.3	106.9	.06	

Thus the school lunch exerted a greater effect on increasing the heights of children.

(c) *Clinical Examinations*: The average scores by the School Lunch and Control groups for the clinical examinations are given in Table IX.

TABLE IX

*The average scores of the School Lunch and Control Groups for Clinical Examinations*

Group	Experimental period			Average difference	Difference in the average increase between School Lunch and Control group
	Beginning	Mid-point	Conclusion		
School Lunch	21.5	15.1	13.1	8.1	} 5.2
Control ..	18.0	16.0	15.1	2.9	

The figures in the above table show that the scores were highest for the School Lunch group at the beginning of the experiment, and lowest at the end of the experiment indicating the significant improvement in their nutritional status as assessed by the clinical examinations. The decrease in the scores was rapid during the first half of the experimental period. In contrast, the improvement shown by the Control group which had started with a better score was of a lesser magnitude.

(d) *Blood Picture*

(i) *Haemoglobin level*.—The haemoglobin percentages of the School Lunch and Control groups are shown in Table X.

**TABLE X**

*Average percentage Haemoglobin levels of the School Lunch and Control Groups*

Group	Begin- ning	Mid- point	Conclu- sion	Average increase in haemo- globin level	Difference in average increase between School Lunch and Control groups
School Lunch	47.03	69.93	82.46	47.03	} 39.4
Control ..	62.13	64.99	69.75	7.62	

The figures in Table X show that the average haemoglobin percentage level of the School Lunch increased from 47.03 per cent to 82.46 at the end of the five month period, while that of the Control group showed only a small (negligible) increase of 7.62 per cent. The improvement in the haemoglobin level of the children receiving the School Lunch was marked, although their initial level was lower than that of the Control group. This difference in the increase of the haemoglobin level between the School Lunch group and the Control group is significant. As can be seen from Figure 7, the rate of increase of the haemoglobin level was a steady and steep ascent for the School Lunch group, as against the almost horizontal line for the Control group.

Furthermore the haemoglobin levels in all the 30 children of the School Lunch group had increased, while in the Control group, the haemoglobin levels had actually decreased in six children during the five months.

The significant increase in the haemoglobin levels in the School Lunch group may be due to their higher intake of good quality protein and iron which are important parts of the haemoglobin in the body.

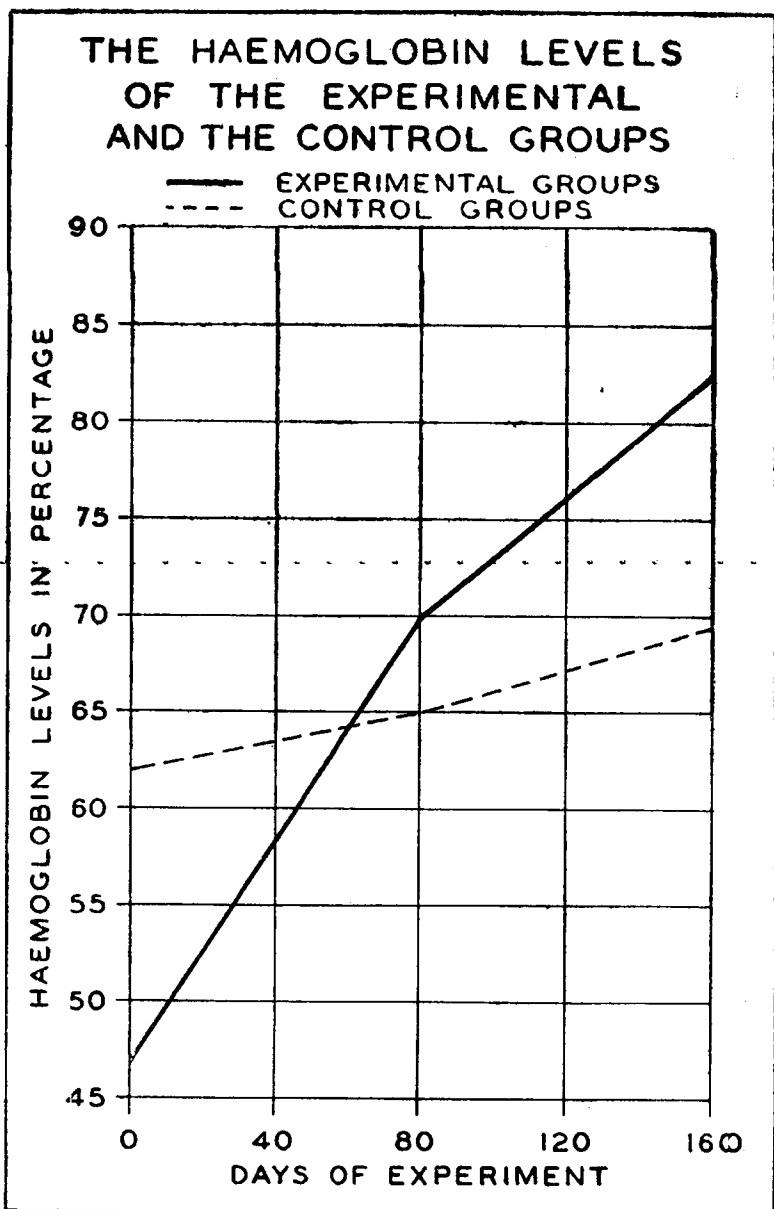


Figure 7.



(ii) *Red Blood Cell Count (RBC)*.—The average values for the Red Blood cell Count (RBC) for the School Lunch and Control groups in the beginning, midpoint and conclusion of the five month period are shown in Table XI.

TABLE XI

*The Average RBC Counts of the School Lunch and Control Groups*

(Figures in million)

Group	RBC Count			Average difference in increase of RBC	Difference in average increase between the School Lunch and Control Groups
	Beginning	Mid-point	Conclusion		
School Lunch	42	55	56	14	} 0.4
Control ..	43.6	48.2	53.6	10.0	

The average increase in the total RBC count for the School Lunch group was, 1,400,000 cells. As shown in Figure 8, the rate of increase of RBC count was very great in the School Lunch group during the first half of the experimental period, and slowed during latter part of the experimental period. This may be due to the fact that the RBC count had somewhat reached the maximum within such a short period as ten weeks.

(e) *Food Intakes*: The intakes of nutrients per day from the School Lunches calculated\* from the average amounts of foods consumed during a three day period, both at the beginning of the experiment, and at the conclusion of the experiment are given in Table XII.

\*The nutrient calculation were made from the values given in Health Bulletin No. 23 for raw food and from those of Devadas (1949) given for food preparations.

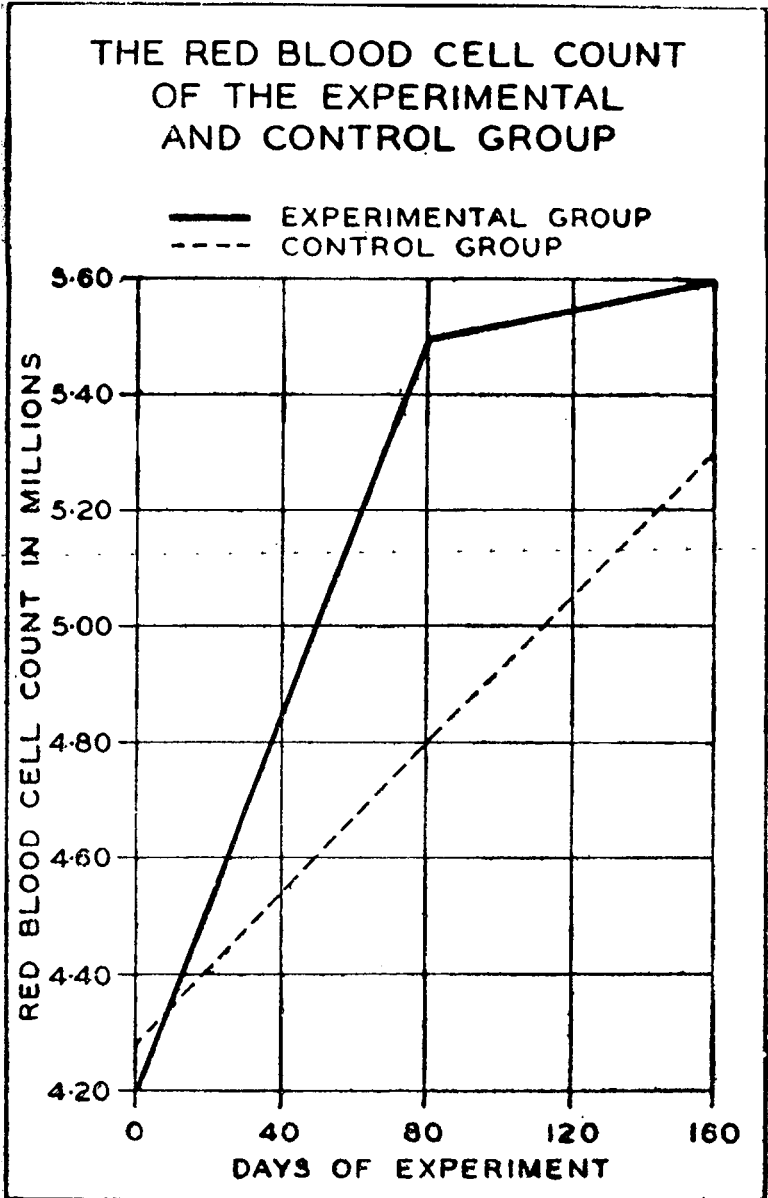


Fig. 8.

