EVALUATION OF THE IMPACT OF THE SELECTED NUTRITION INTERVENTION PROGRAMMES IN TAMIL NADU.

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Thesis

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This is to certify that the thesis entitled "Evaluation of the selected Nutrition Intervention Programmes in Tamil Nadu" submitted by Mrs.S.Rajkumari is a record of research work done by her during the period of study under my guidance that the thesis has not formed the basis for the award to the candidate of any degree, diploma, associateship, fellowship or other similiar title.

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INTRODUCTION

The United Nation's Declaration on the Rights of the child (1961) stresses, the debt mankind owes to children to give its best to them. The physical and mental development of today's children will determine the prosperity and peace of tomorrow (IYC, 1976, Government of India, 1979). As Radhakrishnan (1962) had pointed out, the prosperity or poverty, strength or weakness of our nation depend on the care with which the future citizens of India are brought up. Healthy children are the foundation for a healthy nation. Good health is the most precious endowment parents and communities can confer on their children (Devadas and Usha, 1966).

Children in India constitute nearly 40 percent of the total population. They represent the most vulnerable, critical component of the nation's human resources. There are nearly 250 million children below the age of 12 years. The most crucial age group among these number is nearly 100 million. While this huge number is staggering in its dimension, the quality of the child population is even more important. The present state of their health and nutrition will measure the quality and calibre of the nation in 2000 A.D. and beyond (Gopalan, 1982).

Children are our most valuable possession, a trust and an investment (Prokopec, 1964). Yet, the quality of life of most children remains sadly below the standard envisaged by national policy makers. This is reflected in key indicators such as a high infant mortality rate, high levels of morbidity, a high incidence of malnutrition and nutrition related dis-

eases leading to temporary or irreversible disabilities and low literacy rates coupled with high rates of school drop out (UNICEF, 1984).

In the developing countries, about 40 percent of the children are stunted from chronic Protein Energy Malnutrition (PEM) and 12 percent are wasted from acute PEM. Over 20 percent of all infants born are of low birth weight (Stephen, 1985). Around 100 million infants and young children in the world are moderately or severely under weight and 400 to 500 million persons exist on energy deficient diets (WHO, 1981).

As Sukhatme (1983) states, malnutrition is a major problem in India. 50 percent of the population are so poor that they cannot afford a diet which meets their minimum energy needs and 85 percent of the children born develop into people of substandard quality. If this relentless trend continues, it will undermine the most valuable of all the resources of the nation and pose a far greater threat than any aggression from external agencies.

Malnutrition is an obstacle to national development (Devadas, 1979). It renders children as an economic drain upon society. It impairs their learning ability and school performance (Amcoff, 1981). Malnutrition is a direct cause of morbidity and mortality and an indirect debilitating factor in parasitic and infectious diseases, particularly in cases of malaria, measles, respiratory illness and diarrhoea, especially under poor environmental conditions (Mahler, 1984). Malnutrition adversely affects work productivity, pregnancy outcome, motivation, activity levels, learning capacity of children, and the well-being and earning capacity of the poor (Rabneck, 1985). During the foetal period and infancy, malnutrition is associated with intellectual impairment (Devadas, 1979).

The WHO Director General, Mahler (1984), has warned that malnutrition together with other adverse environmental factors, interferes with growth and normal disease resistance of those children who are not killed or disabled by it.

The school going children have survived the ill-health and malnutrition of early years of their lives. These children are "less vulnerable" and have a higher probability of surviving than the pre-schoolers. However, the avaliable evidence suggests that these children still suffer from malnutrition and show growth retardation which inhibits their ability to cope with normal developmental requirements (CARE, 1979). Thus malnutrition reduces the capacity of the survivors to learn during childhood and to earn during adulthood.

Until recently, malnutrition was viewed fundamentally as a food supply problem and the solution promoted was to grow more food. It is now widely recognised that it is very difficult to improve nutrition of the poor by merely increasing food supplies (Anderson et al.,1976). The causes of malnutrition are multi-dimensional and include both food and non-food factors. The non-food factors are deep rooted cultural beliefs and customs and dependence on outmoded and traditional bound methods of treatment besides, poverty, ignorance, inequal distribution of food, insanitary conditions, lack of medical facilities etc., (Chandra, 1975). These factors combine to form a web of biological, cultural and environmental deprivations leading to malnutrition (FAO, 1985).

Malnutrition which is the direct result of injustice and underdevelopment, daily robs thousands of their intellectual and economic birth right (Mahler, 1982). Poor people are hungry or malnourished either be-

cause they are not able to obtain sufficient food of the right kind or because they are not sufficiently knowledgeable as to the nature and importance of an adequate diet (Scrimshaw, 1985).

Ramalingaswamy (1985) points out that the striking feature in the manifestation of malnutrition is the convergence phenomenon; convergence of poverty and unemployment, of disease and illiteracy, of population growth and of environmental degradation. These, in turn, are linked to cultural factors, economic distortions, human inequalities and social injustice. Hence the problem of malnutrition cannot be solved in isolation.

Iyengar (1983) points out, "Malnutrition - a by product of various factors, such as poverty, unemployment, social inequalities and illiteracy". Hence, there is a need to develop an integrated plan to solve the problem. An integrated programme consisting of provision of employment, health services, safe drinking water and improvement of environmental hygiene along with health and nutrition education would be far more effective in realising the objectives rather than adhoc schemes in isolation addressed to a specific socio-economic target group of the population.

As pointed out by Devadas (1983), investment in children is investment in human resource development. Prevention of malnutrition should receive priority in national plans. Fulfilment of the health and nutritional needs of children is crucial to the well being of the nation, since they are the biggest resource for development (Devadas, 1983).

The foundation for growth and development through the years of school age, youth and adult life is laid in infancy and early childhood, indeed

even earlier in the womb (Haxton, 1981). Each stage of life is a preparation for the next. If the early years suffer relative neglect, as they often do, it will not be easy to make up later for the lost human potential.

No nation can afford a generation of men and women incapable of achieving their full potentials of growth and working capacity. Therefore, it is of paramount importance to direct all the efforts possible to improve the nutritional and environmental conditions of the infant population and break the vicious circle of malnutrition - subcultural conditions - under development - malnutrition (Devadas, 1977). Malnutrition which exists in all countries is a challenge to man's conscience and an opportunity to eradicate a social evil by methods which will increase economic productivity (Lunven, 1985). Stratigies to overcome malnutrition cannot wait for an increase in individual income. Nutrition intervention is necessary to reduce the old and infirm persons, pre-school children and pregnant and nursing mothers from under nutrition and malnutrition (Swaminathan, 1984). In the absence of positive intervention, disease, ignorance and poverty perpetuate themselves in the tragic vicious circle (Mouly, 1970). This vicious circle cannot be broken by an attack from one front alone. A concerted attack must be made on all fronts.

Pinstrup et al.,(1976) have grouped nutrition intervention programmes into four categories, nutrition education, special feeding programmes, promotion of breast feeding and food fortification. Nutrition and health education as one of the intervention programmes has been

demonstrated as an effective tool in eradicating malnutrition (Devadas, 1979).

Good nutrition and malnutrition are the end results of many interacting factors operating simultaneously and concurrently on the individual's physical, biological and cultural environment of the community (Devadas, 1978, 1979, Gopalan, 1978). Gupta (1983), has stressed the liberating influence of education as a life long process whereby individuals come to grip with their liabilities and develop an autonomous problem solving capacity leading to the creative use of the environment and resources, thereby promoting individual and social welfare. This is possible because education has certain built-in characteristics and potentials whereby skills, attitudes, values and aspirations can be developed which leads an individual to strive for raising his standard; provides necessary input and environment for technological breakthrough whereby old practices can be changed and modern and more effective means can be developed.

Schooling as a formal educational system is one of the most potent socialising agents to which many individuals are exposed (UNESCO, 1984). Education of the young, demands the acquisition of a wide range of knowledge, skills and attitudes enabling them to cope with the uncertainities which may confront them in the years ahead(UNESCO, 1985).

The key to better nutrition in India is not food gifts and parcels but education along with food production (Devadas, 1983). Learning opportunities and education in general, are meant to equip individuals and groups with ability to identify relevant problems and issues, consider

alternate solutions and take appropriate action at the individual or group level (UNESCO, 1980).

Nutrition education should culminate in producing nutritionally literate decision makers, motivated, knowledgeble, skilled, and willing to consider and choose proper nutritional alternatives (Lewis, 1976, Swaminathan,1984). Thus the goal of nutrition education should no longer be the mere transmission and dissemination of information but it should enable the people and all those concerned to articulate their needs and problems, identify their problems, their own resources and scan the environment for alternatives (Valdecans,1982).

If health and nutrition education is imparted effectively and efficiently to the primary school children before they drop out at primary school level, they can be used as effective agents for disseminating health and nutrition education information in their homes and communities (Devadas, 1982, Mohapatna et al., 1985).

Although alleviating poverty and increasing food production are the only permanent solutions to malnutrition, the existing malnutrition among children, its continuing harassment and legacy it carries for the future adult population, warn that something must be done urgently now. The most specific solution is to increase the food intake of the population most in need, that is, the malnourished children of the poor. This is the objective of the supplementary feeding programmes for children (Devadas, 1983).

Nutrition intervention is necessary to redeem the old and infirm persons, pre-school children and pregnant and nursing mothers from undernutrition and malnutrition (Swaminathan, 1984). Thus, supplementary

feeding programmes have a crucial contribution to make towards improving the working efficiency of the population of the future and would considerably save national expenditure on social rehabilitation and health care (Devadas, 1983, Amcoff, 1981).

Feeding programmes are necessary in the present socio economic inadequacies, but it is necessary to build into these operations a strong education component since nutrition education is one of the resources available to the community in the selection, choice and decision regarding food, nutrition and health. Feeding programmes devoid of nutrition education can never be a permanent answer to the problems of malnutrition (Alfredo, 1973).

Evaluation of nutrition intervention programme is indispensable to obtain information about how the programmes are functioning with respect to achieving their goals (Sen, 1981). Evaluation serves as the compass for nutritional health education programmes. It helps to keep the programme on its course and gives it direction as it moves towards, the objectives. Hence, evaluation should be an integral part of any educational process. To function effectively, nutrition educators, need to gather information on how much a given population knows about nutrition (Marielle, 1978).

Evaluation of nutrition education may be in the form of written, oral or performance tests. Written and oral tests evaluate knowledge of subject matter and principles and techniques, while performance tests demonstrate the learner's ability to make practical application of principles, techniques and knowledge (Medved, 1973).

Growth, as reflected in height and weight is the most commonly used indicator of nutritional status in children. Weighing especially serially as Jelliffe (1968) points out is the most important method of detecting malnutrition in early childhood. Hence, in developmental and nutrition intervention programmes for children, monitoring growth through the measurement of weight at frequent intervals, is being used as an important tool for measuring the progress of the programmes (Devadas and Easwaran, 1986).

As Kalz (1978) states, evaluation is not just concerned with whether a programme's objectives are attained or not, but with how the programme functions, in what context it operates, what problems or issues it encounters, what intended or unintended outcomes it produces, and what elements are facilitating or impeding its success. By attempting thus to understand what is happening, the evaluator may arrive at judgement of quality; he is not merely concerned with whether the programme worked or not, but understanding what the programme really consists of, whom it reaches, how it functions and in what context.

Hence, realising the need for evaluation of nutrition intervention programmes, the present study was directed towards evaluating the impact of selected nutrition intervention programmes in Tamil Nadu. The investigator aimed at clarifying the issues, making explicit what is implicit to assist in identifying what is happening and thereby providing the much needed feedback to all concerned.

Several different types of feeding programmes were in operation for children in Tamil Nadu until July 1982. They were the Special Nutrition Programme (SNP), Modified Special Nutrition Programme (MSNP), Family and

Child Welfare Feeding Programme (FCWFP), Pre-school Feeding Programme (PFP), Applied Nutrition Programme (ANP), Integrated Child Development Services (ICDS), School Lunch (Mid-day Meals) Programme (SLP or MMP) and other programmes sponsored by voluntary organisations. These programmes were under different departments of the government. Their cost, organisation, manner of operation and evaluation differed from each other. As a result, even a complete profile of the feeding programmes in the State and their outcomes were not easily available (Devadas, 1987).

At this juncture, the Hon'ble Chief Minister of Tamil Nadu, (Late) Dr. M.G. Ramachandran, embarked on a new scheme for feeding over six million poor children, in the age range of 2 to 10 years, in the rural areas of the state. The programme was further extended to cover children in the urban areas from September 15, 1982. This new programme brought all the different types of feeding programmes under one umbrella. The other unique features of this venture were feeding the needy for 365 days of the year and serving a fresh hot meal on the spot. Thus today, nearly 8.5 million children are benefitting from the supplementary feeding, which is designated as the Chief Minister's Nutritious Meal Programme.

Imparting nutrition and health concepts through an integrated curriculum in the primary schools is an educational intervention. This experimental project is an outcome of a proposal made by the Director of Sri Avinashilingam Home Science College to the Government of Tamil Nadu. This has been taken up as a national scheme with the help of the Government of India, the National Council for Educational Research and Training (NCERT) and UNICEF.

Since these two intervention programmes are being carried out with different specific objectives and cover the primary school children, the investigator chose Chief Minister's Nutritious Meal Programme (CMNMP) and Nutrition Health Education and Environmental Sanitation at Primary Stage (NHEES) for evaluation.

CHAPTER II

REVIEW OF LITERATURE

The literature pertinent to the present study "Evaluation of the Selected Nutrition Intervention Programmes in Tamil Nadu" is reviewed under the following heads:

A. Effects of malnutrition on school achievement and intellectual functions

B. History of school feeding programmes in Tamil Nadu

C. School feeding programme - school achievement and intelluctual function

D. Education - A tool in combating malnutrition

E. Impediments to nutrition education at primary school level

A. Effects of malnutrition on school achievement and intellectual functions

An ancient Chinese saying goes, "A bird's beauty lies in its feathers, but a man's beauty lies in his knowledge". National development requires adequate brain growth and subsequent intellectual development of the young children. For full intellectual development, a stimulating and loving environment along with nutrition and comprehensive health care for children is required (UNESCO, 1985).

Learning is an important basis of human behaviour. It is influenced by various social, motivational, perceptual, and nutritional factors (Devadas, 1980). Learning progresses in stages, each of which becomes a

foundation for the next developmental period. But a hungry or malnourished child cannot respond to early stimulation. Therefore he gradually becomes less able to benefit from the learning experiences (UNESCO, 1984).

The physical, biochemical, and physiological development of the brain and consequent behaviour in all species of higher animals evolve from the continuous interaction of genetic and numerous environmental factors (Ecology of food and nutrition, 1973). Nutritional and environmental factors may affect the central nervous system's capability and performance in a variety of ways (Dobbing, 1970). First, abnormalities of morphologic, biochemical, and/or physiological characteristics may so alter normal brain function as to reduce abilities. Second, the developmental process may be impaired by the decreased exposure and responsiveness to environmental stimuli during critical periods when essential sequences of experiences must be acquired to provide for continued orderly development. Third, the learning process may be disrupted by advanced changes in personality, emotionality, and behaviour of the child. These changes may interfere with interpersonal relationships that are necessary for learning experience. Furthermore, malnutrition among the persons in social contact with the child may militate against their providing adequate learning experiences (Ecology of Food and Nutrition, 1973).

Thus a child would fail to learn, not because he lacked the experiential foundation, but suffers from malnutrition (Ecology of Food and Nutrition, 1973). Severe protein calorie malnutrition leads to mental disabilities such as apathy, irritability, listlessness, psychomotor re-

tardation, reduced attention, reduced concentration and lowered problem solving capacity (Devadas, 1973; Arya, 1981; World Bank, 1983).

Gupta (1983) has stated that malnutrition may cause permanent damages to the brain, leaving the children unable to reach their intellectual potential. Malnourished children show delayed cognitive development. Protein energy malnutrition reduces the cell number and affects myelination. Brain size is also reduced (Ghosh and Mohan, 1979). This leads to disturbances in the central nervous system function and related cognitive development (Chase et al., 1970 and Rosso et al., 1970).

Children who are victims of severe malnutrition early in life, may never attain their full intellectual potential (Nutrition Reviews, 1969, Berg, 1968). Malnutriton restricts full expression of genetic potential for the development of intelligence in children. Malnourished children tend to develop anxiety about food and hence their attention and motivation for learning will be reduced (Arya, 1979).

Malnutrition affects school performance both directly and indirectly. A child who is malnourished is more susceptible to infection and illness and so he accumulates absences. When he is in school, his alertness and his ability to concentrate are reduced. The malnourished child limits his activities in order to conserve energy (Latham and Cobos, 1974). He plays less, verbalises less and thus generally lacks the stimulation and experiences that are necessary for learning.

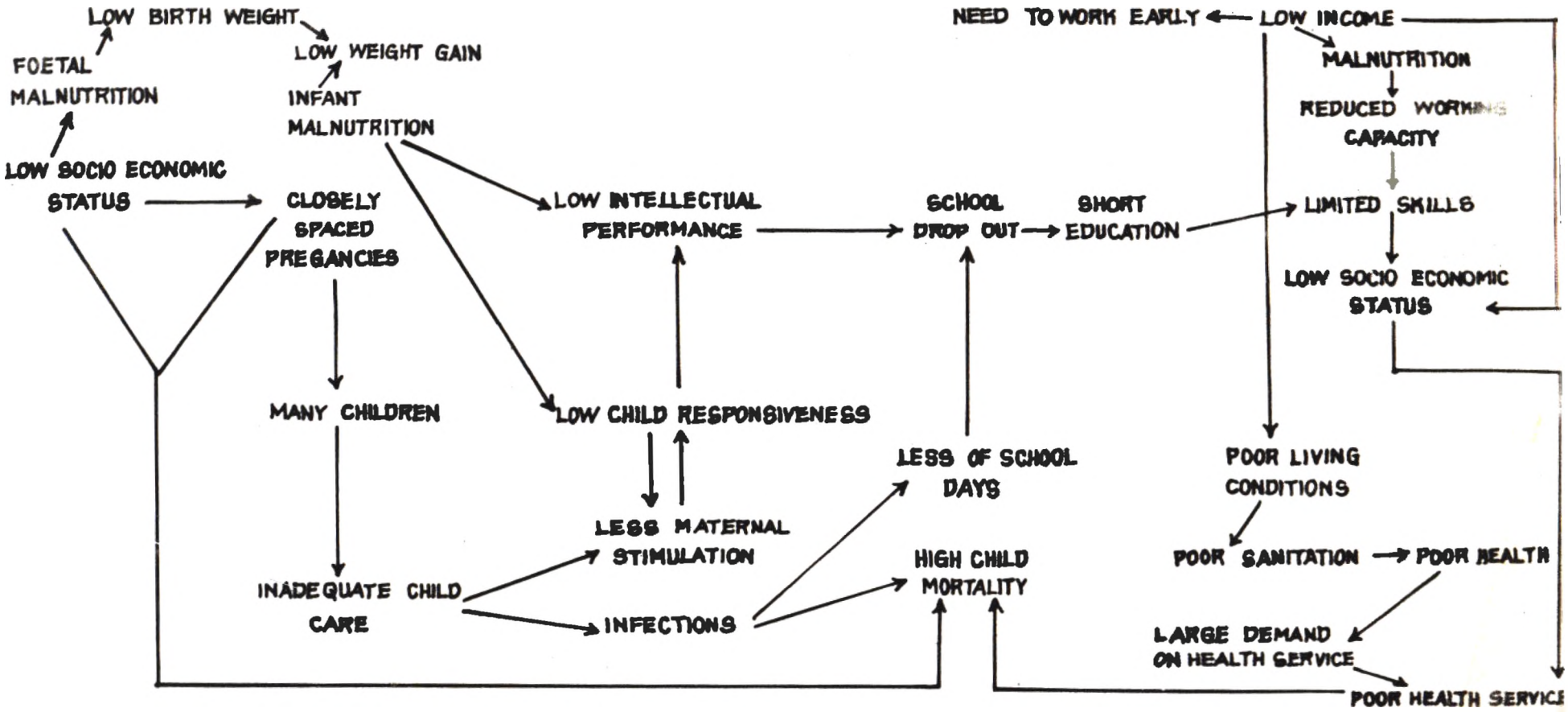
Any child who has suffered malnutrition loses a substantial period of time in which he cannot learn and this may extend indefinitely. In addition, the psychological trauma he is liable to experience in the

hospital may influence adversely his learning capacity atleast for some time.

Srikantia and Sastri (1971) observed that a child who lags in nutritional status and development is ill prepared for future learning tasks. The language that is heard is characteristically limited to the most functional and ill enunciated usage and this may prove a lasting handicap. Added to this, the new integrative disorganisation that makes skills of reading and writing difficult to master and the stage is set for early failure. This may interfere with the monitoring of musculature and other proprioreceptive information which is essential for perception of the outer world (Eceles, 1970).

The intellect is reduced by a direct effect of malnutriton on the Central Nervous System. The apathy of malnutrition and the period of hospitalisation reduce the learning time of the child at a behaviourally critical stage which possibly correspond to the "sensitive period". The growth deficiencies may interfere with the "sequential emergence of competence", so that the child's ability to explore his environment is reduced (Bisch, 1972).

A malnourished child becomes dull, inactive, restless, unhappy, irritable, and listless. His appetite, sleeping habits, and posture are poor and often fails to grow (Devadas and Radha Ruckmani, 1966). Gopalan (1975), Cravioto (1970), Cravioto and Delecardie (1971), have found that malnutrition evinces a higher probability of poor performance in intelligence tests and other types of tests related to learning than their well nourished counterparts. Figure-1 presents the factors contributing to the low level of education of the nutritionally deprived population.



FACTORS CONTRIBUTING TO THE LOW LEVEL OF EDUCATION OF THE NUTRITIONALLY DEPRIVED POPULATION

Figure: 1

Thus the survivors of early malnutrition start with the developmental path characterized by defective psychological functioning, school failure, poor intellectual performance, and lowest adaptive functioning. The resultant chain of events ecologically is a "spiral effect". Hence good nutrition should act as a catalysing agent on the child's physical growth, child's capacity to make use of his intellectual endowment, emotional unfolding, and healthy personality development (Saroj and Arya, 1979).

Improving the nutrition of the child cannot wait for an increase in income. Tomorrow is too...late. Today his bones are being formed and to him we cannot answer tomorrow. Hence, feeding programmes are necessary to prevent the child from the effects of malnutrition.

B. History and background of the school feeding programmes in Tamil Nadu:

(1) Need for school feeding programme:

Supplementary feeding was identified as just one of the methods of interventions in the nutrition system. Even though mass supplemental feeding programmes do not directly address themselves to the problems of poverty and low buying power in the market place, it is being recognised that supplemental feeding programmes are a natural vehicle for nutrition education efforts.

When an existing structure is used for the food distribution systems, the major share of resources can be devoted to actual feeding and its preparation rather than for developing an administrative system. The utilisation of the primary school net work is a major facility. It is

an established structure. Using it saves the cost of establishing a parallel structure.

To the poor, the only means of salvation and social uplift is education. If the poor children are to be educated, certain basic requirements must be ensured for them. The provision of free mid-day meals to school children has always been recognised as one of the incentives to the regular attendance of pupils (Sundaravadivelu, 1970).

(2) History of school lunch programme:

The history of school lunch programmes in India dates as far back as 1925. Since then supplementary feeding programmes have been in operation in different parts of India (Devadas and Radha Ruckmani, 1966, Avinashilingam, 1970).

'The Madras mid-day meals scheme' in Madras was started in 1925 by the corporation of Madras with the aim of increasing the attendance of children who were suffering from malnutrition and avitaminosis, and children from the families whose monthly income was 50 Rupees (Devadas and Radha Ruckmani, 1966). Initially starting with 500 pupils to feed, the programme made rapid progress with the number of participants increasing to 30,000 in 1929 and 75,000 in 1961. Meals were prepared in various centers early in the morning and distributed in vans by 12 noon. About 360g of cooked rice and 240g of sambar (dal with vegetables) formed the meal per child per day (Rau, 1978).

The Madras scheme of free school meals to poor children was started in 1956, inspired by the response given by the public, with the dual purposes of:

(a) enrolling poor children who did not attend schools because of poverty.

(b) giving at least one satisfying meal to poor children who attended the school but remained hungry all day long.

The programme was run entirely through people contributing food grains and other food stuffs for the scheme. Recognising the good result of this voluntary effort, the Tamil Nadu Government stepped in with a substantial grant, extending the scheme throughout the state in September, 1957 (Devadas and Radha Ruckmani, 1966, Sundaravadivelu, 1970, and Rau, 1978). The mid-day meals programme was run in the elementary schools by the voluntary contribution of the public at the rate of 4 paise per meal together with the government aid which is actually spent in excess of the public contribution of 4 paise per meal per pupil subject to a ceiling of 6 paise per meal per pupil. The meals generally consisted of cooked rice served with sambar. The scheme has brought about a social consciousness by 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.

The larger municipalities in the state also took interest in the school feeding programme. There were 39 Municipal Elementary Schools under the scheme, feeding nearly 26,000 children in the Coimbatore District in 1961 (Devadas and Radha Ruckmani, 1966).

In 1966, out of the 23,501 elementary schools under the department of education in the Madras state, the mid-day meals programme was in operation in 21,347 schools with the number of pupils fed being 7,45,000. In addition, the scheme was functioning in 269 corporation elementary

schools and 853 Harijan Welfare schools with the number of pupils fed in these schools being 1,17,448. The scheme was also functioning in 416 night schools on a purely voluntary basis, feeding nearly 11,760 pupils (Devadas and Radha Ruckmani, 1966).

By 1968, the Madras feeding programme had achieved the target set for itself of extending the mid-day meal to atleast 1 in every 3 students in the elementary schools. Every day of the school year 28,000 primary schools with 1,60,00,000 children received hot lunch. Dedicated work on the part of large number of people involved in the programme from its early stages made this possible despite the lack of facilities, proper cooks, other help etc., (Johnston, 1966).

International organisations like CARE and UNICEF had come forward to strengthen this programme through the contribution of protective foods such as skimmed milk, butter, oil, wheat, and pulses (Devadas and Kasipandiya Devi, 1970, Devadas et al., 1971) through which 4.15 million children were being fed daily. From 1968, the CARE has been supplying a new high protein product known as CSM (Corn Soya Milk) to primary schools in the place of skim milk.

By 1973 there were 11.9 million beneficiaries under the programme. It was estimated that over 1 million of those were pre-school children. The number of feeding days by then ranged from 200-220 per year. The National Institute of Nutrition then suggested that there should be atleast 250 feeding days in the year to have the desired impact on children (Natarajan and Panniker, 1973).

The mid-day meal feeding programme of school children, which covered about 11 million children in 1968-1969 was envisaged to extend to 14

million children by April 1974. The coverage however, reached under the mid-day meals feeding programme was 12 million beneficiaries. In 1970-1971 a special feeding programme for children of 0-3 age was launched in tribal areas and urban slums and later extended to the age group of 3-6 years, and then to pregnant and nursing mothers. By 1973, 38 lakhs of beneficiaries have been covered through the feeding centers (Chakaborathy, 1980).

Thus, the noon meal scheme started as a small voluntary effort, enlarged and widened into a government scheme and today has nearly 66,27,643 children benefiting from it. The more recent nutritious noon meal scheme of Tamil Nadu is comprehensive. It is a major socio-economic measure aimed at establishing a hungerless, egalitarian society through promoting the healthy growth of young children by nourishing not only their bodies, but their mind as well (Jeyalalitha, 1983).

C. School Feeding Programme, School Achievement and Intellectual Function

Malnutrition in India has been a by-product of poverty, unemployment, social inequalities, and illiteracy. Hence a multidimensional approach is needed to tackle the problem of malnutrition. Human resources represent a most valuable national asset (Iyengar, 1983). But their participation in productive programmes contributing to national development will depend to a great extent on their childhood nutritional status (Shinn, 1980).

