

**NUTRITIONAL STATUS OF SELECTED PRESCHOOL CHILDREN
IN AN APPLIED NUTRITION PROGRAMME**

By

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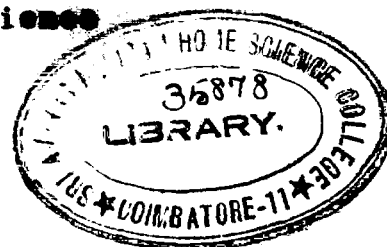


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1. INTRODUCTION

Protein Calorie malnutrition is the most common nutritional disorder of childhood in developing nations. (Gopalan 1967, Vinodini Reddi 1968, Devadas, 1968). The mortality rate of children from one to five years age group is about 50 to 80 times higher than that of the developed countries, (Tely 1964, Gyorgy 1964, Raman 1968).

UNICEF (1963), Swaminathan (1967), Sebastian (1968) stress that preschool children of the population represent the most vulnerable group among whom the incidence of malnutrition is very high, 70% of Indian children of preschool age suffer with Protein-Calorie deficiency, (Gulati 1967, Edwards, 1968).

Kanungo (1970) explains 75 million children in India are with in the age range of 0-5 and five lakhs among them attend preschools.

Perez (1966), ^{Scrim} Shaw (1966), Siva Rao (1968) explain that the preschool child needs great attention while infants have the protective care of the mothers and the school child is reached through the school but the preschool child lacks, These opportunities.

It has been stated by Swaminathan (1967), Visweswara Rao (1967), Raza (1968) that malnutrition exists chiefly because of the following reasons, inadequate income, poor

food habits, non-availability and high cost of protective foods, physiological stress and metabolic disorders. Simpson (1968) points out that malnutrition and under nutrition are very much interrelated, those who suffer from under nutrition are simultaneously malnourished.

Since child hood is a period of growth and development Nageswara Rao (1967) and Cam Cam (1969) point out that health and wellbeing are impossible without a satisfactory diet both in quantity and quality.

According to King (1966), Radh Krishna (1969), Sri Kantia (1970) the rapid growth during infancy and early childhood call for adequate amounts of good quality of protein and greater amounts of nutrients. Devadas (1968) says that higher incidence of malnutrition calls for active health education programmes to improve the food practises in the community.

The need for better nutrition for the preschoolers has been recognised today more than ever before. As a result, the Government of India in collaboration with State Governments and International Agencies has launched Applied Nutrition Programme, one aspect of which is organising feeding centres for Preschoolers. (Hedyat (1968), Brook (1969))

So the present study has been under taken to study the effects of an organised supplementary feeding programme for a group of children in an Applied Nutrition Programme.

The objectives of the study are:

1. To study the nutritional status of a group of preschool children participating in an Applied Nutrition Programme.

2. To study the impact of Nutrition Education given to mothers of the same group of children on their family eating habits.

II REVIEW OF LITERATURE

The literature pertaining is reviewed under the following heads:

- A. Programme in operation for the betterment of Nutritional Status of Preschool Children.
- B. The Applied Nutrition Programme.
- C. Research carried out in the area of Applied Nutrition Programme.
- D. Nutritional Requirements of preschool children.
- and E. Nutrition Education

To combat the widespread protein calorie malnutrition throughout India, the Central and State Governments have undertaken many programmes in collaboration with United Nations Organisations and Voluntary Agencies. (Thirumala Rao, 1963, WHO, 1966, Purohit et al., 1968).

A. Programme in operation for the betterment of Nutritional Status of Preschool Children

1. Nutrition Programmes for children in the age group 2 to 5 years through Balwadies

The programmes of nutrition for preschool children in the age group 3 to 5 years which has been included in fourth plan is being initiated during the year 1970-71 with the help of existing Balwadies run by Voluntary Organisations as well as by Tribal Welfare and Harijan

Welfare Departments in different states. The nutritional contents of the programme would provide 300 calories and 5 g. of protein per day per child for 250 days in one year. On an average the contents of the food could give 60 g. of cereals and 30 g. of pulses costing 15 paise per day per child. Wherever local food is available efforts will be made to encourage local voluntary organisations and made in the preparation and distribution of food to children. Initially the programme would cover 68,600 children costing Rs.20 lakhs.

The existing Balwadis in Family Child Welfare Projects and those run by Voluntary Social Welfare Organisations receiving grants from the Central Social Welfare Board, in tribal and backward areas by the State Directorates of Tribal Welfare and Harijan Welfare ~~and Harijan Welfare~~ will be made use of, in supplying nutritional services to children (Balasubramaniam, 1970).

2. Maternal and Child Health Programmes

Maternal and Child Welfare Services in India are an integral part of general health services. The primary health centre in each 5,200 Community Development Blocks each covering a population between 70,000 to 1,00,000 is intended for providing its area Maternal and Child Health Services including family planning, school health services in medical care and health and nutrition education (Herman 1967).

Organisations like the Red Cross Society, Kasturba Gandhi Trust, Central Social Welfare Board, Indian Council of Child Welfare etc. are involved in organising the much needed services for mothers and children apart from purely local voluntary organisations.

Nutritional Services

Maternal child health institutions provide food supplements like skim milk or CSM foods to supply protein either free of cost or at subsidized rates. Greater emphasis is laid on nutrition education than on providing direct diet supplements. The mothers are taught about improved infant feeding practices. The underlying principle is to teach the mothers better use of locally available food stuffs and to bridge the gap in the availability of animal protein like milk, egg etc. (Mathai 1965, Sebastian 1968).

3. Family and Child Welfare Programme

Family and Child Welfare Programme is the joint effort of the Women's Welfare Department of state governments and Central Social Welfare Board with significant assistance from UNICEF. The objective of the programme is to promote physical, mental and social development of children through organised preschools and educational programmes to mothers. Their essential services cover an educational programmes in Nutrition through preschool lunch

programmes. A well organised lunch programme is supplied to approximately 40 children in each preschool. The cost of the meal per child per day is Rs.0.20. Personnel involved in this programme are a trained Balasevika and a cook.

The programme of Family and Child Welfare was inaugurated by the Central Social Welfare Board on November 14th 1967. The Family and Child Welfare Projects are expected to meet the needs by providing integrated welfare services to children of preschool age. The UNICEF is providing equipment and transport facilities for these projects (Dhar 1971).

The existing balwadis in Family and Child Welfare Projects and those run by Voluntary Social Welfare Organizations receiving grants from the Central Social Welfare Board. It is estimated that 21.5 lakh children in the age group 3 to 5 years received the benefits of midday meals at primary schools during 1969-70 (ICMR, 1970).

4. Other schemes undertaken by the Indian Council of Child Welfare

The programme of nutrition for children under the ministry of Health, Family Planning and Urban Development covers the following major schemes:

- a) Prophylaxis against Nutritional Anaemia
- and b) Prophylaxis against blindness through Vitamin A deficiency.

a) Prophylaxis against Nutritional Anaemia for mothers and children

The scheme seems to provide preventive measures against nutritional anemia in mothers and children by administering ferrous sulphate and folic acid through Maternity and Child Health and Family Planning Centres. During the year 1970-71, it is proposed under the schemes, 70 lakhs are estimated to cover 30 lakhs children with this service.

b) Prophylaxis against blindness in Children caused by Vitamin A deficiency

A scheme for controlling blindness in children caused by Vitamin A deficiency is being implemented by the Department of Family Planning Ministry of Health during the Fourth Five Year Plan. During 1969-70, 16 lakhs children are proposed to be covered by this scheme. Vitamin A capsules of high dosage would be administered to the children through Maternal Child Health and family Planning Centres. The plan outlaid for the scheme is Rs.40 lakhs. During 1970-71 Rs.8 lakhs will be provided to cover 16 lakhs children with concentrated doses of Vitamin A in the form of capsules (Balasubramanian, 1970).

B. The Applied Nutrition Programme

The Applied Nutrition Programme is one of the very important programmes, largest of its kind launched in India with the cooperation of state and central governments in

collaboration with International Agencies like UNICEF, FAO and WHO, to educate the village people in the production of protective feeds, consumption of nutritive diets through well organised demonstration feeding programmes and education to impart the knowledge of good nutrition to all (FAO 1966, Intengan, 1966).

1. Origin of the programme

Orissa was the first state to run the programme as an experiment under the name Expanded Nutrition Programme, which was a great success. This motivated the other states to start the programme with a different name Applied Nutrition Programme, or ANP (Kerwood 1963, Egger 1964, Barbara Purvis 1969).

2. The definition of Applied Nutrition Programme

Applied Nutrition Programme may be defined as a programme which aims at the application of existing knowledge in the field of food and nutrition sciences for improving the nutritional standards of dietary intake of people particularly the vulnerable groups consisting of preschool children, expectant women and nursing mothers (*Ritchie* 1967, *Davey* 1967).

3. The objectives of Applied Nutrition Programme

Applied Nutrition Programmes are comprehensive types of interrelated educational activities aimed at improvement of local food production, consumption and

education in favour of local communities particularly mothers and children in rural areas in which the active participation of people, is sought (Wali 1963, Nagara 1967, Devadas 1970).

4. Implementation of Applied Nutrition Programme

FAO (1969) States that the total population of India is 53,00,00,000. The country is divided into 5,625 community Development Blocks. In 1968, 580 Community Blocks were covered under ANP involving 221 training and 219 production centres. Initially the plan period was for 3 years and later it was extended for 5 years when the government aid is available. After the plan period, the programme is expected to become self sustaining, so that it could be run by the local people.

5. Applied Nutrition Programme in Tamil Nadu

The Applied Nutrition Programme was launched in Tamil Nadu in 1962. (Medivitt et al 1969). Now ANP is being implemented in 22 Community Blocks, and currently 1,000 Balwadis are involved in the feeding of 2 lakhs of preschool children.

Under the ANP in Tamil Nadu, emphasis is given to production of eggs through poultry units, production of vegetables and fruits in kitchen and school gardens. Nutrition education is given through Magalir Manram and through demonstrations. Eggs are supplied to preschool children 2 or 3 per week. UNICEF skim milk feeding pro-

gramme has come to a conclusion which has been taken over by CARE Midday Meals Programme.

C. Research Carried Out

1. Supplementary Feeding Programmes

An experiment was conducted with 99 preschool children of 82 families of Veera Pandipur Village revealed that the nutritional status of upper income group children were better than the middle and low income groups (Devadas 1967).