TABLE XII

*The average intake of Nutrients from the School Lunch in the School Lunch Group at the beginning and at the conclusion of the experiments*

Experi- mental period	Calc- rics	Pro- teins gm.	Cal- cium mg.	Iron gm.	Vita- min A I.U.	Ribo- fla- vin mic- ro- gram	Thi- min micro- gram	Vita- min C mg.
Beginning ..	435	18.3	561.00	12.5	2868	388	390	62.5
Conclusion	517	22.0	673.00	15.0	3440	467	465	75.0

The intake of nutrients in the School Lunch group was significantly higher at the conclusion of the experiment than the beginning. Increase intake of nutrients indicates growth and enhanced appetite, which are some of the outcomes of good nutrition.

With regard to the quantities of foods consumed from the school lunch during the first fortnight of the experiment, 13 children were taking average servings and 14 were consuming below average servings. During the course of the experiment, the number of the children consuming average servings increased from 13 to 17, and the number consuming below average decreased from fourteen to five. This increase in the intake of food during the experimental period is another indication of improvement in the nutritional status, which in turn stimulated the appetite.

Table XIII gives a comparison of the nutrients supplied by the lunches served at the school, and those brought from home by the children of the Control group for a three day period during the midpoint of the experiment.

TABLE XIII

*The Nutrient intakes of the School Lunch and Control Groups from the Lunches*

Group	Calories	Protein gm.	Calcium mg.	Iron mg.	Vitamin A I. U.
School Lunch (Average of 30 children)	517	22.0	673.0	15.0	3440
Control (Average 15 children)	380	5.0	189.0	9.5	Negligible.*

The figures in Table XIII clearly indicate that the lunches brought from the homes by the children were not adequate to meet their requirements, while the lunches provided in the school were superior in every respect.

(f) *Dietary Surveys:* Dietary surveys were conducted in ten selected families from each of the School Lunch and Control groups, using the proforma given in Appendix VI in order to appraise the contribution of the school lunch to the total daily diets of the children, and to see whether or not any difference existed in the types of diets consumed in the homes by both the groups.

Table XIV shows the average nutrient content of the diets consumed in the homes by children of the School Lunch and Control groups, and the amounts contributed by the School Lunch to the total daily intake in comparison with the Recommended Daily Allowances suggested by the Nutrition Advisory Committee of the Indian Council of Medical Research.

\*As iddli, uppuma, plain rice, pickles and chutney were the items of the lunch, the vitamin A values are negligible.

TABLE XIV

The percentage contribution of nutrients by the total average daily nutrient intake (including Lunch) at House

Food	Calories		Protein gm.		Calcium mg.		Iron mg.		Vitamin A I.U.		Vitamin mg.	
	Food Lunch group	Control	School Lunch	Control	School Lunch	Control	School Lunch	Control	School Lunch	Control	School Lunch	Control
From House (including lunch)	1,342	1,488	31.50	41.30	312.0	430.35	11.65	12.5	1,294	2742.53	43.65	41.79
From lunch	517	380	22.00	5.00	673.00	189.00	15.00	9.5	3,440	negligible	75.00	negligible
Percentage contributed by lunch	37.77	26.11	69.84	12.106	215.7	32.29	128.38	86	250.38	negligible	172.03	negligible

2. Observations on rats: The weekly weights of the rats fed with individual and combined items of the school lunch are given in Table XV.

TABLE XV

*The weekly weights of the Rats who received the full and Individual items of the School Lunch*

Name of Rat	Diet given	Weights in grams during the weeks of the experiment							Total gain in weights
		1	2	3	4	5	6	7	
Chandran ..	Cereal preparation only	39.0	50.2	64.5	79.0	95.12	107.0	120.0	81.2
Murugan ..	Cereal preparation plus greens and vegetables only.	38.6	56.2	72.8	87.0	105.1	119.4	135.0	96.4
Balan ..	Cereal preparation plus payasam only.	36.2	58.8	83.0	110.4	138.2	165.0	187.8	151.6
Kannan ..	Full Meal—Cereal preparation plus greens and vegetables plus payasam	36.0	68.4	99.5	129.0	157.2	187.4	209.6	173.6

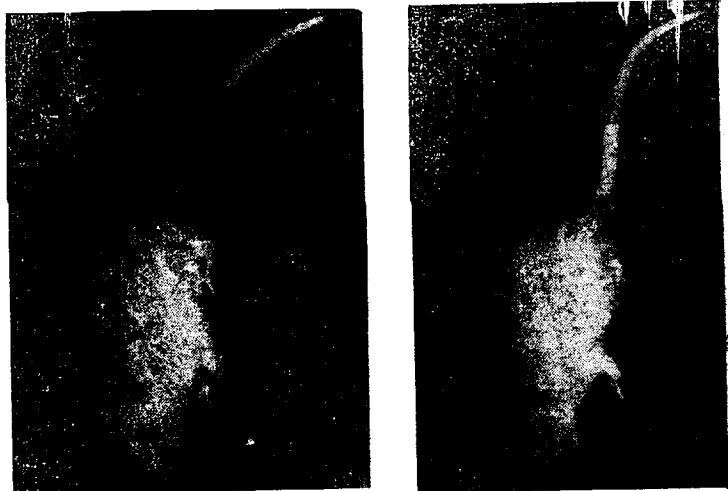


Fig. 9. The Rats on ~~the~~ Different Diets



As can be seen from Table XV and Figure 9 which shows the four rats on the different diets, children found that "Kannan" the rat, which received all the items of the school lunch showed the greatest gain in weight. He was the best in appearance also. On the other hand, Chandran, the rat which received only the cereal preparation had, grown least. He was the most ugly looking with his hair turned yellowish brown. Balan who was served skim milk and MPF was next to Kannan in weight gain, followed by Murugan who received the combination of cereals and greens.

All the pupils wanted to feed only "Kannan" which received all the items of the lunch. When they were asked why they preferred to feed only Kannan, they replied, "Because Kannan is healthier and prettier than all the other rats." "His skin is very nice" "He is active", "He is our 'first choice'." The least liked rat was Chandran which received the cereal preparation, because he was poor in appearance. Therefore he was not liked by any one. At each lunch period all the pupils would first visit "Kannan" and say they liked him because he was healthy, active, brisk bright and had good fur. While feeding the rats, the children expressed that they would soon grow up like "Kannan", because they were taking all the items served in the school lunch. They commented on the other rats also. Their remarks on Chandran, the rat which received only the cereal were specially striking. They called him, "The weakest, most inactive, dull and lethargic rat." "He does not have clean eyes because he does not take any greens". "His fur is ugly and not white". "Since he did not drink milk, the colour of his skin has changed to brown". "Since he does not get all the items, he is growing thinner and thinner day by day". Thus the children noted spontaneously all the changes and expressed their views freely.

The feeding experiments had a natural appeal at this age level because of children's curiosity and interest in animals. It was fascinating because the



children themselves fed the rats daily and made observations from which they were able to rank the nutritive values of the individual items of their lunch as well as the effects of the combinations. They realised how important it was to eat all the items served in the lunch to grow healthy, strong and happy. The simple rat feeding experiment provided children visual proof of the kind of foods they need to eat for good physical development and well-being.

### 3. Knowledge Acquired by Children regarding Nutritional Principles

Nutrition information was imparted to the children in the School Lunch group through display of posters and charts, conducting rat growth experiments, telling stories and school garden activities. The nutritional knowledge children had gained through all these methods was evaluated at the conclusion of the experiment through interviewing\* the children individually using the following questions :

(i) Why do we need food?

(ii) Which foods should be included daily in our diet ?

(iii) Which foods do you like most?

These questions were put to both the groups of children, those receiving the lunch and those not receiving the lunch for comparison. Their responses were studied as shown below :

(i) *Why do we need food?*

On classifying the responses given to the question, 'why do we need food' shown in Table XVI as positive

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\*The interview was necessitated since children of this age group could not write their ideas.

and negative answers, it was observed that the maximum number of positive answers such as: 'Food is necessary for health, strength and growth', 'To have good teeth and blood' came forth from the School Lunch group and almost all the negative answers such as: 'Because we feel hungry', 'To prevent stomach troubles' and 'To remove dirt' came from the Non-School Lunch group.

TABLE XVI

*The Responses of the School Lunch and Control Group to the Question "Why do we need food"*

Reasons	Number of Children Mentioning from the	
	School Lunch Group	Control Group
1. To become healthy, robust and grow big	28	12
2. To study well .. .. .	3	0
3. To get red blood .. .. .	2	0
4. To get nice complexion .. .. .	2	0
5. To improve teeth .. .. .	1	0
6. Because we feel hungry .. .. .	10	18
7. To prevent fever .. .. .	2	4
8. To prevent stomach ache and stomach troubles .. .. .	1	4
9. To prevent becoming dirty .. .. .	0	1
10. So that we may not die .. .. .	1	2
11. To avoid becoming thin .. .. .	2	4

(ii) *What foods should be included daily in our diet?*

To the question, what foods should be included in the daily diet, the pupils mentioned several food preparations. Classification of their responses on the basis of the basic food groups, as to the number of children mentioning or not mentioning the particular food group is given in Table XVII.