Feeding programme may be considered as a part of a short term strategy designed to mitigate undernutrition in children for the time being, till long term measure directed towards alleviation of hunger and

malnutrition, improvement of environmental sanitation, removal of illiteracy (especially female illiteracy), and family planning begin to show effect. As Schuchat (1973) states, school lunch programme is designed to provide nutrition so that growth for the future and learning for the present can take place.

School feeding programme is no more a charitable activity; but, it is an enterprise in which pupils, teachers, school administrators, and the community take an active interest and pool efforts towards the attainment of its objectives to overcome the nutritional deficiencies of school children and to serve as a laboratory for the development of knowledge, attitudes, habits, and skills not only for school children but also for parents and out of school youth who are involved in school feeding activities (Juadiong, 1983). Devadas and Usha (1966) state that provision of inexpensive but nutritious meals in the school is a boon to a growing generation. Feeding children through the school lunch programmes has 2 distinct potentialities:

(1) It helps children to improve their physical stature through improved nutrition and to learn better and improve their eating habits.

(2) It promotes the emotional, social, and physical health of children.

Many studies have been carried out in Tamil Nadu and other states, and the educational outcomes of the feeding programmes have been evaluated. The following are some of the studies on that line. Devadas and Usha (1966) have studied the effect of school lunch programmes on elementary school pupils. Their study has proved that the group which received a

planned nutrition programme had gained greater nutritional knowledge. The attendance and performance of the lunch groups were better than those of the non-lunch groups. Therefore, the provision of lunch in the elementary schools, helps to improve nutritional status, attendance, performance, and social development of children, besides supplementing their home diets. The impact of school lunch programme on the nutritional status and development of children was assessed in comparison with the group of children who were not participating in the school lunch (Devadas and Radha Ruckmani, 1964). The result indicated that the children participating in the school lunch in Sri Avinashilingam primary school were better in terms of height, weight, blood haemoglobin levels, school attendance, and nutritional knowledge than their counterparts, who were not participating in the lunch. A well organised school lunch programme with built in nutrition and health education results in not only significant physical development, but also in better school performance and better behavioural aspects such as general cleanliness and tolerance (Devadas et al., 1972). Devadas and Usha (1966) found that the school lunch programme had "Carry Home" effects. Their findings included:

1. The parents of the children of the school lunch group which received nutrition education were more conscious of the objectives of the school lunch than those of the non-school lunch group.
2. Parents of the school lunch group considered green leafy vegetables and millets important for the growing child in addition to the cereals, other vegetables, and protective foods.
3. The consumption of leafy vegetables and millets in the home diet was high among the school lunch groups.

4. The school lunch programme had significant influence on changing the dietary habits of children.
5. A large number of children in the school lunch group demanded the types of food served in the school lunch from their mothers.

Amirthaveni and Usha (1976) found out the impact of school lunch programme on physical development, mental ability, and behavioural aspects of selected primary school children and have found out that the children participating in the school lunch programme revealed a significantly higher physical development, greater mental ability, and better behavioural aspects.

In a similar study Parvathy Rao (1978) showed that the children receiving the supplementary foods have gained weight, improved in general health status, attendance at school, improved food habits, and social behaviour when compared with children not receiving supplements.

A massive study was undertaken by Devadas (1983) to study the impact of CMNMP in the rural areas around Coimbatore city. It was found that more than 2.5 million children in the 6-10 age group have been additionally enrolled in the classes from 1-5 during the 2 months since the inspection of the scheme.

All the children registered increments in height, weight, and mid-upper arm circumference over a period of 4 months. Greater awareness of nutrition messages were noticed among the children after their 4 months participation in the programme with nutrition education. The parents generally appreciated the programme and the maintenance of the feeding centers.

Research Undertaken On the Nutritious Meal Programme:

Several short term researches towards evaluating the CMNMP have been carried out by the faculty and the Post-graduate students of Sri Avinashilingam Home Science College. The researches so far carried out are as follows:-

1. Estimation of thiamine, riboflavin, niacin and ascorbic acid in the lunch provided under CMNMP.
2. Management of the CMNMP for children in selected pre-schools.
3. A study on the nutritional benefits of the CMNMP on children.
4. Managerial aspects of CMNMP.
5. Impact of CMNMP on pre-school children.
6. Impact of CMNMP on the nutritional status of pre-school children.
7. Study on the functioning of the CMNMP in selected villages of Coimbatore District.
8. Designing and evaluating a solar cooker for noon meal programme.
9. Impact of CMNMP on the cognitive development of children.
10. A study of CMNMP in a selected village of Karamadai Block.
11. Motivating women's club to participate in CMNMP of Government of Tamil Nadu.
12. Nutritious Meal Programme- A case Study

Srikantia (1983) records that the benefits of the supplementary feeding programme results in lowered mortality and morbidity, better awareness of existing health and family welfare facilities, including childhood immunisation, improved school registration and school attend-

ance, increased physical activity leading to better psychological stimulation, generation of employment, and redistribution of food and income.

D. Education: A Tool Combating Malnutriton:

Nath (1982) has remarked that education in any form is a precursor to change in knowledge, beliefs, attitudes, practice, and habits which all constitute the ways of life that people adopt. Without the ability to read, write, and count, a person is locked into a narrow world, condemned for life to hard labour, unable to earn more than bare sustenance. Schooling is essential if a child is to become capable of contributing to society (UNICEF, 1979).

Today's world is prompted by a high degree of social awareness, and there is a significantly pervasive concern about the education of the young, and in particular of the deprived, underprivileged young. The education of the young in particular may demand the acquisition of a wide range of knowledge, skills and attitudes enabling them to cope with such uncertainties as may confront them in the years ahead (UNESCO, 1980). Good schools must prepare children to develop mentally, socially, and emotionally. Education must also teach practical skills the community needs, which children will have opportunities to use (UNICEF, 1979).

Schooling, as a formal educational system, is one of the most potent socialising agents to which many individuals are exposed. It has beneficial effects on psychosocial development and on the acquisition and utilisation of knowledge, contributing to economic and social development of individuals and society, both in developed and developing countries (UNESCO, 1984).

Education is essential to both development and informed action. Education in its fullest sense is seen as giving persons the basic skills needed to function in a rapidly modernising context (Stoesz, 1977).

Nutrition Education is Development Education. Development education depends on making information accessible to people, encouraging them to form moral and critical judgements and enabling them to participate in such changes as they believe appropriate, in ways appropriate to their own skills and interests (Allen Peters, 1985). It involves their own development as individuals, as well as that of society as a whole. The objective of development education is to enable the people to comprehend and participate in their own, their community's, their nation's and world's development. Any process of development education must create a critical awareness of local, national and international situations starting from the perceived reality and perspective of the individual (Peters, 1985). Development education thus requires a close connection between the acquisition of knowledge and attitude formation which should develop a new political and social awareness leading to concrete action and commitment (UNESCO, 1974).

Nutrition/Nutrition education is neither a welfare dole, nor a social welfare measure subject to resource availability. It should be regarded as a national investment to improve the quality of the nation. (Ramalingaswami, 1985). Effective nutrition education is more beneficial than supplemental feeding programmes because it helps people towards self reliance (Devadas, 1973).

Nutrition education is aimed at promotion of optimum nutritional status through positive food-related behaviour. As a process, nutrition

education develops the understanding, skills and motivation required to promote nutritional health (Schwartz, 1985). It is the only means for bringing about an awareness in the individual or community of the need for nutritional improvement. It is the first step toward improving the food habits (Boysen and Ahrens, 1972 and Tiglao, 1968).

The world is undergoing a period of rapid changes, which have imposed severe limitations on resources. Energy and economic crises are evident everywhere. Hence, the strategies for development must ensure conservation of resources (Devadas, 1982). In terms of health, optimal nutrition must be assured for all people. Nutrition education must be considered as an investment in human resource development. Good health is important for the child to be happy and satisfied and well adjusted. Therefore, the earlier the nutrition education is imparted to the child to promote positive health practices, the more likely is the possibility of the child realising his full potential for a creative life, marked by freedom and dignity (Devadas, 1981).

According to Lewis (1976) the goal of nutrition education "is to produce nutritionally literate decision makers, motivated, knowledgeable, skilled and willing to consider and choose proper nutritional alternatives." Nutrition education must give people the self-confidence and factual information, which people need to keep healthy and to adapt sensibly to changing situations.

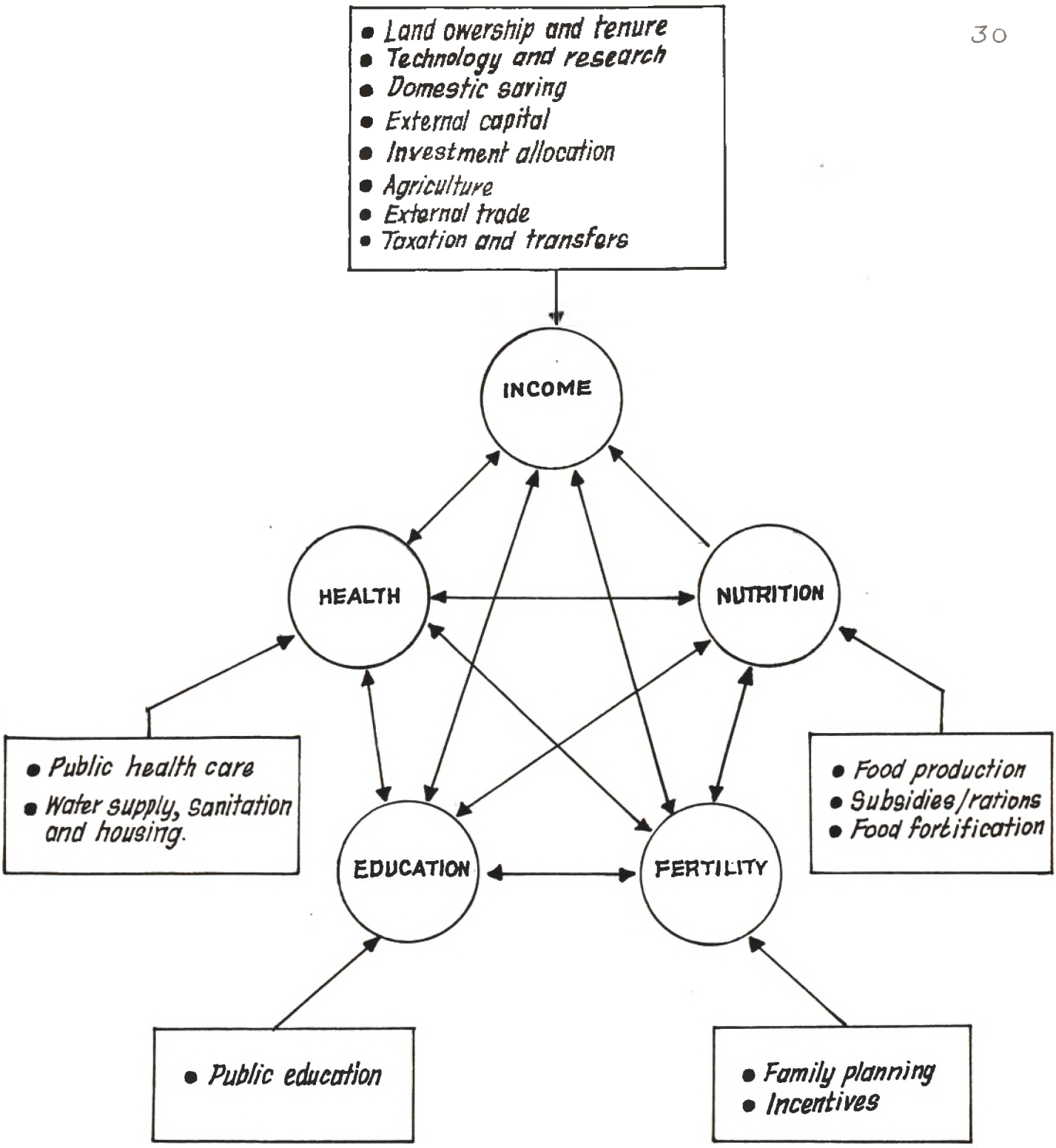
Nutrition education cannot flourish in isolation, because it depends on an understanding of the related fields of agriculture, environment, finance, science, technology, home, family, and community. It is essential to forge strong links both inside and outside school. Figure 2 il-

lustrates the multisectoral coordination that will bring overall development of the nation (Ramalingaswami, 1985). Out of the 143 million children of the age group 6-14 years in India (Child Atlas of India, 1981), 60 million attend over 5,00,000 primary schools and constitute 71 percent of the school child population (Guru, 1980). As many as 75 percent leave the school (drop-outs) at the primary stage itself (NIPCCD, 1980). If health and nutrition education is imparted effectively and efficiently in the primary school, children before they drop out at the primary school level, can in turn be used as effective agents disseminating health and nutrition education information among their parents and community (Mohapatna et al., 1985).

Related Studies:

Devadas et al., 1973, 1974, 1975 have tried the possibilities of incorporating nutriton education through the school curriculum and the school meals. The results revealed that nutrition education imparted through the curriculum had resulted in a significantly higher nutritional knowledge of the children.

A nutrition education programme was planned and conducted in a village for a group of 30 pre-school children, 10 expectant women and 12 nursing mothers who were participating in ANP from which they received milk and eggs as food supplements. The nutritional knowledge of the subjects was evaluated at the beginning and at the end of the six-month study period through observation and questionnaire cum interview methods. It was found that the nutrition education programme along with food distribution had significantly changed the food habits of children and adults.



MULTI-SECTORAL CO-ORDINATION

Fig: 2

Devadas et al., (1974) found out that the nutritional knowledge of the children who were given nutrition education regarding the importance of protective food was compared with those of the children who did not participate in the nutrition education programme.

The difference between the number of children mentioning foods as nutritionally essential varied significantly ($P < 0.01$) between the two groups. There is a highly significant association between the knowledge gained by the children and the nutrition education programme. Devadas (1983) in "An Experience of Early Learning" has concluded "Imparting Nutrition and health education through an integrated curriculum in the primary schools has brought about improvements in the knowledge and practices of the children, their parents and the school teachers." Nutrition and health education therefore, can be effectively incorporated in the primary school curricula. The teachers can also be oriented in the basic concepts and methodology. These will help to alleviate the problem of malnutrition and undernutrition.

Yperiman and Uermeersch (1979) in a study on "Factors associated with children's food habits" have concluded that children are better able to retain knowledge gained at school when it is reinforced by conditions in the home that are favourable to good nutrition practices.

Parental attitudes conditions the child's familiarity with a variety of foods and this variable is more important than any others in determining the child's acceptance of new foods at school.

A statewide mail survey of Pennsylvania junior and senior high school administrators and teachers of all subject matter areas was conducted to ascertain their perspective on nutrition education for students in grades

7 to 12. Both the teachers and administrators favoured integrating nutrition education into the existing courses over teaching it as a separate course. In their study on "Home Interviews Measure Positive Effects of School Nutrition Programme", McDonald et al., (1981) revealed that children exposed to the nutrition education programme reported greater consumption of fruits and vegetables and displayed improved ability to apply nutriton knowledge in making food choices. These findings provede evidence that school nutrition education influences children's reported food behaviour outside the classroon.

A nutrition education programme using the school lunch programme as a teaching resource was designed for 63 fourth grade students in a small town in Wisconsin. The result showed that an increase in reported milk consumption was evidence of a behaviour change. Test scores showed a signigicant increase in the students' comprehension of the four food groups and of the importance of four nutrients.

Realising the important role that education plays in alleviating malnutrition, it can be concluded that intervention programmes that combine nutrition supplementation, health care, and educational stimulation will have a significant developmental impact. The earlier the intervention and the longer the duration, the greater the developmental and educational benefits accrued. Thus, it can also be expected that these intervention programmes will have a significant effect on the decrease of school wastage among population where malnutrition is endemic.

E.Impediments of Nutrition Education at Primary School Level:

While progress has clearly been made in many aspects of nutrition education, weaknesses and gaps remain a challenge to the future endeavours (Schwartz, 1985).

Some of the problems are as follows:

1. The system of education is mainly burdened with the imparting of 3 R's. Nutrition and Health Education have been the grossly neglected subjects at different stages of education.

2. Nutrition and health education offered to the vulnerable sections of the population on an experimental basis sometimes lack clear-cut goals, reliance on ineffective strategies, limited outreach to audiences, lack of coordination, failure to evaluate and lack of public participation.

3. Fragmented nature of efforts resulting form lack of coordinated naitonal policy.

4. The basic facilities like accomodation, water supply, space for garden are practically not available. Obviously because of these limitations and lack of orientation to effective channels, teachers reveal a poor appreciation of use of these innovative means of health and nutrition communication. Hence, teaching is very uninteresting.

5. Lack of teaching aids.

6. One of the frustrations teachers express most frequently was limited time. With many school activities many teachers feel that they do not have enough time to cover even the basic subjects. Hence, low priority is given to the teaching of nutrition and health education.

7. Teachers are not qualified to teach nutrition and health education since it is not included in the curriculum of the pre-service teacher training programme.

8. Since the parents and community are not given any education, their participation and social demand for education is poor.

9. The in-service education programme is not regular and does not provide coverage to all teachers in service.

10. Lethargy of the individual teacher, indifference and frequent transfers of the trained teachers and replacement by the untrained teachers are responsible for the failure of the programme.

11. Implementation of isolated interventions usually has a small impact or none at all.

CHAPTER III

EXPERIMENTAL PROCEDURE

The methods and materials used in the present study, "Evaluation of the Impact of the Selected Nutrition Intervention Programmes in Tamil Nadu" are presented in the following sequence.

1. Selection of the nutrition intervention programmes
2. Implementation of the programmes
    a. The inputs
    b. The study design
    c. Objectives and scope
    d. Theoretical frame work
3. Selection of areas and sample
4. Methods used for evaluating the impact
5. Evaluation of the impact of the programme

1. Selection of the Nutrition Intervention Programmes:

'Nutrition Intervention' programmes, are programmes which are operated to prevent the vulnerable section of the society becoming malnourished and ensure the beneficiaries optimum opportunity for good growth.

In India, numerous supplementary feeding programmes focused on children are currently in operation. Most of these are small scale operations undertaken by the government or voluntary agencies. One such programme, assisted by the UNICEF, is "Nutrition, Health Education and Environmental Sanitation (NHEES) at Primary Stage". The two major state

sponsored supplementary feeding programmes are (1) the Tamil Nadu Chief minister's Nutritious Meal Programme and (2) the feeding component of the Intrgerated Child Development Services (ICDS). Feeding is also a part of the World Bank assisted Tamil Nadu Integrated Nutrition Project (TINP). Among these, the investigator selected the Tamil Nadu Chief Minister's Nutritious Meal Programme for children (A) and Nutrition, Health and Environmental Sanitation at Primary Stage (B) for this study. In the intervention Programme 'A' Nutritious Meal Programme of Tamil Nadu, the feeding component is present but there is no formal, structured class room teaching of nutrition,health and environmental sanitation at Primary stage. On the other hand in the intervention 'B' NHEES, the education component, is present along with the feeding component.

A. Intervention 'A' Nutritious Meal Programme (CMNMP):

The Hon'ble Chief Minister's Nutritious Meal Programme is a massive operation in Tamil Nadu covering children from above 2 years of age to 14 years, costing over 2 billions of rupees annually. A meal is offered at noon daily for all the 365 days in the year to all the children above 2 years, who care to come to the several thousands of centers in the state. It is helping to mitigate hunger for millions of children.

The CMNMP aims to increase food consumption on the part of the children attending the school. It is viewed as an important school attendance stabilisation and nutrition programme.

The provision of a free school meal is an effort to improve the child's nutritional status and to increase their contact with the school programme. Increased literacy and greater food intake is expected to result not only in the physical well-being and improved quality of life

for these children, but also to enhance their productivity and ability to contribute to national economy in their adult life.

Thus the CMNMP is designed as a measure to:

1. Provide one third of the Recommended Daily Allowance
2. Improve the school attendance
3. Improve performance in the school

Intervention 'B' Nutrition, Health Education and Environmental Sanitation at Primary Stage (NHEES)

School nutrition education programmes aim to change children's nutrition-related knowledge, attitudes and behaviours with the long range goal of improving nutritional and health status.

Investment in education is investment for life. Education helps children to think logically and to develop, the ideas and skills through which they can understand and control the world around them.

Primary schooling is not just the first successive level of education, but rather the first in importance among pre-requisites for human and social development. Realising the importance of primary education and the need for nutrition education at this stage, a massive programme was launched in Tamil Nadu with the assistance of NCERT/UNICEF in collaboration with the Government of Tamil Nadu. The objectives of this intervention were to:

1. Impart knowledge in nutrition,health education and environmental sanitation.
2. Increase the awareness of the pupils regarding the relationship between nutrition and health.
3. Help the pupils develop desirable, healthy, nutritional, and

sanitary practices.

4. Promote and inculcate the ability to apply and put into practice the knowledge they have acquired in nutrition, health education at school.
5. Take home the nutrition, and health concepts they have learnt in school and have discussions with parents. Thus, they form the change agents of nutrition and health practices.
6. Improve the problem solving ability of children in relation to nutrition, health and environmental sanitation.
7. Improve the nutritional status with the objective of reducing the deficiency diseases.
8. Increase pupils participation in food production activities.

Thus the NHEES programme is designed as a measure to:

1. Impart knowledge in nutrition, health and sanitation.
2. Improve the practice in nutrition, health and sanitation.
3. Improve the problem solving ability relating to nutrition, health, and sanitation.
4. Improve the nutritional status by applying the knowledge.

2. Implementation:

Intervention A:

The programme in Tamil Nadu had been in operation for nearly 5 years. The noon meal organiser had the responsibility for implementing the programme. The target of feeding was for 365 days in the year.

Intervention B:

A scheme was launched in 1976 to effect a nutrition integrated curriculum in selected primary schools in selected community development blocks in Coimbatore district in Tamil Nadu. The achievements of this programme resulted in expansion of the scheme to other districts in the state.

This experimental project is an outcome of a proposal made by Sri Avinashilingam Home Science College to the Government of Tamil Nadu. This has been taken up as a national scheme with the help of Government of India, the National Council for Educational Research and Training (NCERT) and UNICEF.

A curriculum was prepared incorporating into the existing syllabus for classes I to V, simple concepts on nutrition, health and environmental sanitation. Thus the nutrition, health curriculum fitted into the existing primary school syllabus, (Annexure I) without enhancing the teaching time or the teacher's load on one hand, and without disturbing the existing concentric pattern wherein the concepts start from simple items in class I and, increases in depth as the pupils progress to class V. Trained teacher taught the integrated nutrition curriculum for 20 to 30 minutes daily.

Inputs:

Intervention A:

Under the CMNMP, provision is made for a beneficiary to receive a meal prepared from rice 100g, dhal 15g, oil 5g, leafy vegetables 25g, and other vegetables 25g.

FIG.3 PREPARATION OF MIDDAY MEAL

FIG.4 WAITING FOR THE MEAL

FIG. 5 SERVING THE MEAL

FIG. 6 EATING THE MEAL

The annual target number of feeding days is 365. Under specific directive, the food supplement is distributed on all school days, and on non-working days as well (Figures 3-6).

Intervention B:

The learning inputs were:

(a) Inservice training of the teachers in nutrition and health education, which is a pre-requisite for teaching nutrition and health education in the schools.

(b) Integrated curriculum for the teaching of nutrition and health education.

(c) Supply of mid-day meals to the school children.

(d) Supply of instuctional material - supplementary readers in nutrition, health and environmental sanitation to children, hand book of nutrition to teachers, integrated curriculum,and charts and posters in nutrition and health education to the teachers (Figure - 7, Annexure II).

A curriculum is defined as the interaction of pupil and subject brought about by the teacher. For this project on nutrition, health integrated curriculum was developed by the Project Director and staff.

Topics in the spiral curriculum:

1. You and your food
2. Food and nutrient requirements
3. Deficiency diseases and their prevention
4. Meal planning
5. Methods to conserve nutrients

6. Personal hygiene
7. Communicable diseases and their prevention
8. Handling of health emergencies
9. Social evils - food adulteration, drug addiction,alcoholics
10. You and your surroundings
11. Safe drinking water

The special curriculum, in nutrition,health and environmental sanitation concepts were integrated into all the subjects that are currently taught to the children. The three dimensions - Nutrition, Health and Environmental Sanitation wrer graded in terms of complexity to suit the developmental levels of children in the five grades of primary school into 11 broad themes which ran through all the grades in a spiral format. The spiral format was used, in preference to one based, on concentric circles with clearly demarcated boundaries denoting the content for each grade level.

The primary schools in Tamil Nadu with an enrolment of 40-50 children in each of the five classes, follow the class-teacher system. In this system the single teacher handles all the subjects for the same class and some times are manned by one or two teachers. Since, the eleven themes were common to all the classes, it was expected that teacher could guide them better.

Supplementary readers were also prepared by the Project staff in Tamil for classes I to V based on the topics listed in the Nutrition, health integrated special curriculum. A copy of the reader was distributed to all children in all the experimental schools. Besides, the supplementary readers, a teacher's handbook in nutrition, manual in

FIG.7 TEACHING AIDS SUPPLIED

nutrition and health education and a set of seven posters, charts for teaching nutrition and health education were distributed to the project schools (Figure 7).

The pivotal link in the joint enterprise of creating a relevant and effective nutrition education among the children is the teacher (Sinclair and Howat,1980). It is this group of teachers who provide nutrition education for the future citizens. Therefore, the project staff conducted a five day in-service training for the primary school teachers in the selected schools.

b. Study design.

Intervention A:

The traditional experimental design could not be applied due to the non availability of a comparable control group. Instead, a substitute approach was followed in which analysis was done for the same group from the data collected over a period of six months.

Intervention B:

This being a normative study, the score obtained by the experimental group were compared with those of the control group. The control schools had no organised school wide nutrition curriculum and closely matched the test schools with respect to family income levels of the parents. Both test schools and control schools enrolled children from the lower socio economic strata. Where ever possible the pre and post-test model was also used. This indicated whether the observed changes in food behaviour and improvement in nutritional status was due to the programme or to the changes unrelated to it.

c.Objectives and scope:

Intervention A:

To measure the impact of the CMNMP on school enrolment, attendance and on the nutritional status of programme participants.

Intervention B:

To measure the knowledge and awareness in nutrition,health and environmental sanitation, and improvement in the nutritional and health practices and the impact on the nutritional status of the students.

d. Theoretical framework.

Intervention A :

The provision of a nutritious meal in CMNMP is viewed as an important input in the physical and mental development of the participants. The thrust of the programme has been to provide one third of the daily requirements to the school children throughout the year. This should produce a tangible improvement in the school enrolement, attendance, and nutritional status. However, there are a multitude of factors which determine these intended benefits. For this evaluation study, the interest is in knowing the relationship between one particular factor - the midday meal programme and its possible impact on school enrolement, attendance, academic achievement and the nutritional status.

Intervention B:

Educational intervention aims at increasing the level of awareness and knowledge about nutrition, health and environmental sanitation among the learners, and subsequently influence their attitude towards the

adoption of desirable nutrition, and health practices. There are other factors such as education, income of the parents, and others which determine the intended benefits. The present study aims at finding the relationship between nutrition education and its possible impact on increase in the level of knowledge, problem solving ability, adoption of desirable, healthy practices and the nutritional status.

3.Selection of Areas and Samples:

Intervention A:

Two community Development Blocks in Nilgiris namely, Kotagiri and Coonoor and an urban area in Coimbatore city were selected for the study. Children studying in classes I to V were the subjects selected for the impact evaluation. Table I and figures 8 and 8a show the area of study and one of the experimental schools.