Swaminathan et al (1970) conducted a study with 150 preschool children whose diet was supplemented with 30 g. of wheat flour, 20 g. of green gram, 8 mg. of groundnuts and 20 g. of sugar. The control group did not receive any supplementation. There was improvement in heights and weights of the experimental group over the control group. This indicates that the feeding programme had not resulted in a diminution in the intake of their home diets thus it proved that supplement was truly a supplement and not a substitute for their home diet.

Doraiswamy et al (1964) conducted feeding experiment with weaned infants and preschool children aged 13 to 46 months over a period of four and a half months showed that daily supplementation of the diet with a mixture of 30 g. of spray dried protein feed and 15 g. of cane sugar brought about a significant improvement in their growth

and nutritional status as compared with the control group receiving an isocaloric supplement of rice flour and cane sugar.

2. Supplementary feeding in the area of Applied Nutrition Programme

An impact of Applied Nutrition Programme and the nutritional status of preschool children were studied in comparison with a corresponding group of preschool children who were not in the Applied Nutrition Programme. The former received daily cup of reconstituted skim milk and one egg on alternate days three times a week, the control group did not receive any supplementation. The increase in heights and weights, haemoglobin levels, differences in eating habits, and social development were assessed. There was significant increase in the height and weight of the preschool children in ANP group and there was no significant difference in the haemoglobin levels. There was rapid decrease in the incidence of clinical signs in the ANP group. The attendance, eating habits and social development of the ANP preschool children were better than those of the controls (Unpublished Thesis, 1970).

An experiment was conducted with 26 children attending Balwadi 12 at Kottamangalam and 10 Basuvapalayam. Their food was supplemented with skim milk, half egg and midday meals once in a week. For control group there was no supplemen-

tation. There was improvement in the heights and weights of the children who attended Balwadi. The Haemoglobin content of those receiving supplementary foods were significantly greater than those observed in children not receiving the food supplements. There was improvement in their nutritional status (Devadas 1965).

D. The Nutritional Requirements of Preschool Children

The Recommended Requirements of nutrients are the amounts sufficient or more than sufficient for the nutritional needs of practically all healthy persons in a population (Greaves, 1963, Smith, 1966).

Proteins:

The optimal intake of protein as FAO, 1965 (Sri Kantia) (1970) say is made up of two components. A basal amounts below which it is believed that normal health and growth cannot be achieved and an additional amount to provide for the stresses including minor infections to which every one is exposed. ICMR (1968) states that daily requirement of protein is 20 g. for 3 years and 22 g. for 4-6 years.

Calories:

The calorie requirement of preschool children increases throughout preschool period. The calorie requirements of any population depends on their mental and physical activity, size, age and climate, (Blaxter, 1967). The requirement for the preschool children is 1500 calories (ICMR, 1968)

Minerals:

The high mineral content is largely responsible for the rigidity and strength of the bones during growing period, (FAO 1961, Hegsted, 1968). ICMR (1968) suggests that requirements of the preschool children calcium 0-4-0.5g and iron 15-20 mg.

Vitamin A:

The optimal intake of 250 mg. of Vitamin A in the form of retinol is suggested by ICMR (1968) to prevent the effects of Vitamin A deficiency in infants and children up to the age of five years (FAO, 1965).

B Complex Vitamins

Beaton (1964) stresses that Beri Beri angular stomatitis and diarrhoea in preschool children can be prevented by optimal intake of B Complex Vitamins. ICMR (1968) suggests the B complex vitamin requirement for pre-school children as following.

<u>Vitamin</u>	<u>Age groups</u> (Years)	<u>Requirements</u>
Thiamine	2 to 6	0.6 to 0.8 mg.
Riboflavin	2 to 6	0.7 to 0.8 mg.
Niacin	2 to 6	0.8 to 10 mg.

Vitamin C:

Vitamin C is important for tooth formation, bone formation and in the production of bone salts and in wound healing. Vitamin C is also necessary for the formation of

intercellular substance the 'cement' between the cells (Proudfit, 1967). ICMR (1968) recommended the intake of 30-50 mg. for age group 2-6 years.

E. Nutrition Education: The Framework of Applied Nutrition Programme :

Nutrition education of the people is important in the context of prevention of malnutrition. In a large country with comparatively higher rates of illiteracy, nutrition education should prove a tedious task (Pattison et al 1957, Ghosh, 1966, Patwardhan, 1970).

1. Methods of Nutrition Education

Since the ignorance of mothers is a very important factor for the existing malnutrition in the villages, different methods are employed to correct their nutritional status. Among them are demonstrations, talks, dramas, film shows, exhibitions, individual contacts, distribution of leaflets, Puppet shows, and radio broadcast (DeKieffer 1966, Chakrabarti 1967).

2. Nutrition Education for Mothers

Intelligent co-operation on the part of parents and teachers is of the most importance in improving the nutritional status of children, (Bertha, 1957, Rao et al 1961, Johnson 1964). Nutrition education to the mothers include imparting food selection, information on food preservation, changes in food habits, infant feeding, food productions, methods of cooking and food budgeting, using the methods explained above.

3. Nutrition education for children

The aim of nutrition education is to teach the children the importance of good food and instill in them good food habits, (Alarcon 1968, FAO 1965).

Children are the agents to carry nutrition information to their homes. Hence great attention need to be paid in educating the children about nutrition.

III EXPERIMENTAL PROCEDURE

The experimental procedure consisted of the following steps.

- A. Selection of the village
- B. Study of the operation of Applied Nutrition Programme in the Selected Village
- C. Selection of the subjects
- D. Conducting the survey
- E. Assessment of the nutritional status of the selected subjects
- F. Assistance in the feeding programme
- G. Conducting nutrition education programme
- and H. Evaluation of the effect of supplementation and nutrition education.

A. Selection of the village

The village Pannimadai located 12 kms. from the college belonging to Perianaickenpalayam Block was selected for the investigation.

1. Criteria for the selection of the Block were:
 - a) Proximity of the village to the city and availability of public transport to the village.
 - b) Had the co-operation of the Balasevika and village leaders.
 - c) Had good rapport with the school children as they had been subjects of previous studies and well oriented to clinical and physical examinations.

- d) Had a well organized poultry unit and Magalir Manram, hence regular supplementary feeding programme was being conducted.
- e) The Balasevika and Magalir Manram members were trained in applied nutrition.

B. Study of the operation of Applied Nutrition Programme in the selected village

The Applied Nutrition Programme in Pannimadai village belongs to the III series of Applied Nutrition Blocks in Tamil Nadu to which Perianaickenpalayan Block belonged. The programme was co-ordinated by the Rural Development and Local Administration Department of the Government of Tamil Nadu under the direct co-ordination of the Director of Rural Development, assisted by the Joint Director of Agriculture who in turn was assisted by the Project Nutrition Officer and Project Poultry Officer.

At the district level the programme was co-ordinated by the Chairman of the District co-ordination Committee who is the District Collector, assisted by the Secretary of the Committee, Block Development Officer, who is in charge of implementing the programme as per the comprehensive plan drawn, with the co-operation of the personnel involved in the implementation. They are Panchayat Union Chairman, Panchayat President, District Level Officer, Block Extension Officers, Principals and Staff of the Training Institutions.

At the village level the programme is run by Grama Sevikas, Grama Sevaks and Balsevikas with the co-operation of the people of the village who will take over the programme after the plan period of the five years.

1. The Main Elements of Applied Nutrition Programme in operation in the selected villages

The main elements of Applied Nutrition Programme in operation in Pannimadai were:

- a) A well organized preschool (Kuzanthaigal Kappagam) with a well trained Balasevika to run the school.
- b) Village poultry unit.
- c) Kitchen gardens, school gardens and a community well programme for starting a community garden.
- d) Feeding programme for pregnant and nursing mothers.
- e) Active Magalir Manram with regular Nutrition Education Programme.
- f) Regular training Programme in Pannimadai villages for the personnel involved in Applied Nutrition Programme.

2. Finances:

Financial commitments of the State Government towards the production, distribution and educational aspects of Applied Nutrition Programme in Pannimadai village during 1970-71 are given in the following Tables.

TABLE I

FINANCIAL COMMITMENTS OF THE STATE GOVERNMENT
AND OTHER AGENCIES FOR ANP IN PANNIMADAI

S.No.	Item	Amount Commit by State Government in Rs.	Others	Total amount in Rs.
<u>POULTRY</u>				
1.	Replacements of 100 birds	600	600 (UNICEF)	1200
2.	Feeding Charges	2100	300 (Magalir Mandram Saving)	2400
3.	Honorarium for attendant	360	...	360
4.	Medicine	150	...	150
5.	Litter	40	...	40
6.	<u>HORTICULTURE</u>			
6.	School garden	40	...	--
7.	Community garden	8850	...	8850
	Nutrition Education	170	...	170
		12,310		13,170

DETAILS OF PRODUCTION AND DISTRIBUTION OF FOOD IN THE
SELECTED VILLAGES

Aspect	Area, capacity and No.	Foods pre- duced	Foods distri- buted	Money gained
Poultry	200 birds	180	180	..
School garden	7 cents	413.5 kg	413.5 kg	..

TABLE III

THE DETAILS OF FEEDING PROGRAMME I.

Food Supple- ments	Source	Amount/ child/day	Frequency	No. of children
Eggs	Village poultry	1	3 times/week	40
Skin Milk	UNICEF	30 g.	5 times/week	40

These supplements were well accepted by children and are eminently the right food during and after weaning. (Armstrong, et al 1963, Berry 1968, Sukhatme 1969).

3. Personnel incharge of the distribution of supplements

The Balasevika was solely incharge of the feeding programme assisted occasionally by mothers or school children.

4. Procurement and storage of supplements

Skim Milk powder supplied by UNICEF and distributed by the Block was stored in the carton in which it was received at room temperature, eggs produced in the poultry were collected and stored in cardboard cases in side a wooden box.

5. Preparation and distribution of supplements

a) Preparation of milk

The milk was prepared from the measured quantity of powder equivalent to 30 g./child/day. The reconstitution was done by mixing with required quantity of cold water and reconstituting of the same with required quantity of the hot water and bringing the same to boiling point, 10 g. of sugar/child was added. After boiling, luke warm milk was distributed to children equivalent to 150 ml/day in aluminium tumblers provided for the purpose.

b) Preparation of eggs

Required number of eggs were carefully dipped into boiling water in an aluminium pot over the fire. The eggs were left in the boiling point for 5 minutes and afterwards cooled. The shells were removed just before serving.