TABLE XVII

*Number of children who mentioned or did not mention particular foods to be taken daily*

Foods	School Lunch Group		Control Group	
	Number mentioning	Number not mentioning	Number mentioning	Number not mentioning
Rice .. ..	30	—	26	4
Milk .. ..	28	2	5	25
Greens .. ..	27	3	4	26
Vegetables .. ..	24	5	9	21
Dhal .. ..	23	7	8	22
Uppuma (wheat) ..	21	9	7	23
Fruits .. ..	11	19	10	20
Ghee .. ..	8	22	0	0
Sweets .. ..	1	29	7	23
Coffee .. ..	1	29	9	21

As can be seen from Table XVII, 28 children from the School Lunch group had mentioned the importance

of milk in the daily diet, whereas in the Control group only five children had mentioned milk as a need in the daily diet. The number of children who mentioned the need for green in the daily diet was 27 in the School Lunch group, as against four in the Control group. 24 children in the School Lunch group had realised the importance of vegetables in the daily diet as against the nine children in the Control group. 23 children in the School Lunch group had mentioned dhal. Regarding the intake of fruits there was not much difference in the replies received from both the groups. Since fruit was not included in this School Lunch programme, this response is understandable. The consciousness of children in the School Lunch group regarding the need to include the protective foods with which they were familiarised through the school lunches was thus significantly high. It is interesting to note that all the children in the School Lunch group and 26 in the Control group were appreciative of the need to take rice daily and only one child in the School Lunch group had mentioned coffee or sweets, whereas in the Control group nine had mentioned coffee, and seven, sweets.

### **3. Changes in Food Likes and Dislikes and Other Food Habits**

The food likes and dislikes of the children in the School Lunch and Control Groups were studied through :

- (a) their responses to the questions, which foods do you like and which foods do you not like?
- (b) Parents remarks, and
- (c) Observations made during the lunch period at home and at school.

#### **(a) Children's Responses**

The answers given by the children to the questions, which foods they liked and did not like are tabulated in Table XVIII.

TABLE XVIII

*Food likes and dislikes of the School Lunch and Control Groups*

Foods	Number of Children Indicating					
	In the School Lunch Group			In the Control Group		
	Like	Dislike	Neither like nor dislike	Like	Dislike	Neither like nor dislike
Rice . . .	26	4	—	28	2	—
Wheat . . .	18	2	10	4	8	18
Vegetables	17	1	12	13	4	13
Greens . . .	27	1	2	6	11	13
Milk . . . .	26	1	3	8	12	10
Sweets . . .	22	8	0	14	4	12
Coffee . . .	7	5	18	15	2	13

From Table XVIII it can be seen that 26 children in the School Lunch group, and 28 children in the Control group liked rice. Rice, being the most familiar of all the foods to these children, there was no significant difference between the likes of both the groups for rice. As for wheat, 18 children in the School Lunch group, and only four from the Control group indicated their "liking" wheat. With regard to the protective foods, namely, green leafy vegetables and milk, 27 and 26 children respectively from the School Lunch group and only six and eight children respectively from the Control group liked greens and milk. Seventeen children from the school lunch group and 13 children from the Control group liked vegetables.

In contrast to the School Lunch group's preferences for protective foods, 14 children from the Control group and only two from the School Lunch group liked sweets. Similarly 15 children in the Control group, and only seven in the School Lunch group liked coffee. Thus the School Lunch group had developed desirable food habits during the period of the School Lunch programme.

(b) *Parents Remarks*

The changes in the likes and dislikes for foods of the School Lunch group were studied from another angle also by evaluating their parents' observations through the responses to a questionnaire specially designed for the elicitation as shown in Appendix VIII.

The analysis of the parents' replies to the question on the food likes and dislikes of children is given in Table XIX.

TABLE XIX

*The food likes and dislikes of the School Lunch group before and after participation in the School Lunch as revealed by the parents*

Food	Before		After	
	Number liking	Number disliking	Number liking	Number disliking
Rice . . . . .	24	6	30	0
Greens . . . . .	12	18	30	0
Vegetables . . . . .	16	14	30	0
Milk . . . . .	21	9	30	0

The data in Table XIX prove that after joining the school lunch 18 children who disliked greens previously had begun to like them, nine children who had disliked milk had started to like them, and 14 children who were in the habit of refusing vegetables had learned to eat and like them.

(c) *Observations during Lunch at Home and School*

Besides the above changes in food likes and dislikes, changes in other habits were also studied from the parent's replies and through the entries in the daily observation schedule. They were: (i) attitudes towards meals and new foods, time taken for eating, and extent of wasting food in the home (ii) changes in the amounts of food eaten (iii) cleanliness before eating (iv) acceptability of the items served in the school lunch, (v) time taken to eat the school lunch, and (vi) amount of spilling food in the school lunch.

(i) *Attitudes Towards Meals as Reserved by Parents*

Table XX gives the changes observed by the parents with regard to childrens' attitudes towards meals and new foods, time taken and extent of wasting food.

TABLE XX

*Some food habits of children before and after participating in the School Lunch*

Food Habits	As Judged by the	Number indicating	
		Before	After
(a) Attitude towards meals	Reluctance to eat	28	4
	Eagerness to eat	2	26
(b) Time taken for eating	Long time taken	22	6
	Reasonable time	8	24
(c) Wasting food	Large amount of plate waste	27	4
	No waste	3	26
(d) Attitude towards new foods	Hesitation	24	8
	Acceptance	6	22

The data in Table XX point out, that children who had poor food habits such as reluctance to eat taking long time for eating and wasting food before participation in the school lunch, showed significantly positive improvements such as reasonable reduction in time taken for eating, eradication or wasting food, and willing acceptance of the new foods.

(ii) *Changes in the Accounts of Food Consumed as Revealed by the Parents*

The parents reported also changes with regard to the amounts of foods consumed by the children as shown in Table XXI.

TABLE XXI

*Changes observed in Amounts of Food Consumed at Home by the School Lunch Group at the Conclusion of the Experiment*

Food	Number of children		
	Consum- ing same quantity as before	Consum- ing more quantity	Consum- ing less quantity than before
Cereals . . . . .	22	2	6
Dhal . . . . .	26	4	0
Vegetables (greens) . . . . .	6	24	0
Milk . . . . .	18	12	0

Thus definite changes had taken place regarding the amounts of foods consumed by children as the result of their participation in the school lunch. While no appreciable change was noticed in the consumption of



cereals except that six children actually consumed less quantities than before, in the case of vegetables and milk 24 and 12 children respectively had started taking increased quantities.

(iii) *Cleanliness as Revealed by the Daily Observation Schedules in the School*

The children were rated for their cleanliness before eating according to the scores given in the daily observation schedule in Appendix IV.

The average fortnightly score ranges are given below:

**TABLE XXII**  
*Cleanliness Scores of the School Lunch Group Children*

Fortnight	Score Range			
	1-4	5-8	9-12	13-16
	Number of children receiving the score range			
I . . .	1	13	11	5
II . . .	1	9	12	8
III . . .		4	15	11
IV . . .		1	12	17
V . . .			7	23
VI . . .			5	25
VII . . .			5	25
VIII . . .			3	27

The above data, pictorially, show that during the first fortnight only five children got the highest score while others received varying scores from the least

onwards. During the last fortnight 27 children got the highest score and three children the next highest score and none the lower ranges. These differences showed that children had acquired some clean habits through the school lunch programme.

(iv) *Acceptability of the items served in the School Lunch*

It was found that during the first week of the experiment only 16 children accepted all the items served; ten did not accept the milk preparation 'payasam' and four did not accept the greens. After the fifth week onwards, except one child who still refused the payasam, all the others accepted all the items. That child continued to refuse the dessert because of her aversion to sweets from early childhood. Excepting her, all the others relished all the items and asked for second and even third servings of the vegetables and the MPF payasam.

(v) *Time taken to eat the School Lunch*

The maximum time taken for the lunch period changed from one hour, to thirty minutes during the course of the experiment. Some children who gulped their foods quickly within ten minutes in the beginning of the experiment learned to be more sociable and to take a little longer time on eating.

(vi) *Amount of Spilling Observed in the School Lunch*

At the beginning of the experiment, none of the children had the habit of eating neatly without spilling. The number of children eating shabbily, decreased gradually from 28 to four in the last week and correspondingly the children eating without spilling increased from zero to 26.

## 5 Social Development of Children

The scores awarded to children in the School Lunch group for their social development revealed by the

daily observations, parents remarks and teacher's rating, using the proforma given in Appendix IX for sociability, at the beginning, midpoint and conclusions of the experimental period is given in Table XXIII.

TABLE XXIII

*Scores received by Children for Social Development*

Period of Study	Range of scores									
	61 to 80	81 to 100	101 to 120	121 to 140	141 to 160	161 to 180	181 to 200	201 to 220	221 to 240	
	Number of children									
Beginning . . . . .	4	7	6	5	4	4	1	0	0	
Midpoint . . . . .	—	—	—	2	3	4	4	6	11	
Conclusion . . . . .	—	—	—	—	—	—	2	4	23	

The scores shown in the above table indicate that at the study more than half the number of children got less than 50 per cent scores for sociability and none got the highest or even next to the highest scores. However, at the midpoint of the experiment, all the children obtained more than 50 per cent scores for sociability, with 11 children getting the highest scores. At the conclusion of the experiment 23 children got the highest scores four the next highest, and all the children had obtained more than 67 per cent of the scores. These differences show the significant effects of the school lunch programme on the social development of children.

The social development of the children of the School Lunch group as assessed by the parents on the basis

of their conversation during meal times at home, before and after their joining the school lunch programme, is given in the Table XXIV.