TABLE I

AREAS SELECTED FOR THE STUDY

S.No.	District	Area	Rural/Urban
1	Nilgiris	Kotagiri Block	Rural
		Coonoor Block	Rural
2	Coimbatore	Municipal corporation (East Range)	Urban

These areas were selected on the basis of their easy accessibility for the investigator and the co-operation extended for carrying out the study. Nutritional status was assessed for 1,598 primary school children

SAMPLE SIZE OF THE STUDY

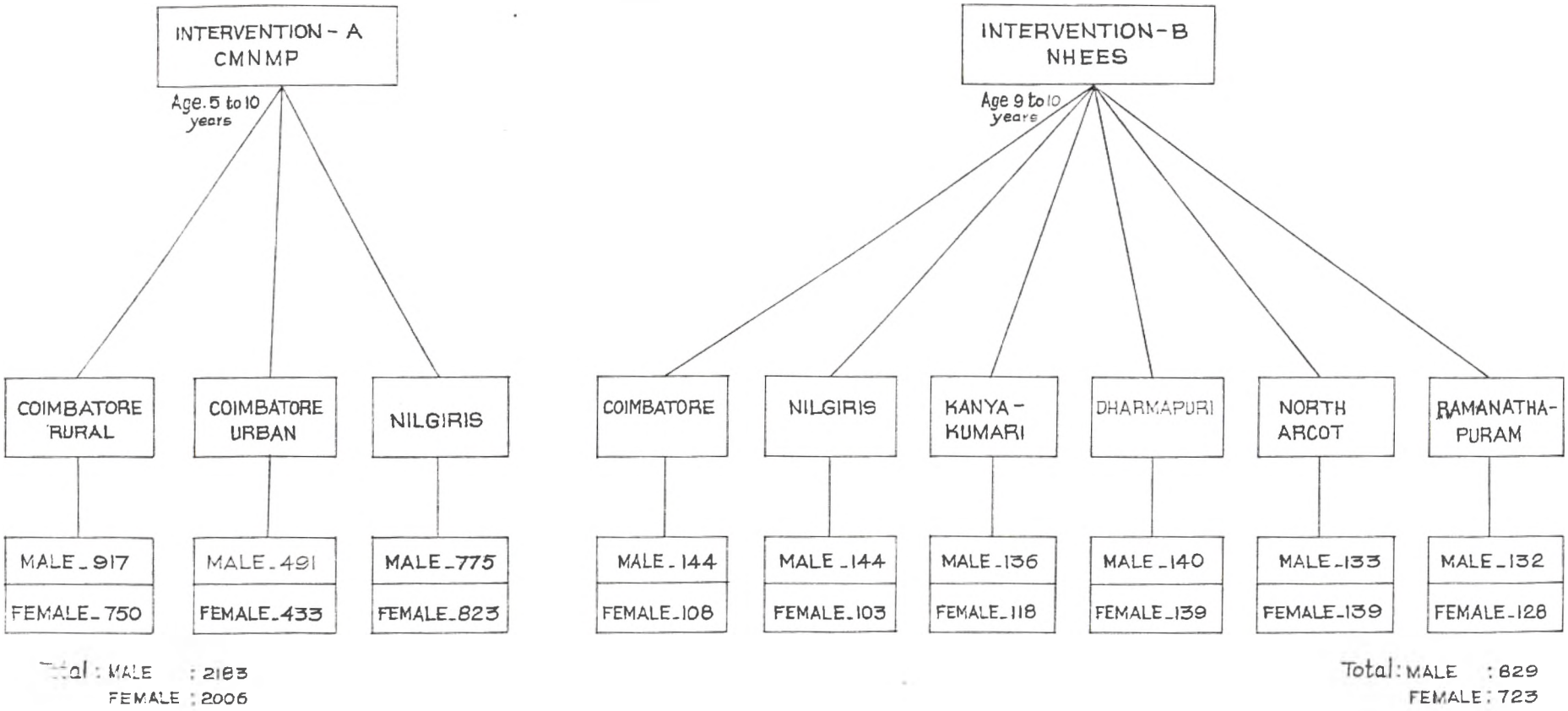


FIG. 8

FIG.8a VIEW OF A TRIBAL SCHOOL

in the Nilgiris, and 2,591 children in Coimbatore city. The enrolement pattern and attendance of the children participating in the nutritious meal programme was found out from 50 schools in Kotagiri taluk and 50 from Coonoor taluk (Annexure III).

The sample size of the study for both the intervention programmes is shown in Figure 8. 2,183 boys and 2,006 girls were assessed for their nutritional status for the nutritious meal programme. All the children studying in the selected schools were included for the study irrespective of their caste, creed, income level of the family with the only criterion being their participation in the Nutritious Meal programme.

Intervention B:

In order to have an adequate representation for the six districts of Tamil Nadu viz. Nilgiris, Kanyakumari, Coimabatore, Ramanathapuram, Dharmapuri and North Arcot were chosen. The selection was based on the ecological difference like, coastal, tribal, underprivileged urban slum, literacy wise backward and economically backward (Figure 9). One Community Development Block in each of the six districts was selected. In each Block five primary schools were randomly selected. Annexure IV shows the District, Block and the schools selected and Figure 10 shows the view of a tribal village in Nilgiris District.

Though nutrition and health education was imparted to all the children studying through classes I to V, only children studying in class V were selected for this study. The rationale behind this choice was that children belonging to the age group 10+ would have a better understanding than the children in the younger age group and express themselves explicitly.

4. Methods Used for Evaluating the Impacts:

Intervention A:

a. School Enrolment:

Achieving cent percent enrolment is one of the objectives of the Chief Ministers Nurtitious Meal Programme. Therefore it was imperative to find out the impact of CMNMP on enrolment. The statistics of enrolment two years before the introduction of CMNMP and two years after the launching of CMNMP (i.e.) from the year 1980-1981 to 1984-1985 were collected. The area of study was Coonoor and Kotagiri Taluks in the Nilgiris district. Fifty schools were studied from each of the two taluks. The data regarding the enrolment was obtained using the schedule given in Annexure V.

Column 3 in the schedule is equal to the total of columns 4, 8 and 9. Every school has a "Census area". Children from this "Census area" will be attending the particular school located outside the census area or be out of school as children yet to be enrolled.

Column 6 in the schedule is equal to column 4 plus column 5. Column 5 gives the number of children from other villages attending this particular school. In a particular school, children from different areas can be enrolled along with the children of that particular village where the school is located.

Thus the enrolment percentage calculated using the formula.

$$\frac{\text{No. enrolled X 100}}{\text{No. of school age children}}$$

DISTRICTS SELECTED FOR THE STUDY IN TAMIL NADU

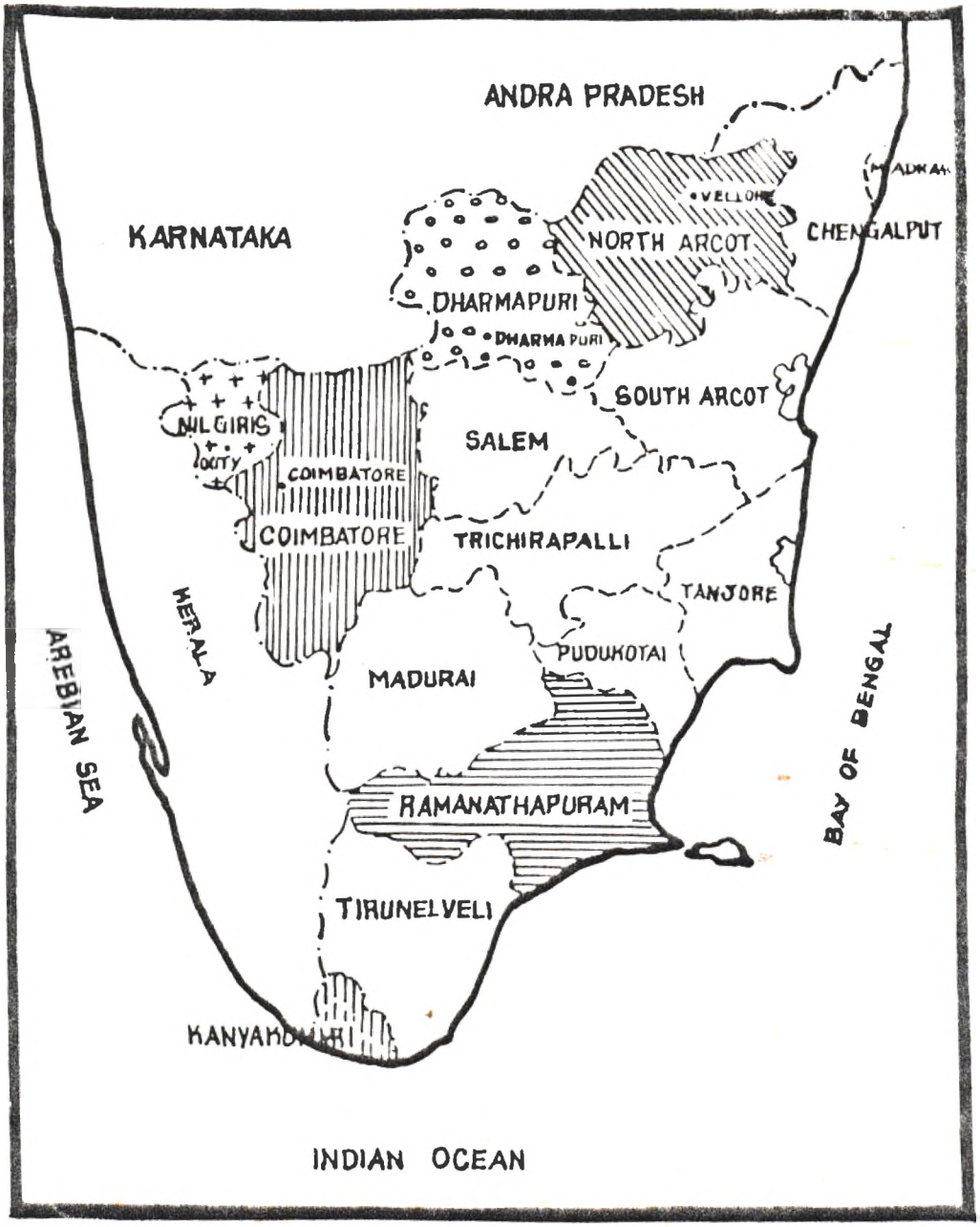


Figure: 9

FIG.10 VIEW OF A TRIBAL VILLAGE

(b) School Attendance:

The average attendance in school was furnished for the entire roll of the class and school in column 6 of the schedule.

To start with, average attendance for June of a particular academic year was found out. Likewise it was calculated for the 10 subsequent months. Thus the average attendance was calculated for the entire school year. This was done for a particular standard, say standard I and then repeated for other standards. Thus the percentage of attendance was found by using the formula.

$$\frac{\text{Average attendance X 100}}{\text{No. on roll}}$$

Source of Data:

The headmaster of every primary school is expected, under the existing educational rules, to send a periodical report called "monthly return" for each calendar month to the office of the Deputy Inspector of Schools, which among other things, contains detailed particulars regarding:

a) Total number of children available for admission at the age group of 6-11 years and 11-14 years
b) Number of children admitted in the school whose report is sent
c) Number of children attending other schools from the numbers shown
d) Number of children who are yet to be enrolled
e) Number of children attending this particular school coming from other villages
f) Standard-wise strength during the beginning of the month
g) Admissions and withdrawals made during the month
h) Class wise roll on the last day of the month

i) Average attendance of the children for the month concerned in each class etc.,

The Census Registers, Register of admissions and withdrawals and class attendance Registers were the important records which were the sources to gather and furnish the details in the monthly returns for all the five years for the 100 schools subjected for this purpose.

C. Improvement in academic achievement:

The hypothesis "Improved attendance should register an improvement in the academic achievements" should be tested. One of the objectives of CMNMP is to "Enthuse children to go to school and improve school attendance".

In order to find out imporvement of the learners in their academic performance, a correlation was obtained between the number of days the individual child has attended the school for the total number of working days within the period in which the study was conducted and the increase or decrease of the marks from that of the marks obtained at the start of the study was found.

The average marks obtained by each student in the experimental study at the start and at the end was obtained from the class teacher. The increase or decrease was found by subtracting the initial from the final marks. The teacher made tests, based on the subject matter taught during that particular period were used.

d. Anthropometric Measurements:

School lunch menus have been designed to provide atleast one third of dietary allowances recommended for the child. Hence, they have the potential to make a substantial contribution to nutrient intake (Astrid and Joyce, 1979). Nutritional status represents the end result of a number of factors, most important of which are the quantity and quality of the dietary intake. Therefore the anthropometric measurements height and weight were taken over a period of six months. The mean increases were found out by subtracting from the final values. The values obtained at the start of the study, the final weight and height of the individual was compared with the standard weight and heights of the children of the same age given by ICMR.

Thus from the height and weight measurements, normal children, children with long duration and chronic form of malnutrition according to the classification given by Visweswara Rao et al., (1986) were identified. Table II gives the estimation of nutritional status of the children.

TABLE II

ESTIMATION OF NUTRITIONAL STATUS

S.No.	Given values of wt/ht (percentage)	Nutritional status
1	80	Severely malnourished
2	90	Mild
3	90 and above	Normal
4	Above 120	Obese

i) Measuring the height of the children:

Teachers who were willing to participate in the study were trained to measure the heights and weights of children. They were measured on the same day of every month over a period of 6 months.

For taking the height measurement, the child stood with barefeet on a flat floor against a straight, smooth wall with feet parallel and with heels, buttocks, shoulders and back of the head touching the wall. The head was held comfortably erect and a mark on the wall with the help of a right angled object (e.g) a large book touching the top of the head horizontally, with vertical edge flat against the wall. Height was then measured by using a measuring tape . Height was measured to the nearest 0.1 cm. Where ever a stadiometer was available height was measured by using a stadiometer (Figure 11).

ii) Measuring weights:

Weight was measured by using a bathroom scale. Bathroom scales were distributed to the selected schools. The balance was checked periodically for any error.

The subject, with minimum clothes was made to stand at the centre of the platform of the weighing machine without touching anything, or leaning or bending. She was asked to look straight. The value indicated by the was noted. Weight was measured to the nfearest 0.1 kg (Figure 12).

iii) Clinical Assessment:

Gopalan (1961), Garn (1962), Swaminathan (1969), FAO(1970) WHO (1976) report that clinical examination is an essential part of nutri-

FIG.11 MEASURING HEIGHT

FIG.12 MEASURING WEIGHT

FIG.13 HEALTH CHECK-UP

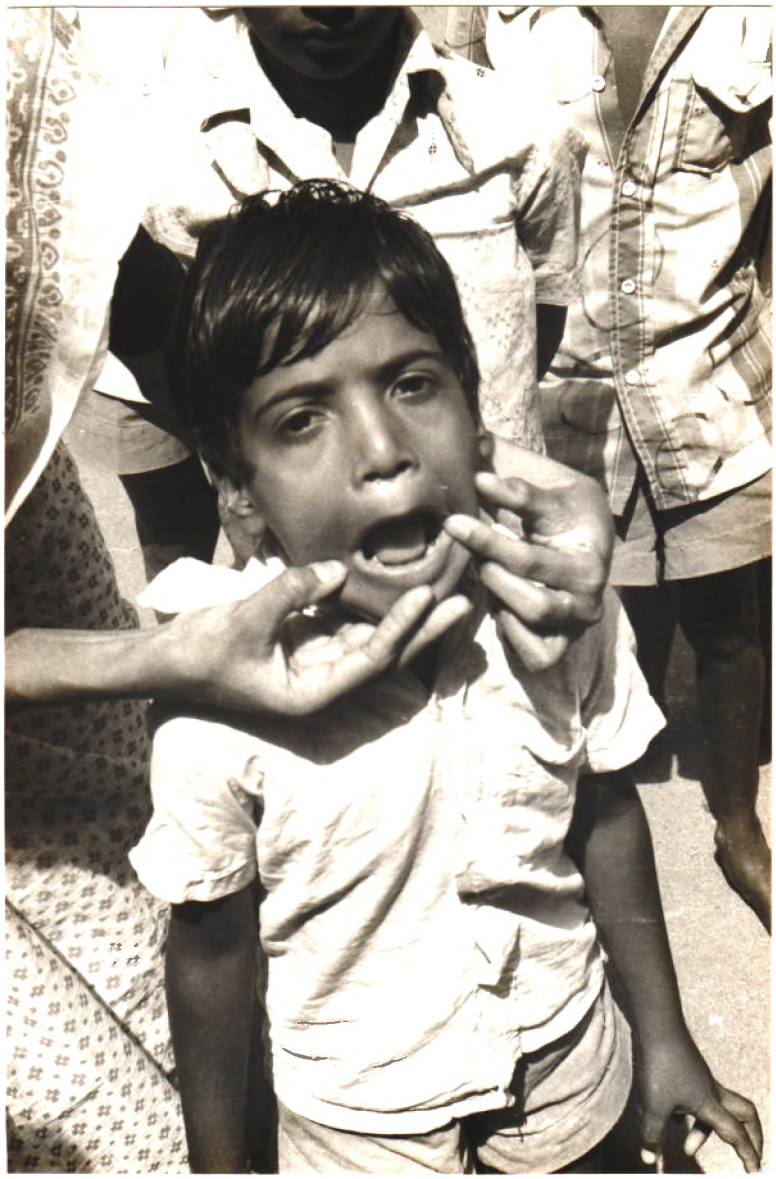


FIG. 13a CLINICAL EXAMINATION

FIG.14 PALE NAIL

FIG.15 ANGULARSTOMATITIS

tional surveys, since the ultimate objective is to assess levels of health of individuals and population groups. (Gopalan, 1961; Garn, 1962).

Clinical examinations are based on examination of certain physical signs on the skin, musculature and state of bones and teeth. The ICMR modified clinical survey form (Annexure VI) was used and the services of the Primary Health Centre doctor was utilised (Figure 13-15). The findings of the clinical assesment were interpreted and the results were expressed in terms of deficiencies of different nutrients.

e. Nutritional, Health and Sanitary Practices of Children:

The nutritional health and sanitary practices of children was found by using a check list (Annexure VII). Each child learning in class 5 was given a copy of the check list. She/he was asked to put a tick mark against the practice which she/he is following. This was administered at the start and at the end of the study. Each desirable practice was given one mark and no mark was given for the wrong practice. The teachers also observed the practices of children during the meal time. The investigator also observed their practices (Figure 16).

Intervention B:

The evaluation of the impact of the programme was based on these objectives of the intervention programme. The procedure followed in the study pertaining to the evaluation were:

a) Trained teachers were requested to integrate nutrition and health education on their return to their schools after training. They were urged to maintain a record of the heights and weights of the children, deficiency symptoms

seen in the children and record dissappearance of symptoms etc., in a health card.

b) Follow up visits were paid by the investigator to the experimental schools to find out the problems in implementation and obtain their suggestions for further improvement.

c) The services of these teachers were used in the assessment of the nutritional status and test-teach-test programme.

d) The teachers integrated the nutrition, health and environmental sanitation through the school subjects, namely, mathematics, language, history,geography, general science, arts and crafts (Annexure VIII). On an average each teacher devoted about 20-30 minutes for nutrition education while teaching the alloted subjects. Thus nutrition education formed a connecting strand throughout the fabric of education.

Approaches to Integrated Nutrition and Health Education:

The teaching of nutrition, health education and environmental sanitation was geared to the pattern of child development - that is the developmental stages at different ages (Figures 17-19) illustrate the approaches to integrated nutrition and health education and sequences of nutrition, health and environmental sanitation.

FIG.16 WASHING HANDS BEFORE AND AFTER MEALS

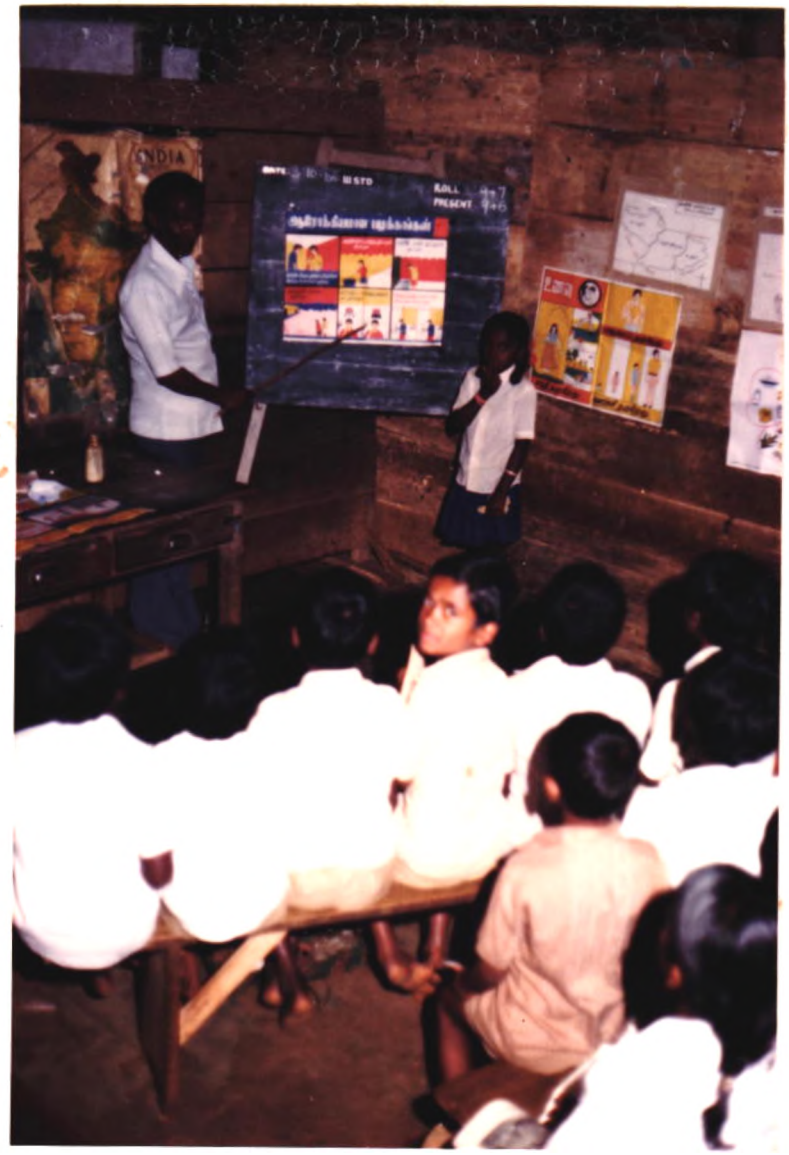


FIG.17 TEACHING NUTRITION & HEALTH CONCEPTS

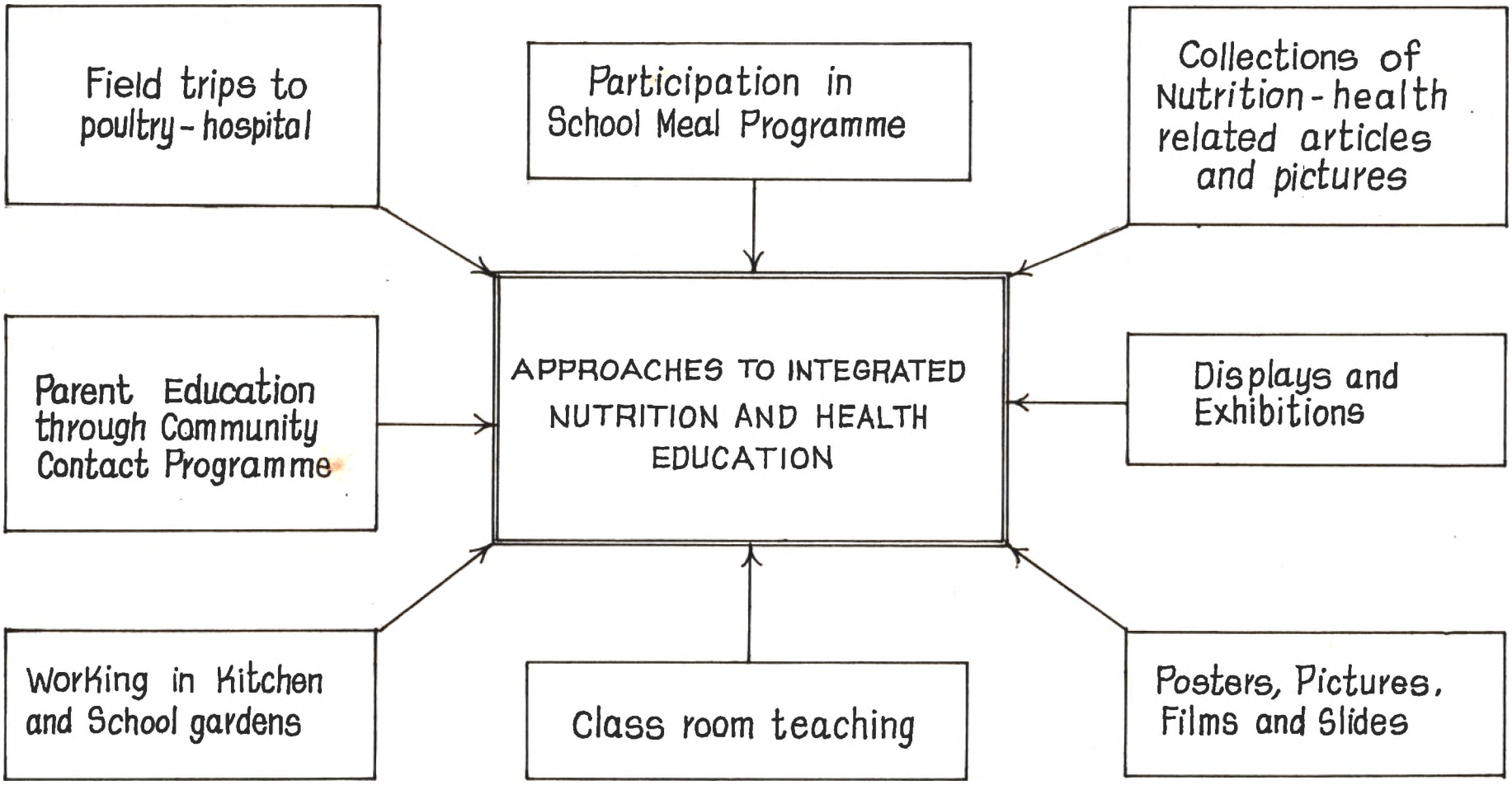

Field trips to poultry - hospital
Participation in School Meal Programme
Collections of Nutrition - health related articles and pictures
Parent Education through Community Contact Programme
APPROACHES TO INTEGRATED NUTRITION AND HEALTH EDUCATION
Displays and Exhibitions
Working in Kitchen and School gardens
Class room teaching
Posters, Pictures, Films and Slides

FIGURE - 18.

NUTRITION HEALTH AND ENVIRONMENTAL SANITATION SEQUENCE

Stages of children's development	Main ideas	Interpretation of main ideas
Stage-I concrete thinking early stage (5-6 years)	Food health and factors affecting food and health	Creating a greater awareness of the locally available foods- their names and building up a positive attitude towards food and health - meaning of health - signs of good health. The level of understanding of nutrition,health and environmental sanitation at this stage would be that there are varieties of food like, vegetarian foods, non-vegetarian foods and we need them to keep us healthy and alive.
Stage-II concrete thinking later stage (7-8 years)	fleshy foods, fruits and vegetables	The food we eat consists of cereals, pulses, and vegetables. These are classified according to the function they do in the body and when we add some food from each group in our daily diet we get a balanced diet. Clean environment is needed for a healthy life.
Stage-III Abstract thinking (9 years & above)	Nutrients, functions, sources,deficiency diseases, communicable diseases prevention, prevention of health hazards	Understanding the idea that different nutrients are present in food and each nutrient has its own function in the body. The need for each nutrient differs according to age, sex, work, physiological conditions -Inadequate consumption of food leads to deficiency diseases

Figure. 19

f.Parents Education:

An important aspect of nutrition and health education in schools is the linkage that should be built up with the home and the community. This has two advantages. On the one hand, it helps the teacher to understand the problems of the child in the home and community settings, and, on the other, it helps in obtainining the co-operation of parent and the community in the execution of school nutrition education programmes (WHO, 1969).

With the aim of involving the community in school nutrition education programme the project staff formulated 10 basic universal messages applicable in rural and urban situations, in consonance with the social customs and beliefs regarding illness and food habits and taboos of the community (Annexure IX).