6. Distribution of the supplements

Eggs were supplied to all the 40 children 3 times in a week. Each individual was given a full egg. Skim Milk at the rate of 30 g. per child was supplied 5 times in a week. The supplementation programme lasted for 5 full months and 15 days of the study period after which period, CARE preschool lunch programme was started in the school.

7. Consumption of the supplements

The children who attended the Balwadi were given the supplements daily. After and before eating, Balasevika took the care of washing their hands. The supplements were fed to children at 10.30 A.M. on every feeding day. (Figure I).

In the case of milk, after boiling and cooking measured amount of milk was given to each child in washed tumblers and served under sanitary conditions.

C. Selection of the Sample

All the 40 children who attended the Balwadi in Pannimadai were selected as the sample for the study because:

1. Sample less than that cannot be taken for the present investigation.
2. The children represented the age groups between 2½ - 6 years.
3. The children attended Balwadi regularly.
4. Both sexes of the children were present in the sample.

FIGURE - 1

CHILDREN AT FEEDING PROGRAMME



5. The selected sample of the subjects were residents of the same village and did not expect to move.
6. The mothers of the selected subjects were Magalir Manram Members and were willing to co-operate throughout the study.

TABLE IV

The table given below shows the age and sex distribution of the selected sample of children.

Age	Sex	
	Female	Male
2½ - 3½	3	1
3½ - 4½	12	10
4½ - 5½	8	3
5½ - 6½	1	2

D. Conducting the survey

Three types of surveys were conducted in order to assess the nutritional status of the selected subjects. They are:

1. A dietary and socioeconomic survey to assess the socio-economic status of the selected families and the dietary pattern.

Dietary Survey

Swaminathan (1966) says that this method is efficient enough to find out the per-centage of the under fed to assess the nutritional status of the population. So a dietary survey to elicit the information

on dietary pattern of the families of the selected subjects was conducted with an organised schedule.

Gopalan et al (1961) explain that nutrition surveys should not only be with the diet surveys of the communities but also with the surveys of anthropological socio-economic and environmental aspects of the community.

A socio-economic survey was conducted to elicit the information on the social attitudes and the economic status of the selected families.

2. Attitude survey

Attitude survey is helpful in understanding the attitudes of the mothers of the selected subjects towards the food and the supplements supplied in Applied Nutrition Programme.

A survey to study the attitudes of the mothers of the selected subjects towards the foods, their food habits, food beliefs, and their opinion about the supplements in the Balwadi was conducted by a well formed schedule.

3. Weighment survey

To find out the actual intake of the children a weighment survey was conducted for selected six subjects. Devadas (1964) states that the method of survey depends on the sample to be surveyed. The selection of the sample is governed by the purpose of the survey, method of survey and the characteristics of the population.

E. Assessment of the Nutritional status of the selected subjects

The Nutritional status of the selected children was assessed under the following.

1. Anthropometry
2. Bio-chemical studies
3. Clinical examination
- and 4. Weighment survey

1. Anthropometry

Physical Assessment of Growth of the selected subjects.

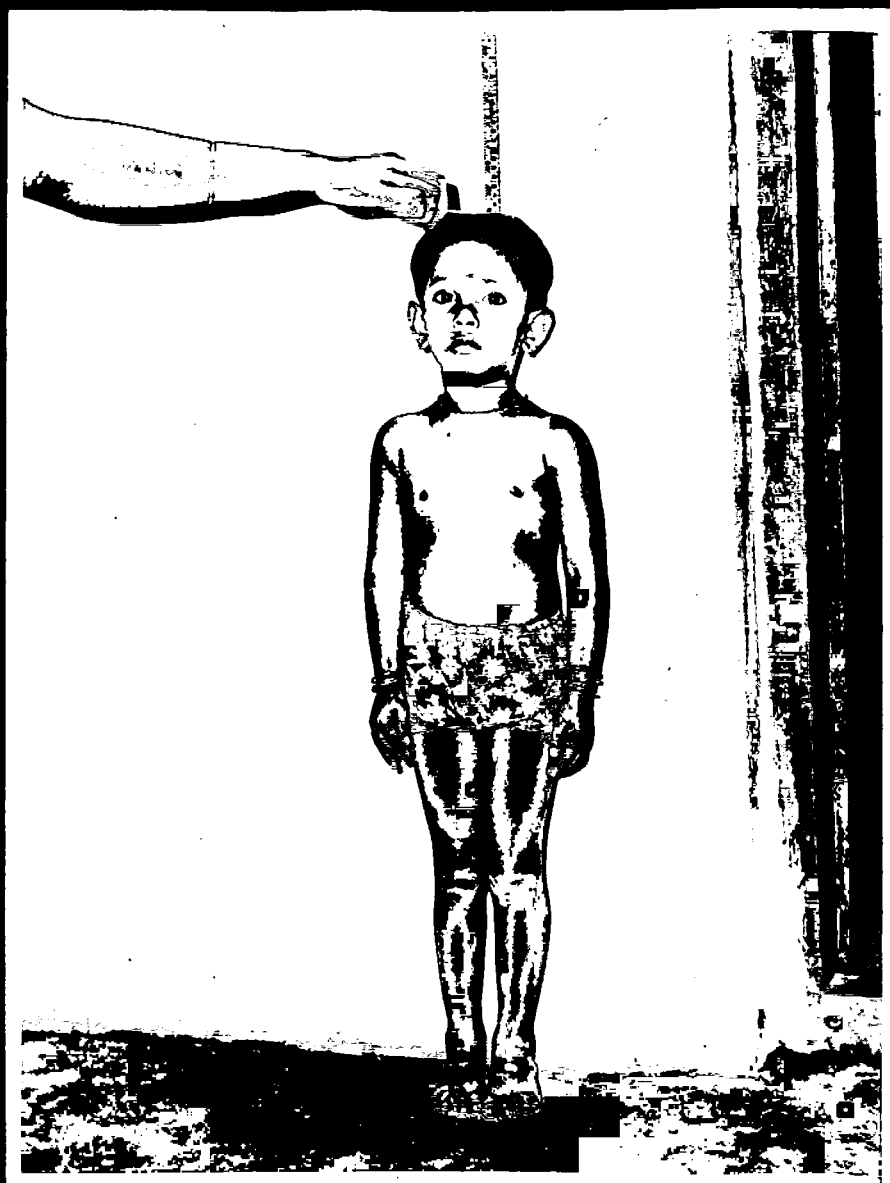
Chauduri (1965), Luzzi (1966), Gurney (1969) opine that the anthropometric measurements such as heights and weights constitute an important means of assessing the nutritional status of a population and if interpreted would serve as a useful indicators in the evaluation of nutritional status. The heights and weights of the subjects 40 were noted periodically and regularly for every month for 6 months and the improvement was discussed later.

(a) Taking Height

The heights for all the subjects were recorded every month using a scale marked in centimetres pasted on the wall. The children were made to stand near the wall almost touching it. The head was held erect with the bare feet, heels touching the base of the scale. The height was recorded in centimetres (Figure II).

FIGURE 2.

TAKING THE HEIGHT OF A CHILD



(b) Taking weight

The weights were recorded every month for 6 months. The subjects were made to stand bare footed on the platform of weight weighing machine with minimum clothing. The weights were noted in kilograms. (Figure III.)

2. Biochemical Methods

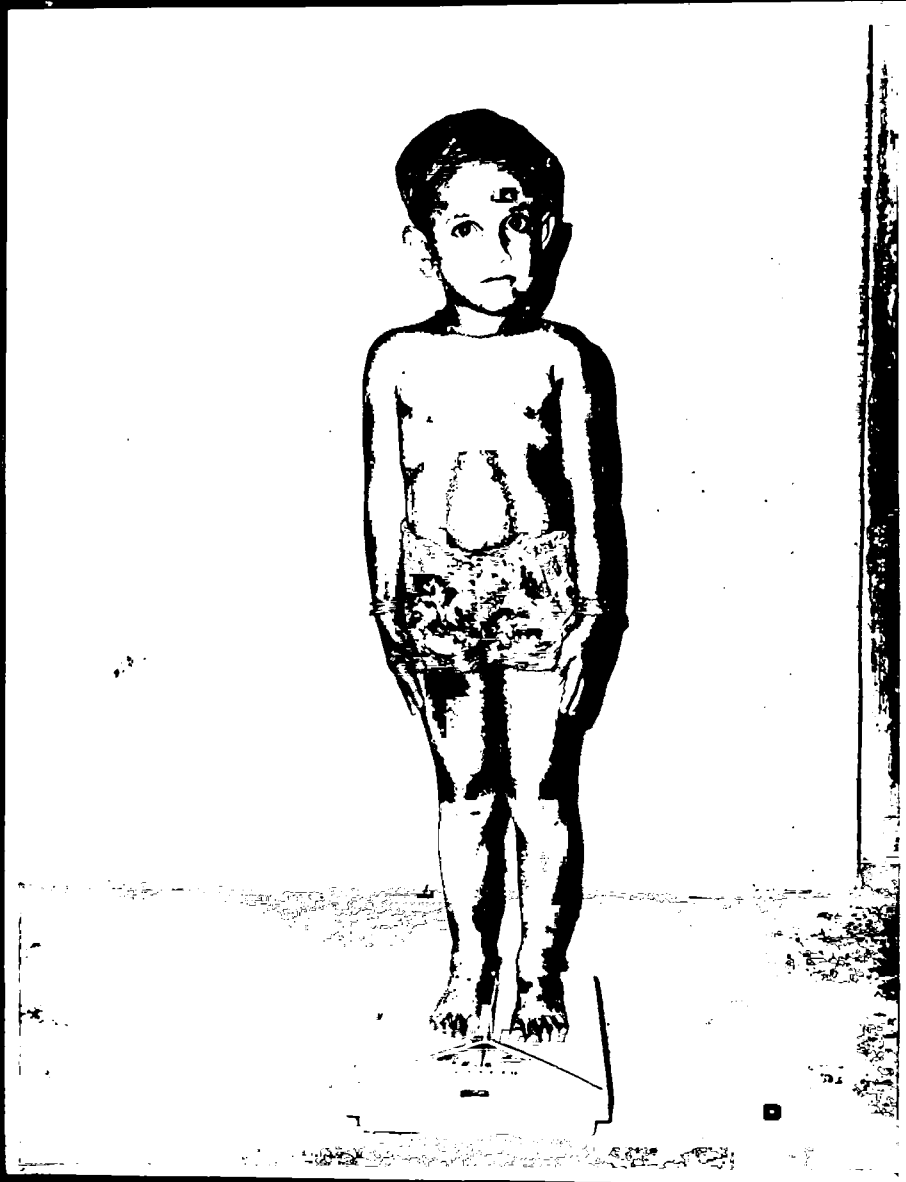
Estimation of Haemoglobin: The biochemical methods are those which directly measure the supply of nutrients in the body fluids. (Arroyave 1960, Bansi 1960, Someswara Rao 1961). So the haemoglobin estimation for children was selected as biochemical method of finding the nutritional status. Haemoglobin estimation was done for all selected children before and after the study period.