TABLE XXIV

*The Social Development of Children in the School Lunch Programme as assessed by Parents*

Nature of conversation	Before joining the school lunch	After joining the school lunch
Never talked . . . . .	19	1
Talked to a selected few . . . . .	5	2
Felt shy to talk . . . . .	3	2
Talked freely . . . . .	3	25

It is thus obvious that children who were not in the habit of talking freely during mealtimes learned to be sociable through their participation in the school lunch programme.

### 6 Attendance in School

The percentage of attendance of children who were present during the experimental period from both the groups, showed that the percentage of attendance of the School Lunch group improved from the first half to the second half of the experiment by 9, while there was a decrease in attendance in the Control group to the extent of 9 per cent during the second half of the period.

### 7 Performance in the School

From the average percentage of the marks obtained in school tests by the School Lunch and Control groups

for their studies during the first and second halves of the experimental period, it was observed that the pupils of the School Lunch group registered an increase of 7.2 per cent in the performance as compared with the increase of only 3.7 per cent of the Control group.

### 8. Parents' Opinion about the School Lunch Programme

The analysis of the the parents' remarks about the school lunch programme before and after they admitted their children to the midday meals, are classified as follows: (a) remarks before admitting their children, (b) remarks after admitting their children, and (c) reasons for continuing their children, on the school lunch programme.

#### (a) Before admitting their children to the lunch programme

*Number mentioning*

- |  |       |
|--|-------|
| (i) I do not know anything about the school lunch              | .. 19 |
| (ii) The midday meals programme is meant for the poor children | .. 7  |
| (iii) The midday meals provide nutritious meals to children    | .. 4  |

#### (b) After admitting their children to the programme

- |  |       |
|--|-------|
| (i) Nutritious foods are given to children                 | .. 18 |
| (ii) The meals are given in happy atmosphere               | .. 11 |
| (iii) The children are taught good manners                 | .. 8  |
| (iv) The children are treated with love and affection      | .. 4  |
| (v) The school lunch has improved the appetite of my child | .. 4  |

(c) *Parents' reasons to continue their children on the school lunch programme*

	<i>Number mentioning</i>
(i) The child likes it ..	19
(ii) Nutritious meals are supplied ..	12
(iii) To establish good eating habits ..	8
(iv) Both parents work outside and are not able to look after the child's lunch ..	6
(v) For eating with others and sharing with others ..	6
(vi) Economic conditions ..	6
(vii) The child refuses to eat and gives trouble while eating at home ..	5
(viii) The long distance of home from school ..	3
(ix) The child does not like the meals prepared at home ..	2
(x) To help the children learn to eat all types of foods ..	2

The parents' opinions regarding the school lunch programme before and after admitting their children show the significant reaching of nutrition education to the homes through the children. Their remarks also reveal their faith in the school meal programme for teaching children, good eating and social habits.

## CHAPTER XI

### Conclusions of this Study

The purposes of this study were: to organise a school lunch programme for 30 children of five to seven years of age who constituted the "School Lunch" group, and to assess the effects of the school lunch through a five month study on the nutritional and health status, nutrition education, food habits, social development, attendance and performance in school of the children in the School Lunch group in comparison with thirty children of the same age and sex distribution in the 'Control' group who were not receiving the school lunch. The school lunch was planned to furnish a third of the daily nutritional requirements within the cost of 10 paise per meal in the Madras Midday Meals Scheme.

The nutritional and health status were appraised by anthropometric measurements, clinical examinations, biochemical methods and dietary surveys. The impact of the 'nutrition education' imparted through the display of posters and charts, rat experiments, cultivation of the school garden and story telling was evaluated by interviews with the children and the parents. Social development was appraised through observations on the children's sociability during the lunch hour, teachers' rating and parent's remarks. Attendance and performance in school of the children participating in the school lunch were compared with those not receiving the school lunch. The findings of this study revealed that:

1. The average weight gains and increases in heights of the children in the School Lunch group were greater than those of the Control group during the experimental period, although the children in the Control group had a better start since they came from families of higher income levels.

2. The percentage haemoglobin level and the RBC count of the School Lunch group were higher than that of the Control group at the conclusion of the experiment.

3. Children in the School Lunch group obtained higher scores for general health status at the conclusion of the experimental period, than those of the Control group.

4. The daily diets supplied in the homes of both the School Lunch and Control groups were deficient in all the essential nutrients and even in calories. The home diets of the children belonging to the Control group were slightly better in nutrient content than those of the School Lunch group. However, the lunches brought from homes by the children of the Control group were lower in nutrient content than those furnished by the school lunch.

5. Children participating in the school lunch had established some desirable food habits during the experimental period such as accepting new foods, eating protective foods, and avoiding spilling.

6. Children participating in the school lunch programme also showed greater social development.

7. The school lunch programme had helped in increasing attendance and performance at school.

8. The nutritional knowledge acquired by the children of the School Lunch group was of a high quality, while children not receiving the school lunch had no concept of what good food does for them. A good part of the nutritional knowledge was carried to the homes by the children participating in the school lunch programme, as revealed by the parents' appreciation.

The study has thus established the significant and far-reaching effects of the school lunch programme in improving the nutritional status, nutritional knowledge, food habits, social development, and attendance and performance in school of children in the age group 5 to 7 years.



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## APPENDICES

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## APPENDIX I

# INTERNATIONAL ORGANISATIONS ASSISTING LUNCH PROGRAMMES IN INDIA

### 1 (a) UNITED NATIONS CHILDREN'S FUND (UNICEF)

The United Nations Children's Fund is one of the specialized agencies of the United Nations with its head quarters at New York. It was originally created as an emergency measure, to provide assistance for children who were suffering as a result of the second World War. On December 11, 1946, The United Nations International Children's Emergency Fund was set up as a rehabilitation measure to assist the victims of aggression with assistance from the United Nations Relief and Rehabilitation Administration (UNRRA), which were subsequently the United Nations decided that the UNICEF should fill an even greater and more universal need of providing assistance on a long term basis to children all over the world as a continuing agency. Thus, on October 6, 1953, the UNICEF was declared a continuing organization and the name was changed from the United Nations International Children's Emergency Fund' to 'United Nations Children's Fund', while retaining the familiar initials UNICEF.

On 20th November, 1959 the General Assembly unanimously adopted and proclaimed a Declaration of the Rights of the child setting forth the rights and privileges which every child, without exception everywhere, should enjoy. The General Assembly also pointed out that, "The aid provided through UNICEF constitutes a practical way of international co-operation to help countries carry out the aims proclaimed in the Declaration".

Having turned, in the early fifties, from the war devastated countries to the less developed parts of the world. UNICEF found itself faced with hundreds of millions of children needing help—at birth, during infancy and throughout school age. One fifth of the World's Children were dying before their fifth birthday. Two-thirds were exposed to hunger, disease, poverty and ignorance.

To help countries help these children, UNICEF sends equipment and supplies of various kinds. Additional elements like leadership, administration and Government funds are necessary within the country. Any project is undertaken only at the request from the Government concerned. The obligations of the governments, UNICEF and the other U.N. Technical agencies are then clearly defined and the Government guarantees the proper distribution of UNICEF supplies without regard to race, creed or political beliefs. UNICEF is also providing assistance to a wide variety of training schemes by supplying equipments, teaching

materials and stipends, training person from the countries seeking help. In their endeavours the assisted countries and UNICEF took for technical advice to WHO in matters of child-birth and health, to FAO and WHO in fighting undernourishment and malnourishment, and to the United Nations Bureau of Social Affairs to improving family and child welfare.

In response to requests from the Government of India, UNICEF is operating in this country since 1949. It has participated in a large number of programmes contributing supplies, equipment and other forms of aid to the value of \$ 30.2 million (Rs. 144 million) as on in 1963. For basic health services for mothers and children particularly in the rural areas, UNICEF has provided equipment, drugs and diet supplements and essential transport to some 3,500 various types of centres. Teaching equipment and other materials have also been provided for more than 300 schools training doctors, nurses, midwives and other personnel required to maintain the national health services.

UNICEF transport, equipment and field kits have been given to support India's BCG (anti-tuberculosis) campaign—now the largest field operation in the world.

To assist the Government's efforts to combat malnutrition and under-nourishment, UNICEF assistance is being given under four headings :

- (a) Supplementary feeding, chiefly in the form of imported powdered milk and vitamins;
- (b) milk conservation, in the form of general dairy and milk drying equipment to stimulate greater production and utilisation of local resources;
- (c) the development of new protein-rich foods such as peanut flour, and
- (d) nutrition education and training accompanied by related practical activities aimed towards increased production and consumption of nutritious foods at village schools and homes.

UNICEF assistance in the shape of skim milk powder for long-range school feeding programmes in India commenced in 1954 when 25 States and Territories started milk distribution programmes with UNICEF assistance. At present, the UNICEF is operating a programme in Gujarat, Maharashtra, Madhya Pradesh, Orissa and Uttar Pradesh and a small programme in Laccadives. In the midday meals programme, UNICEF assistance is confined to milk.

The Ministry of Health receives this milk powder from the ports of Bombay, Madras and Calcutta and then forwards it to the Directors of Health Services in the states who in turn, distribute to the schools. The total coverage of the UNICEF programme is roughly 1 million children.