The project staff helped to conduct parent education through community contact programmes by trained primary school teachers of the same neighbourhood. These teachers had been already oriented to nutrition and health education programme. The programmes were conducted in the evenings, when the parents were available after completing their day's work. The methods used were mostly folk methods, like, villuppattu, puppet show, kummi, kholattam, demonstration, discussion etc., (Figures 20-22). Each teacher spent about an hour in the working days and 2-3 hours during holidays. This had been carried out for a period of 6 months. About 20 such contact programmes were conducted in the selected villages.

FIG. 20 & 21 EDUCATION FOR THE PARENTS

5.Evaluation of the educational impact of the programme:

a. Selection of the parameters for evaluation:

Modes of evaluation were linked with the objectives of the programme and curriculum content. Aquisition of knowledge is necessary for success in nutrition education. The most important indicators of success in the evaluation are however, changes in behaviour - which implies adoption of desirable food and health practices and aquisition of problem solving ability. If these are obtained, a better nutritional status will be achieved. With these assumptions the evaluation aimed at finding the gain in knowledge of nutrition, health and environmental sanitation, improvements in the nutritional health practices, aquisition of problem solving ability, and improvement in the nutrititonal status of the children.

Figure 23 illustrates the model used to achieve the objectives.

The Instructional Model:

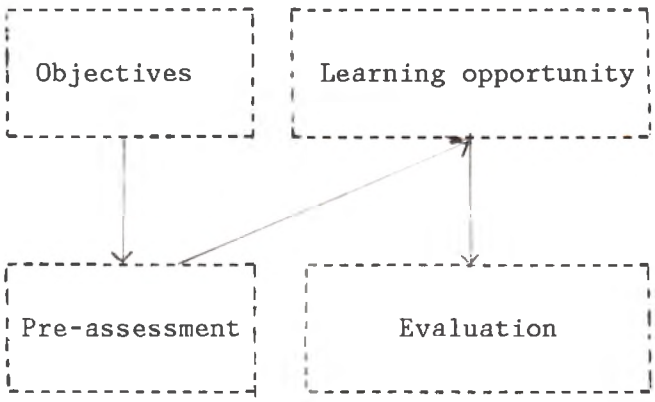


Figure.23

This study being a normative study (assessing individual performance relative to a group) the investigator was able to compare the subjects with their peer group. (i.e) experimental with control besides, finding the impact of the programme before and after its implementation.

b.Preparation of Tools:

The following tools (i) knowledge test, (ii) checklists for finding out their practices (iii) a small test on problem solving ability were formulated. The same methods and tools were used to evaluate the impact of both the interventions.

i.Knowledge test:

The knowledge test consisted of 24 test items for 30 marks. It consisted of 9 fill in the blanks items, 6 short answer questions and 9 matching items. It covered the major aspects of nutrition, health and environmental sanitation. These questions were completely based on the supplementary reader supplied to the students (Annexure X).

A pilot study was conducted to find out the "Item difficulty and index of discrimination". Item difficulty is simply a percentage ratio between the number of students who answer a question correctly and incorrectly. An index of discrimination on the other hand, is a biserial correlation with the total test. The computed decimal (from 0.0 to 1.0) indicates to what extent success on that question is related to the total test. The test items for the present study had an index of discrimination of 0.4 and above. The test items with lesser values were rejected.

Reliability and validity of the prepared tools:

a.Reliability:

Reliability refers to the extent to which the results of the test are verifiable after a lapse of time regardless of particular items. The test - retest reliability for a sample of 50 children to whom the second test was administered after a month and half was found to range from 0.75 to 0.81. Hence the test had a good reliability.

b. Validity:

The validity of a test refers to "the degree to which the test actually measures that it purports to measure". the content validity for the present knowledge test was found and the test items completely covered the content matter.

ii.Checklists for finding out the practices:

Separate checklists were prepared for nutrition, health and environmental sanitation. They were prepared in consultation with the experts in the specific fields. The students were asked to put a tick mark against the practice which they follow.

iii. Test on problem solving ability and Decision making:

Problem solving ability is defined as the "Thinking process in which the learner discovers a combination of previously learned rules he can apply to solve a novel problem situation". The learner is required to discover the higher order rule without specific help.

Problem solving ability was measured by providing hypothetical situations concerning nutrition, health and environmental sanitation within

the experience of the respondents(Annexure XI). In each question the various situations and possible solutions were added. The respondents were to make the correct choice and the reasons. Thus uniformity was ensured by standardising the test for all the tools.

IV. Administration of Tests:

The testswhich were pre-tested and finalised by the investigator were sent to the Headmasters of the selected schools. The time limit was two hours for all the tests. Instructions were given to the Headmasters regarding the conduct of the tests. The tests were administered before the commencement (pre-test) of the programme (Figure 23a). The answer sheets were sent to the investigator.

v. Scoring Procedure:

a) Knowledge test:

One point was awarded for every correct response and no points were given for incorrect response. The maximum score was 30.

b) Practice Checklists:

One mark was given to every desirable practice which the students follows and no mark was given for the undesirable practice. The maximum score was 15 for nutritional practice and 25 for sanitary practices and 30 for the health practices.

FIG.23a NUTRITION/HEALTH EDN. TEST

c) Problem solving ability:

3 points were given only if the corrct choice and reasons were mentioned. The maximum score was 15. The answer sheets were collected and scoring was done by the investigator.

d) Questionnaire for the parents:

Parents of the children received nutrition education were interviewed to find out the changes they have observed in the food habits of their children, their children's interest in eating nutritious foods and their participation in food preparing activities (Annexure XII).

e.Evaluation of parents Nutrition education:

A checklist containing 10 items were prepared to find out the practices of mothers who were contacted through a community contact programme. The investigator selected a few households at random in each district and administered it before the commencement and 6 months after the programme.

Data source:

The written tests, filled in checklists, heights and weights recorded over a period of 6 months by their teachers, response from the questionnaire and interview schedule were the source of data.

f.Statistical Analysis:

To isolate the effects of pre-test per se, and interaction between them, analysis of variance and analysis of co-variance was performed as outlined by Comphell and Stanley.

CHAPTER IV

RESULTS AND DISCUSSION

The results of the study "Evaluation of the impact of the Selected Intervention Programmes in Tamil Nadu" is discussed under the following heads:

I. Anthropometric measurements

II. The clinical picture of the children

III. Improvement in enrolment and average attendance

IV. Improvement in the academic achievement

V. Gain in nutrition, health and environmental sanitation knowledge of the children

VI. Improvement in problem solving ability of the children

VII. Mothers' nutrition knowledge and practice

VIII. Correlation Study:

1. Mothers' nutritional practice vs children's practice (Nutrition, health and environmental sanitation put together)
2. Mothers' nutritional practice vs Children's knowledge scores
3. Mothers' nutritional practice vs Children's problem solving and decision making ability
4. Children's problem solving ability and their

knowledge in nutrition, health and environmental sanitation

5. Children's problem solving ability and their nutritional practice

6. Children's knowledge vs practice

I. Anthropometric Measurements:

Anthropometric measures provide some of the most relevant indicators in monitoring the magnitude and distribution of malnutrition over a time. Such a flow of information provides the basic elements for policy decisions and programme planning by various disciplines and sectors. Further, the use of measurement becomes important when dealing with children who do not show clinical signs of malnutrition but who are suspected of being malnourished (Dean, 1965).

Table III to VI present the mean final height and weight of children participating in the two selected intervention programmes in comparison with those of All India and Tamil Nadu figures.

The mean heights and weights of the boys and girls participating are higher than the values obtained on All India and Tamil Nadu basis in both the interventions.

Among the districts the mean heights and weights of the children in the experimental group are higher than that of their counterparts who neither received nutrition education nor any supplementary feeding. These findings prove that the mean heights and weights of children participating in the nutritious meals is far better than the nutritional status, of the non-participants. This finding is in total agreement with

TABLE III

FINAL HEIGHTS (CMS) OF THE CHILDREN IN COMPARISON WITH THOSE OF ALL INDIA,TAMILNADU BASIS
(INTERVENTION A CMNMP)

S.No.	Area/Age in Years	5		6+		7+		8+		9+	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1.	Coimbatore - Rural	113.13	112.63	117.3	116.83	120.94	122.97	122.89	121.50	131.39	127.42
2.	Coimbatore - Urban	112.15	108.70	114.50	110.85	115.35	118.50	124.45	120.30	129.35	124.45
3.	Nilgiris	111.51	105.87	111.80	110.93	116.69	111.45	126.24	126.23	128.05	126.56
	All India		101.41	108.50	107.40	113.90	112.80	119.30	118.20	123.70	122.90
	Tamil Nadu	103.40	105.20	105.90	108.20	109.50	112.30	116.30	120.40	121.40	121.70

TABLE IV

FINAL WEIGHTS (KG) OF THE CHILDREN IN COMPARISON WITH THOSE OF ALL INDIA AND TAMILNADU BASIS
(INTERVENTION A CMNMP)

S.No.	Area	Age in Years 5+		6+		7+		8+		9+	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1.	Coimbatore - Rural	18.45	18.32	20.54	19.98	22.14	21.02	21.00	23.18	23.10	22.89
2.	Coimbatore - Urban	18.35	18.75	19.86	18.85	21.23	21.25	22.45	24.53	24.60	23.85
3.	Nilgiris	19.14	18.69	19.50	19.00	19.9	21.38	24.70	25.00	25.84	25.04
	All India		14.50	16.3	16.00	18.0	17.60	19.70	19.40	21.5	21.30
	Tamil Nadu	15.4	14.1	16.5	15.60	17.4	17.90	19.7	19.10	21.9	20.30

TABLE V

MEAN FINAL HEIGHTS (Cms) OF THE CHILDREN 9+ IN COMPARISON WITH THOSE OF ALL INDIA AND TAMILNADU BASIS

(INTERVENTION B NHEES)

S.No.	District	Control Group		Experimental Group	
		Male	Female	Male	Female
		No.15	No.25		
1.	Dharmapuri	123.50	124.00	124.68 (n=140)	125.13 (N=134)
2.	Kanyakumari	124.00	124.50	124.75 (N=136)	125.54 (N=119)
3.	Nilgiris	123.75	124.30	124.06 (N=144)	125.47 (N=103)
4.	Ramanathapuram	122.90	123.50	123.85 (N=132)	124.95 (N=128)
5.	Coimbatore	124.75	123.90	125.15 (N=144)	124.29 (N=107)
6.	North Arcot	122.90	123.85	123.87 (N=133)	124.34 (N=139)
	TamilNadu	121.40	122.90	121.40	121.70
	All India	123.70	121.70	123.70	122.90

TABLE VI

MEAN FINAL WEIGHTS (Kg) OF THE CHILDREN 9+ IN COMPARISON WITH THOSE OF ALL INDIA AND TAMILNADU BASIS
(INTERVENTION B NHESS)

S.No.	District	Control Group		Experimental Group	
		Male	Female	Male	Female
1.	Dharmapuri	20.50	21.35	21.70	22.10
2.	Kanyakumari	21.30	22.75	21.71	23.43
3.	Nilgiris	20.04	20.85	22.04	21.97
4.	Ramanathapuram	21.52	20.92	22.15	22.43
5.	Coimbatore	21.28	21.95	22.55	22.66
6.	North Arcot	21.54	21.85	22.71	22.52
	All India	21.50	21.30	21.50	21.30
	Tamilnadu	21.90	20.30	21.90	21.90

the findings of Devadas, Radha Ruckmani (1964), Devadas et al., (1964), Devadas and Usha (1964), Easwaran (1970), and Devadas et al., (1975).

Analysis of Variance:

Analysis of variance for mean increase in heights for the children participating in the interventions A and B are given in Tables VII to IX

a. Coimbatore Rural Area:

The mean gain in height is more for boys than the girls. The age group 6+ gained more height among both the boys and girls than any other groups. The least gain is recorded among the 8+ age group.

Among girls the age groups 5,6, and 8 years gained equally but more than other two groups. Among the age group 7+ the boys gained significantly more than the girls. In other age groups sex difference is not significant regarding the gain in height.

b. Coimbatore Urban:

The increment obtained in height by the age groups of 5+, 7+ and 9+ are significantly more than that of 8+ age group. The difference among the sex is not statistically significant.

c. Nilgiris:

The increment in height obtained by the 9+ age group of boys is significantly more than the other age group. The increase in height recorded by 5+,6+, and 7+ both among boys and girls are alike. The difference among age and sex are statistically significant.

d. Comparison of mean increase in heights:

Coimbatore urban area recorded the highest increase in height among all the age groups ,both in boys and girls. The maximum was noted in the 7+ for boys with a mean increase of 4.492 cm. The least increment was found among the boys belonging to 8+ age group in the Nilgiris District.

From the tables it is clear that among the groups, the experimental group which received an organised nutrition education along with CMNMP gained significantly more than the control group which had neither nutrition education nor CMNMP.

With regard to sex, boys gained more than the girls. Kanyakumari district recorded more gain in height followed by Dharmapuri, North Arcot, and Nilgiris. The increase in height in Ramanathapuram and Coimbatore was alike, being the least. The difference between the sexes and groups was not significant.

Among the control group the district Dharmapuri gained more than the other districts whereas all other districts were alike in the gain.

The districts Kanyakumari and Dharmapuri had gained significantly more than other districts in both sexes. Among boys Ramanathapuram gained least and among girls, Coimbatore secured the least gain.

In the Nilgiris district, girls gained more than boys while in Coimbatore and North Arcot districts, boys gained significantly more height than girls. In other districts, the gain by both sexes was not statistically significant.

TABLE VII

ANALYSIS OF VARIANCE FOR INCREASE IN HEIGHTS FOR THE THREE AREAS IN INTERVENTION A

Source	Coimbatore Rural				Coimbatore Urban				Nilgiris			
	DF	SS	MS	F	DF	SS	MS	F	DF	SS	MS	F
Sex	1	2.78	2.78	5.56**	1	1.3455	1.3455	2.94NS	1	53.836	53.836	17.39**
Group	4	702.25	175.56	351.12**	4	6.3589	1.5898	3.43**	4	558.166	139.542	45.08**
Interaction	4	37.17	9.29	18.58**	4	2.4340	0.6085	1.33NS	4	230.835	57.709	18.65**
Error	1647	826.37	0.50		914	418.3711	0.4577		1588	4914.684	3.095	

** Significant at P > 0.01 level

	Coimbatore Rural		Coimbatore Urban		Nilgiris	
	SED	CD	SED	CD	SED	CD
Sex	0.035	0.07	0.0446	0.087	0.088	0.17
Age Group	0.055	0.11	0.0715	0.140	0.140	0.27
Interaction	0.078	0.15	0.1014	0.199	0.198	0.39

MEAN INCREASE IN HEIGHTS

Areas	Age/Sex										Mean	
	Boys 9+	Girls	Boys 8+	Girls	Boys 7+	Girls	Boys 6+	Girls	Boys 5+	Girls	Boys	Girls
Coimbatore Rural	3.49	3.44	2.18	2.19	2.64	2.05	3.54	3.90	3.42	3.39	3.04	2.95
Coimbatore Urban	4.415	4.405	4.339	4.082	4.492	4.369	4.299	4.335	4.457	4.439	4.403	4.327
Nilgiris	4.88	3.04	2.79	3.04	2.29	2.51	2.47	2.45	2.69	2.34	3.06	2.69

TABLE VIII

ANALYSIS OF VARIANCE (FOR GAIN IN HEIGHT) (INTERVENTION B)

Source	CF	DF	SS	MS	'F'
Group	2889.5822	1	255.0724	255.0724	1325.09**
Sex	3144.5645	1	0.9823	0.9823	5.103**
Districts	3114.0115	5	224.4293	44.8859	233.18**
G x S	3145.6438	1	0.0069	0.0069	1NS
G x D	3390.5419	5	21.4580	4.2916	22.29**
S x D	3156.0761	5	41.0823	8.2165	42.68**
G x S x D	3448.4015	5	15.7881	3.1576	16.40**
Error		1858	353.2285	0.1925	

** Significant at P > 0.01 level NS. = Not significant

	SED	CD
Group	0.0277	0.054
Sex	0.0204	0.040
District	0.0352	0.069
Group x Sex		
Male Vs Female at Control	0.0507	0.099
Male Vs Female at Experimental	0.0223	0.044
Control Vs Experimental	0.0389	0.076
Control Vs Experimental	0.0393	0.077
Group x District		
Control Vs Experimental at Districts	0.0678	0.133
Districts - Control	0.0877	0.172
Districts Experimental	0.0386	0.076
Sex and Districts	0.050	0.098

TABLE IX

MEAN TABLE FOR GAIN IN HEIGHT

District	Group:	Control			Experimental			Mean		
	Sex:	Male	Female	Mean	Male	Female	Mean	Male	Female	Mean
Dharmapuri (D_1)		0.900	0.584	0.752	1.736	1.847	1.790	1.609	1.648	1.628
Kanyakumari (D_2)		0.512	0.348	0.430	2.007	2.050	2.027	1.775	1.755	1.766
Nilgiris (D_3)		0.344	0.248	0.296	1.017	1.617	1.267	0.918	1.349	1.104
Ramanathapuram(D_4)		0.268	0.312	0.290	0.894	0.988	0.940	0.794	0.878	0.835
Coimbatore(D_5)		0.332	0.348	0.340	1.201	0.752	1.010	1.073	0.676	0.899
North Arcot (D_6)		0.320	0.312	0.316	1.665	1.129	1.392	1.453	1.005	1.225
Mean		0.446	0.359	0.402	1.417	1.400	1.409	1.269	1.223	

Mean Gain in Weight:

a. Coimbatore Rural:

The mean weight gain of all the age groups for boys was 2.374, 2.644 and 2.790 kg in Coimbatore rural, Coimbatore urban and Nilgiris district respectively. Among the boys in Coimbatore rural area, the maximum weight gain was 2.467 kg registered by the 6+ age group. Among the girls, the 7+ age group showed an increase of 2.360 kg. The least was 2.285 kg in the age group 9+. The difference between the sex and age groups was statistically significant.

b. Coimbatore Urban:

The weight gain among the 9+ age group, was the least, at 2.000 kg and 2.004 kg for boys and girls respectively. Both boys and girls in 5+ age group gained the maximum, 3.302 kg and 3.563 kg respectively. However, the difference between the sex and age groups was not statistically different.

c. Nilgiris:

In Nilgiris, maximum increase was recorded by boys and girls in the age group 9+, being 2.790 kg, and 2.770 kg respectively. The difference between the groups was statistically significant.

Table X to XII gives the analysis of variance for increase in weights for the children participating in interventions A and B.

The weight gain of the experimental group was higher than that of the control group. The difference in gain in weight between the boys and girls was not significant. Among the districts Dharmapuri, Coimbatore,

TABLE X

ANALYSIS OF VARIANCE FOR GAIN IN WEIGHTS FOR THE THREE AREAS

Source	Coimbatore Rural				Coimbatore Urban				Nilgiris			
	DF	SS	MS	F	DF	SS	MS	F	DF	SS	MS	F
Sex	1	2.5453	2.5353	9.69**	1	0.7870	0.7870	1.674NS	1	0.226	0.226	1.35NS
Group	4	569.6289	142.4072	542.50**	4	4.1674	1.0419	2.216NS	4	7073.203	268.301	91.07**
Interaction	4	23.0239	5.7560	21.93**	4	2.4311	0.6078	1.293NS	4	19.798	4.950	1.68NS
Error	1647	432.2669	0.2625		914	429.7920	0.4702		1588	4678.020	2.946	

** - Significant at P > 0.01 level NS = Not significant

	Coimbatore Rural		Coimbatore Urban		Nilgiris	
	SED	CD	SED	CD	SED	CD
Sex	0.0452	0.089	0.0253	0.050	0.086	0.17
Age Group	0.725	0.142	0.0398	0.078	0.136	0.27
Interaction	0.1028	0.201	0.0563	0.110	0.193	0.38

MEAN INCREASE IN WEIGHT

Area	Age in Years 9+		8+		7+		6+		5+		Mean	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Coimbatore Rural	2.175	2.285	2.414	2.285	2.424	2.360	2.467	2.308	2.433	2.318	2.374	2.315
Coimbatore Urban	2.000	2.004	2.225	2.227	2.485	2.115	3.170	3.482	3.302	3.563	2.644	2.722
Nilgiris	4.31	4.57	2.03	2.70	2.68	2.42	2.34	2.26	2.41	2.02	2.79	2.77

TABLE XI

ANALYSIS OF VARIANCE(OF GAIN IN WEIGHT)

Source	(F=1672.906)	DF	SS	MS	'F'
Group	1804.5496	1	131.6436	131.6436	2072.24
Sex	1672.9664	1	0.0604	0.0604	1 NS
District	1734.0795	5	61.1735	12.2347	192.59**
G x S	1804.6518	1	0.0418	0.0418	1 NS
G x D	1873.7893	5	8.0662	1.6132	25.39**
S x D	1735.4219	5	1.2820	0.2560	4.04**
G x S x D	1875.6176	5	0.441	0.0888	1.4ONS
Error		1835	116.5724	0.0635	

** Significant at P > 0.01 level
NS Not significant

TABLE XII

MEAN GAIN IN WEIGHT

Group	Control			Experimental			Mean		
Sex / District	Male	Female	Mean	Male	Female	Mean	Male	Female	Mean
D_1	0.572	0.540	0.556	1.159	1.245	1.201	1.070	1.134	1.101
D_2	0.316	0.324	0.320	1.185	1.134	1.161	1.050	0.993	1.023
D_3	0.240	0.240	0.240	0.844	0.857	0.850	0.755	0.737	0.747
D_4	0.296	0.336	0.316	0.694	0.719	0.706	0.631	0.656	0.643
D_5	0.320	0.296	0.308	1.208	1.236	1.220	1.077	1.058	1.069
D_6	0.292	0.332	0.312	1.297	1.176	1.235	1.138	1.048	1.092
Mean	0.339	0.345	0.342	1.065	1.065	1.065	0.954	0.943	

	Source	SED	CD
	Group	0.0159	0.031
	Sex	0.0117	0.023
	Districts	0.0202	0.040
Group x Sex	Male Vs Female control	0.0291	0.057
	Male Vs Female Experimental	0.0128	0.025
	Control Vs Experimental Male	0.0224	0.044
	Control Vs Experimental Female	0.0226	0.044
Group x District	Control Vs Experimental District	0.0389	0.076
	Districts Control	0.0504	0.099
	Districts Experimental	0.0221	0.043
Sex x District		0.0287	0.056

TABLE XIII

COMPARISON OF GAIN IN HEIGHTS AND WEIGHTS BY THE 9+ AGE GROUP IN INTERVENTION A AND B

Intervention		Mean Increase			
		Height (Cm)		Weight (Kg)	
		Boys	Girls	Boys	Girls
Intervention	A	4.261	3.628	2.825	2.953
Intervention	B	1.417	1.4000	1.065	1.065
Control		0.446	0.359	0.339	0.345

and North Arcot showed gains alike, and the gains were more than in other districts. The least gain was noted in Ramanthapuram.

Boys from North Arcot district gained significantly more weight than those from other districts and girls, from Dharmapuri showed the highest gain considering both the sexes. Children from Nilgiris and Ramanathapuram showed the least gain. In other districts, the differences in weight gain between the sexes were alike and not statistically significant.

Table XIII presents the comparison of gain in height and weight by the 9+ age group in interventions A and B.

The mean increase in heights and weights was greater among the subjects of Intervention A. The gain was least among the control group in both the sexes. Although children in Intervention B had received organised nutrition education along with the Chief Minister's Nutritious Meal Programme, they did not record as much increase in height and weight, as children in Intervention A, who had received the nutritious meal with informal nutrition education. The reason could be attributed to the economic deprivations combined with other factors. For instance, in the Nilgiris district, the impact of Intervention B was assessed in a Tribal belt where the tribes survived only on subsistence cultivation and the forest products. The income was very low even to provide one meal per day. Similarly North Arcot and Ramanthapuram are most backward areas. They are also declared as drought prone areas. Besides these deprivations, there is an acute shortage of water, which results in repeated episodes of infection which counter act the effects of the supplementary feeding programme.

As Mahler (1984) points, out of many factors that affect growth and development of children, drought, inflation, conflicts, level of food production, food availability, wage levels of low income groups, the prevailing cultural patterns, storage and distribution problems, lack of general education and lack of communication systems are important. Hence, for a lasting impact of educational or supplementary feeding programmes, they must be linked with other developmental programmes to alleviate poverty. This gives the warning that unless educational programmes are linked with developmental programmes to alleviate poverty, no lasting impact can be achieved through educational or supplementary programmes.

Nutritional Status:

The data on body weight and height of the children were classified both qualitatively and quantitatively to assess the pattern of malnutrition and the magnitude and severity of the problem. The standards given by Indian Council for Medical Research for children were used for comparison. Table XIV gives the age-wise classification of children by the weight-for-age Index.

In the weight-for-age index 57.23 percent and 53.78 percent of boys and girls (all age group combined) were in the third degree of malnutrition. Only 4.50 and 4.18 percent boys and girls respectively belong to the normal group. The deficit increased with increasing age.

In terms of the height-for-age index the deficit was less than that in the case of weight-for-age. With an increase in age, the deficit also increased. Children with mild and moderate forms of retardation ranged from 5 to 10 percent, and 7.5 and 3.9 for boys and girls respectively.

TABLE XIV

AGE WISE CLASSIFICATION OF CHILDREN BY WEIGHT FOR AGE INDEX

(All Districts Combined)

Children		Weight - for - age (per cent of Standard)			
Degree of malnutrition					
Age/Sex	No	Normal	I	II	III
5+ Years Male	392	28 (7.14)	53 (13.52)	99 (25.25)	212 (54.07)
Female	380	18 (4.73)	54 (14.21)	114 (30.00)	194 (51.04)
6+ Years Male	408	15 (3.68)	45 (11.02)	128 (31.37)	220 (53.91)
Female	411	17 (4.14)	65 (15.80)	145 (35.27)	184 (44.76)
7+ Years Male	457	17 (3.71)	45 (9.85)	129 (28.22)	266 (58.20)
Female	437	16 (3.66)	60 (13.72)	122 (27.91)	239 (54.68)
8+ Years Male	492	23 (4.67)	60 (12.19)	125 (25.40)	284 (57.72)
Female	431	20 (4.64)	45 (10.44)	107 (24.82)	259 (60.09)
9+ Years Male	424	14 (3.30)	30 (7.07)	116 (27.35)	264 (62.25)
Female	346	13 (3.75)	38 (10.98)	93 (26.87)	202 (58.37)

Growth of 17 percent of children (all ages and both sexes combined) was severely retarded as their height-for-age was less than 85 percent of the standard.

Table XV presents the age-wise classification of children, by the height-for-age index.

Height-for-age provides a picture of the past nutritional history, the extent of height deficit relative to age is a measure of duration of malnutrition (PAG Bulletin, 1976). For assessment of current nutritional status, the weight-for-height has been suggested (Beaton and Bengoa, 1976). The weight in relation to height is computed by comparing the weight of the child with the height of a reference group of the same height rather than that of age. Interestingly enough, this study showed that unlike the weight and height in relation to age, the weight-for-height index showed an increase with increase in age, according to the classification suggested by ICMR. 4.2 percent of children were normal. Nearly one-half of the children could be described as normal and marginal.

Table XVI, XVII and figure 24 give the age-wise classification of children by combined weight-for-height and height-for-age indices.

An age-wise analysis of clasification of children in the four categories was indicative of retardation in height with advancement of age. The group of children classified as normal and marginal decreased from 60.5 percent at 5 years of age to 43.5 percent at 9 years of age. The number of children with"stunted" height increased significantly over the years although their weight was proportionate to their height. The category with 25 percent "wasted" at 5 years of age was reduced to 11 percent at 9 years of age. However, the data suggested a high probability of

TABLE XV

AGEWISE CLASSIFICATION OF CHILDREN BY HEIGHT FOR AGE INDEX

(All Districts Combined)

Children		Height-for-age			
Degree of Stunting/ Retardation		Per cent of Standard			
Age/Sex	No.	Normal	I	II	III
5+ Years Male	392	51 (13.01)	123 (31.37)	184 (46.43)	34 (8.67)
Female	380	24 (6.31)	70 (18.42)	151 (39.73)	135 (35.52)
6+ Years Male	408	45 (11.03)	187 (45.83)	132 (32.35)	44 (10.73)
Female	411	12 (2.91)	118 (28.71)	173 (42.09)	108 (26.29)
7+ Years Male	457	10 (2.18)	248 (54.26)	125 (27.35)	73 (16.21)
Female	437	21 (4.80)	92 (21.05)	211 (48.28)	113 (25.85)
8+ Years Male	492	15 (3.05)	229 (46.54)	149 (30.28)	99 (20.12)
Female	431	12 (2.78)	97 (22.50)	198 (45.93)	124 (28.79)
9+ Years Male	424	35 (8.23)	227 (53.54)	99 (23.342)	63 (12.50)
Female	346	10 (2.8)	105 (30.34)	182 (52.60)	49 (14.16).