(a) Methodology of Haemoglobin estimation

- i) The subjects fingers were washed with water and the point of finger was wiped with the spirit.
- ii) The fingertip was pricked with a sterilized needle. A hard prick was given to avoid repetition and pain due to it.
- iii) The finger tip was pressed and 20 cmm. blood was collected into blood collecting pipette in Haemocytometer and placed on the bits of filter paper.
- iv) The bits of the papers were dried and the haemoglobin was estimated chemically by following cyanmethaemoglobin method (Varley, 1966).

FIGURE 3

TAKING THE WEIGHT OF A CHILD



3. Clinical Assessment

The clinical examination of the selected children was conducted initially and finally by a well trained physician using a standard ICNND (1963) clinical form (Mc bee Card). Radhakrishna Rao (1960) opines that the clinical assessment is another reliable index for showing the health and diseased condition of the children.

4. Weighment survey

Assessment of the actual nutrients intake of the selected children were assessed through weighment survey.

A weighment survey was conducted in the selected families of subjects for 7 days as this method may be considered the most reliable since it takes care of the daily fluctuations in food intake, (Thimmayamma et al (1969)).

The selected six children represented both the sexes between the age of 4 and 6 years. Because of the nature of the survey and limitations of time, only 6 subjects were selected.

(a) The steps in conducting the survey

- 1) Establishing the rapport with the mothers of the selected subjects.

The purpose of the weighment survey and the method of conducting the same was explained to all the mothers of the selected subjects by visiting their homes and discussions.

(b) Conducting the survey

- i) The weights of all the raw foods for that days cooking for the whole family were weighed initially for every meal. Cooking was observed to ensure that all the same foods weighed were cooked.
- ii) The weight of the cooked food and their full volumes were noted.
- iii) The amount each subject ate was weighed separately just before feeding.
- iv) Any plate waste and extra food consumed also weighed.
- v) The average nutrient intake was calculated using the figures given by Aykroyd et al (1966).

F. Assistance in the feeding programme

The assistance in the feeding programme was given:

1. During the preparation of the supplements.
2. In feeding the children.
3. In ensuring their regular attendance and supplementation.
4. Assistance in keeping the utensils clean.
5. Nutrition education for the mothers.

G. Conducting the Nutrition Education

Nutrition education at all the stages is an important aspect of Applied Nutrition Programme.

This aspect is handled in manyways.

1. Different Audio-visual Aids used in Teaching

Charts: A Chart is a visual symbol summarizing or comparing or contrasting or performing other helpful services effectively in subject matter (Brown et al 1959). The following charts were used in conducting nutrition Education.

- a) Charts of balance diet.
- b) Food groups.
- c) Vitamins and their resources.

2. Posters

These are pictorial designs usually symbolic in nature which imparts the matter clearly (Brown et al 1959).

The following topics were covered through use of posters

- a) Vitamin deficiency diseases.
- b) Sanitary habits in handling food and their importance.
- c) Cooking methods and how to take care of cooked foods.

3. Demonstrations

A demonstration is defined as a show to public emphasizing the salient merits, utility, efficiency etc. from article or procedure, (Dale 1964). A nutrition information presented to the housewife should be geared to the normal diet as prepared from available food products and should be presented in terms of these foods. (Olsen 1957, Brown 1959).

The demonstrations conducted were:

- a. Supplementary foods for children.
- b. Preparation of ragi leaf cakes.
- c. Pappaya halva.
- d. Ragi malt

Food preservation:

- a. Tomato Jam
- b. Tomato pickle

4. Flash cards

Flash cards are the compact cards which will be flashed before audience to bring forth an idea (Hass, 1955 et al). Colourful attractive cards were shown in these chapters to explain.

- a. Protein rich foods and their importance.
- b. Story revealing the importance of sanitation and good food habits and ANP supplements.

(Appendix I).



5. Group discussions

Intelligent cooperation on the part of the parents and children is of the most importance in improving the nutritional status (Rao et al, 1961). Group discussions help the illiterate mothers to clear off their doubts and to improve their knowledge. The discussions^s were:

- a. The importance of the kitchen gardens and the problems in raising kitchen gardens.
- b. The problem of poultry raising.
- c. Different ways of food preservation.

6. Personal contacts

Spindle (1967) says that this is an important method to teach mothers. Mothers were taught about (1) taking care of children (2) Importance of supplying all the nutrients in the foods (3) teaching them good food habits and (4) importance of changing certain food habits to better habits.

7. Songs

Songs composed on Pappaya, egg, milk and other foods were taught to the children to make them understand the significance of those foods. The songs are given in the Appendix II.

8. Through the nutrition education mothers were taught about:

- a. Selection of food
- b. Cooking methods
- c. Sanitary habits in handling foods

- d. Need to change certain food habits
- e. Raising kitchen garden, and backyard poultry

9. The children were taught about:

1. Eating habits
2. Songs on milk, Egg and Papaya
3. Importance of Eggs and Milk

H. Evaluation of Applied Nutrition Programme

In all the programmes of training and education in population, periodic evaluation of the effectiveness of the teaching is desirable (FAO 1960, FAO 1967, SIMPSON 1967).

At the end of the study period of six months an evaluation of the effects of the supplementary feeding programme for children was carried out. The results of each programme may be assessed by direct observation by means of questionnaire to find out the relative value and the effect of different ways of teaching nutrition. An evaluation is carried out in the terms of:

1. Assessment of the nutrients intake of the selected subjects.
2. Assessment of the nutritional status of the selected subjects.
3. A questionnaire to elicit the information to find out the nutritional knowledge and the attitudes of the mothers towards the feeds.

4. Nutrient intake of the children

A three day weighing was conducted in the same houses as the final to find out the impact of nutrition education on the food intake as suggested by ICMR (1964).

5. Evaluation of nutrition education given to mothers

A schedule was used to assess the nutritional knowledge gained by the mothers after nutrition education. The questionnaire is given in Appendix III.

IV RESULTS AND DISCUSSION

The results of this study on the effects of a feeding programme on the nutritional status of selected preschool children in an Applied Nutrition Programme are discussed in terms of "Before and After" effects under the following headings.

- A. Food and nutrient intake of the selected subjects
- B. Nutritional Status of selected children
 - 1. Heights and Weights
 - 2. Results of Clinical Examination
 - 3. Results of Biochemical Examination
- C. Evaluation of Nutrition Education
- and D. Suggested improvement.

A. Food and Nutrient intake of the selected subjects

The data obtained from the seven day weighment survey for the selected children before the study and three day weighment survey after the study, are given along with the ICMR (1968) recommended allowances. The table given below shows the mean daily food intake of selected children before and after nutrition education.

COMPARISON OF THE INITIAL AND FINAL FOOD INTAKE OF
SELECTED CHILDREN WITH THE RECOMMENDED ALLOWANCES,
ICMR (1968)

Foods	Mean ini- tial intake in (g.)	Recommended amounts 4-6 years	Mean final intake in (g.)
Cereals	120	200	163
Pulses	34	60	36
Green leafy vege- tables	11	75	24
Other vegetables	27	50	33
Roots and tubers	20	50	21
Fruits	8	50	15
Milk	187 ml.	200 ml.	41 ml.
Fats and oil	8	25	18
Meat, fish and egg	33	30	38
Sugar	30	40	22

The table indicates the improvement in the mean daily food intake of the selected children. This may be due to the regular and continuous emphasis on the importance of good nutrition to the mothers of the selected children.

There is a decrease in the amount of milk consumed by the selected children at the conclusion of the study because UNICEF skim milk distribution was stopped and there was no supply of milk to the children when final weighment survey was conducted.

Table shows the initial and final mean intake of the nutrients by the selected subjects in comparison with recommended allowances of ICMR (1968).