The largest programme perhaps the UNICEF has been assisting in recent years is the Applied Nutrition Programme sponsored

through the Ministry of Community Development in collaboration with the WHO and FAO. Among the aims of the Applied Nutrition Programme are: the production of nutritionally rich foods, especially protein rich feeds to fill the gaps in the diets of vulnerable groups; feeding the vulnerable groups and imparting nutrition education to the community.

The production of such foods is being done at the village level in the following manner:

- (a) Setting up poultry units (approximately 60 to 70 birds)
- (b) Production of fish in village tanks
- (c) Setting up community orchards
- (d) Kitchen gardens
- (e) Setting up school orchards and vegetable gardens
- (f) Increasing milk production by producing better fodder and upgrading the breed of cattle, and
- (g) Marine fishing in coastal areas.

Part of the protective foods produced are utilized in the school feeding programmes, and also in the feeding of expectant and nursing mothers. UNICEF provides the milk powder for the feeding programme conducted by the Applied Nutrition Programme in the different blocks.

## I (b) VOLUNTARY CHURCH ORGANISATIONS

Two Church Organisations—Catholic Relief Services and Church World Service—also assist school programmes. The programmes assisted by them are mainly on the basis of individual institutions in all parts of the country. The coverage is about 7 lakh children.

The major milk and midday meals programme assisted by the Catholic Relief Services are being conducted at the municipal level. For example, the Delhi Municipal Corporation is running a programme covering one lakh children; this is expected to be increased to 3 lakh children during this year. The New Delhi Municipal Committee is conducting a programme with 30,000 children who receive milk and 1,200 children who are given midday meals. Further more, the Madras Corporation has a milk feeding programme of 1,35,000 children. There is also a pilot midday meals programme of curds only for 25,000 children.

This year (1964-65), a midday meals programme assisted by Catholic Relief Services has been introduced in the Union Territories of Himachal Pradesh and Goa. These programmes have been started by the respective administrations of these territories.

### I (c) CARE

CARE is a private, non-profit non-secretarian organization. It was incorporated at the end of World War II. At that time, there were thousands of families in the United States who wanted desperately to help their friends and relatives in war-torn Europe. But conditions were chaotic. Packages of food or clothing sent through the mails never reached their destinations. Nearly all the major welfare groups in the States—the Lions, the Salvation Army, the Eagles and dozens of other were inundated with requests from their members—"Can you get our gifts through to our relatives in Europe?" None of them could.

Finally in November, 1945 about a dozen of these groups joined together and formed CARE. The administrative channels were set up for packing, shipping, and deliver, and the first CARE food packages were delivered in Le Harve, France, on May 11, 1946. World got around fast. As soon as people heard that at last there was an organisation to get help through contributions began pouring in. CARE veterans in New York can still remember the days when so much money was coming in that it had to be carried across the street to the bank in waste baskets.

CARE thus began as a relief agency in post-war Europe. Since then its scope and aims have changed and expanded enormously. CARE's services have extended to four continents and have included, besides food and clothing, thousands of self-help projects. Today, the many CARE programmes share one vital aim: To enable Americans to supplement government aid with direct, personal assistance that will help unite the peoples of the world in the friendship so essential to peace.

In March 1962, MEDICO which was (founded by the late Dr. Tom Dooley) became a service of CARE thus adding a new dimension to CARE's assault against hunger, poverty, and disease.

CARE does not represent the U.S. Government, but requests and obtains food stocks from U.S. Government. Thus the first and largest expense—the cost of the food itself—is borne by the U.S. Government who also undertake to pay the shipping of that food. Expenses on bundling, marketing, insurance, and administration are usually borne by CARE with the help of the countries where the programmes are to be carried out. CARE is engaged in four major areas of self-help in India: agriculture, vocational training and adult literacy, health and Tibetan relief and rehabilitation. Among these lines, CARE has initiated 75 self-help projects since 1961.

While feeding seven million school children in India daily, CARE feels it is equally important to help people grow their own food, and more of it. CARE-India has helped to make this possible by providing various groups in India with improved equipment and school garden kits. When the food arrives in India there are further cost. Every bag or box or bundle must be off-loaded from the ship, cleared through the port and customs, loaded into trucks, taken to godowns and put into trains. The rail journey itself is

a major expense, and even when the commodities have reached the proper rail stop, they are still often far from the villages where they are to be distributed.

The responsibility for port clearance and raiing are shared by the Central Ministry of Food, and the various State Governments. The food is exempt from duty under an Indo-CARE agreement of 1959. CARE supervised and inspects most of the port and rail procedures. When the food arrives at the railheads, delivery is taken by block development or education officers appointed for the purpose. The milk or other food is then sent to the schools where it is to be consumed. Usually the teachers take the responsibility for preparing and handing out the food.

The CARE has feeding programmes in Punjab, Andhra Pradesh, Rajasthan, Kerala, Mysore, Madras and in the city of Bombay.

In Andhra Pradesh, the State Government sought the assistance of CARE during 1962-63. Accordingly, a scheme was prepared for supplying midday meals to 2 lakh children. The following year, i.e., 1963-64, it was expanded to over 8 lakh children—the increased number covering non-municipal areas in the entire State and 152 lakh children in the municipal areas. Under the programme, the CARE supplies milk powder, corn meal and vegetable oil free of cost. These are given to children in the form of 'Uppuma' and milk. The children in the municipal areas are supplied only milk.

The Secretary, Zila Parishad at the district level, and the Block Development Officer at the Samithi level are responsible for the implementation of the scheme. Detailed instructions are given to the teachers on the preparation and serving of food under hygienic conditions. These instructions are usually accompanied by demonstrations and conferences. The State Government is at the moment considering the idea of providing regular training in nutrition and hygiene to those connected with the school lunch programme.

CARE started helping the Kerala State Government in its school meals programme during 1961-62. From December, 1961, the State Government introduced milk feeding to supplement their midday meals programme started several years early. A child is now given with the CARE supplement 8 ounces of warm liquid milk daily along with 'Uppuma' prepared out of corn meal and vegetable oil. The number of children covered by the scheme during 1963-64 was nearly 15 lakhs.

The State Education Department is responsible for transporting the food commodities from the port and their subsequent storage in godowns. The Department distributes the food stuffs to sub-depots of 119 Assistant Educational Officers spread all over the State. The transport of these commodities from the sub-depots of the Assistant Educational Officers to the schools is undertaken by the headmasters themselves, the cost of which is borne by the Education Department.

Madras has been taking the assistance of CARE in its programme since 1961. The CARE commodities (milk powder, corn meal and cooking oil) are stored in the State headquarters and distributed to the school meal centres according to their monthly requirements through the District Education Officers and the Deputy Inspectors of Schools. At the State level, the Director of Public Instruction is in charge, assisted by a Special Officer for School Meal Programme.

In Mysore, the scheme of midday meals was formulated on a larger scale in 1963-64, with the assistance of CARE and the Union Ministry of Education to include 5 lakh children in about 7,000 primary schools all over the State. During 1964-65 it is planned to cover 8 lakhs children in about 10,000 schools which will include the nursery schools as well.

The scheme is implemented through the Education Department at District and Taluk levels, and at the State level by the Senior Assistant Director of Public Instruction (Midday Meals). Supervision and inspection are periodically carried out by the State Government officials and the Field Officers of the CARE Administration.

The School Feeding Programme was inaugurated in the Punjab on 15th February 1962 in collaboration with CARE. The scheme is under the overall administrative control of the Commissioner for Agricultural Production and Rural Development and Secretary to the Government of Punjab for Development and Panchayat Department.

In 1962 the Government of Rajasthan started the CARE assisted School Lunch Programme for 500,000 children studying in the primary schools and primary sections of middle schools in the rural areas. From October 1963, the scheme was increased to cover a total of one million children. Under the scheme, CARE provides commodities at the port of Bombay from where the State Government makes arrangements for their transport to the schools. The scheme is administered jointly by the Department of Education and the Department of Panchayat and Development at the State Level.

Hundreds of thousands of school teachers all over India are giving their time to prepare, boil, mix and distribute CARE food in these programmes. Thousands of others are taking on extra work and responsibilities to help feed these children. The dedication of these people is admirable.

#### **1(d) FOOD FOR PEACE**

Food for peace is a programme for sharing with the newly developing countries America's agricultural abundance. By aiding these countries in their efforts to provide a more adequate diet for their people and to promote the growth of their economies, Food for Peace increases their ability to develop into strong mem-

bers of free world society. To share food with the world's hungry and newly developing countries is to share life and hope with them, and to give them more strength to help themselves.

In agriculture U.S.A.'s strength is second to none. The Nation's farmers, by their skill, their diligence, their resourcefulness, have made this possible. The Food for Peace Programme gives them strength to use in helping to build a freer, more self-reliant world. For nearly a half century the United States has shared its food and other farm products to relieve world hunger and to speed economic development. This was done in times of abundance and in times of scarcity, as in both World Wars and the reconstruction periods that followed. These past efforts were responses to emergencies of limited duration. The goal of the Food for Peace Programme, on the other hand, is to permit the United States to use its agricultural abundance in a coordinated long range attack on hunger and poverty in countries where these twin troubles are chronic.

Food for Peace is thus a humanitarian concept in dynamic action—a companion programme to the many other peace-supporting efforts of the United States, including mutual security programmes and participation in the United Nations.

The Food for Peace Programme works in several ways. Its principal vehicle is the Agricultural Trade Development and Assistance Act (popularly known as Public Law 480). Many less developed countries would like to raise their level of food consumption but are unable to do so because a shortage of foreign exchange prevents them from increasing their purchases in the commercial market. Title I of P.L. 480 meets this problem by letting such countries buy American farm products with their own currencies.