TABLE XVI

AGEWISE CLASSIFICATION OF CHILDREN BY WEIGHT FOR HEIGHT INDEX

(All Districts Combined)

Children Degree of Wasting	No	Weight-for-Height (Per cent of Standard) Normal	I	II	III
5+ Years Male	392	43 (10.96)	179 (45.66)	142 (36.22)	28 (7.13)
Female	380	60 (15.78)	186 (48.94)	112 (29.47)	22 (5.78)
6+ Years Male	408	52 (12.74)	164 (40.19)	154 (37.74)	38 (9.31)
Female	411	70 (17.03)	190 (46.22)	123 (29.92)	28 (6.80)
7+ Years Male	457	68 (14.87)	203 (44.42)	146 (31.94)	40 (8.75)
Female	437	84 (19.22)	209 (47.82)	113 (25.85)	31 (7.08)
8+ Years Male	492	65 (13.21)	185 (37.60)	181 (36.78)	61 (12.39)
Female	431	99 (22.96)	208 (48.25)	101 (23.43)	23 (5.33)
9+ Years Male	424	78 (18.39)	187 (44.10)	123 (29.00)	36 (8.49)
Female	346	68 (19.65)	178 (51.44)	86 (24.85)	14 (4.03)

TABLE XVII

AGEWISE CLASSIFICATION OF CHILDREN BY COMBINED WEIGHT FOR HEIGHT AND HEIGHT FOR AGE INDICES

Age/Sex	Normal and Marginal %	Stunted %	Wasted %	Wasted and Stunted %
5 + Years				
Male	58	15	25	2
Female	63	10	27	0
6 + Years				
Male	62	18	15	5
Female	58	12	28	2
7 + Years				
Male	57	19	18	6
Female	59	20	19	2
8 + Years				
Male	54	26	14	6
Female	55	22	19	4
9 + Years				
Male	39	34	10	17
Female	48	29	12	11

AGE-WISE CLASSIFICATION OF CHILDREN BY COMBINED WEIGHT-FOR-HEIGHT AND HEIGHT-FOR-AGE INDICES

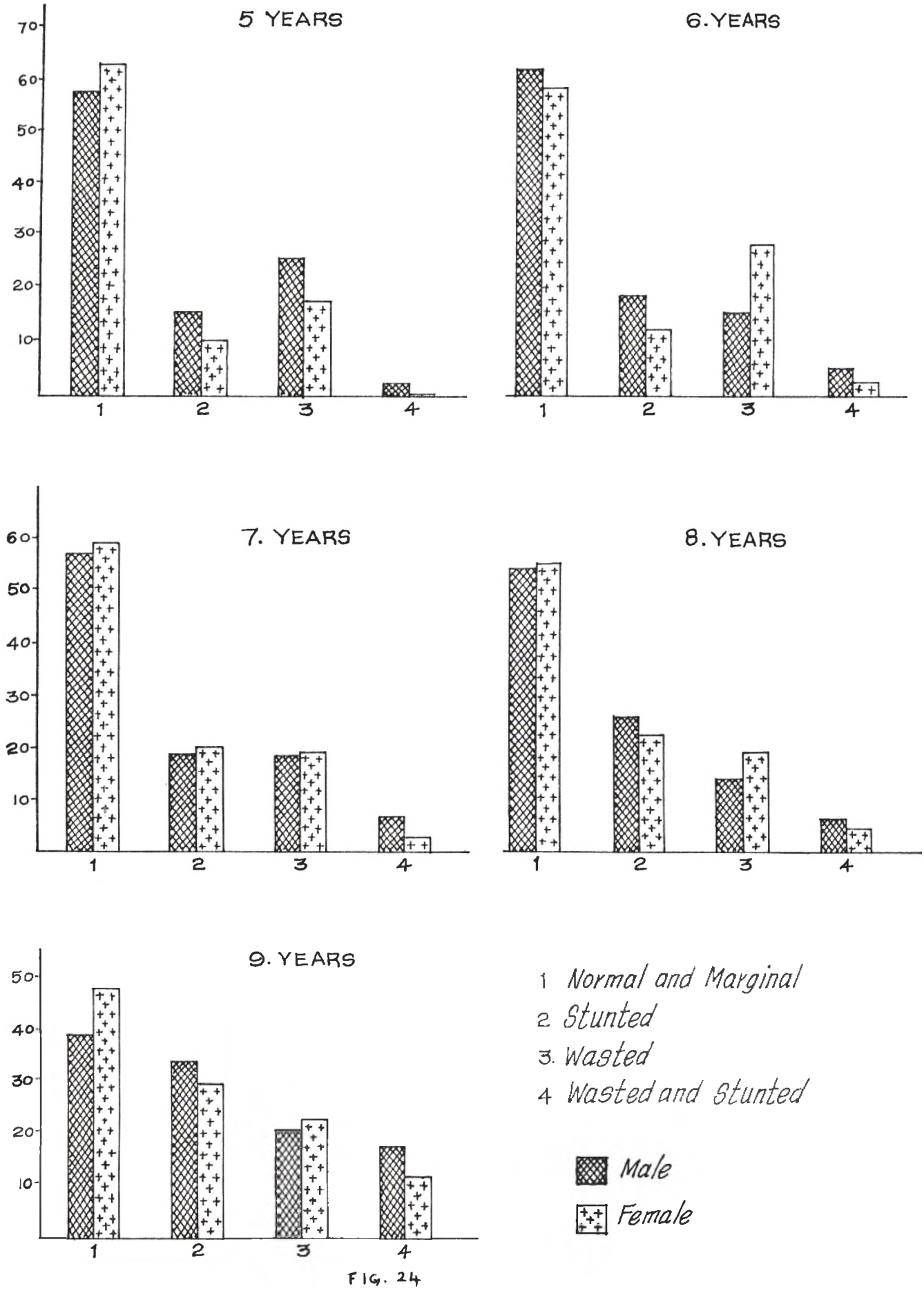


FIG. 24

regression in height as the percentage of children in normal category had not increased over the years. What is more, the number of children grouped as "wasted and stunted" had increased 14 times. Evidently, with the advancement of age, the number of children with improved nutritional status had increased but a majority were not tall. As a result, they fall short of the standard, although they were certainly not under-weight as their weight was commensurate with their height.

Comparison of the Nutritional Status of Children Participating in the Different Interventions:

An attempt was made to compare the nutritional status of the children belonging to the age group of 9+ to find out the impact of specific intervention on the nutritional status. In Intervention A, children received only the supplementary feeding with little or no nutrition education. In Intervention B, children received supplementary feeding with an organised nutrition and health education. Table XVIII to XX and figures 25-27 bring out the nutritional status of children according to 3 indices weight-for-age, height-for-age and weight-for-height.

Among the boys the percentage of normal children according to the index weight-for-age was found to be 10.37 and 10.25 percent respectively for Interventions A and B. The difference was not significant. However, among the severely malnourished group the boys occupied 49.55 percent and 42.22 percent respectively for Interventions A and B.

In the index height-for-age, the percentage of normal children were 21.23 and 21.59 for interventions A and B respectively. 29.09 and 23.45

percent of children fall under severely stunted in intervention A and B respectively.

In the index weight-for-height, 16.04 and 29.43 percent of children were in the normal group and 7.31 and 14.11 percent fall under the severely wasted group in the Interventions A and B respectively. Among the girls in the weight-for-age index 9.24 percent and 7.33 percent of children fall under normal group. 40.75 and 48.27 percent of children constituted the severely malnourished in the Interventions A and B respectively.

With the Index height-for-age 9.24 and 33.05 percent of children were found to be normal, and 15.60 and 13.80 percent of children were found to be severely retarded in the two interventions A and B respectively.

When the weight-for-height index was considered 13.54 and 27.66 percent of children constituted the normal group and 10.94 and 19.80 in the sevrely wasted group among the Interventions A and B respectively.

Children in the Intervention B has a better nutritional status than the children in Intervention A as shown by the indicators height-for- age and weight-for-height. However, with the index, weight-for-age, the picture was not very encouraging. Children in the intervention A appeared to be better than the other group. Weight-for-age is an indicator of current nutritional status. This has an important implication. In the context of Indian culture, the child has a very limited opportunity to relate his nutrition knowledge to eating behaviour, as he cannot select his own diet, but accept the food offered by the mothers. The findings of Emmons (1973) and Ramos (1975) that if good returns are expected from

TABLE XVIII

CLASSIFICATION OF CHILDREN BY WEIGHT FOR AGE INDEX

(9+ YEARS)

Type of Interventions		Weight - for - age (Per cent of Standard)							
		Normal		I		II		III	
		Male	Female	Male	Female	Male	Female	Male	Female
A. Nutritious meal without Nutrition education									
Male No.	424	44	32	64	67	116	83	200	165
Female	347	(10.37)	(9.24)	(12.73)	(26.09)	(27.35)	(23.92)	(49.55)	(40.75)
B. Nutritious meal with nutrition education									
Male	829	85	53	125	172	269	150	350	348
Female	723	(10.25)	(7.33)	(15.70)	(23.64)	(32.00)	(20.76)	42.22)	(48.27)

TABLE XIX

CLASSIFICATION OF CHILDREN BY HEIGHT FOR AGE INDEX (9+ YEARS)

S.No.	Type of Interventions		Height-for-age (Per cent of Standard) Normal		I		II		III	
			Male	Female	Male	Female	Male	Female	Male	Female
A.	Noonmeal Without Nutrition Education									
	Male	424	90	32	113	78	97	183	123	54
	Female	347	(21.23)	(9.24)	(26.73)	(22.27)	(22.87)	(52.89)	(29.09)	(15.60)
B.	Noonmeal With Nutrition Education									
	Male	829	179	239	246	208	201	168	203	100
	Female	723	(21.59)	(33.05)	(29.67)	(29.92)	(23.21)	(23.23)	(23.45)	(13.80)

CLASSIFICATION OF CHILDREN BY WEIGHT-FOR-AGE INDEX (9 YEARS)

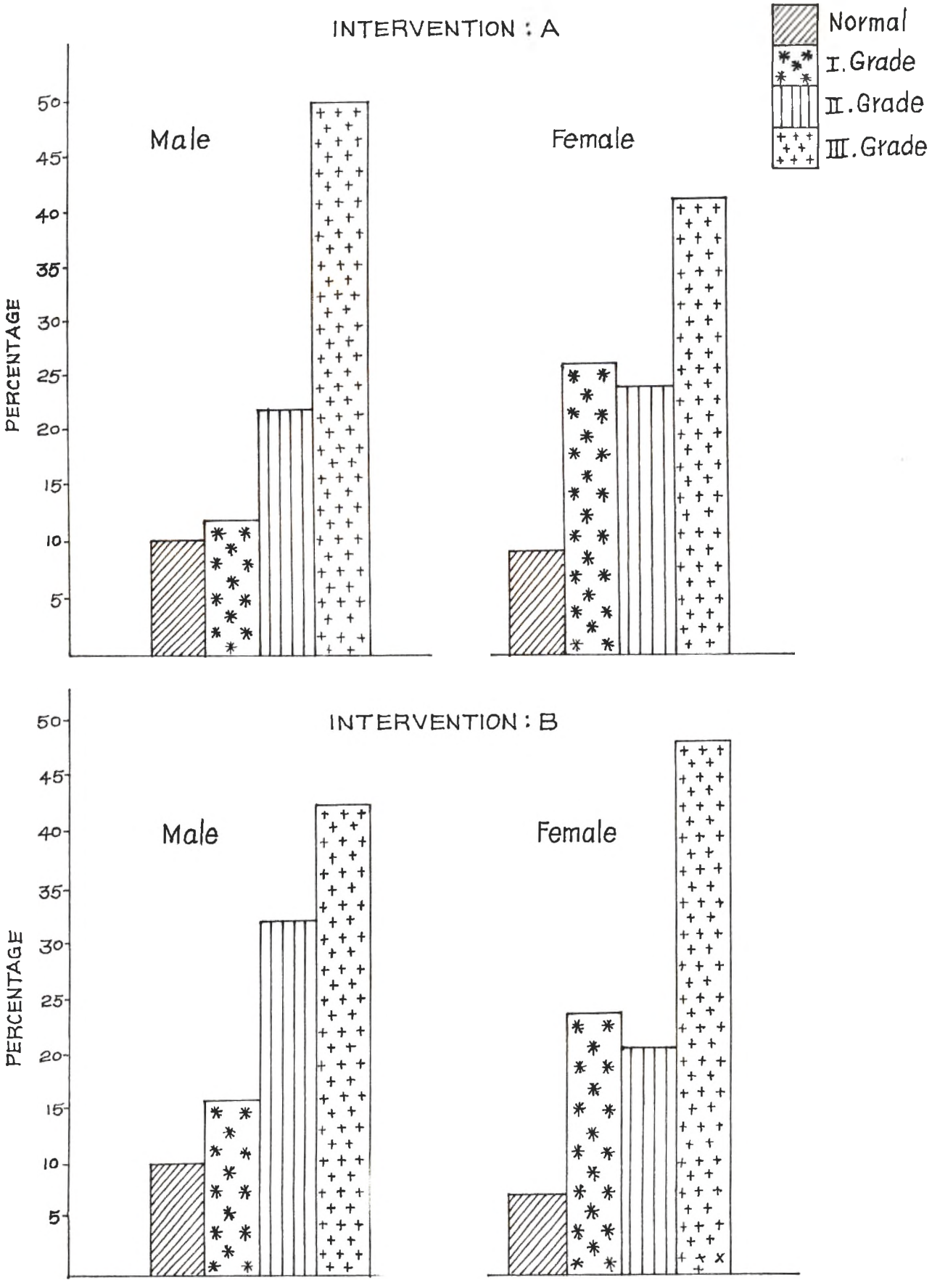


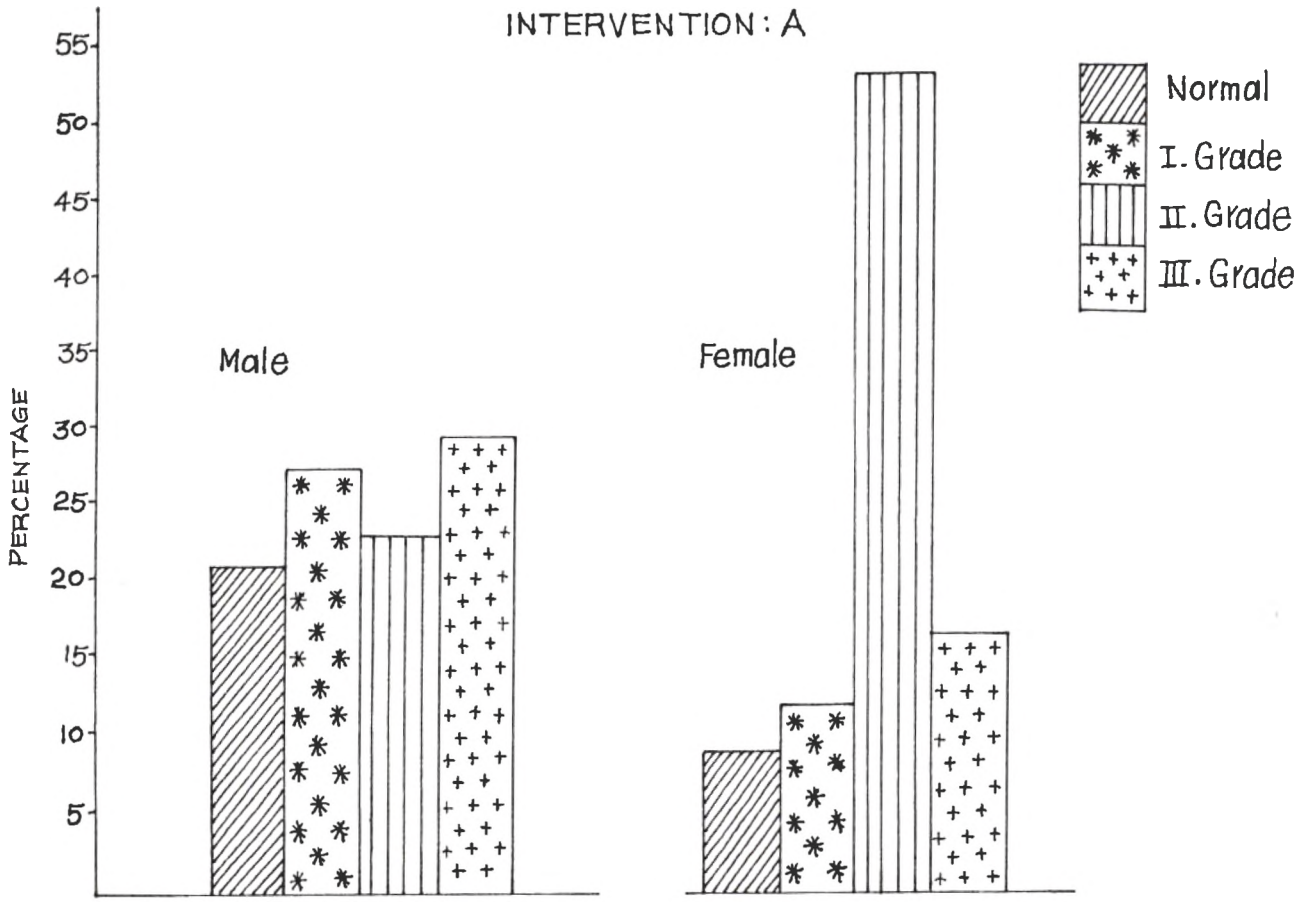
Fig. 25

TABLE XX

CLASSIFICATION OF CHILDREN BY WEIGHT FOR HEIGHT INDEX (9 +Years)

S.No.	Type of Interventions		Weight-for-height (Per cent of Standard)							
			Normal		I		II		III	
			Male	Female	Male	Female	Male	Female	Male	Female
A.	Noon Meal without Nutrition Education									
	Male	424	68	47	187	127	138	135	31	38
	Female	347	(16.04)	(13.54)	(44.10)	(36.59)	(32.54)	(38.90)	(7.31)	(10.94)
B.	Noon Meal with Nutrition Education									
	Male	829	244	200	319	279	149	106	117	138
	Female	723	(29.43)	(27.66)	(38.48)	(38.58)	(17.97)	(14.66)	(14.11)	(19.08)

CLASSIFICATION OF CHILDREN BY HEIGHT FOR-AGE INDEX (9 YEARS)



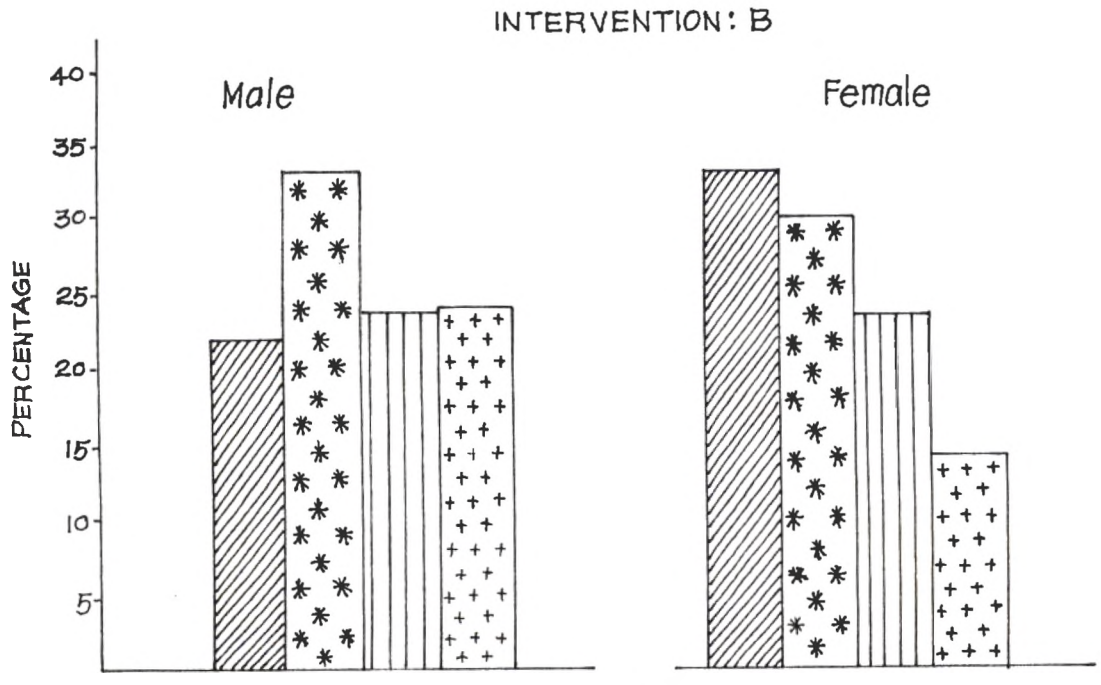


Fig. 26

CLASSIFICATION OF CHILDREN BY WEIGHT-FOR-HEIGHT INDEX (9 YEARS)

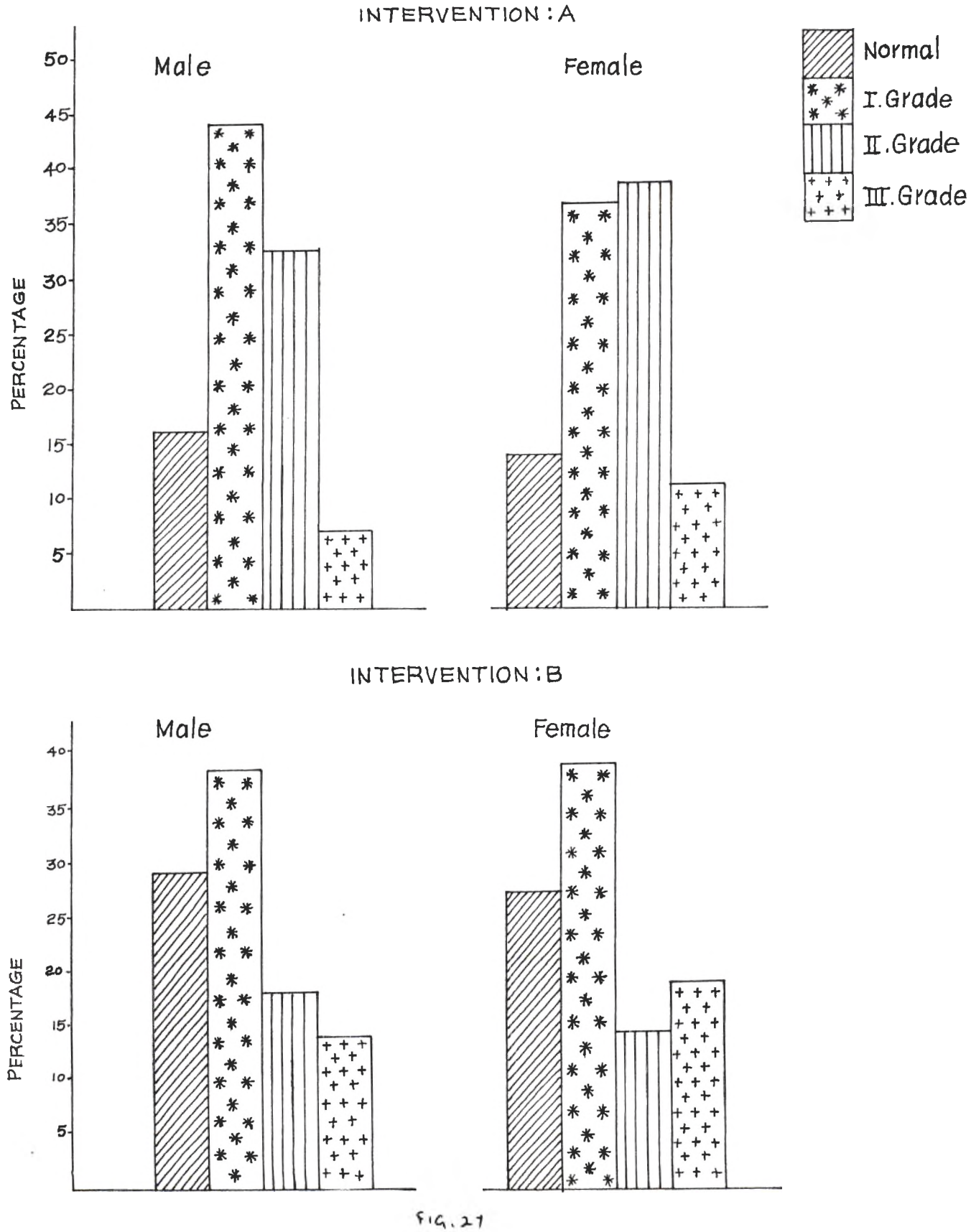


FIG. 21

the investments in education, mothers must form the target group of education, holds true for the Indian situation too.

II. Clinical Signs of Malnutrition:

Jelliffe (1966) suggested the use of clinical signs to assess the nutritional status of groups. According to present evidence, these signs indicate, with considerable probability, recent deficiency of one or more nutrients. The nature of the signs varies with the age of the individual, the duration and rate of infections, the environment, climatic conditions and to some extent, genetics.

The occurence of clinical signs of malnutrition observed is shown in table XXI and figure 28.

Fifty four percent among the girls and 65 percent among the boys had pale nails and 16 and 24 percent of girls and boys suffered from cracks in the nails. Both conditions are probably attributed to iron deficiency. It is also possible to speculate that infection may be associated with worm infection. Earlier studies conducted by UPASI (1980) revealed that nearly 60 percent of the tea plantation workers had hookworm infestation. Children in the study belonged to the plantation area with high prevalence of iron deficiency symptoms may be due to hookworm infestations.

Hair splitting at the ends, dry hair, angularstomatitis, ulcers in the tongue were found to be common among the children under study. One reason for such high occurence can also be attributed to the dry weather, very hot during the day the and cold spells in the night.