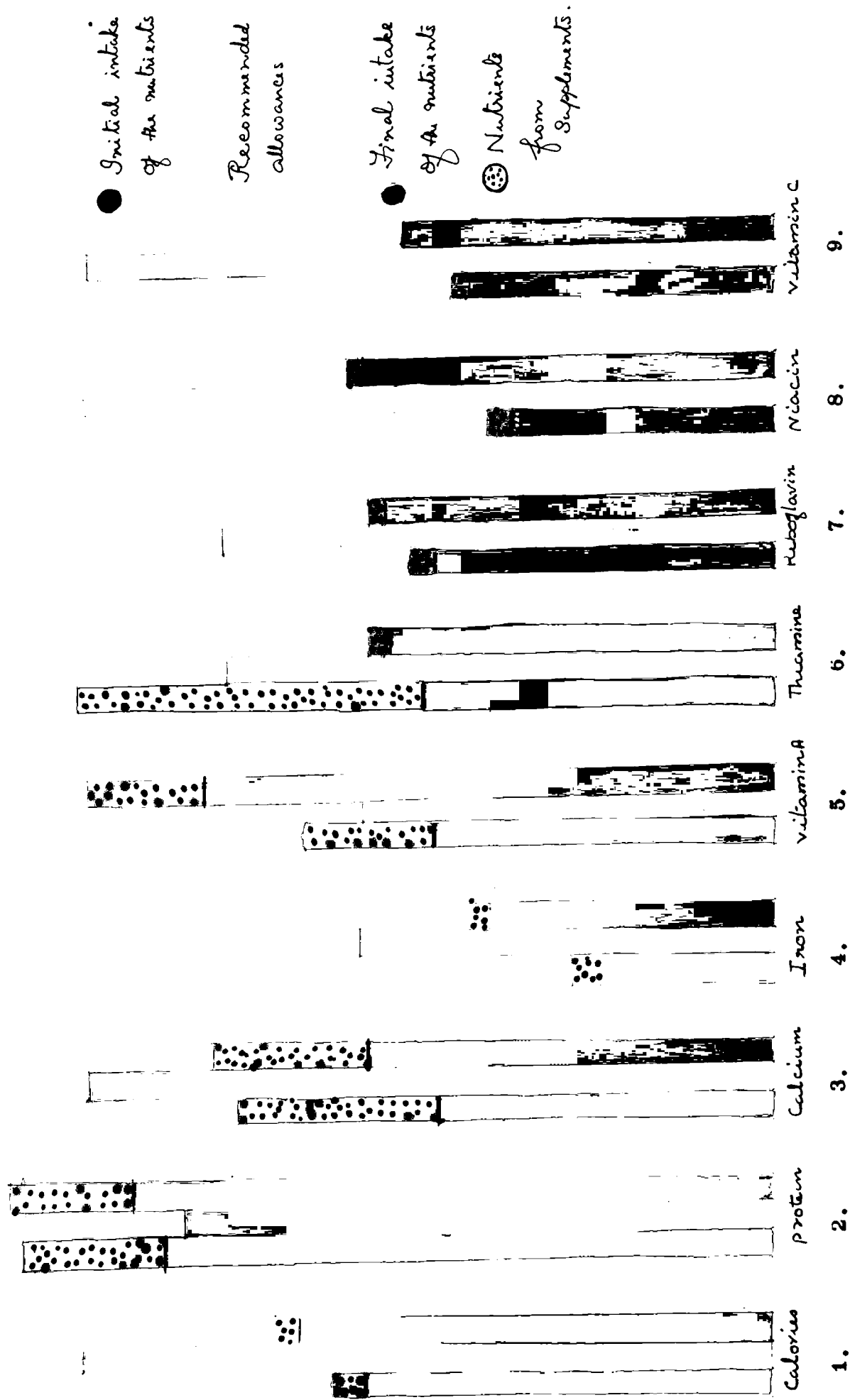
TABLE V I
INITIAL AND FINAL INTAKE OF NUTRIENTS IN COMPARISON
WITH RECOMMENDED ALLOWANCES

S.No. Nutrients	Mean home diet	ANP supplements	Total	Recommended allowances	Final home diet	ANP supplements	Total
1. Calories	887	56	943	1500	1035	45	1080
2. Proteins (gm)	23.1	5	28.1	22	24.4	3.4	27.8
3. Calcium (g.)	.186	.2	.386	.4-.5	.242	.155	.397
4. Iron (mg.)	12.5	1.2	13.7	15-30	20.6	.9	21.5
5. Vitamin A in retinol (mg.)	246	92.3	338.3	300	413	92.3	505.3
6. Thiamine (mgm)	.53	.5	1.03	.8	.54	.042	.58
7. Riboflavin (mg.)	.49	.1	.57	.8	.51	.077	.58
8. Niacin (mg.)	.49	.1	.59	10	.56	.042	.6
9. Vitamin C (mg.)	22	.5	22.5	30-50	26	0	26

From the table it is evident that the initial mean daily intake of selected children were deficient in calories, calcium and iron. At the conclusion of the study there is an increase in the availability of iron, calories and all the other nutrients met the recommended allowance^s, given by ICMR for the preschool children. Calcium amount was decreased due to the

FIGURE 4

THE INITIAL AND FINAL MEAN INTAKE OF NUTRIENTS OF 6 SELECTED CHILDREN
 IN COMPARISON WITH RECOMMENDED ALLOWANCE OF ICMR (1968)



stopage of milk distribution during final weighment survey.

The amounts of supplements given in the Balwadi initially met 4% of calories, 25% of protein, 50% calcium, 8% iron, 3.7% of vitamin A, 62% Thiamine, 12 $\frac{1}{2}$ % riboflavin, 1% Niacin, and 1.6% Vitamin C content of the ICMR recommended allowances for preschool children. But due to the stopage of skim milk distribution by UNICEF to the preschool children the ANP supplements during final weighment survey, supplied only 3% of calories, 15.5% protein, 6% iron, 3.7% of Vitamin A, .5% of thiamine, .08% riboflavin, .4% Niacin and 1.6% of Vitamin C. The initial and final average intake of individual subjects is given in Appendix IV and V.

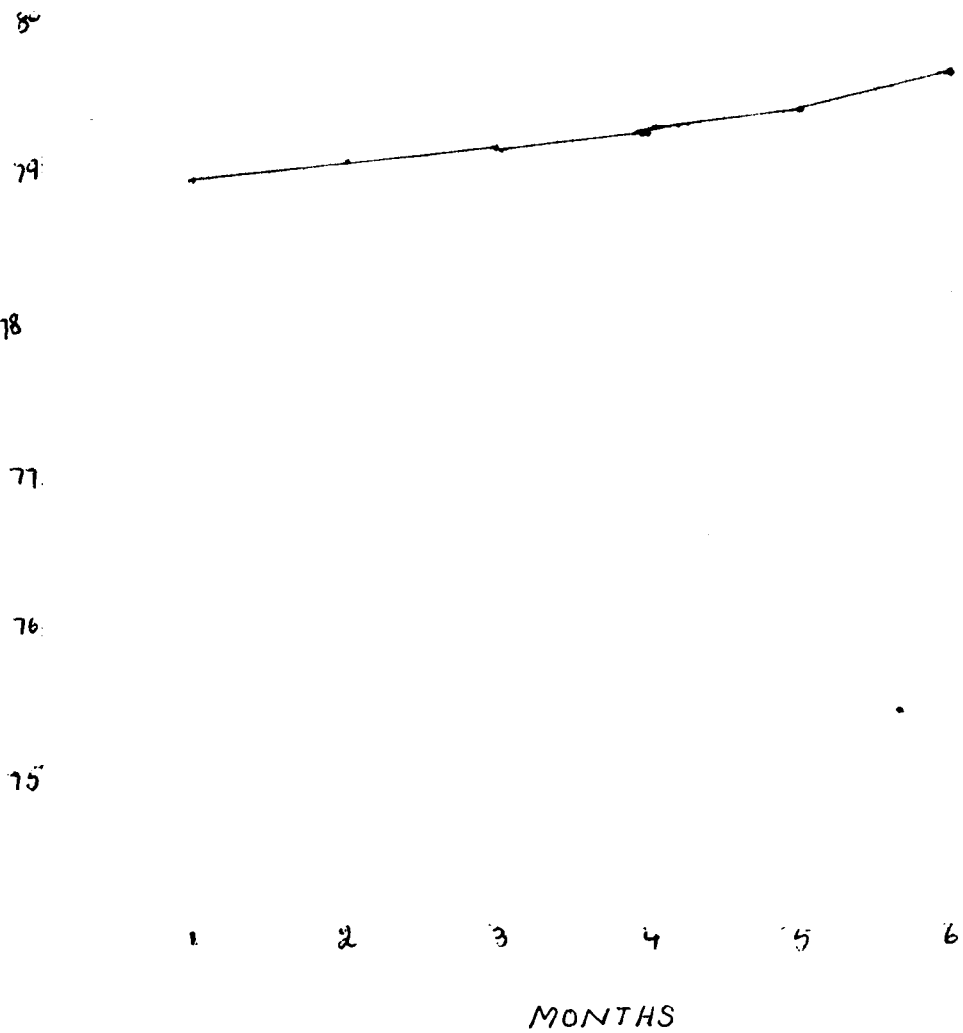
B. Nutritional status of the selected children

1. Results of Anthropometry

TABLE IV
INITIAL AND FINAL MEAN HEIGHTS OF THE SELECTED CHILDREN

Age in years	No. of children	Mean Initial ht. in (cm.)	Mean final ht. in cm.	't' value
2 $\frac{1}{2}$ - 3 $\frac{1}{2}$	4	88.2	88.6	0.930
3 $\frac{1}{2}$ - 4 $\frac{1}{2}$	22	92.2	93.1	0.366**
4 $\frac{1}{2}$ - 5 $\frac{1}{2}$	11	93.5	93.1	5.147**
5 $\frac{1}{2}$ - 6 $\frac{1}{2}$	3	97.5	98.1	15.162**

MEAN HEIGHT IN (CM) OF ALL THE SELECTED CHILDREN FOR SIX MONTHS



The table indicates the increase in heights of the selected subjects according to the age groups before and at the end of the study. These increase in the heights of the selected subjects after the supplementation may be due to the better feeding and higher nutrient availability to children. However 4 children did not show any improvement in height though there was an increase in their weights. The difference in height is statistically significant at 1% level except in 2½ - 3½ age group.

TABLE VIII

ANTHROPO METRIC DATA ; OF FOUR CHILDREN WHO DID NOT IMPROVE IN HEIGHT

No. of children	Initial Ht. in cm.	Final ht.in cm.	Diffe- rance in cm.	Initial wt. in kg.	Final Wt.in kg.	Diffe- rance
1	94	94	0	11	12.5	1.5
2	87	87	0	11.5	13	1.5
3.	88	88	0	10.5	11.5	1
4.	99	99	0	11.5	13.5	2.0

This may be due to their slow growth rate. The increase in weight may be due to the supplements of eggs and milk given. The heights of all the selected children are represented in Appendix VI

TABLE IX

WEIGHTS

MEAN INITIAL AND FINAL WEIGHTS OF THE SELECTED CHILDREN

Age in years	No. of children	Mean initial Wt. in (kg.)	Mean final Wt. in (kg)	't' value
2½-3½	4	11.2	12.4	11.00**
3½-4½	22	11.6	12.3	11.496**
4½-5½	11	11.6	12.7	13.74**
5½-6½	3	11.0	12.3	3.757 not significant

All the selected children showed an increase in weight over the study period. The increase in weight may be due to the high protein foods egg and skim milk. Champakam (1967), Radha Krishna (1969) and Gopalan (1967) view that the supplementation positively result in weight gain. The individual weights of the selected subjects are represented in Appendix VII.

The difference in the weights of the selected children is significant at 1% level except in 5½ - 6½ age group.

2. Clinical assessment

The scores of the clinical examination conducted for the children attending the feeding programme are given in Table VI in terms of "Initial and Final".