The Food for Peace Programme's contribution to increased food consumption in the less developed countries is at the same time a contribution to the economic development of these countries. Economic growth inevitably results in an increase in a country's demand for food and other resources. When the country cannot meet this demand either through increased domestic production or through imports, inflation and economic stagnation results. Growth is halted. By supplying some of these resources and, in countries where dollars are scarce, accepting payment in local currency, the Food for Peace Programme helps economic development to continue.

Food for Peace operates on the humanitarian as well as the purely economic plans. It does this through large scale food donations on a people-to-people basis in cooperation with United States voluntary agencies, aid to refugees and other needy persons, and school lunch programmes. Food for Peace also supports and supplements the food distribution work of the United Nations.

A companion phase of the Food for Peace Programme helps needy foreign countries to increase their own food production.



Through USAID programmes about a thousand United States technicians are working with technicians of many newly-developing countries in programmes to expand agricultural development and distribution of improved seed, introduction of soil and water conservation practices and control of plant and animal diseases and pests.

Food for Peace is under the direction of the President through the Director of the Food for Peace Programme and in cooperation with the Departments of State and Agriculture and the International Cooperation Administration.

#### **I(e) Meals for Millions**

The Meals for Millions Association, which is a non-profit California Corporation, was founded in 1946, with its headquarters at Los Angeles. Its founder, President Clifford E. Cliton, is a Los Angeles restaurateur, who witnessed starvation in China as a young boy and resolved to "do something about it". When he grew up, Meals for Millions is the embodiment of the young boy's dream.

The non-profit Meals for Millions Foundation, established to introduce a new concept for the prevention of malnutrition, first introduced Multi-Purpose Food (MPF) to the world in 1946. The foundation launched the first organized programme to demonstrate how low-cost foods of this type would be developed throughout the world from abundant available materials little used or unused for human food. It showed how MPF could, while providing emergency relief, become a stepping stone to the prevention of chronic protein malnutrition through local production within the purchasing power of very poor people. The objectives of the Foundation and its independent affiliates in other countries is to stimulate MPF production where malnutrition is prevalent and where protein of good quality vitamins and minerals are deficient to a critical extent in prevailing diets.

Meals for Millions is not primarily a relief agency but provides MPF in an "eating—is—believing" educational programme to demonstrate not only the value of MPF as a "relief food" in emergency situations but as an important corrective supplement to normal deficient diets. Education is reaction to experience and repeated experience in eating, MPF provides the convincing demonstration of nutritional principles of which MPF is a pioneering example.

The Meals for Millions Association of India was launched, under the leadership of Dr. Panjab Rao S. Deshmukh, then Minister for Agriculture, when Miss Florence Rose, Executive Director of the Meals for Millions Association of USA visited India in 1956. Since 1956, India has pioneered to demonstrate that existing resources, primarily groundnut through the application of modern scientific food technology can provide protein, in both adequate quantity and quality, to fill the great protein gap that causes such devastating infant mortality and stunts the growth and impairs the health of growing children everywhere.

The formula for Indian Multipurpose Food was developed in 1956 at the Central Food Technological Research Institute, Mysore. This was based on the principle underlying the development of the Multipurpose Food at the California Institute of Technology in 1946. Production of MPF with indigenous materials is carried out at the Chandra Corporation, Peelamedu, Coimbatore, in collaboration with the Central Food Technological Research Institute, Mysore. Multipurpose Food is available in two forms, namely seasoned and unseasoned and both the varieties cost 1.63 paise per bag. It is a versatile food and requires no change in food habits or cooking. It can be easily incorporated in any common dish such as uppuma, sambar, kootu, and other sweets and savouries.

Distribution of over 3 million pounds of Indian MPF has thoroughly demonstrated and documented its usefulness, as a low cost fortified high protein supplement to balanced diet. It is being used in the School Lunch programmes in the Madras State.

Nutro-Biscuits were developed for distribution by the Meals for Millions Association of India to provide a ready-to-eat snack, rich in protein and fortified with vitamins and minerals and are manufactured by the Britannia Biscuits Company, Calcutta. Clinical trials carried out using Nutro-biscuits in diet therapy of children suffering from protein malnutrition have proved their efficacy as a high protein food in improving and combating malnutrition.

## APPENDIX II

### RULES AND REGULATIONS OF THE MADRAS GOVERNMENT REGARDING THE MIDDAY MEALS SCHEMES TO THE POOR PUPIL

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

**REFERENCE :** R.O.C. 453 P×D. I/56, dated 12-11-1957 in Proceedings G.O.P.S. No. 1850, Education, dated 8-11-1957 regarding.

#### ANNEXURE I

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

1. *Name* : The scheme shall be called the 'Poor Feeding Mid-day 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.

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

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

6. *Committees* : The donors in 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.

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

### 7. *The Executive Committee :*

The Executive Committee 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 correspondence with the educational 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.

### 8. *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 Scheme.

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

### 10. *Execution of the Scheme :*

- (a) *Selection of Children :* The Executive committee shall select children on the basis of necessity and poverty under rule 4.
- (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 6 ps. per meal collected on the basis of 10 ps. per meal is sanctioned by the Government.

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

- (i) Cost of the food stuffs.
- (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* :

The following registers must be maintained by the secretary.

- (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 p. per meal per pupil, or 6 p. per meal per pupil whichever is less. D.E.O. is the sanctioning authority.

*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 desire, 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 this 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 up to 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 debitted to the budget head "37-Education-Miscellaneous Schemes under the Second Five Year Plan—Grants for school meals to elementary school pupils".

## APPENDIX III

### STANDARDISED RECIPES AND SERVINGS

#### I. Rice Kitchadi

Ingredients	Quantity per child	Quantity for 30 children	Cost for 30 children
	gm.	gm.	Paise
Rice . . . . .	56	1,680	60
Green gram dhal . . . . .	14	420	30
Cumin seeds . . . . .	1	30	15
Pepper . . . . .	1	30	15
Gingelly oil . . . . .	5	150	20
Common salt . . . . .	0.5	15	2
Water . . . . .	210	6,300	—
		<b>Total Cost</b>	<b>1.42</b>

#### *Preparation*

- (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 cumin seeds and pepper slightly with three grams of oil and powder.
- (6) When dhal-rice mixture is cooked, add the powdered cumin seeds and pepper. Stir occasionally.
- (7) Remove from fire and serve hot.

*Calculation of one serving of rice kitchadi*

Total weight of the cooked kitchadi	..	6960 gm
Weight of one serving of rice kitchadi	..	232 gm
Volume of one serving of rice kitchadi	..	1½ cups*

**II. Sambar Satham's (Rice)**

Ingredients	Quantity per child (gm.)	Quantity for 30 children (gm.)	Cost for 30 children (paise)
Rice	42	1,160	45
Dhal	14	420	30
Green beans	28	840	45
Gingelly oil	6	180	20
Turmeric powder	2	60	
Chilly powder	8	240	
Onion	2	60	
Tamarind	5	150	
Mustard seed	1	30	
Black gram dhal	8	240	
Curry leaves	0.25	7.5	30
Asafoetida		0.5	
Common salt	—	50	
Water	210	6,300	
<b>Total Cost</b>			<b>1.70</b>

*Preparation*

The preparation is in three stages: (a) The sambar (b) The rice, and (c) The sambar rice.

*(a) Sambar*

1. Wash the dhal and cook in 3 cups boiling water, adding turmeric powder and half the gingelly oil. Boil for 40 minutes.

\* Cup is a standard measuring cup with capacity of 225 milliliters.



2. Wash the beans, and 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 vegetable 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 black gram dhal, curry leaves and dry chillies.

(b) *Rice*

Cook the rice separately, using 17 cups water and the remaining oil by the absorption method\* and remove from the fire, when it is well cooked.

(c) *Sambar rice*

Add the sambar to the rice, mix well and serve. Calculation of one serving of sambar satham (rice).

Total weight of the cooked sambar satham (rice)	7200 gms.
Weight of one serving of sambar satham	240 gms.
Volume of one serving of sambar satham	1½ cups

### III. Wheat Kitchadi

Ingredients	Quantity per child	Quantity for 30 children	Cost for 30 children
	(gm.)	(gm.)	(paise)
Wheat rava . . . . .	56	1,680	60
Green gram dhal . . . . .	14	420	30
Cumin seeds . . . . .	1	30	15
Pepper . . . . .	1	30	15
Gingelly oil . . . . .	5	150	20
Common salt . . . . .	0.5	15	2
Water . . . . .	140	4,200	—
<b>Total Cost</b>			<b>1.42</b>

\*Absorption method is the method in which rice is cooked in just sufficient quantity of water without straining.

*Preparation*

1. Roast the green gram dhal to golden brown colour.
2. Boil 19 cups of water.
3. Clean the 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.

*Calculation of one serving of wheat kitchadi*

Total weight of the cooked wheat kitchadi ..	6840 gms.
Weight of one serving wheat kitchadi ..	228 gms.
Volume of one serving of the wheat Kitchadi ..	1½ cup

**IV. Wheat Uppuma**

Ingredients	Quantity per child	Quantity for 30 children	Cost for 30 children
	(gm.)	(gm.)	(paise)
Wheat rava . . . . .	56	1,680	60
Chillies . . . . .	1	30	} 20
Onion . . . . .	2	60	
Mustard . . . . .	0.3	39	
Black gram dhal . . . . .	0.5	15	
Bengal gram dhal . . . . .	0.5	15	
Common salt . . . . .	0.5	15	
Gingelly oil . . . . .	5	150	20
Water . . . . .	140	4,200	
<b>Total Cost . . . . .</b>			<b>1.00</b>

*Preparation*

1. Heat the oil.
2. Fry the mustard, black gram dhal, Bengal gram dhal, chopped onions, chillies, and curry leaves in the oil.
3. Add 15 cups 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.