Generally, the South Indian diet is devoid of water soluble vitamins. The method of cooking, non-inclusion of green leafy vegetables in the

TABLE XXI

INITIAL AND FINAL CLINICAL PICTURE OF THE CHILDREN PARTICIPATION IN INTERVENTION A AND INTERVENTION B

Clinical Symptoms	Intervention A Per centage of children Manifesting		Intervention B Per centage of children Manifesting	
	Before	After	Before	After
Hair				
Split at the ends	8.45	6.35	10.53	0.53
Brown and falling hair	11.75	7.44	11.33	1.05
Dry hair	9.33	8.07	8.91	0.45
Eye				
Discharge in the eyes	3.50	0	8.85	0.75
Reddish eyes	5.43	1.50	6.00	2.15
Bitot spots	8.00	2.50	7.64	1.20
Dark rings around eyes	0.95	0.25	2.25	0
Mouth				
Angular Stomatitis	9.35	1.20	12.00	1.25
Cheilosis	5.28	0.63	7.00	0.15
Teeth				
Spongy and bleeding gums	1.80	0.30	2.05	0.05
Nose				
Sores at the nasolabial junction	3.25	0.75	4.10	0.25
Running nose	15.00	5.25	13.00	3.00
Tongue				
Fissures	12.39	2.50	3.75	0.25
Ulcers	8.25	1.50	7.35	0.85
Pale Tongue	8.75	2.75	10.00	1.75
Nails				
Crack in the nails	9.58	1.65	7.33	0.80
Pale nails	15.35	4.25	16.80	3.75
Brittle and easily breakable	9.35	2.15	12.15	1.65
Dots in the nails	8.68	2.20	9.38	2.15
Skin				
Dermatitis	0.80	0.15	0.35	0
Scabies	3.15	1.00	3.85	0
Dry Skin	6.00	0.85	7.30	1.35

INITIAL AND FINAL CLINICAL PICTURE OF THE CHILDREN PARTICIPATING IN INTERVENTION 'A' AND INTERVENTION 'B' (Percentages)

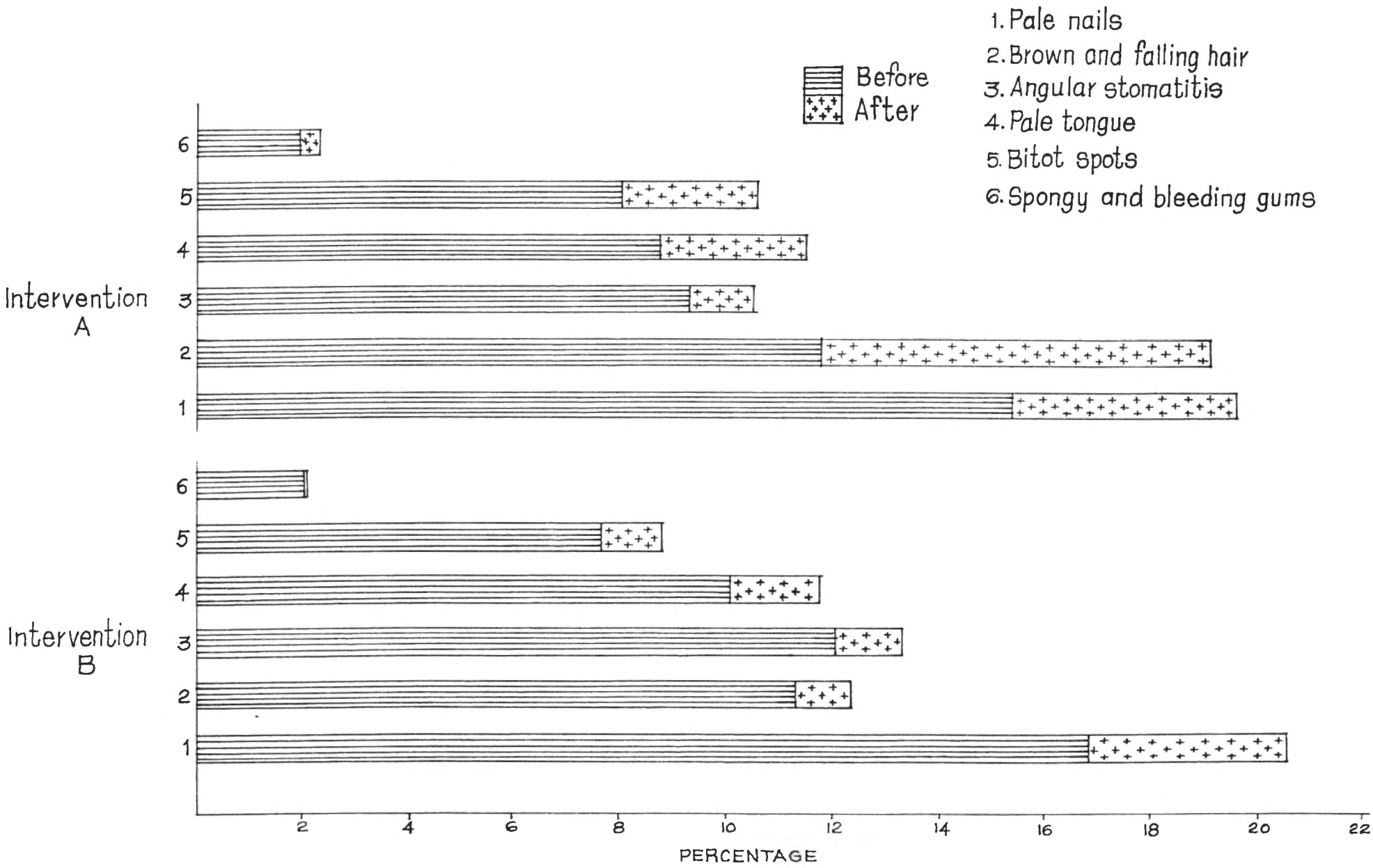


Fig. 28

daily diet, contributes to this state. This may be the cause of angularstomatitis, fissures and ulcers in the tongue.

At the end of the study, after six months, many of the deficiency symptoms like dry hair, mild anaemia, angularstomatitis and other symptoms were reduced to a greater extent.

An organised nutrition education programme is more effective in the reduction of deficiency symptoms. It is an evidence that children apply the knowledge in nutrition and health education to their eating habits and thus change their behaviour. Secondly, their knowledge about the deficiency symptoms and the measures to prevent them must have helped in a greater reduction in the occurrence of these symptoms, than through mere feeding as in Intervention A.

III. Enrolment and Attendance:

One of the objectives of the CMNMP is to improve the enrolment and increase the attendance of the school going children at the primary level. To measure the impact of this intervention based on this objective, a survey was undertaken to study the enrolment pattern and attendance from 100 schools situated in Coonoor and Kotagiri Taluks of the Nilgiris district. The data were collected for a period of four years, that is, two years before and two years after launching the CMNMP during the period 1980-1981 to 1984-1985.

Out of the 100 schools surveyed, 84 percent of the schools registered an increase in the percentage of enrolment during the three years after the introduction of CMNMP, compared to the percentage of enrolment in the pre-scheme period (i.e. before the introduction of CMNMP during the year 1981-1982).

Out of the 84 percent of schools which registered an increase in the percentage of enrolment, there were schools which had cent percent enrolment in certain years only, and in all the three years after the introduction of CMNMP.

Table XXII shows the percentage of schools with cent percent enrolment during the years 1982-1983, 1983-1984 and 1984-1985.

TABLE XXII

SCHOOLS WITH CENT PERCENT ENROLEMENT DURING THE YEARS 1982-1983 to 1984-1985

S.No.	Years of cent percent enrolement	Percentage of schools
1	1982 -1983	53
2	1983 -1984	50
3	1984 -1985	60

Fifty three schools in 1982-1983, 50 in 1983-1984 and 60 in 1984-1985 had cent percent enrolment.

Table XXIII shows the maintenance of cent percent enrolment during the period of study.

TABLE XXIII

MAINTENANCE OF CENT PERCENT EMROLEMENT FOR ONE YEAR, TWO YEARS AND ALL THREE YEARS

S.No.	Particulars	For any one year only	For any two years only	For all the three years
1	Number of schools which have cent percent enrolement after the introduction of the scheme	13	16	50

In the increasing trend of enrolment after the introduction of the CMNMP, out of the 100 schools surveyed, 13 schools had attained cent

percent enrolment for one year only, 16 for two years only, but 50 for the three years together.

In contrast, there were only 15 percent schools which had cent percent enrolment during the year 1980-1981, the year immediately preceding before the introduction of CMNMP.

There were 12 percent schools which had cent percent enrolment for all the five years under study, that is, two years before and three years after the introduction of CMNMP. These schools are situated in villages which are compact by nature, the school being centrally located and easily accessible to all the children whose residences are neither too far from, nor individually scattered outside the village.

Strangely and strikingly enough, there were 9 percent of schools which enjoyed an enthusiastic increasing trend in enrolment before the introduction of CMNMP, but deterioratingly decreased during the post-scheme period, that is 1982-1985. This calls for attention to conduct a separate survey to search the reasons for this unfortunate state of affairs.

Sixteen percent of schools presented fluctuations in their percentage of enrolment during the entire 5 year period of study.

Table XXIV brings out the average attendance of school children during the study period.

TABLE XXIV

INCREASE IN THE AVERAGE ATTENDANCE DURING THE YEARS 1980 - 1981 TO 1984 - 1985

S.No.	Particulars	Percentage
1	Schools with increased percentage of attendance during 1981-1982 compared to 1980 -1981	57
2	Schools with a continuous increse of average attendance during the first two years after the introduction of CMNMP (i.e.) 1981-'82 and 1982-'83	19
3	Schools with a continuous increase of average attendance during the years 1983-'84 and 1984-'85	13
4	Schools with a continuous increase in the average attendance for all the five years of study	2
5	Increase in the average attendance continuously for thre years (i.e.) 1982-'83, 1983-'84 and 1984-'85	4

In 57 percent of the schools there was an increase in the average attendance in 1981-1982 compared to that of 1980-1981. But 43 percent of the schools suffered a decrease in the average attendance in 1981-1982 compared to that of 1980-1981.

Thirty two percent of the schools showed an increase in the average attendance after the launching of CMNMP. In 4 percent of the schools, there was a steady increase year after year in the average attendance.

Table XXV shows the decrease in attendance during the study period for 1980-1981 to 1984-1985.

TABLE XXV

DECREASE IN THE AVERAGE ATTENDANCE DURING THE STUDY PERIOD

S.No.	Particulars	Percentage of schools
1	Decrease in the percentage of average attendance during 1982-'83 compared to that of 1981-'82	32
2	Decrease in the percentage of average attendance in 1982-'83 and 1983-'84 compared to 1981-'82	10
3	Decrease during 1983-'84 and 1984-'85 compared to 1981-'82	23
4	Decrease during 1982-'83 and 1984-'85 compared to 1981-'82	12

In 32 percent of schools there was a decrease in the percentage of attendance during 1982-1983, before the introduction of CMNMP. Likewise there was a decrease in the percentage of average attendance in 45 percent of schools during the period of 1982-1983 compared to 1984-1985. There was an isolated single school which showed a decrease in the average attendance subsequently for 5 years starting right from 1980-1981, which is situated in an isolated area. Table XXVI brings out the average attendance of 96 to cent percent.

TABLE XXVI

SCHOOLS WHICH HAVE AN AVERAGE ATTENDANCE OF 96 TO CENT PERCENT

S.No.	Years	Percentage
1	1980-'81	41
2	1981-'82	37
3	1982-'83	28
4	1983-'84	20
5	1984-'85	15

The percentage of schools with an average attendance of 96 percent and above for two years and above continuously for two years was only 16 percent before the introduction of the scheme. The percentage of schools with an average attendance of 96 percent and above was 20 percent after the introduction of the programme. There was a sudden increase in the average attendance soon after the introduction of CMNMP but a declining trend was noted whereas a steady increase was observed during the period 1980-1981 to 1981-1982. Table XXVII presents the number of schools which had an average attendance of 91 to 95 percent before and after the introduction of the programme.

TABLE XXVII

SCHOOLS WHICH HAVE AN AVERAGE ATTENDANCE OF 91 TO 95 PERCENT BEFORE AND AFTER THE INTRODUCTION OF CMNMP

	Period	Year	Percentage of schools
A	Before introduction of CMNMP	1980-'81	25
		1981-'82	17
B	After introduction of CMNMP	1982-'83	25
		1983-'84	19
		1984-'85	12

Number of schools with 91 to 95 percent of average attendance decreased from 25 percent to 17 percent in the pre-scheme period.

Immediately after the launching of the CMNMP it increased again to 25. But the very next year the numbers decreased to 19 percent in 1983-1984 and to 12 percent in 1984-1985. These schools increased in attendance during on the first year of the Chief Minister's Nutritious Meal Programme, but soon in the subsequent years the number of schools with high percentage of average attendance decreased year by year.

The reason for this phenomenon is not clear. When parents of the children were interviewed they revealed that due to the spiralling prices they preferred their children to be in the work force, so that they would add to the family income. Tea and coffee fruit plucking were the main occupations in the areas where this study was conducted. These jobs pay a high daily wage.

Another cause for children to stay away from school was found to be the responsibility of the elder one to look after the younger ones when both the parents go out for gainful employment. Thus, the school going child though enroled in the school is compelled to stay away from school for various reasons. As Naik (1983) has pointed out, poor retention in the schools are due to the absence of strong social demand, especially among the poor people and the weaker sections of the society, poor interest evinced by the parents in the education of their children and low literacy level of the parents and low quality of primary education.

These situations increase the need for the special attention of policy planners and decision makers. In order to bring about lasting nutritional improvement, interventions have to be linked with more fundamental measures aimed at the reduction of poverty.

In order to facilitate the children to earn while they learn, the present school timing can be changed, so that they will get atleast a few hours to pursue their wage earning work and add to the family's income. Socially Useful Productive Work (SUPW) can be started in the primary level itself so that children will get some skill training from early childhood. The SUPW activities should be based on the local resources and needs. Creches should be opened so that infants below three years will be taken care of and older children will remain in the schools.

IV. Academic Achievement:

Table XXVIII and XXIX shows the academic achievements of the children in all the regular subjects. There was an increment of marks in all the areas and in all the age groups both, among boys and girls. Among the areas the mean increase in mark was highest in Coimbatore Rural, followed by Coimbatore Urban. The least increase was noted among the children from Nilgiris district.

Hunger is one of the causes for poor concentration, attention and motivation. The improvement, in the academic achievement is due to the provision of one full meal to the children, which helps them to be more attentive and receptive to what is happening in the class room.

V. Gain in Nutrition Knowledge and Improvement in Nutritonal and Health Practices of Children:

The results of the pre-test and post-test scores on the nutrition, health and environmental sanitation practice test achieved by the different groups are described below. Test questions were partitioned into three categories corresponding to the three components. The partitioning

TABLE XXVIII

MEAN INCREASE IN PERCENTAGE OF MARKS AT THE END OF THE STUDY IN INTERVENTION A

Age/Sex / Areas	9+		8+		7+		6+		5+		Mean	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Coimbatore												
Rural	5.896	5.945	6.327	4.961	1.706	3.769	9.915	1.012	1.839	1.981	5.219	3.382
Urban	5.715	5.632	5.965	4.853	0.983	2.850	7.325	2.038	1.985	1.750	4.394	3.424
Nilgiris	0.975	1.403	6.978	7.000	2.140	2.184	1.938	2.051	0.051	0.268	2.674	2.810

TABLE XXIX

ANALYSIS OF VARIANCE FOR INCREASE IN MARKS

Source	Coimbatore Rural				Coimbatore Urban				Nilgiris			
	DF	SS	MS	'F'	DF	SS	MS	F	DF	SS	MS	F
Sex	1	1385.560	1385.560	50.25**	1	9.85	9.85	NS	1	7.48	7.48	1NS
Age Group	4	5037.767	1259.442	45.67**	4	3585.563	1635.334	25.26**	4	9499.66	2374.92	86.96**
Interaction	4	6084.376	1521.094	55.16*	4	5075.556	1460.082	14.38*	4	13.52	3.38	1 NS
Error	1649	45472.925	27.576		1760	42415.85	29.386		1597	43337.41	2.78	

** = P 0.01 * = P 0.05 NS = Not significant

Source	Coimbatore Rural		Coimbatore Urban		Nilgiris	
	SED	CD	SED	CD	SED	CD
Sex	0.259	0.508	0.256	0.503	0.262	0.51
Age Group	0.408	0.800	0.414	0.820	0.415	0.81
Interaction	0.577	1.131	0.582	1.141	0.586	1.15

TABLE XXX

CHILDRENS PRACTICE SCORE

CHILDRENS PRACTICE / COMPONENTS		D_1 DHARMAPURI		D_2 KANYAKUMARI		D_3 NILGIRIS		D_4 RAMANATHAPURAM		D_5 COIMBATORE		D_6 NORTH ARCOT		INTERVENTION CMNMP		
		CONTROL	EXPERIMENTAL	CONTROL	EXPERIMENTAL	CONTROL	EXPERIMENTAL	CONTROL	EXPERIMENTAL	CONTROL	EXPERIMENTAL	CONTROL	EXPERIMENTAL	COIMBATORE RURAL	COIMBATORE URBAN	NILGIRIS
NUTRITION	PRE-TEST	5.58± 1.2975	5.953± 1.3728	9.15± 2.2450	9.3622± 2.8704	8.00± 1.4967	8.1124± 2.8825	6.3478± 1.7963	5.9884± 1.0228	6.68± 1.3920	4.6056± 1.1500	11.00± 1.56	11.5809± 2.0149	0.5126± 0.5814	0.7627± 0.5072	0.7751± 0.5718
	POST-TEST	5.58± 1.6308	12.3577± 2.5751	9.52± 2.5475	14.0394± 1.8481	8.0889± 1.6169	12.9237± 2.7765	6.7609± 2.0236	12.00± 1.0398	7.44± 1.4305	9.9363± 1.3404	12.55± 3.56	13.2059± 2.146	1.6680± 0.4214	1.6186± 0.37211	1.4161± 0.6435
	GAIN	0.40± 0.7483	6.3978± 1.1646	0.37± 1.0815	4.6654± 2.1903	0.0889± 0.6871	4.7992± 1.4085	0.4130± 0.6453	6.0116± 1.4769	0.76± 0.8139	5.3307± 0.7923	1.55± 0.88	1.6250± 0.08592	1.1554± 0.5052	0.8559± 0.4122	0.6476± 0.4724
HEALTH	PRE-TEST	13.00± 2.1170	13.1898± 2.5901	7.00± 2.1726	7.7244± 2.4250	8.3111± 1.1584	7.5141± 3.0565	8.0435± 2.0212	8.9614 1.7080	4.6056± 1.1500	7.6972± 1.5056	11.00± 2.10	11.06015± 1.68031	4.21848± 0.7577	3.3898± 0.5528	2.5335± 0.6872
	POST-TEST	13.54± 2.2141	17.3212± 2.2046	7.48± 1.9924	11.6693± 2.4879	9.2667± 2.4166	11.6345± 3.0099	9.9130± 1.9541	15.2548± 1.8550	9.9363± 1.3404	13.5378± 2.0143	12.10± 3.93	14.0827± 2.1592	5.1344± 0.5858	7.1440± 0.5752	3.6208± 0.5897
	GAIN	0.54± 0.8535	4.1606± 0.5948	0.48± 0.8060	3.9685± 1.2292	0.9556± 1.0532	4.1124± 0.6850	1.8696± 0.8750	6.2934± 1.1419	5.3307± 0.7923	5.9363± 1.9300	1.10± 0.85	3.0226± 1.5008	0.9159± 0.3062	0.7542± 0.2663	1.0872± 0.4802
ENVIRONMENTAL SANITATION	PRE-POST	3.94± 0.8811	3.9927± 1.2173	3.92± 1.3242	3.7874± 1.1714	3.89± 1.0932	4.2570± 1.4333	3.7174± 1.2098	4.3822± 1.0042	2.92± 0.9130	3.8606± 0.9740	2.56± 0.58	2.6654± 0.9326	4.4117± 0.7380	3.6949± 0.7422	2.5503± 0.92
	POST-TEST	4.86± 1.0585	7.7007± 1.2549	4.46± 1.5259	7.9764± 1.3279	3.7111± 1.1666	6.5502± 1.5698	3.9348± 1.0509	7.9923± 1.1390	3.26± 0.8902	7.3068± 1.2771	3.59± 1.11 1.03	6.5596± 1.2256	5.2941± 0.6749	4.6610± 0.6407	3.7315± 1.0403
	GAIN	0.92± 0.8207	3.7030± 1.1441	0.54± 0.78	4.1890± 0.7910	0.18± 0.7781	2.2932± 0.6325	0.2174± 0.6225	3.6100± 0.8416	0.34± 0.5142	3.4462± 0.7627	0.75±	3.8942± 2.1543	0.8823± 0.3156	0.9661± 0.5030	1.1812± 0.4956

Level of significance

Intervention NHEES = 0.01 for all the three components

Intervention CMNM P = N.S. for all the three components

was considered necessary, since they dealt with different concepts and also each category of practice incolves different kind of behaviour. Each category was evaluated separately using the 'F' test.

Table XXX and Figure 29 show the practice scores obtained by children.

Significant difference between Pre and Post-test scores for all experimental groups and no significant differences between pre and post test scores for the control groups were observed.

When the districts were compared for mean gain, the District of Dharmapuri showed the highest (6.4) followed by Ramanathapuram (6.0) and Coimbatore (5.3).

In the health category, Ramanathapuram gained the highest (6.2) followed by Coimbatore (5.3). In the environmental sanitation, Kanyakumari gained the highest (4.2) followed by Coimbatore District (3.9) and Ramanathapuram (3.6).

When the mean gains of the intervention CMNMP was compared with NHEES, children in intervention NHEES followed better practices than those in CMNMP. This improvement is attributable to the effect of teaching nutrition, health and environmental sanitation specifically to this group.

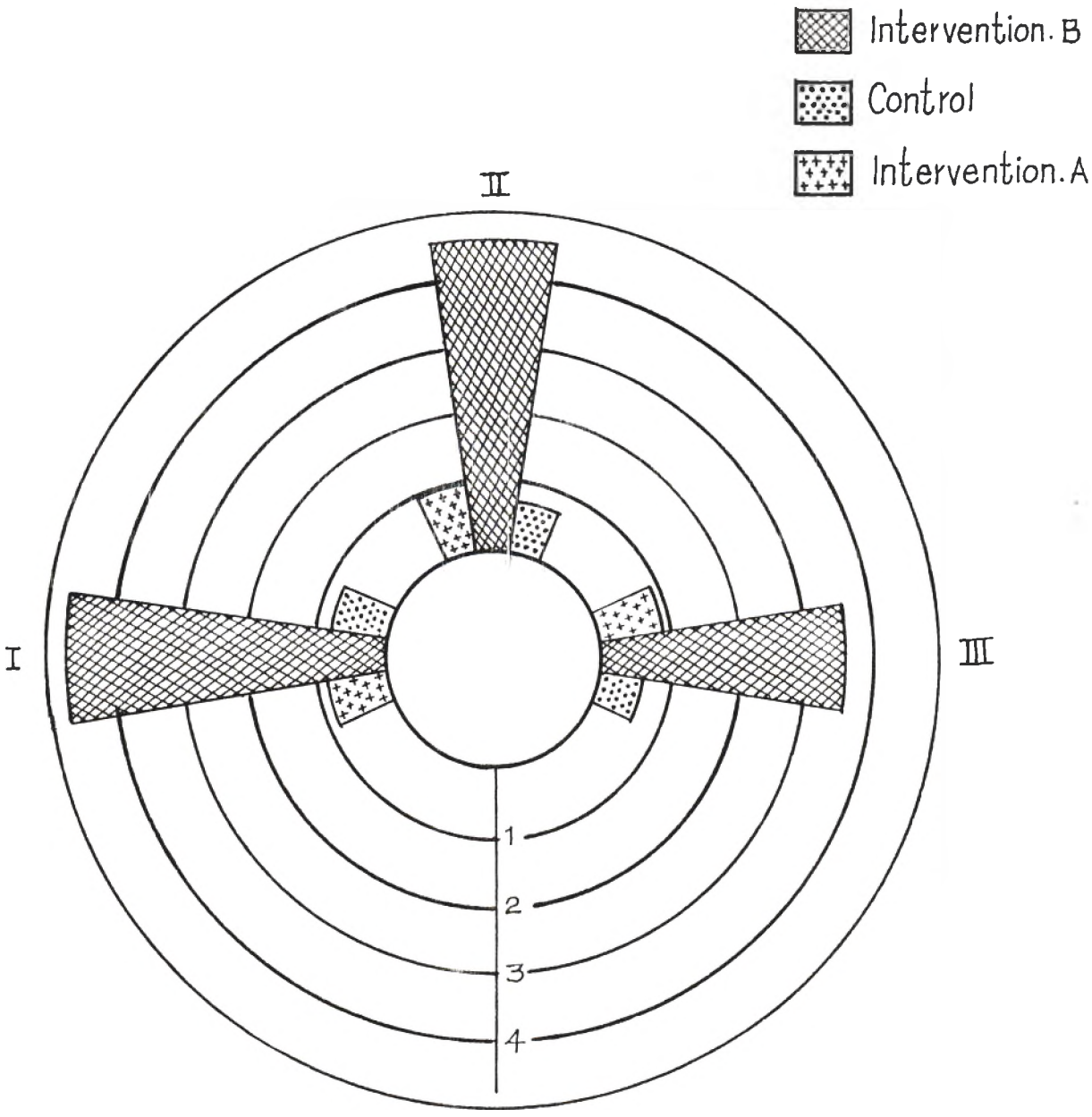
Since it could have been that for the post-test scores were higher for some districts because they knew more about nutrition and health education initially, analysis of co-variance was carried out(Table XXXI). The results showed a significant difference between the pre and post-test scores even when the post-test scores had been adjusted for differences in initial pre-test scores ($P < 0.01$). Therefore, it is concluded that:

TABLE XXXI

ANALYSIS OF DIFERENCE BETWEEN PRE-TEST AND POST TEST SCORES

DISTRICT / GROUPS	PRE-TEST MEAN	POST-TEST MEAN	MEAN GAIN	LEVEL OF SIGNIFICANCE
RAMANATHAPURAM				
Experimental	2.826 ± 1.341	11.819 ± 1.348	8.992 ± 1.780	19.45 **
Control	2.75 ± 1.152	3.628 ± 1.364	0.878 ± 0.846	
DHARMAPURI				
Experimental	2.97 ± 1.326	11.766 ± 1.451	8.788 ± 1.875	15.50 **
Control	2.811 ± 1.046	3.622 ± 1.060	0.81 ± 0.962	
KANYAKUMARI				
Experimental	2.708 ± 1.243	12.1165 ± 1.667	9.456 ± 1.576	17.43 **
Control	2.65 ± 1.0445	4.0455 ± 1.2605	1.39 ± 0.928	
NILGIRIS				
Experimental	2.097 ± 1.111	10.874 ± 1.523	8.776 ± 1.583	21.33 **
Control	2.126 ± 0.786	3.289 ± 1.122	1.169 ± 0.871	
NORTH ARCOT				
Experimental	3.560 ± 1.114	11.970 ± 1.578	8.410 ± 1.805	18.35 **
Control	3.490 ± 0.930	0.330 ± 1.258	2.00 ± 0.816	
COIMBATORE				
Experimental	3.015 ± 1.256	12.044 ± 1.781	9.027 ± 1.539	16.12 **
Control	2.905 ± 0.921	6.53 ± 1.550	3.63 ± 215	
Intervention CMNMP				
Coimbatore : Rural	0.5336 ± 0.576	1.6680 ± 0.3904	1.1345 ± 0.6075	N.S
Urban	0.6864 ± 0.503	1.6016 ± 0.3656	0.9152 ± 0.4524	N.S
Nilgiris	0.7483 ± 0.669	1.758 ± 0.529	0.996 ± 0.479	N.S.

MEAN GAIN IN NUTRITION HEALTH AND ENVIRONMENTAL SANITATION PRACTICES OF CHILDREN



I. Nutrition
II. Health
III. Environmental Sanitation

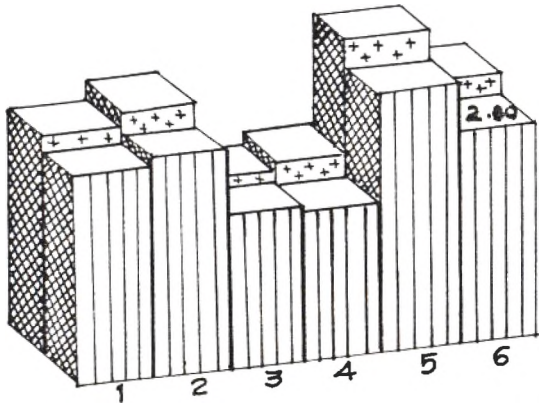
Fig. 29

PRE-TEST-POST TEST SCORES AND MEAN GAIN OF THE CHILDREN IN THE KNOWLEDGE TEST

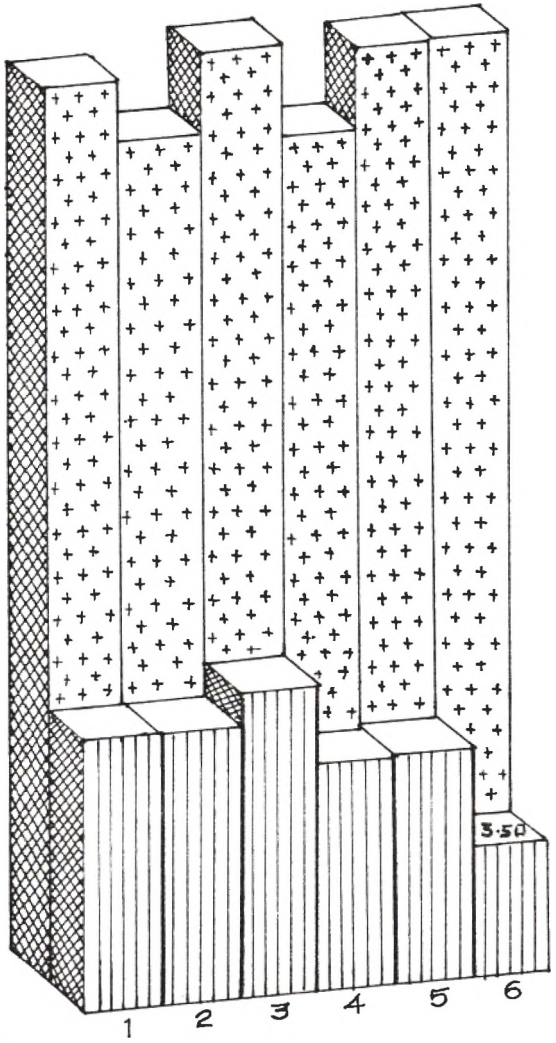
EXPERIMENTAL

CONTROL

1. Ramanathapuram
2. Dharmapuri
3. Kanyakumari
4. Nilgiris
5. North Arcot
6. Coimbatore



Mean-Pre-test score



Post-test score

FIG. 30

there was a significant improvement in knowledge of nutrition as measured by a written test of nutrition, health and environmental sanitation administered before and six months after the teaching between the experimental and control groups which received no organised teaching of nutrition. The improvement was attributable to the effect of teaching nutrition and health education.