MEAN WEIGHT IN (CM) OF ALL THE SELECTED CHILDREN FOR SIX MONTHS

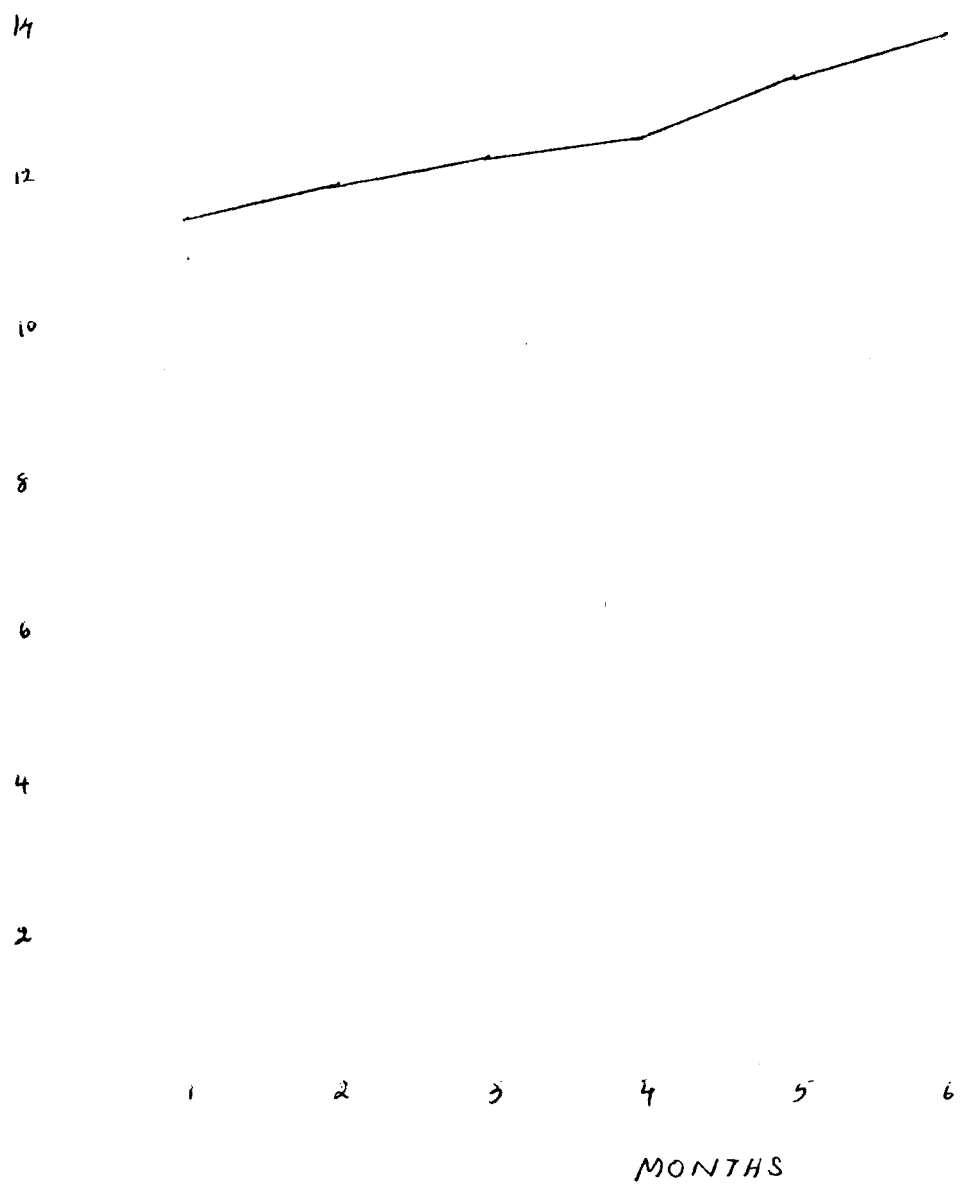


TABLE X

RESULTS OF THE CLINICAL EXAMINATION OF SELECTED CHILDREN

Criteria	No. of Initial	Children Final
Good	29	32
Fair	9	8
Poor	2	-
	40	40

The clinical examination revealed an improvement in the health status of the selected children after the supplementary feeding programme.

3. Results of the Biochemical Examination

The mean initial and final levels of the haemoglobin for the selected subjects are presented in the table given below and the haemoglobin levels of the individual children are represented in Appendix VII.

TABLE X1

BIOCHEMICAL PICTURE OF THE SELECTED CHILDREN

Mean initial	Standard	Mean Final
10.4 g/l.	10.8 g/l.	12.3 g/l.

This was an increase in haemoglobin levels of the selected children over the study period of six months. The mean final haemoglobin level is compared with the standard, (Swaminathan (1968)). The mean increase of 1.96 g/l.

gm. can be attributed to the supplementation of eggs and milk and this view is supported by Beartls (1970) statement that protein supplementation results in better biochemical picture. The initial and final haemoglobin levels of all the selected children are given in Appendix VIII.

C. Evaluation of the nutrition education

The results of the nutrition education conducted to mothers is discussed by comparing their initial and final food habits in terms of their practise in inclusion of foods, cooking methods, food preservation, foods given in special conditions, knowledge about ANP and the supplementation from ANP.

1. Food inclusion AFTER NUTRITION EDUCATION

The table given below shows the inclusion of different foods in the home diets before and after nutrition education.

TABLE VIII

THE DIFFERENT FOOD INCLUSION OF THE SELECTED FAMILIES
AFTER THE NUTRITION EDUCATION

Food items	No. of mothers included in home diets		Reasons given	No
	Before	After		
Cereals				
Maize	6	8	1. Good for health.	6
			2. Knows the method of cooking.	4
Magi	26	29	1. It is good for health.	24
			2. Less expensive and more nutritious.	18
			3. Good and suitable for children's health.	4
Wheat	12	19	1. Promotes good health	15
			2. Gives strength	7
Cholan	32	36	1. Good for health	12
			2. Cholan won't cause any digestive disorders.	12
<u>Animal Foods</u>				
Eggs	22	24	1. Good for health	21
			2. Children like it.	32
Milk	36	38	1. Promotes good health.	38
			2. Childrens best choice	32
Meat	12	16	1. Good for health.	14
			2. Gives strength	4
<u>Fruits</u>	32	38	1. Seasonal fruits are cheaper than the other fruits.	30
			2. Good for diseased conditions.	16

There was improvement in the use of millets, other cereals and animal products after the nutrition education. The reasons given by the mothers are represented in the above table.

2. Changes in Cooking Practices

Cooking practices adopted by the mothers before and after nutrition education are presented in the table below.

TABLE XIII

CHANGES IN THE COOKING PRACTICES ADOPTED BY THE MOTHERS

Food	Method	No. of mothers		Reasons	No
		Before	After		
Cereals	Boiling	40	40	1. Best way of cooking cereals	40
				2. For good digestion	10
	Steaming	32	34	1. This is the best way of cooking breakfast foods like Idli, Idiappam	30
Vegetables	Absorbtion	32	36	1. Good taste and flavour are retained in this way of cooking vegetables	32
				2. Loss of nutrients are less	4
Greens	Frying	31	36	1. Less time consuming	30
	Absorbtion			2. Good way of cooking	15
Fleshy foods	Stewing	34	34	1. For good digestion	34
				2. For good taste and flavour	8
	Frying	8	12	1. Good taste	12

The changes in the cooking practises of selected mothers revealed a better understanding of the importance of good cooking ^{to} mothers imparted through nutrition education.

3. Food Preservation

TABLE XIV

ATTITUDES OF MOTHERS TOWARDS FOOD PRESERVATION

Method	No. of mothers		Reasons	No
	Before	After		
Pickling	12	18	1. They were anxious to practise the novel methods they learnt	16
			2. For uniform consumption of the seasonal foods throughout	4
Jam making	5	16	1. Less expensive method since jaggery is used	12
			2. Children like sweets preparation	8
			3. Can be preserved for a minimum ^{period} of three months	3
			4. Mothers are anxious to try out the new methods learnt.	3

Mothers were interested in food preservation, especially in sweet preparation because their children like sweet preparation. This encouraging attitude of mothers towards food is their realization of the needs of preserving food.

4. Foods given in the ^{pc} special conditions

The table given below shows the foods given in special conditions by the mothers of the selected children before and after nutrition education.

TABLE X
FOODS GIVEN IN SPECIAL CONDITIONS

Stages	No. of mothers		Food	Reasons	No	
	Initial	Final				
Infancy	40	40	Milk	1. Good for health	40	
				2. For growth	12	
				3. Easy to digest	10	
Weaning	12	13	Biscuits	1. As they cannot eat hard foods.	12	
				Rice-Ghee	2. Good for weaning children	
					3. For good digestion and health	12
					1. To relieve constipation	9
Pregnancy	9	15	Soft foods	2. To promote strength	21	
				Fruits Juices	1. They will have the special tastes.	40
					2. Good for health	40
Lactation	40	40	What all they eat	1. For good health and strength	12	
				Eggs and Milk	1. They should eat all the foods	40
					2. They cannot give the food they cannot afford	28
<u>Diseased Conditions</u>	10	12	Egg and milk	1. Good for the health of mother and child	12	
				Diarrhoea	1. To reduce the heat of the body	12
					2. To decrease the diarrhoea	18
			Fruits like plantains	3. Good during diarrhoea	10	

Stages	No. of mothers		Food	Reasons	No
	Initial	Final			
Fever	31	30	Bread and Coffee	1. To reduce the heat of the body	18
	4	10	Fruits	2. To improve the health	12
				3. They cannot digest others foods	6
				4. As per doctors advice	6
Meseals	11	18	Curds or butter milk without salt	1. Salt irretates the body	12
	8	10	Coconut water	2. To cool the body temperature	8
			Fruits	3. For good health and strength	6

The mothers did not realize the importance of foods in special conditions like pregnancy, infancy, lactation and in diseased conditions. The reasons were ignorance and superstitions. Though there was an improvement, to convince them to introduce new practises during special conditions, take time.

5. Food Production

TABLE XI/I
FOOD PRODUCTION AT HOME.

Items	No. of mothers	Reasons	No	
Kitchen Gardens	11	14	1. Cheap to raise the kitchen garden.	12
			2. Waste water can be utilised in a better way	4
			3. Reduces the food budget	8
			4. What all the foods they want can be produced at home easily	4
Milk Production	8	8	1. There is no need for them to buy milk outside	8
			2. Reduces the food budget	8
			3. The children and family can have milk and milk products as they wish	6
Poultry	4	6	1. Very expensive way to maintain a poultry with large number of hens	28
			2. Few hens are easy to look after and enough for their family	4
			3. Can have eggs freely	6

Mothers of the selected children were interested in raising kitchen garden after the nutrition education and they were happy to have the production from their own homes for family use. Since poultry and dairy maintenance are expensive

methods, need greater capital and will result in great loss, if done carelessly. The mothers were reluctant to under take these methods.