*Calculation of one serving of wheat uppuma*

Total weight of the cooked wheat uppuma ..	6300 gms.
Weight of one serving of wheat uppuma ..	210 gms.
Volume of one serving of the wheat uppuma ..	1 cup

**V. Lime Rice**

Ingredients	Quantity per child	Quantity for 30 children	Cost for 30 children
	(gm.)	(gm.)	(paise)
Rice . . . . .	56	1,680	60
Lime fruit . . . . .	14	420	40
Gingelly oil . . . . .	5	150	20
Turmeric powder . . . . .	0.25	7.5	} 20
Dry chillies . . . . .	1	30	
Curry leaves . . . . .	0.5	15	
Black gram dhal . . . . .	0.5	15	
Bengal gram dhal . . . . .	1	30	
Mustard seeds . . . . .	0.25	7.5	
Common salt . . . . .	0.5	15	
Water . . . . .	186	5,580	
Total Cost . . . . .			1.40

*Preparation*

1. Clean and wash the rice.
2. Boil water and add the washed rice.
3. Cook the rice till all the water is absorbed.
4. Remove the rice from the fire.
5. Extract the juice from the limes.
6. Heat the oil in a dekchi and fry mustard, black gram dhal, chopped dry chillies and curry leaves.
7. Add the lime juice and turmeric powder.
8. Remove from the fire.
9. Add the seasoned lime juice to the cooked rice.
10. Mix well and serve hot.

*Calculation of one serving of lime rice*

Total weight of the cooked lime rice	..	6300 gms.
Weight of one serving of the lime rice	..	210 gms.
Volume of one serving of lime rice	..	1 cup

**VI. Multi-Purpose Food Payasam**

Ingredients	Quantity per child	Quantity for 30 children	Cost for 30 children
	(gm.)	(gm.)	(paise)
Skim milk powder . . . . .	19	570	free
Multi-Purpose Food . . . . .	11	330	55
Jaggery . . . . .	16	480	30
Cardamom . . . . .	—	6	3
Gingelly oil . . . . .	—	8	
Water . . . . .	140	4,200	
Total Cost . . . . .			0.88

*Preparation*

1. Add the skim milk powder gradually into the water and stir constantly to obtain reconstituted milk.
2. Boil the reconstituted milk for ten minutes to remove the raw milk flavour.

3. Roast the Multi-Purpose Food powder with a teaspoon of gingelly oil to enhance its flavour.
4. Add three cups water to the roasted MPF and make a batter.
5. Add 12 cups water to jaggery, boil and make a syrup.
6. Add the milk and the Multi-Purpose Food into the jaggery syrup.
7. Powder the cardamom and add to the payasam before removing from fire.

*Calculation of one serving of MPF Payasam*

Total weight of the payasam after cooking ..	4800 gms.
Weight of one serving of payasam ..	160 gms.
Volume of one serving of payasam ..	$\frac{1}{2}$ cup

**VII. Amaranth Pugath**

Ingredients	Quantity per child	Quantity for 30 children	Cost for 30 children
	(gm.)	(gm.)	(paise)
Amaranth leaves . . . . .	42	1,260	30
Chillies . . . . .	0.5	15	} 15
Common salt . . . . .	0.25	7.5	
Mustard seeds . . . . .	—	4	
Black gram dhal . . . . .	0.5	15	} 20
Bengal gram dhal . . . . .	0.5	15	
Gingelly oil . . . . .	5	150	} 150
Water . . . . .	5	150	
Total Cost . . . . .			0.65

*Preparation*

1. Wash the amaranth leaves, remove stalks and cut.
2. Boil  $\frac{1}{2}$  cup of water.
3. Add the cut amaranth and salt to boiling water.
4. Cook for 12 minutes.
5. Heat oil and fry the mustard black gram dhal, Bengal-gram dhal and chillies.

6. Add the cooked amaranth.
7. Remove from fire and serve.

*Calculation of one serving of amaranth pugath*

Total weight of the cooked amaranth pugath	.. 900 gm.
Weight of one serving of amaranth pugath	.. 30 gm.
Volume of one serving of the amaranth pugath	.. 1 Table Spoon

**VIII. Dhal Amaranth Kootu**

Ingredients	Quantity per child	Quantity for 30 children	Cost for 30 children
	(gm.)	(gm.)	(paise)
Amaranth . . . . .	42	1,260	30
Green gram dhal . . . . .	14	420	30
Gingelly oil . . . . .	5	150	20
Chillies . . . . .	0.5	15	} 15
Curry leaves . . . . .	0.5	15	
Coriander seeds . . . . .	0.5	15	
Mustard seeds . . . . .	0.25	7.5	
Turmeric . . . . .	—	4	
Common salt . . . . .	—	4	
Water . . . . .	70	2,100	
Total Cost . . . . .			0.95

*Preparation*

1. Clean and wash the dhal.
2. Boil eight cups of water.
3. To the boiling water add the washed dhal, turmeric and a little oil.
4. Cook the dhal for 40 minutes till it is soft.

\* One tablespoon has a capacity of 3 teaspoons.

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 gingelly 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 fire and serve hot.

*Calculation of one serving of dhal amaranth kootu*

Weight of the cooked dhal amaranth kootu ..	2580 gms.
Weight of one serving of dhal amaranth kootu ..	86 gms.
Volume of one serving of dhal amaranth kootu ..	1/3 cup

## APPENDIX IV

### SRI AVINASHILINGAM BASIC SCHOOL, COIMBATORE MIDDAY MEALS PROGRAMME

#### Observation Schedule

Name of the child :

Date :

Class :

1. Appearance :

- (a) Neat and tidy
- (b) Dirty
- (c) Shabby

2. General attitudes :

- (a) Happy disposition
- (b) Unhappy disposition
- (c) Indifferent towards everything
- (d) Lethargic
- (e) Healthy
- (f) Sick

3. Attitude towards the lunch :

4. Cleanliness before eating :

	Score
Hands and feet washed ..	4
Hands and feet improperly washed ..	3
Hands and feet washed only after somebody had reminded ..	2
Hands and feet not washed ..	1

5. Participation prayers before eating :

- (a) Sings the prayer song with interest.
- (b) Never sings
- (c) Does not concentrate
- (d) Feels shy to sing



## 6. Acceptance of dishes served :

Dish	Acceptance
1. Cereal 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 (e) Asks for more serving than normal (f) Asks for less than normal
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 (e) Asks for more serving than normal (f) Asks for less than normal
3. MPF 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 (e) Asks for more serving than normal (f) Asks for less than normal

7. 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
  - (e) Others
8. Eating habits :
- (a) Eats neatly without spilling
  - (c) Eats hurriedly (takes...minutes)
  - (d) Eats slowly (takes...minutes)
9. 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
10. Consumption of food :

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Dish	Amount served (gm.)	Amount left (gm.)	Amount consumed (gm.)
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11. Any special remarks made about food or meal time:

12. 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
- (e) Sits quietly.
- (f) Sits and talks.
- (g) Stands always.

## APPENDIX V

### SCHEDULE FOR CLINICAL EXAMINATION FOR ASSESSMENT OF NUTRITIONAL STATUS

Name of child :

#### I. GENERAL

Appearance :

0. Good
1. Fair
2. Poor
3. Very poor

#### II. EYES

Conjunctiva :

0. Absent, glistening, and moist
1. Slightly dry on exposure to sunlight for half minute
2. Conjunctiva dry and wrinkled
3. Conjunctiva very dry and bitot's spots present

Pigmentation :

0. Normal colour
1. Slight discolouration
2. Moderate browning in patches
3. Purulent

Discharge :

0. Absent
1. Watery
2. Mucopurulent
3. Purulent

Xerosis :

0. Absent
1. Slight dryness and diminished sensibility
2. Haziness and diminished transparency
3. Ulceration

Vascularisation :

0. Absent
1. Circum-corneal injection of blood vessels
2. Vascularisation of cornea

Angular conjunctivitis :

- 0. Absent
- 1. Present

Night blindness :

- 0. Absent
- 1. Present

### III. MOUTH

*Lips*

Condition :

- 0. Normal
- 1. Angular stomatitis mild
- 2. Angular stomatitis marked

*Tongue*

Colour :

- 0. Normal
- 1. Pale but coated
- 2. Red
- 3. Red and raw

Surface :

- 0. Normal
- 1. Fissured
- 2. Ulcered
- 3. Glazed and atropic

*Gums*

Condition :

- 0. Normal
- 1. Bleeding.
- 2. Pyorrhoea.
- 3. Retracted

Fluorosis :

- 0. Absent
- 1. Chalky teeth
- 2. Pitting of teeth
- 3. Mottled and discoloured

Caries :

- 0. Absent
- 1. Slight
- 2. Marked

**IV. HAIR**

Condition :

0. Normal
1. Loss of lustre
2. Discoloured and dry
3. Sparse and brittle

**V. SKIN**

Appearance :

0. Normal
1. Loss of lustre
2. Dry and rough or crazy pavement
3. Hyper keratosis, phrynoderma

**VI. OEDEMA**

Distribution :

0. Absent
1. Oedema on dependent parts
2. Oedema on face and dependent parts
3. General

**VII. HEART**

Size :

0. Normal
1. Apex just outside the
2. Enlarged

## APPENDIX VI

### SCHEDULE FOR DIETARY SURVEY OF FAMILIES

Serial No.....