Further analysis of the results on the knowledge test (Figure 30) showed that the difference in the mean gain of scores among the districts was not very great. However, Kanyakumari district gained the highest (9.456) followed by Coimbatore (9.027). This might have been due to the fact that the teachers of those districts showed a greater interest in teaching nutrition and health education.

The difference between the control for the intervention NHEES and scores obtained by the participants of CMNMP was slightly greater in spite of the same inputs (only nutritious meal programme without nutrition education). The reasons are not known and they need further study.

The slight gain between the pre-test and post-test scores by the control group could be attributed to the incidental learning in nutrition and health education through the mass media like radio, television, magazines, news-papers and cinema. However, this gain was not significant. These findings are in consonance with the findings of Devadas et al., (1973, 1974, 1975) which revealed that nutrition education imparted through the curriculum had resulted in a significantly higher nutritional knowledge of the children.

VI. Improvement in Problem solving ability.

The problem solving ability and decision making ability of the children are shown in table XXXII and figure 31.

Children's problem solving ability had increased significantly after exposure to nutrition and health education. The more knowledgeble the children were, the higher was their ability to solve the problem.

In further analysis it was found that the gain in problem solving ability of children in Intervention A was not as much as that in Intervention B. Nutrition education is necessary to the learners to meet with their day to day problems.

VII. Mothers' Nutritional Practice scores:

Table XXXIII and figure 32 present the mothers' nutrition knowledge and practice scores.

The mean scores and F value of the scores after adjusting to the initial value is given in Table XXXIV. The final scores of different groups (after adjustment to initial scores) indicate that group number 3 (in which both the mother and children had received nutrition education) had secured higher scores while the group (in which none received nutrition education) had obtained the least scores. These findings agree with the findings of Devadas (1982) that education given to children had a "carry home effect" and influenced even the meal patterns and habits of their families.

TABLE XXXII

CHILDRENS MEAN INITIAL FINAL AND MEAN GAIN IN PROBLEM SOLVING ABILITY AND DECISION MAKING

Components	Tests	Ramanathapuram	Kanyakumari	Nilgiris	North Arcot	Intervention A			Level of Significance ANCOVA 'f'
						Coimbatore Urban	Coimbatore Rural	Nilgiris	
NUTRITION	PRE-TEST	1.4462 ± 0.9070	1.5569 ± 0.9920	2.08097 ± 1.0463	1.5368 ± 0.9845	0.529661 ± 0.564832	0.47899 ± 0.581200	1.07012 ± 0.62685	95.37 ** P = 0.01
	POST-TEST	7.3462 ± 1.7084	7.454902 ± 1.6654	7.5506 ± 1.5391	6.0441 ± 1.0458	1.49576 ± 0.41423	1.5420168 ± 0.4700251	2.2012195 ± 0.3893	
	GAIN	6.0154 ± 1.6171	5.8980 ± 1.5099	5.4777 ± 1.2656	5.9669 ± 1.0619	0.966101 ± 0.44018	1.0630252 ± 0.508559	1.1310 ± 0.5320	

** - Significant at 0.01 Level

* - Significant at 0.05 Level

MEAN INITIAL-FINAL SCORES AND MEAN GAIN IN THE PROBLEM SOLVING AND DECISION MAKING ABILITY OF CHILDREN IN INTERVENTION 'A' AND INTERVENTION 'B'

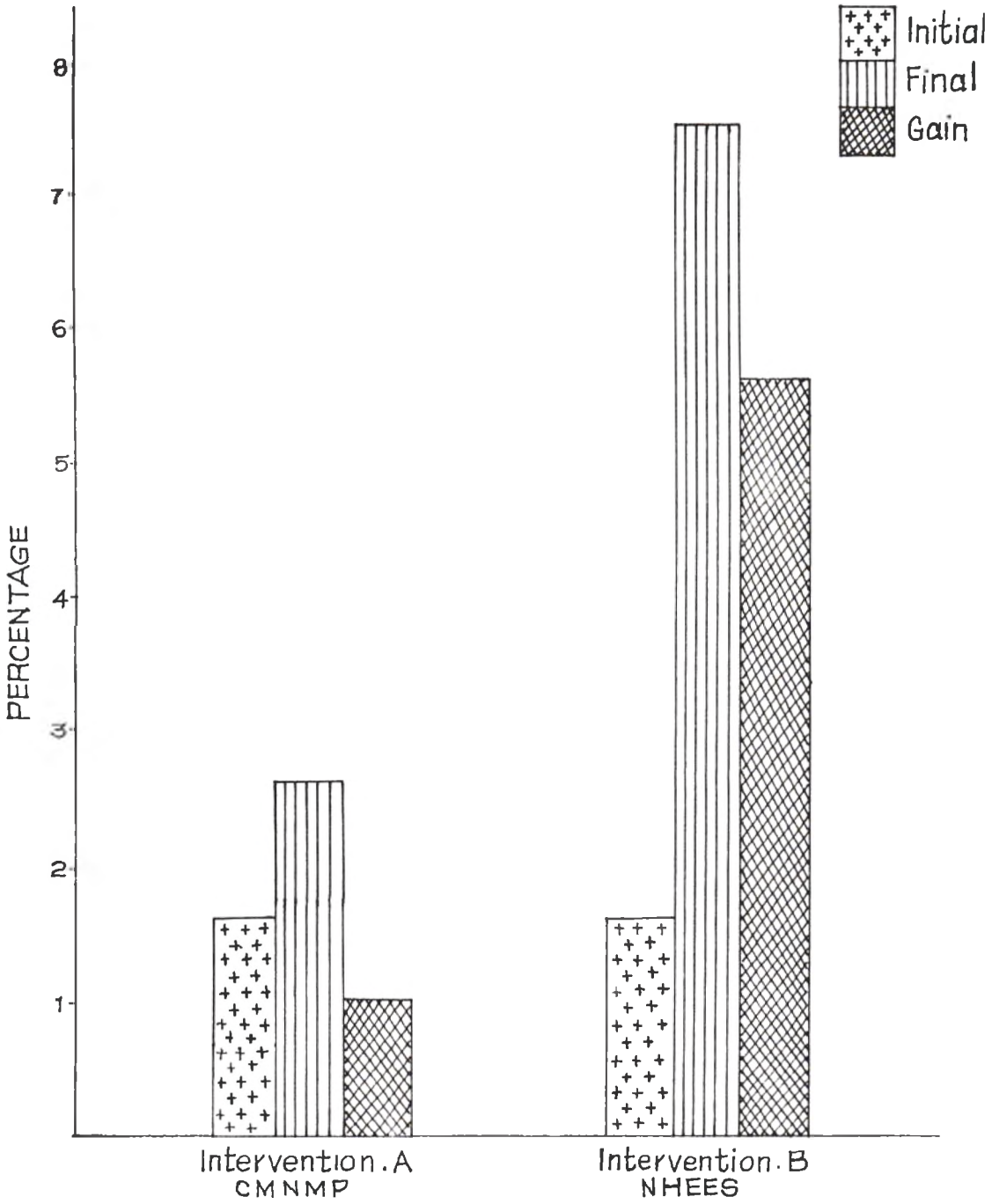


Fig. 31

VIII. Correlation Study:

Correlation study was undertaken to find out the relationship between mothers' nutrition education and their children's betterment in nutritional and health behaviour. The following correlations were arrived of:

1. Mothers' nutritional practice vs children's practice scores(Table XXXV).
2. Mothers' nutritional practice vs children's knowledge scores(Table XXXVI).
3. Mothers' nutritional practices vs children's problem solving and decision making scores(Table XXXVII).
4. Children's problem solving and decision making ability vs their knowledge scores(Table XXXVIII).
5. Children's problem solving ability and their practice scores.
6. Children's knowledge scores vs practice scores(Table XXXIX).

Children's knowledge and children's practices were positively correlated. When children showed more knowledge, it was reflected in their behaviour.

The correlation co-efficient worked out between mothers' nutritional practice and children's nutritional knowledge scores ($r=0.7275$) is highly significant. The positive correlation shows that if one variable increases, another variable is also increased.

The regression equation ($y=1.43+0.87x$) shows that for an increase of one score in x (mothers' scores) there would be an increase of 0.87 score in y.

TABLE XXXIII

IMPROVEMENT IN NUTRITIONAL, HEALTH AND ENVIRONMENTAL SANITATION PRACTICES AMONG THE MOTHERS

N = 150

Groups	Initial	Final	Gain
Mothers and children who did not receive nutrition education	1.8± 1.0	2.06± 0.9881	0.26± 0.4821
Children who received nutrition education alone	2.5983± 0.9805	4.4330± 1.3337	1.84± 0.8171
Mothers and children who received nutrition education	1.667± 1.1353	5.2333± 1.3387	3.5667± 0.9339

IMPROVEMENT IN NUTRITIONAL HEALTH AND ENVIRONMENTAL SANITARY PRACTICES OF MOTHERS

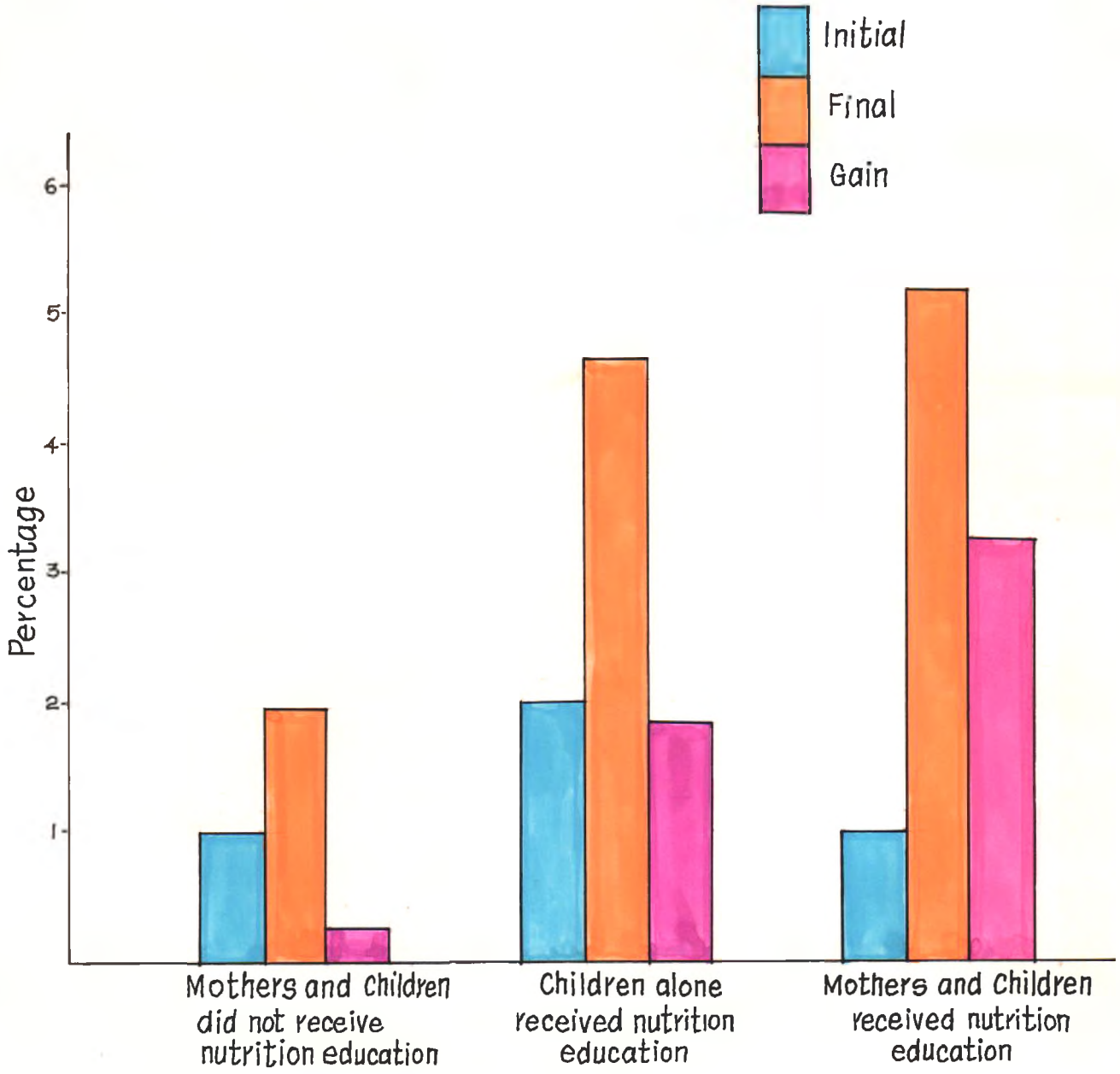


Fig. 32.

TABLE XXXIV

ANALYSIS OF COVARIANCE FOR FINAL (Y) NUTRITION PRACTICE SCORES OF MOTHERS (ADJUSTED TO INITIAL SCORES)

Source	DF	Unadjusted Values YY	XY	XX	Adjusted Values SS	DF	MS	f
Condition	2	377.6304	16.3771	69.0704	372.8935	2	186.9468	** 113.30
Error	347	584.4867	72.5341	387.5267	570.9103	346	1.6500	

** Significant at P = 0.01 level

Mean Scores adjusted to initial scores

Condition	Mean Scores adjusted	SED	CD
T_1-Both not received	2.10	T_1 Vs T_2 = 0.21	0.41
T_2 only Children Received	4.32	T_1 Vs T_3 = 0.21	0.41
T_3 Both received	5.32	T_2 Vs T_3 = 0.15	0.29

TABLE XXXV

MOTHERS' NUTRITIONAL PRACTICE SCORES VS CHILDRENS' PRACTICE SCORES (MOTHERS AND CHILDREN RECEIVED NUTRITION EDUCATION)

Mothers' Practice Score	Childrens' Practice Score 2	3	4	5	6	Total	$\bar{x}$	fx	fx^2	fxy
2	4	6	1			11	-2	-22	44	28
3		7	12	11		30	-1	-30	30	-4
4		2	18	15	8	43	0	0	0	0
5			2	9	4	15	1	15	15	17
6					1	1	2	2	4	4
					(N=100)			-35	93	45
Total(y)	4	15	33	35	13	38				
$\bar{y}$	-2	-1	0	1	2	118				
fy	-8	-15	0	35	26	45				
fy^2	16	15	0	35	52			r = 0.6375**		
fyx	16	19	0	-2	12			Equation = y 1.74 + 0.72x		

Children = y
Mothers = x

TABLE XXXVI

MOTHERS' NUTRITIONAL PRACTICE SCORES VS CHILDRENS KNOWLEDGE SCORES (MOTHERS AND CHILDREN RECEIVED NUTRITION EDUCATION

Mothers' Practice Score	Childrens knowledge 2	3	4	5	6	7	Total	$\bar{x}$	fx	fx^2	fxy
2	3	5	3				11	-2	-22	44	44
3		6	14	10			30	-1	-30	30	26
4		2	7	26	8		43	0	0	0	0
5				8	4	3	15	1	15	15	10
6						1	1	2	2	4	4
Total(f)	3	13	24	44	12	4	N=100		-35	93	84
$\bar{Y}$	-3	-2	-1	0	1	2					
fy	-9	-26	-24	0	12	8	-39(f)				
fy^2	27	52	24	0	12	16	131(fy^2)				
fyx	18	32	20	0	4	10	84(fyx)				

r = 0.7275**

y = 1.43 + 0.87x

11 Significant at P = 0.01 level

Childrens knowledge = Y
Nutritional Practice = x

TABLE XXXVII

MOTHERS' PRACTICE SCORES VS CHILDRENS PROBLEM SOLVING AND DECISION MAKING (MOTHERS AND CHILDREN RECEIVED NUTRITION EDUCATION)

Mothers' Practice Score	Childrens Practice Score 2	3	4	5	6	7	Total	$\bar{x}$	fx	fx^2	fxy
2	3	5	3				11	-2	-22	44	44
3		8	10	12			30	-2	-30	30	26
4		1	9	23	10		43	0	0	0	0
5			1	10	3	1	15	1	15	15	4
6						1	1	2	2	4	4
Total (f)	3	14	23	45	13	2	N=100		-35	93	78
y	-3	-2	-1	0	1	2					
fy	-9	-28	-23	0	13	4	-43				
fy^2	27	56	23	0	13	8	127				
fxy	18	36	15	0	3	6	78				

Children = y
Mother = x

$r = 0.6725^{**}$

$y = 1.72 + 0.78x$

TABLE XXXVIII

CHILDREN'S KNOWLEDGE VS PROBLEM SOLVING AND DECISION MAKING

Mothers' Practice Score	Problem Solving Knowledge 2	3	4	5	6	7	Total	x	fx	fx^2	fxy
2	4	3	1				8	-3	-24	72	57
3	5	18	14	20			57	-2	-114	228	130
4	1	22	14	10			47	-1	-47	47	61
5		14	15	32	3	1	65	0	0	0	0
6			4	5	9	1	19	1	19	19	7
7					2	2	4	2	8	16	12
Total	10	57	48	67	14	4	N=200		-158	382	267
Y	-3	-2	-1	0	1	2					
fy	-30	-114	-48	0	14	8	170				
fy^2	90	228	48	0	14	6	396				
fyx	69	134	41	0	13	10	267				

Knowledge = x
Problem solving = y

r = 0.5218

y = 1.98 + 0.52x

TABLE XXXIX

CHILDRENS KNOWLEDGE Vs CHILDRENS PRACTICE

Practice / Knowledge	2	3	4	5	6	7	Total	(X)	fx	fx^2	fxy
2	2	4	2				8				
3	1	10	25	21			57				
4	1	4	20	18	4		47				
5			28	23	14		65				
6			8	1	10		19				
7				1	2	1	4				
Total	4	18	83	64	30	1	200		-158	382	23
Y	-2	-1	0	1	2	3					
fy	-8	-18	0	64	60	3	101				
fy^2	16	18	0	64	120	9	227				
fyx	18	36	0	-57	20	6	23	r = 0.4832**			
								y = 2.82 + 0.40 x			

Among the groups in which both mothers and children received nutrition education, there was a positive correlation between mothers' nutritional practices and children's practices. When mothers follow sound health and nutritional practices, children also practice sound habits. Thus as stated by Stephen (1985) mothers could significantly improve their own nutritional status and that of their children, if they had improved awareness, literacy rates, and increased confidence in their own abilities to deal with external events and processes.

CHAPTER - V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

A. The Interventions Selected:

1. CMNMP

In Tamil Nadu, the CMNMP which was started in the year 1982, continues in schools as an important nutritional and attendance stabilisation programme. The main aim of the CMNMP has been to supplement the home food, in the school. Also food given in the school is regarded as an incentive for increasing attendance in the school. Under this programme, a beneficiary child is expected to receive a meal prepared from 100g of rice, 15g of dhal, 3g of oil, 25g of green vegetables and 25g of other vegetables all through the year.

2 NHEES

NHEES - a pilot programme started in the year 1976 was an attempt to incorparate nutrition, health and environmental sanitation concepts in the existing curriculum of primary school children without increasing the work-load of the teachers and without appointing additional staff to handle this subject. To begin with, this programme was implemented in Coimbatore district alone. Later it was extended to other districts in Tamil Nadu. The main aim of NHEES has been to impart knowledge in nutrition, health and environmental sanitation, through an attractive curriculum. Education in nutrition and health is regarded as a change agent,

because children are expected to improve their nutritional and health practices which will ultimately be reflected in their nutritional status, and create an awareness that health and well being of the individual are related to nutrition. In this intervention, a child receives formal instruction in nutrition and health education through an integrated approach.

B. Study Design:

Educational and nutritional benefits of the CMNMP that have accrued over the years in the two districts, Coimbatore and Nilgiris have been evaluated in this study. In the absence of matching samples of children who are not participating in the CMNMP, the impact of the programme was studied on the same children over a period of six months. The study covered 4189 children in 100 schools. The data for the study were gathered from the teachers' records, between June and December 1986.

The educational benefits of the Intervention B (NHEES) such as gain in nutrition and health knowledge, improvement in nutritional, health practices, acquisition of problem solving ability related to nutrition and other nutritional benefits have been evaluated in six districts of Tamil Nadu in this study. A comparable control group in addition to the pre and post-test design was used to measure the impact of the programme. This study covered children in 30 schools. The data were collected between June 1986 and December 1986.

The direct responses given by individuals were recorded and this formed the data source, observation and written responses were also the other modes of data collection.

C. Programme Operation:

The CMNMP in Tamil Nadu has been in operation for nearly six years. The Nutritious Meal Organiser has the responsibility for implementing the programme. The feeding is for all the 365 days in the year.

The programme NHEES was in operation for nearly eight years in Tamil Nadu. The teachers who received the orientation training in nutrition and health had the responsibility of imparting nutrition and health knowledge to the children. On an average each teacher spent about 20 to 30 minutes daily to teach nutrition/health concepts through an integrated programme.

D. The impact of the Interventions:

a. Nutritional Status:

The prevalence and severity of malnutrition in school children was assessed from the body weight and height measurements and were compared with the Indian standard. Ninety three percent of children weighed lesser than their well to do counterparts in India.

According to the weight-for-age index, 16.24 percent of children were found to have a deficit of 10 percent of standard. More than 50 percent of children suffered from "third" degree of malnutrition and the height of only 6 percent of the children was "normal". The children with "mild" and "moderate" forms of stunting (height deficient) were 35.25 percent and 38.83 percent respectively. Twenty percent of the children had "severely" stunted growth.

The body weights were commensurate with heights for 14.88 percent of children. The "mild" and "moderate" deficit in weight in proportion

to height was found in 45.44 percent and 30.52 percent respectively. Seven percent were "severely wasted", their weight-for-height being less than 60 percent of the standard.

As the malnourished children presented a combination of both "wasting" and "stunting" they were classified into broad categories that were qualitatively different. Accordingly 55.30 percent of children were "normal and nearly normal". This group included children manifesting "first" degree malnutrition by weight-for-age, "mild stunting", by height for age and "mild wasting" by weight-for-height indices. Twenty one percent of children were "stunted", shorter in height-for-age but had a weight proportionate to their height. Six percent of the children were suffering from "severe" malnutrition. These children were classified as having "third" degree malnutrition by weight-for-age criteria. It is imperative to point out that the number of children classified as "wasted" and "stunted" increased 14 times by the age of 9 years.

When the nutritional status of children participating in the two different intervention programmes was compared it was found that among boys the percentage of normal children in the index weight-for-age was 10.37 and 10.25 percent in Interventions A and B respectively. In the severely malnourished group the boys occupied 49.55 percent and 42.22 percent respectively for Interventions A and B.

In the index height-for-age the percentage of normal children were 21.23 and 21.59 for Interventions A and B respectively. Twenty nine and 23.45 percent of children fell under "severely stunted" in Interventions A and B respectively.

In the Index weight-for-height 16.04 and 29.43 percent of children belonged to the normal group and 7.31 and 14.11 percent fell under the "severely wasted" group in the Interventions A and B respectively.

Among the girls in the weight-for-age Index 9.24 percent and 7.33 percent of children fell under the "normal" group. Forty one percent and 48 percent of children constituted the "severely malnourished" in the Interventions A and B respectively.

With the index height-for-age 9.24 and 33.05 percent of children were found to be normal. Sixteen and 14 percent of children were found to be "severely retarded" in the two Interventions A and B respectively.

When weight-for height index was considered 13.54 and 27.66 percent of children constituted the normal group and 11 and 19 percent in the "severely wasted" group among the Interventions A and B respectively.

b. The Clinical Picture of the Children:

At the start of the study 9.35 and 12.00 percent of the children had angularstomatitis in the Interventions A and B respectively. At the end of six months, only 1.20 and 1.25 percent of children showed symptoms of angularstomatitis. Among the other deficiency signs, mild anaemia (15.35 and 16.80 percent), dry skin (6.00 and 7.35 percent), ulcers in the tongue (8.25 and 7.35 percent) were observed in the beginning in the Interventions A and B respectively. But all these signs were reduced to a greater extent, as the children participated in the nutritious meal programme over six months.

The reduction in the deficiency symptoms was found to be more among the participants of Intervention B than in Intervention A. This could

be due to the fact that children applied their knowledge and thus protected themselves from the occurrence of deficiency diseases.

c. Improvement in Enrolement and Average Attendance:

i) In 84 percent of the schools there was an increase in the percentage of enrolement compared to the percentage of enrolement prior to the introduction of CMNMP.

ii) Fifty three schools in 1982-1983, 50 in 1983-1984 and 60 in 1984-1985 had registered cent percent enrolment.

iii) 57 percent of the schools there was an increase in the average attendance in the year 1981-1982.

iv) Forty three percent of the schools suffered a decrease in the average attendance in 1981-1982 compared to that of 1980-1981.

v) The percentage of schools with an average attendance of 96 percent and above continuously for two years was only in 16 percent prior to the scheme; but it rose to 20 percent after the introduction of the programme.

vi) Immediately after the launching of CMNMP the schools with high a percentage of attendance increased to 25 percent but the very next year the numbers decreased to 19 in 1983-1984 and 12 in 1984-1985.

d. Improvement in the Academic Achievements:

The mean increase of marks in all the areas, in all the age groups and both among the boys and girls was more than at the start of the study.

Among the areas the mean increase in marks was highest for children from Coimbatore rural area followed by Coimbatore urban. The least increment was noted among the children from the Nilgiris district.

E. Correlation Study:

i) The correlation co-efficient worked out between children's knowledge and problem solving ability ($r = 0.5218$) is highly significant when children are more knowledgeable, they can solve the problems beter.

ii) The correlation co-efficient worked out between mothers' nutritional practice scores and children's knowledge scores ($r = 0.7275$) is highly significant.

iii) Among the groups in which both mothers and children received nutrition education, there was a positive correlation between mothers nutritional practice and children's practice.

iv) Similarly a positive correlation was observed between mothers' practice scores and childrens problems solving ability, 'r' being 0.6725. If parents are nutritionally aware, they can help children develop appropriate eating habits.

F. Conclusion:

The Tamil Nadu Chief Minister's Nutritious Meal Programme is a boon to the under-privileged. This should help strengthen their social, economic, and educational advancements and bring them into the main stream as active partners and participants in national development (Devadas,1986). A feeding programme is not an end in itself, but it should be considered as an "entry point". Nutrition and health education is a justifiable adjunct to a feeding programme as malnutrition is the result not only of scarce resources but of ignorance and adverse cultural practices. The simultaneous provision of food and nutrition education would have an impact that will be more lasting than what could be expected from the impact of the two working in isolation.