TABLE XV/1

KNOWLEDGE ABOUT THE FOOD AND NUTRITION

The table given below shows the knowledge gained by the mothers of the selected children in Nutrition.

Items	Attitudes of mothers		Reasons	No
	Before	After		
<u>Meaning of Adequate food</u>				
			1. They did not know how to express reasons	
1. Meal which includes all foods	3	18		
2. All basic groups	9	12		
3. Good food	4	18		
<u>II. The foods that are important for health</u>				
Animal Foods	4	18	Promotes growth and gives strength	16
Fruits	21	28	One of the basic group to be definitely included in the diet.	10
Milk	32	36	1. It is 'must' for children	10
			2. Children like it	12
Vegetables	12	18	3. Cheap and available in all times	18
Willingness to change food habits	12	18	Changing food habits is difficult with in a short period.	10

The mothers of the selected children improved their knowledge about Food and Nutrition but they did not show much interest in changing food habits as there is need for continuous emphasis on good food habits.

6. Knowledge of mothers about the Applied Nutrition Programme

The table represented below shows the knowledge and views of mothers about the Applied Nutrition Programme and the supplements given in the school.

**TABLE VIII
KNOWLEDGE AND VIEWS OF MOTHERS ABOUT ANP**

Aspects	No. of mothers
<u>The Meaning of Applied Nutrition Programme</u>	
1. A feeding programme	23
2. To promote the health for the vulnerable groups	10
3. As a self sustaining programme in raising the nutritional standards of the population	4
<u>Assistance for Applied Nutrition Programme</u>	
1. The assistance for ANP is from UNICEF, Central and State Governments	8
<u>The knowledge about the supplements given in Balwadi</u>	
a) Supplements given are egg and milk	36
b) The supplements are good for promoting health of preschool children	28

All the mothers did not know about the Applied Nutrition Programme, its meaning, the supplements given, and why they are given. After the nutrition education their knowledge regarding the Applied Nutrition Programme and its objectives improved as given in the above table.

7. Problems faced by mothers of the selected children and the suggested improvement

Problems experienced by the mothers in food production and the solution suggested to them during nutrition education are listed in Table represented below.

TABLE XIX
FOOD PRODUCTION AND BETTER
SUGGESTIONS GIVEN.

Problems	No	Suggestions given
<u>Problems in raising kitchen garden</u>		
1. Lack of space	21	Roots, tubers and green leafy vegetables can be raised by pot system.
2. Lack of water	4	Waste water can be sent to kitchen garden from bath room and kitchen
3. Damage by animals and pests	3	Pesticides and small fence can be obtained free from the block head quarters
<u>Problems in raising poultry</u>		
Very expensive	28	1. Poultry can be raised in group method. 2. Subsidy can be obtained from ANP. 3. Better to attend the training given to poultry breeders.
No space	4	4. Deep litter system should be followed
Problems in raising dairy	21	Group dairy system is good

Nutrition Education imparted^{to} the mothers included aspects of nutrition. The mothers were also enlightened about their role in the Applied Nutrition Programme.

If the rural population have to realize the importance of ANP and make it a self sustaining programme, if significant benefits are expected from ANP, if permanency in feeding programmes are expected, great attention need to be given for nutrition education programme, uniformity in preschool feeding, with well balanced midday meals programme, which will result in better nutritional status of the preschool children. In this regard the efforts of central and state governments, UNICEF and CARE are greatly appreciated but lot more need to be done to achieve the expected results.

V SUMMARY AND CONCLUSION

The effects of the supplements in a feeding programme under Applied Nutrition Programme, to 40 selected preschool children in Pannimadai Village were studied. The effects of nutrition education given to the mothers of the selected children were also evaluated after the study period.

The criteria used for the nutritional assessment for selected children were diet and nutrition surveys, anthropometric measurements, biochemical tests^{and} clinical examination. The beliefs, attitudes, customs and nutritional knowledge of the mothers of the selected subjects were also assessed.

The findings of the study revealed that:

1. Although the ANP supplements had increased the nutrient intake, the diets of the selected children were still inadequate and did not meet the recommended allowances of ^{the} ICMR (1968).
2. The heights and weights recorded during the study period of 6 months showed an increased significance in all the age groups except in 2½ - 3½ age group in height and in 5½ - 6½ age group in weight.
3. The clinical examination revealed an improvement of the selected subjects over the study period.
4. The Mean increase in the haemoglobin levels in the

selected children was higher than the ~~YCB~~ standard.

5. The attitudes of mothers towards better dietary practices and changes in their food habits, customs, beliefs were appreciable.

The results of the study reveal that the present amount of supplementation of eggs and milk from Applied Nutrition Programme are not sufficient to overcome the deficiencies in the home diet.

A uniform policy of preschool feeding supplying the essential nutrients to overcome the deficiencies of the home diets need to be enforced. Until such a status is given to the nutrition programme the great investments, financially and human efforts will not bring forth the expected results.

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APPENDICES

APPENDIX I

சூரராட்சியத்தில் ரசமியல்

ராஜ, கௌ, மயி நீயரும் அந்த சூரராட்சியில் ரசமியல் உண் ரதாப்பில் விசயமாகக் கொண்டுவந்தார்கள். மற்ற சூழ்ச்சிகள் அவர்கள் விசயமாட்டில் சுவந்து கொண்டார்கள். விசயமாட்டில் சீரடி வந்து விட்ட கௌ அது சூரம்பிக்கரைய சூராதரர்கள் இருவரும் ஓடி வந்து ஓரகி சமாதானப்படுத்தினர். மற்ற சூழ்ச்சிகள் பலவிடறி நிகழ்ந் நெவிந்து காணப்படுந் இந் நீயவரயும் ரசமி செய்பவள். அவர்கள் விட்டந்திப்பி ரபாணும் சாப்பிடாமலேயே படுத்த விட்டனர். அவர்கள் தாயாராகிய வஉந்திக்கு சிலநாள் அவர்களை சாப்பிட வலப்படுத்த பிரச்சினையாயிற்று. தங்கள் கட படிக்கெந் சூழ்ச்சிகள் அனைவரும் சூரராட்சியமாக காணப்படுந் ரபாண தாய்கள் இப்படி சூரராட்சியிலிற்றி நெவிந்து இருக்கிறார் என்று ராஜ, மயி, கௌ நீயரும் தாயாருடன் கையறவிட்டுக் கொண்டார்கள். வஉந்திக்கு என் செய்வதென்ற தெரிய- யவில்லை. ரசமியல் தாயாராக சாரதா, அப்பாது விட்டந்தி வரவே வஉந்தி தம் சூழ்ச்சியைக் கறிஞர். வஉந்தி, "சாரதா : ரசமியல், ராஜயும் சூர பிராயந்தாரை! ரசமியல் ராஜவை விட எப்படிய சூரராட்சியமாகக் காணப்படுகிறது. நீ என் சாப்பிட கொடுக்கிறாய்? என்று கேட்டார். சாரதா சாதாரண அளவுச் சாப்பாடு மட்டும்த சூழ்ச்சிகளுக்குக் கொடுத்தால் அவர்கள் வளர்ச்சி சரியாகாது வஉந்தி! காங்கறிகள், சீரடி வகைகள், சிறப்பாக பாக், மட்டை, பப்பாவி ரபாண்களையகளை சூழ்ச்சிகளுக்குக் கொடுக்க ரவட்டுந். அப்பாது அவர்கள் வளர்ச்சி கருவது மட்டுமல்லாது சாப்பாட்டில் சூழ்ச்சிகள் ஏற்படும். தங்களுக்கு சாப்பிட்டி, தங்களுக்கு விசயமாடு- வார்கள். தங்களுக்கு எடுத்துக் கொண்டார்கள். இதுதான் ரசமியல் சூரராட்சியத்தில் ரசமியல் எடுத்துந்.

வடநீர்துறை தலைவர்கள் கீழ்க்கண்ட சத்துவடிவ கொடுக்க
 ஆரம்பித்தார்.

மாநிலநாப்பில் வழங்குகல் விடையாடுகிறீர்கள். ராஜ,
 மலி, காலா லவர்களில் குரூராகியும் பிவறந்த ஆயந்த கச்சம் மற்ற
 வழங்குகலுடன் சார்ந்து சிராமமெதிலும் வெறொலிச்சிறை.

பாட்டு - 1

சத்தியம் உண்மை மெய்யும் உண்மை
சத்தியம் மெய்யும் உண்மை மெய்யும்

(சத்தியம்)

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(சத்தியம்)

உண்மை உண்மை உண்மை - உண்மை
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உண்மை உண்மை உண்மை - உண்மை
உண்மை உண்மை உண்மை.
உண்மை, உண்மை, உண்மை உண்மை உண்மை
உண்மை உண்மை உண்மை, உண்மை உண்மை உண்மை

(சத்தியம்)

உண்மை உண்மை உண்மை உண்மை
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உண்மை, உண்மை, உண்மை
உண்மை உண்மை உண்மை, உண்மை
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(சத்தியம்)

APPENDIX III

66

QUESTIONNAIRE TO EVALUATE THE EFFECT OF NUTRITION
EDUCATION ON THE NUTRITIONAL STATUS OF SELECTED
FAMILIES

Name of the investigator:

Name:

Address:

Caste:

Religion

Village:

Block:

FOOD EXPENDITURE

Foods	Amount/ Month	Daily	Weekly	Occasionally
-------	------------------	-------	--------	--------------

Cereals

Rice

Cholan

Wheat

Maize

Ragi

Others

Pulses

Bengal gram

Green gram

Foods	Amount/ month	Daily	Weekly	Occasionally
Foods				
Hoyse gram				
Red gram				
Others				
<u>Leafy Vegetables</u>				
Agathi				
Amaranth				
Drumstick				
Others				
<u>Roots</u>				
Onion				
Potato				
Others				
<u>Other Vegetables</u>				
Brinjal				
Bhindhi				
Beans				
<u>Fleshy Foods</u>				
Meat				
Fish				
Eggs				
Milk				
Butter Milk				
<u>Fruits</u>				
Plantain				
Others				

III. DAILY MEAL PATTERN

Meal	Time	Menu
Breakfast	1	
	2	
	3	
Lunch	1	
	2	
	3	
Tea	1	
	2	
	3	
Dinner	1	
	2	
	3	

IV. COOKING METHODS

Food	Method	Time
------	--------	------

VI. Which foods are good for health?

VII. a) Attitude towards change of food habits.

Change

Reasons

b) What is the relationship between Nutrition and Agriculture?

c) What is an adequate meal?