1. Name and address . . . .  
Caste or community . . . .  
Occupation . . . .  
Mother tongue . . . .
2. Total income per month . . . .
3. Approximate income spent on food per month
4. Members of the family:

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No.	Name	Sex	Relation- ship to head of family	Occupation Income
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## 5. Three day record of food consumption:

Meal	Content	First Day		Second Day		Third Day	
		Volume	Weight	Volume	Weight	Volume	Weight

Breakfast

Lunch

Tea

Dinner

Others

## 6. Quantity of foods used and menu:

Meal	Content	Food used	Quantity in house- hold measure	In Weight
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Breakfast

Lunch

Tea

Dinner

Remarks:



## APPENDIX VI

### SAMPLE STORIES FOR NUTRITIONAL EDUCATION

#### 1. *Two little rabbits*

'Nandhu' and 'Sundhu' were brothers. Mr. Kittu was their grandfather. He was very fond of his little grandsons. He visited them often in their home. One day he asked them, "My dear children what toys do you like best to play with?" Nandhu and Sundhu at once answered, "Grandfather, we would love to have young rabbits as pets for our play."

After a month, both Nandhu and Sundhu celebrated their birth days. Many of their relatives greeted them with gifts of varieties of toys and new clothes. Grandfather Kittu surprised them with two little identical pretty white rabbits. They were born on the same day to the same mother. Because they were so identical, Nandhu and Sundhu took one each without any quarrel or argument. The little rabbits appeared to be happy and proud of their companions.

Grandfather Kittu told the boys, "Look here, children, you need to feed these little rabbits properly and look after them very well", Mr. Kittu then went back to his village.

The young rabbits started their life with the two boys. Each one fed his rabbit with the food he liked most. Nandhu liked milk and greens and therefore he fed his pet with plenty of milk, greens and rice daily. His rabbit also developed taste for those foods and liked them very much. Sundhu on the contrary never liked milk and greens. He liked only rice. He therefore fed his rabbit with large amounts of rice. Four months rolled on. The two rabbits differed in their growth. Nandhu's rabbit had grown big and healthy. He was very pretty to look at, with thick white velvety fur and bright eyes. He ran about smartly. He was friendly and played with every one. On the other hand Sundhu's rabbit was weak and thin. He had not gained weight. He was ugly to look at, because his fur was brown and thin. He always had a tired appearance. He never liked to play with one but was always sitting in a corner with sleepy eyes. Sundhu, who was taking only rice had himself never looked healthy. When Sundhu saw Nandhu's rabbit he felt sad about his rabbit.

Some more months passed on and one day grandfather Kittu came to visit them, with many other gifts. After sometime he enquired about the rabbits'. "Dear children, how and where are your little rabbits?" With great excitement Nandhu ran and brought his pretty young rabbit. But Sundhu came reluctantly, with a downcast face with his weak rabbit. He was very sad to

show him to his grandfather. Nandhu exclaimed, "See! grandfather! I have been giving plenty of milk and greens to my rabbit and he likes them very much". Sundhu cried, "I am giving plenty of rice, but he never eats. He is angry with me I think". Tears filled his eyes as he narrated his sad story. "Don't cry my boy," you should have followed your brother. You ought to have given your rabbit plenty of milk, greens and a little rice. Do you know why? Rice is the least nutritious when compared to milk and greens".

Sundhu then told Nandhu "Brother, I too will start giving plenty of milk and greens daily to my rabbit and I will also start taking them with him". From that day he consumed plenty of milk and greens and also fed them to his rabbit. In a short time both Sundhu and his pet rabbit regained their health and became happy.

## 2. *Kala and Mala*

Little Kala and Mala were very close friends in school. They were born and brought up in the same village and they were of the same age. Their parents were good neighbours. From the day Kala and Mala joined the village school, they always went together to the classes, studied their lessons and passed all the classes in the elementary school and were ready to join the high school. They decided that they would go to the same high school in the nearby town. Kala and Mala had a happy holiday, and returned with great excitement when the schools reopened.

They dressed up smartly in their new clothes and went to the high school; but, to their great surprise, only Kala got admission and not Mala. When they made enquiries about this difference, the teacher told them that Mala was not strong and healthy enough to study in the high school and pass the examinations, while Kala was very healthy for her age and could easily study her lessons. So Mala and Kala were separated.

Mala returned home with a sad face full of tears. She refused to eat food. The idea that she was not healthy to continue her studies was haunting her. Poor child! She was feeling awfully miserable. Many times she asked herself, "Why is it that, although Kala and I are of the same age, and have been always together, she alone has grown up well not I"? What is the mystery behind this?" She wanted to have an answer for this question. Her young mind searched everywhere for the answer in agony.

In the evening, Mala went to Kala's house, to hear all about her new experiences. She met Kala's mother and asked her "Aunty! Aunty! I have a big question. Why is that I have not grown up according to my age? Had I been healthy like Kala, I would have gone with her to the high school." Kala's mother felt sorry for the little girl and wanted to help her. She asked her "Mala do you eat properly? Do you like eating all the different foods?" The answer was "No". Kala's mother continued, "Have you seen

a paddy field any where Mala?" "Oh! Yes! I have seen paddy fields in plenty! Aunty! They are full of dark green, fresh and beautifully grown blades to look at. I always love to look at them," answered Mala. "Then Mala, can you think of a green paddy field in a dry and unfertile land?" "Pooh! how can it be? Certainly, the paddy plants will become brown, short, shaggy and dried up! They will be ugly to look at" said Mala.

Kala's mother then explained to Mala, "Since the well grown paddy field gets sufficient water, manure, fresh air to grow, the plants are in good condition. On the other hand a dry and unfertile land cannot offer adequate nutrients for the paddy plant. Therefore it will become brown and short. The same happens to you Mala! You also need good nutritious food to grow well."

Mala had the answer for which she had waited long. Her question had been answered. She told Kala's mother, "Aunty! hereafter I will eat good nutritious food and grow up like Kala so that I can go with her to school."

Mala returned home satisfied. From that day she started taking good nutritious food such as milk, eggs and greens and soon attained good standard of nutrition. During the following term she was able to join the same school where Kala was studying.

Once again they became great friends and went to school together from their village.

## APPENDIX VIII

### QUESTIONNAIRE GIVEN TO PARENTS AT THE CONCLUSION OF THE EXPERIMENT

1. What was your opinion about the midday meals before allowing your child to join the programme ?
2. What is your opinion now about the midday meals scheme ?
3. What are the reasons for permitting your child to take midday meals here ?
4. Do you like the midday meals which are being served here ? Why ?
5. What comments does your child make about the school lunches in the home ?
6. Which of the following do you notice in the eating habits of your child after joining the school lunch programme ?
  - (a) Desire towards meals,
  - (b) Time taken for eating
  - (c) Wasting food
  - (d) Conversing with others while eating, and
  - (e) Attitude towards new foods.
7. Is there any food(s) that your child had liked before, and dislikes now ?
8. Which are the foods that were disliked before, but are liked now ?
9. Do you notice any change in the amounts of food consumption of your child at home ?
  - (a) Cereal
  - (b) Dhal
  - (c) Vegetables, and
  - (d) Milk
10. What are changes in the health of the child after participating in the school lunch ?

## APPENDIX IX

### PROFORMA FOR ASSESSING SOCIAL DEVELOPMENT OF CHILDREN

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	<i>Score</i>
<b>1. <i>Cheerfulness</i></b>	
Always cheerful . . . . .	5
Most of the day . . . . .	4
Sometimes . . . . .	3
Rarely . . . . .	2
Never cheerful . . . . .	1
<b>2. <i>Alertness:</i></b>	
Very alert and active . . . . .	5
Alert . . . . .	4
Active . . . . .	3
Dull . . . . .	3
Very dull . . . . .	1
<b>3. <i>Neatness in appearance</i></b>	
Always neat and tidy . . . . .	5
Tidy . . . . .	4
Shabby . . . . .	3
Dirty . . . . .	2
Dirty and shabby . . . . .	1
<b>4. <i>Freedom from anxiety and tensions</i></b>	
Always free from anxiety and tension . . . . .	5
Most of the time . . . . .	4
Sometimes . . . . .	3
Rarely . . . . .	2
Never . . . . .	1
<b>5. <i>Posture</i></b>	
Very good . . . . .	5
Good . . . . .	4
Fair . . . . .	3
Poor . . . . .	2
Very poor . . . . .	1

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6. *Willingness to take up responsibility*

Always . . . . .	5
Most of the time . . . . .	4
Sometimes . . . . .	3
Rarely . . . . .	2
Never . . . . .	1

7. *Cooperation*

Very cooperative . . . . .	5
Cooperative . . . . .	4
Indifferent . . . . .	3
Stubborn . . . . .	2
Very stubborn . . . . .	1

8. *Enjoyment of being in the class*

Always enjoys . . . . .	5
Most of the time . . . . .	4
Neither enjoys nor unhappy . . . . .	3
Indifferent . . . . .	2
Unhappy . . . . .	1

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