VIII. PROGRAMMES IN VILLAGE

(a)

Programme	Knowledge	Interest			Under- standing
		Good	Fair	Poor	
1. ANP					
2. School Lunch					
3. Balwadi					
4. Others					

b) Are you a member of Magalir Manram?

c) Activities of Magalir Manram:

d) What are the food beliefs you have?

e) What do you understand by Nutrition?

IX. a) What type of nutrition education programmes do you consider to be useful?

b) Do you convey nutrition knowledge to neighbours friends and to your own family?

c) Suitable educational methods for your village

Methods	Yes	No	Reasons
1. Individual contacts			
2. Group contacts			
3. Talks			
4. Film shows			
5. Demonstrations			
6. Drama			
7. Exhibition			
8. Leaflet Distribution			
9. Others			

d) How has ANP helped you?

e) Do you have a kitchen garden?

f) Space for kitchen garden?

g) Interest in kitchen garden?

h) Produce from kitchen garden.

i) Problems of kitchen garden.

j) Use of produce for family or sale.

k) Do you have poultry unit?

Yes No

l) Interest in poultry unit.

Yes No

m) Number of hens

n) Problems of poultry unit?

o) Use of eggs.

Family

Sale

Exchange

APPENDIX IV

THE INITIAL MEAN NUTRIENT INTAKE OF SIX SELECTED CHILDREN

S.No.	Calories	Protein (g)	Calcium (g)	Iron (mg.)	Vitamin A in retinol	Thiamine (mg.)	Riboflavin (mg.)	Niacin (mg.)	Vitamin C (mg.)
1.	852	28.56	.376	13.10	268	.93	.88	.46	23.9
2.	1053	25.20	.395	12.29	378	.95	.5	.56	18.4
3.	614	27.7	.363	13.7	311	.63	.47	.53	19.2
4.	840	27.0	.368	13.8	312	.95	.5	.5	22.5
5.	1188	28.8	466	17.1	573	1.1	.56	.55	31.1
6.	940	31.4	346	12.6	248	.99	.5	.46	18.7

APPENDIX V

THE FINAL MEAN NUTRIENT INTAKE OF SIX SELECTED CHILDREN

S.No.	Calories	Protein (g.)	Calcium (g)	Iron (mg.)	Vitamin A in retinol	Thiamine (mg.)	Riboflavin (mg.)	Niacin (mg.)	Vitamin C (mg.)
1.	1100	32.9	.405	20.1	694	.63	.65	.64	37
2.	1032	29.2	.395	18.5	704	.58	.58	.68	14
3.	1109	27.5	.385	37.9	626	.58	.63	.57	27
4.	1437	26.5	.468	26.6	389	.63	.59	.55	33
5.	935	24.1	.340	13.5	440	.37	.44	.63	18
6.	1095	26.5	.362	12.7	280	.51	.60	.55	27

APPENDIX VI
HEIGHT IN CENTIMETERS OF THE INDIVIDUALS

S.No.	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY
1.	92.0	92.3	92.3	92.9	93	93
2.	100.00	100.4	100.4	100.8	101	101.0
3.	96.0	96.0	90.2	96.2	96.4	96.4
4.	94.0	94.0	94.1	94.3	04.3	94.3
5.	88.0	88.0	88.3	88.3	88.3	88.3
6.	87.0	87.0	87.0	87.0	87.0	87.0
7.	87.0	87.4	87.5	87.5	87.5	87.5
8.	90.0	90.3	90.8	90.9	90.9	90.9
9.	99.0	99.0	99.6	99.6	99.6	99.6
10.	99.0	99.0	93.0	93.4	93.6	93.6
11.	93.0	93.0	93.0	93.4	93.6	93.6
12.	97.0	97.2	97.5	97.5	97	97.5
13.	92.0	92.0	92.0	92.0	92.5	92.5
14.	97.0	97.0	97.0	97.5	97.5	97.5
15.	91.0	91.4	91.0	91.0	91.0	91.0
16.	87.0	87.0	87.0	87.0	87.0	87.5
17.	94.0	94.0	94.4	94.4	94.4	94.4
18.	98.0	98.0	98.0	98.5	98.5	98.5
19.	91.0	91.4	91.4	91.4	91.4	91.4
20.	101.5	0.5	101.5	101.5	101.5	102.0
21.	99.5	99.8	99.8	99.8	99.8	100.0
22.	83.0	83.5	83.5	83.5	83.5	83.5

S.No.	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY
23.	88.0	88.0	88.0	88.5	88.5	88.5
24.	99.0	99.0	99.0	99.3	99.3	99.3
25.	100.0	100.0	100.0	100.5	100.5	100.5
26.	80.0	80.0	80.0	80.5	80.5	80.5
27.	88.0	88.0	88.0	88.0	88.0	88.0
28.	88.0	88.5	88.5	88.7	88.7	88.7
29. 92.0	92.0	92.0	92.0	92.4	92.4	92.4
30.	93.0	93.0	93.0	93.0	93.5	93.5
31.	94.0	94.0	94.0	94.0	94.0	94.0
32.	91.0	91.0	91.0	91.0	91.0	91.5
33.	91.0	91.0	91.4	91.4	91.4	91.4
34.	94.0	94.0	94.5	94.5	94.5	94.5
35.	91.0	91.0	91.0	91.5	91.8	91.8
36.	101.0	101.0	101.4	101.4	101.4	101.4
37.	93.0	93.4	93.4	93.4	93.4	93.4
38.	89.0	89.0	89.4	89.4	89.4	89.4
39.	93.0	93.4	93.4	93.4	93.4	93.4
40.	85.0	85.0	85.0	85.5	85.5	85.5

APPENDIX VII

WEIGHTS IN KG OF THE INDIVIDUAL SUBJECTS

S.No.	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY
1.	11	11	11.5	12	12	12.5
2.	11	11	11.5	11.5	12	12
3.	12.5	12.5	12.5	12.5	13	13
4.	11.5	11.5	1.5	12.5	12.5	13
5.	10.0	10.5	10.5	10.5	11	11
6.	12.0	12.0	12.5	12.5	12.5	13
7.	10.0	10.5	11.0	11.5	12	12
8.	10.0	11.0	11.0	11.0	11.0	11.5
9.	10.5	11.0	11.5	11.5	11.5	11.5
10.	14.0	14.0	14.0	14.5	14.5	14.5
11.	12.0	12.0	12.5	14.5	12.5	12.5
12.	13.0	13.0	14.0	12.5	14.0	14.0
13.	11.0	11.5	11.0	14.0	12.0	12.5
14.	12.0	12.5	12.0	11.5	12.5	13.0
15.	11.5	12.0	12.0	12.0	12.5	12.5
16.	11.5	11.5	12.0	12.5	12.5	12.5
17.	11.0	11.0	11.5	12.0	12.0	14.5
18.	13.5	14.0	14.0	12.0	14.5	10.5
19.	9.5	10.0	10.0	10.0	10.5	10.5
20.	9.5	9.5	10.0	10.5	10.5	12.5
21.	11.0	11.0	11.5	11.5	12.0	13.5
22.	13.0	13.0	12.0	12.0	13.0	14.5

S.No.	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY
23.	14.0	14.0	14.0	14.5	14.5	14.5
24.	11.5	12.0	12.5	12.5	13.0	13.5
25.	12.5	12.5	12.5	12.5	13.0	13.0
26.	10.0	10.0	10.0	10.5	11.0	11.5
27.	10.5	11	11.0	11.5	11.5	11.5
28.	10.0	11.5	11.5	11.5	11.5	11.5
29.	12.0	12.5	12.5	12.5	13.0	13.0
30.	12.0	12.5	13.0	13.0	13.5	12.5
31.	11.5	11.5	11.5	11.5	12.0	12.5
32.	11.5	11.5	12.0	12.0	12.0	12.0
33.	10.5	11.0	11.0	11.0	11.5	11.5
34.	12.0	12.0	12.5	12.5	12.5	12.5
35.	9.5	9.5	9.5	9.5	9.5	9.5
36.	12.5	12.5	12.5	13.0	13.0	13.0
37.	10.5	11.0	11.0	10.0	11.5	12.0
38.	12.0	13.0	13.0	13.5	14.0	14.0
39.	13.5	12.5	12.5	12.5	12.5	12.5
40.	10.5	10.5	10.5	10.5	11.0	11.0

APPENDIX VIII
HAEMOGLOBIN LEVELS OF INDIVIDUAL CHILDREN

S.No.	Initial gm. %	Final gm. %	Difference
1.	9.2	10.4	1.2
2.	10.9	12.9	2.0
3.	10.4	11.6	1.2
4.	11.3	12.1	0.8
5.	8.6	10.8	1.2
6.	12.3	12.9	0.6
7.	9.5	10.5	1.0
8.	12.9	13.1	0.2
9.	9.8	10.2	0.4
10.	13.3	13.5	0.2
11.	9.3	10.2	0.9
12.	10.9	11.1	0.2
13.	9.9	10.4	0.5
14.	10.8	11.2	0.4
15.	9.4	10.8	1.4
16.	10.5	10.5	0.0
17.	8.5	9.2	0.7
19.	7.3	8.6	1.3
20.	8.8	10.2	1.4
21.	12.8	13.2	0.4
22.	10.2	10.8	0.6
23.	9.8	11.4	1.6

S.No.	Initial gm. %	Final gm. %	Difference
24.	9.2	9.5	1.6
25.	7.9	12.6	4.7
26.	10.9	12.5	1.6
27.	10.4	10.2	0.8
28.	10.1	10.8	0.7
29.	9.8	12.6	2.8
30.	10.8	12.4	1.6
31.	10.3	11.1	0.8
32.	10.5	10.6	0.1
33.	11.2	10.8	0.6
34.	12.4	13.3	0.9
35.	9.8	10.6	0.8
36.	9.4	10.4	1.0
37.	9.2	10.8	1.6
38.	8.4	9.6	1.2
39.	10.8	11.2	0.4
40.	10.4	11.3	0.9