Integrating nutrition education in the curriculum is economical, as the proportion of expenditure devoted to training the teachers is only a very small fraction of the expenditure on actual nutrition rehabilitation or intervention programmes (Devadas, 1970). Nutrition education promotes the best use of an individual's limited economic resources. Hence, nutrition education should be a part of every child's early training both at home and in school.

G. Limitations of the study:

1. Even though nutrition education was taught through classes I to V, evaluation for its impact was done only for V class for want of time.

2. One of the frustrations teachers expressed most frequently was limited time. With many school activities, many teachers felt that they did not have enough time to cover the basic subjects. They expressed, time pressure forced them to give nutrition education a low priority.

3. In the absence of allotment of percentage of marks for nutrition and health examinations, teaching of NHEES received a low priority among the teachers as well as students.

4. Non-availability of space for school garden was a handicap for students to participate in food producing activities.

5. Most of the meal organisers in CMNMP perceived their job as only feeding the children, and not educating them. This perception was related to a general feeling of a separation and alienation from the main stream of school activities and especially from the educational functions. Thus, the education component was missing from the feeding programme.

6. Lack of safe drinking water and water for other purposes stand in the way of developing good healthy habits like washing hands and plates before eating the mid-day meal.

7. Nutrition, health education and environmental concepts are not included in the text books. This leads to lassitude among the learner, who think that since it is not included in the text book, it is not very important.

H. Suggestions and recommendations:

1. At state level a committee can be formed to assess the current status of nutrition and health education in the schools. This committee should help in the preparation of curriculum guidelines, and resource materials for use by educational departments, to test, evaluate and revise materials.

2. State department of education should incorporate nutrition, health education as a policy in the existing subjects in all the elementary schools.

3. Nutrition and health education should be taught by the teachers who have undergone either the orientation course or who had undergone a course in nutrition and health education during their teacher training programme.

4. Provision should be made for the teachers who teach nutrition, health education to up-date the nutrition knowledge by attending in-service training programmes organised by the concerned institutions. Funding for the preparation and training of teachers should be given a top priority.

5. Schools should expand nutrition education programmes to include the parents of school children and other adults in the community.

6. Nutrition and health education concepts should be included in the text books.

7. Implementation of educational or supplementary feeding programmes as isolated interventions, usually has a small impact or none at all. Therefore supplementary programmes must be accompanied by education measures.

8. While progress has clearly been made in many aspects of nutrition and health education, weaknesses such as limited out-reach to audiences, lack of co-ordination, failure to evaluate and lack of public participation pose a challenge to future endeavours. Fragmented nature of effort should be removed and an unified, intensified, co-ordinated policy for nutrition education should be made.

9. Provision must be made for the training of cooks, the nutritious meal organisers and others who are in-charge of feeding the children in nutrition and health education.

10. Schools should be provided with portable weighing scales to weigh the children, which is one way of finding the impact of the programme.

11. There should be a permanent set up of a medical team to check the health of the school children. This is one way of combating infection which usually results in poor utilisation of supplements.

12. Besides, regular health check up, proper supply of drinking water, provision for the disposal of waste water should be made.

13. A transformation in the character of education - its adjustment to local environment,and its attunement to life of the people to be educated - to their needs and aspirations is needed.

14. The present system of education is such that, a child must either work or attend school. But a child cannot do both. Consequently, it is only the children of well to do families who receive primary education which is denied to the child from poor families who must work in order to survive. A way out of this situation is to provide part-time education at convenient times so that children can work and also can learn.

15. Work-experience must be an integral part of general education.

I. Problems Faced:

1. Frequent transfers of the trained teachers and replacement of the untrained teachers is one of the impediments for the total sucess of the programme.

2. Lethargy, and indifference of the individual teacher are the deserving cause for small failure.

3. The teacher has to reinforce the information contained in the text books with his/her own fund of knowledge.

4. It was however, found that basic facilities like accomodation, space for garden and water supply are not practically available. Obviously because of these limitations, teachers have revealed a poor appreciation of use of innovative means of health and nutrition communication.

J.Suggestions for Future Research:

1. Study on the communication systems in nutrition education - various components of the intervening process should be studied. This will give an idea about where a programme is working and where it is not and why the outcomes were achieved or not achieved.

2. Cost-benefit analysis of nutrition intervention programmes.

3. Ways and means of bringing effective co-ordination between various departments.

4. Co-ordination of nutrition education in the schools with the education of parents.

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SERIAL NUMBER A	NAME OF THE SCHOOL B	1980-81							1981-82							1982-83							1983-84							1984-85			
		NO OF SCHOOL AGE CHILDREN	NO. ENROLLED	ENROLLMENT PERCENTAGE	YET TO BE ENROLL PERCENTAGE	ROLL	AVERAGE	ATTENDANCE PERCENTAGE	NO OF SCHOOL AGE CHILDREN	NO. ENROLLED	ENROLLMENT PERCENTAGE	YET TO BE ENROLLED PERCENTAGE	ROLL	AVERAGE	ATTENDANCE PERCENTAGE	NO OF SCHOOL AGE CHILDREN	NO ENROLLED	ENROLLMENT PERCENTAGE	YET TO BE ENROLLED PERCENTAGE	ROLL	AVERAGE	ATTENDANCE PERCENTAGE	NO OF SCHOOL AGE CHILDREN	NO ENROLLED	ENROLLMENT PERCENTAGE	YET TO BE ENROLLED PERCENTAGE	ROLL	AVERAGE	ATTENDANCE PERCENTAGE	NO OF SCHOOL AGE CHILDREN	NO ENROLLED	ENROLLMENT PERCENTAGE	YET TO BE ENROLLED PERCENTAGE	ROLL	AVERAGE	ATTENDANCE PERCENTAGE
1	2	3							4							5							6							7			
1.	WEL BACK	93	89	95.7	4.3	56	52	92.9	108	100	92.6	7.4	57	50	87.7	110	110	100	–	66	39	59	92	92	100	–	45	40	88.9	62	62	100	–	53	43	81.1
2	BYGAMUND	53	48	90.6	9.4	53	51	96.2	45	41	91.1	8.9	45	32	71.1	43	43	100	–	43	40	93	50	50	100	–	50	45	90	49	49	100	–	49	45	91.8
3	GANDIPET	143	135	94.4	5.6	92	92	100	134	128	95.5	4.5	82	79	96.3	107	107	100	–	83	80	96.4	117	117	100	–	87	80	92	109	109	100	–	78	74	94.9
4	KANMANDU	84	62	96.9	3.1	34	32	94.1	74	71	95.9	4.1	41	35	85.4	55	55	100	–	24	20	95.2	33	33	100	–	32	29	90.6	31	31	100	–	31	30	96.8
5	YEDAPPALLI	123	120	97.6	2.4	128	119	93	114	110	96.5	3.5	114	109	95.6	132	132	100	–	127	122	96.1	125	125	100	–	111	108	97.3	139	139	100	–	117	110	94
6	KODAMALAI	62	62	100	–	76	64	84.2	55	55	100	–	45	42	93.3	81	81	100	–	56	55	98.2	76	76	100	–	52	52	100	65	65	100	–	51	44	86.2
7	HALAKARAI	75	70	93.3	6.7	75	64	85.3	72	71	98.6	1.4	71	68	95.8	81	81	100	–	81	66	81.5	90	90	100	–	90	76	84.4	94	94	100	–	91	71	78
8	GURRENCE	75	70	93.3	6.7	58	54	93.	217	206	94.9	5.1	127	108	85	154	154	100	–	127	126	99	154	154	100	–	138	135	97.8	210	210	100	–	146	141	96.6
9	ELLITHORAI	237	220	96.9	3.1	138	132	95.7	238	230	96.5	3.5	146	136	93.2	237	237	100	–	138	135	97.8	199	199	100	–	130	129	99.2	219	213	100	–	135	124	91.9
10	BATTATTI	73	70	95.9	4.1	96	85	88.5	63	60	95.2	4.8	95	93	97.9	154	154	100	–	97	91	93.8	159	159	100	–	116	107	92.2	172	172	100	–	122	112	91.8
11	BUNDUMI	90	85	94.4	5.6	76	72	94.7	76	70	92.1	7.9	80	78	97.5	117	117	100	–	88	84	95.5	102	102	100	–	85	78	91.8	92	92	100	–	71	64	90.1
12	BARATTY	52	52	100	–	66	62	94	48	48	100	–	62	50	80.6	43	43	100	–	66	53	80.3	67	67	100	–	43	43	100	99	99	100	–	48	45	93.8
13	FORESTDALE	46	40	87.9	13.1	63	58	92.1	49	42	85.7	14.3	63	49	77.8	49	45	91.8	8.2	64	61	95.3	65	65	100	–	63	63	100	65	65	100	–	57	58	98.3
14	KARAKORAI	75	70	93.3	6.7	66	66	100	80	80	100	–	58	58	100	140	130	99.9	7.1	64	64	100	82	82	100	–	65	65	100	74	74	100	–	62	73	89
15	ODHANATTY	94	91	96.8	3.2	101	95	94	89	85	95.5	4.5	99	93	93.9	101	100	99	1	96	92	96.9	96	95	99	1	96	92	95.8	101	101	100	–	101	97	96
16	KODERI	120	110	91.7	8.3	108	92	85.2	96	86	89.6	10.4	105	86	84	86	82	95.3	4.7	89	73	82	115	105	91.3	8.7	115	109	94.8	136	136	100	–	129	103	79.8
17	DAVI VIEW	63	60	95.2	4.8	55	53	96.4	82	80	97.6	2.4	66	64	97	87	81	93.1	6.9	73	68	93.2	82	81	98.8	1.2	76	67	88.2	83	83	100	–	66	61	92.4
18	ADIGARATTY	296	286	96.6	3.4	175	151	89.7	171	163	95.3	4.7	165	170	91.9	200	192	96	4	199	172	86.4	221	221	100	–	213	190	89.2	221	221	100	–	214	172	80.4
19	MUTTINADU	239	234	97.9	2.1	133	124	93.2	219	215	98.2	1.8	133	121	91	214	210	98.1	1.9	137	127	92	210	208	99	1	137	126	92	187	187	100	–	136	114	83.9
20	BICKOL	91	81	89	11	77	74	96.1	148	133	89.9	10.1	87	78	89.7	148	143	96.6	3.4	82	78	95.1	159	159	100	–	105	96	91.4	156	156	100	–	97	84	86.6
21	GODALATTY	53	50	94.3	5.7	46	41	97.5	42	40	95.2	4.8	36	36	100	34	33	97.1	2.9	31	29	93.5	51	51	100	–	38	31	81.6	62	62	100	–	41	33	80.5
22	THAMBATTY	121	115	95	5	111	107	96.4	146	146	100	–	141	141	96.6	162	162	100	–	162	155	95.7	126	126	100	–	126	122	96.8	139	139	100	–	139	132	95
23	THODOORMATTAM	213	210	98.6	1.4	221	195	89.6	197	190	96.4	3.6	219	183	83.6	210	205	97.6	2.4	234	156	66.6	220	216	98.2	1.8	238	179	75.2	196	193	98.5	15	227	180	79.3
24	PALANIPPA ESTATE	115	108	93.4	6.1	113	98	86.7	113	106	93.8	6.2	113	87	77	89	80	89.9	10.1	89	72	80.9	138	126	91.3	8.7	94	83	87.3	129	118	91.5	85	85	77	90.6
25	MANAR ESTATE	104	100	96.2	3.8	92	83	90.2	77	74	96.1	3.9	77	73	94.7	72	68	94.4	5.6	72	72	100	71	70	98.6	1.4	71	68	95.8	65	63	97	3	68	63	97
26	[illegible]	[illegible]							130	125	96.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	103	91	88.3	149	147	98.7	1.3	101	95	94.1	152	150	98.69	1.31	144	94	65.5

		1980-81						1981-82						1982-83						1983-84						1984-85			
27	SHOL ROCK	77	74	96.1	3.9	57	43	75.4	78	73	93.6	6.4	46	39	84.8	82	79	96.3	3.7	52	46	88.5	55	83	97.6	2.4	48	38	79.2	90	89	98.9	1.1	50	40	80
28	KILINJADA	251	240	95.6	4.4	76	49	64.5	56	48	85.7	14.3	53	39	73.6	96	92	95.8	4.2	80	72	90	128	125	97.7	2.3	89	83	93.3	112	110	98.2	1.8	112	74	66.1
29	ANNAPALAM	65	50	76.9	23.1	48	35	73	47	41	87.2	12.8	45	45	100	46	46	100	-	48	41	85.4	52	45	86.5	13.5	39	39	100	65	60	92.3	7.7	45	44	97.8
30	KENTHALA	98	90	91.8	8.2	54	50	92.6	96	88	91.7	8.3	59	53	89.8	82	78	95.1	4.9	73	67	91.8	126	124	98.4	1.6	88	74	84.1	152	150	98.7	1.3	92	70	76.
31	MANTHADA	104	94	90.4	9.6	90	82	91.1	96	86	89.6	10.4	83	66	79.5	94	89	94.7	5.3	84	74	88.1	95	92	96.8	3.2	84	75	89.3	98	97	99.	1	94	64	68.
32	YELLANALLI	280	265	94.6	5.4	235	216	92	292	290	99.3	0.7	242	218	90.1	277	270	97.5	2.5	247	222	89.9	266	261	98.1	1.9	266	222	83.5	256	254	99.2	0.8	256	199	77.7
33	ARAIKATTY	111	111	100	-	102	92	90.2	125	125	100	-	116	109	94	122	122	100	-	98	95	97	131	131	100	-	116	105	90.5	147	147	100	-	132	111	84.
34	MELUR HOSAHATTY	266	260	97.7	2.3	307	269	87.6	258	254	98.4	1.6	307	269	87.6	239	236	98.7	1.3	334	192	57.5	236	234	99.2	0.8	334	287	85.9	257	257	100	-	309	274	88.7
35	MANJACONBAI	178	174	97.8	2.2	178	155	87.1	167	164	98.2	1.8	167	148	88.6	169	169	100	-	169	145	85.8	178	178	100	-	178	144	80.9	178	175	100	-	178	148	83.1
36	JAGATHALA	151	145	96	4	142	120	84.5	182	179	98.3	1.7	153	133	87	184	184	100	-	158	144	91.1	155	153	98.1	1.9	136	122	89.7	166	164	98.8	1.2	135	118	87.4
37	DENALAI	65	60	92.3	7.7	62	60	96.8	64	60	93.8	6.2	66	64	97	60	60	100	-	64	60	93.5	55	55	100	-	69	62	89.9	57	57	100	-	63	63	100
38	KETHERAI	84	84	100	-	94	93	98.9	109	109	100	-	98	90	91.8	104	104	100	-	99	94	95	82	82	100	-	105	96	91.4	79	79	100	-	98	95	96.9
39	KILODIYARATTY	95	95	100	-	65	65	100	55	55	100	-	59	59	100	60	60	100	-	59	59	100	53	53	100	-	60	57	95	56	56	100	-	60	59	98.3
40	KEKKATTY	83	82	98.9	1.1	79	62	78.5	84	82	97.6	2.4	71	70	98.6	74	74	100	-	62	52	83.9	60	60	100	-	53	44	83	53	48	90.6	9.4	38	35	92.1
41	KOLLINALAI	95	85	89.5	10.5	74	70	94.6	77	70	90.9	9.1	66	56	84.8	97	93	95.9	4.1	89	87	97.8	93	91	97.8	2.2	87	82	94.3	94	94	100	-	94	82	87.2
42	SENNANTHADA	80	75	93.8	6.2	52	41	82	75	73	97.3	2.7	45	41	91.1	120	120	100	-	47	41	87.2	127	127	100	-	47	43	91.5	154	154	100	-	44	43	97.8
43	MELODIYARATTY	52	50	96.2	3.8	52	44	84.6	46	44	95.7	4.3	46	41	89.1	45	45	100	-	45	44	97.8	46	46	100	-	46	46	100	44	44	100	-	44	39	88.6
44	GRANALLI	92	85	92.4	7.6	77	68	88.3	152	145	95.7	3.3	69	69	100	67	67	100	-	66	66	100	64	64	100	-	76	73	96	53	53	100	-	68	66	97
45	URBATHALAI	564	540	95.7	4.3	359	328	91.4	555	538	96.9	3.1	404	338	83.7	460	447	97.2	2.8	360	317	88.1	523	513	98.1	1.9	376	314	83.5	509	503	98.8	1.2	388	327	84.2
46	KANNARATTY	77	74	96.1	3.9	79	70	88.6	82	80	97.6	2.4	80	62	77.5	69	69	100	-	83	71	85.5	84	84	100	-	80	69	86.3	52	52	100	-	85	67	78.8
47	MELUR	162	162	100	-	145	125	86.2	163	163	100	-	153	143	93.5	191	191	100	-	122	158	91.9	197	197	100	-	164	142	88	187	187	100	-	169	153	90.5
48	SOGATHORAI	185	175	94.6	5.4	159	153	96.2	216	210	97.2	2.8	171	167	97.7	190	187	98.4	1.6	173	120	98.3	210	207	98.6	1.4	182	165	90.7	152	151	99.3	0.7	170	120	70.6
49	BURLIAR	53	50	94.3	5.7	53	46	86.8	52	49	94.2	5.8	52	49	94.2	65	64	98.5	1.5	65	53	81.5	66	66	100	-	46	52	78.8	49	49	100	-	49	40	81.6
50	MARAPPALAM	83	83	100	-	56	52	92.7	56	52	92.9	7.1	45	41	91.1	57	56	98.2	1.8	52	51	98.2	61	48	78.7	21.3	46	43	93.5	82	80	97.6	2.4	49	41	83.7
51																																				
52																																				
53																																				

SERIAL NUMBER	NAME OF THE SCHOOL	1980-81							1981-82							1982-83						
		NO OF SCHOOL AGE CHILDREN	NO ENROLLED	ENROLLMENT PERCENTAGE	YET TO BE ENROLL PERCENTAGE	ROLL	AVERAGE	ATTENDANCE PERCENTAGE	NO OF SCHOOL AGE CHILDREN	NO ENROLLED	ENROLLMENT PERCENTAGE	YET TO BE ENROLL PERCENTAGE	ROLL	AVERAGE	ATTENDANCE PERCENTAGE	NO OF SCHOOL AGE CHILDREN	NO ENROLLED	ENROLLMENT PERCENTAGE	YET TO BE ENROLL PERCENTAGE	ROLL	AVERAGE	ATTENDANCE PERCENTAGE
51	ACHAL	25	25	100	-	45	37	82.2	34	34	100	-	41	41	100	32	32	100	-	43	43	100
52	BEBBEN	78	75	96.2	3.8	71	63	88.7	47	45	95.7	4.3	70	62	88.6	102	102	100	-	92	80	86.9
53	BERAGANI	105	100	95.2	4.8	93	54	58	98	95	96.9	3.1	85	54	63.5	107	107	100	-	99	78	78.7
54	DIMBATTY	257	257	100	-	176	151	85.8	241	241	100	-	171	158	92.3	228	225	98.7	1.3	164	160	97.5
55	ELADA	62	59	95.2	4.8	59	49	83	60	51	85	15	48	41	85.4	67	67	100	-	72	68	94.4
56	GATHUKULLI	32	30	93.8	6.2	43	25	58.1	28	26	92.9	7.1	41	31	75.6	25	25	100	-	35	33	94.2
57	HAVOOR	187	180	96.3	3.7	146	125	85.6	205	200	97.6	2.4	146	112	76.7	211	209	98.6	1.4	138	130	94.2
58	HETTAGAL	176	170	95.6	4.4	176	169	96	164	160	97.1	2.9	164	145	88.4	177	175	98.9	1.1	177	160	90.3
59	HORASHOLAI	132	130	98.5	1.5	185	145	78.3	135	130	96.3	3.7	173	149	83.7	164	160	97.6	2.4	211	162	76.7
60	HULLATHATTY	40	40	100	-	40	38	95	45	45	100	-	45	43	95.5	48	48	100	-	48	46	95.8
61	IDUKKORAI	28	28	100	-	28	26	92.8	30	29	96.7	3.3	25	16	64	38	38	100	-	38	37	97.3
62	KIL-KOTAGIRI	358	348	97.2	2.8	302	216	71.5	360	346	96.1	3.9	337	279	82.7	327	317	96.9	3.1	319	273	85.5
63	KOTTANALLY	96	95	99	1	95	85	89.4	97	95	97.9	2.1	97	84	86.5	103	103	100	-	93	86	92.4
64	KESALADA	73	68	93.2	6.8	73	59	80.8	86	85	98.8	1.2	86	89	80.2	93	93	100	-	93	86	92.4
65	KERCOMBAI	77	75	97.4	2.6	40	37	92.5	75	73	97.3	2.7	56	49	87.5	86	86	100	-	62	57	91.9
66	KENGARAI	170	165	97.1	2.9	177	174	98.3	191	173	90.6	9.4	163	163	100	180	175	97.2	2.8	162	150	92.5
67	KANNERIMUKKU	181	190	93.9	6.1	232	192	82.7	287	130	54.9	45.1	243	192	79	271	271	100	-	241	203	77
68	KAIRBETTA HOSATTY	193	185	95.9	4.1	152	146	96.1	190	186	97.9	2.1	146	141	96.5	207	205	99	1	161	161	100
69	MILIDHANE	181	181	100	-	166	141	84.9	205	205	100	-	199	168	84.4	161	161	100	-	179	164	91.6
70	NADUHATTY	87	87	100	-	74	70	94.5	75	75	100	-	66	65	98.5	83	82	100	-	65	65	100
71	ODEN	55	50	90.9	9.1	57	41	71.9	59	56	94.9	5.1	55	45	81.8	75	72	96	4	99	73	73.4
72	SACKATHA	307	300	97.7	2.3	307	174	56.6	303	295	98.3	1.7	303	254	83.8	300	299	99	1	300	270	90
73	SULLIGUDU	186	180	96.8	3.2	174	153	87.9	204	200	98	2	191	167	87.4	219	219	100	-	225	177	78.6
74	SHOLURMATTAM	377	370	98.1	1.9	377	316	83.8	362	358	98.9	1.1	362	316	87.2	371	369	99.5	0.5	371	294	79.2
75	THABBACOMBAI	85	85	100	-	85	79	92.9	130	127	97.7	2.3	73	57	78.7	99	94	93.7	6.3	81	63	77
76	THANDINADU	72	69	95.8	4.2	72	61	84.7	76	73	96.1	3.9	76	76	100	75	75	100	-	75	59	78.6

SERIAL NUMBER	NAME OF THE SCHOOL	1983-84							1984-85						
		NO OF SCHOOL AGE CHILDREN	NO ENROLLED	ENROLLMENT PERCENTAGE	YET TO BE ENROLL PERCENTAGE	ROLL	AVERAGE	ATTENDANCE PERCENTAGE	NO OF SCHOOL AGE CHILDREN	NO ENROLLED	ENROLLMENT PERCENTAGE	YET TO BE ENROLL PERCENTAGE	ROLL	AVERAGE	ATTENDANCE PERCENTAGE
51	ACHAL	30	30	100	-	63	60	95.2	36	36	100	-	69	60	86.9
52	BEBBEN	73	73	100	-	58	53	91.3	64	59	92	8	69	60	86.9
53	BERAGANI	112	112	100	-	103	86	83.4	115	115	100	-	110	96	87.2
54	DIMBATTY	213	210	98.6	1.4	175	173	98.5	195	190	97.4	2.6	175	170	97.1
55	ELADA	85	85	100	-	78	60	76.9	82	82	100	-	82	52	63.4
56	GATHUKULLI	30	20	100	-	29	29	100	31	29	93.5	6.5	30	27	90
57	HAVOOR	209	209	100	-	154	135	87.6	228	228	100	-	163	117	71.7
58	HETTAGAL	185	185	100	-	185	154	83.2	199	199	100	-	199	151	75.8
59	HORASHOLAI	176	174	98.9	1.1	212	157	74	164	164	100	-	187	158	84.5
60	HULLATHATTY	52	52	100	-	48	44	91.6	43	43	100	-	41	37	90.2
61	IDUKKORAI	57	57	100	-	57	48	84.2	99	99	100	-	76	73	96
62	KIL-KOTAGIRI	395	374	94.6	5.4	300	217	72.3	365	345	94.5	5.5	289	220	76.1
63	KOTTANALLY	103	103	100	-	97	95	97.9	105	97	92.3	7.7	92	85	92.3
64	KESALADA	87	87	100	-	87	77	88.5	92	92	100	-	92	75	81.5
65	KERCOMBAI	92	92	100	-	64	43	67.2	97	97	100	-	65	39	60
66	KENGARAI	181	181	100	-	181	174	96.1	192	192	100	-	192	178	92.7
67	KANNERIMUKKU	215	210	97.7	2.3	264	213	80.6	230	222	96.5	3.5	268	233	86.9
68	KAIRBETTA HOSATTY	194	190	97.9	2.1	176	162	92	122	122	100	-	155	146	94.1
69	MILIDHANE	186	186	100	-	206	178	86.4	184	184	100	-	213	189	88.7
70	NADUHATTY	62	62	100	-	62	62	100	57	57	100	-	57	56	98.2
71	ODEN	82	80	97.6	2.4	80	77	96.2	79	79	100	-	74	55	74.3
72	SACKATHA	331	329	99.4	0.6	331	267	80.6	358	354	98.9	1.1	358	277	77.3
73	SULLIGUDU	216	216	100	-	251	219	87.2	202	202	100	-	265	199	74.2
74	SHOLURMATTAM	353	349	98.9	1.1	353	313	88.7	323	319	98.8	1.2	323	265	82
75	THABBACOMBAI	89	86	98.9	1.1	80	57	71.2	105	101	96.2	3.8	97	49	50.5
76	THANDINADU	69	62	100	-	62	54	87	71	71	100	-	71	56	78.8

		1980-81							1981-82							1982-83							1983-84							1984-85						
77	NEDUGULA	205	203	99	1	187	149	79.7	224	209	93.3	6.7	194	156	80.4	239	232	97	3	218	209	95.9	219	219	100	–	205	191	93.1	223	223	100	–	232	196	84.5
78	THUNGOOR	147	144	98	2	131	122	93.1	172	167	97.1	2.9	128	110	85.9	137	137	100	–	122	117	95.9	143	143	100	–	131	125	95.4	130	130	100	–	129	116	89.9
79	THENGUMARAHADA	217	210	96.8	3.2	182	150	82.4	168	162	96.4	3.6	149	143	95.9	186	186	100	–	177	168	94.9	160	160	100	–	149	114	76.5	180	180	100	–	173	140	80.9
80	KOTTACOMBAI	247	226	91.5	8.5	232	165	71.1	228	215	94.3	5.7	216	164	75.9	221	218	98.6	3.4	217	191	88	246	239	97.2	2.8	237	183	77.2	241	241	92.3	7.7	238	176	73.9
81	PEDDALA	163	163	100	–	174	150	86.2	191	173	90.5	4.5	145	133	91.7	126	125	99.2	.8	119	117	98.3	120	120	100	–	114	94	82.5	126	126	100	–	128	109	85.5
82	GUNDADA	298	277	92.5	7.5	289	206	71.3	284	265	93.3	6.7	278	195	70.1	324	298	91.9	8.1	306	216	70.6	269	247	93.5	6.5	249	199	79.9	224	199	88.8	11.2	210	193	91.9
83	KATTABETTU	252	239	94.8	5.2	251	166	66.1	262	250	95.4	4.6	262	214	81.7	271	265	97.8	2.2	267	223	83.5	330	326	98.8	1.2	298	267	89.6	252	252	100	–	337	320	95
84	THUNIYOOR	112	108	96.4	3.6	160	149	93.1	108	106	98.1	1.9	162	155	95.7	70	70	100	–	140	140	100	63	63	100	–	149	136	91.3	127	127	100	–	162	147	90.7
85	DENAD	144	140	97.2	2.8	140	122	87.1	140	138	98.6	1.4	143	129	90.2	148	148	100	–	165	156	94.5	155	155	100	–	165	156	94.5	179	179	100	–	166	145	87.3
86	KONAVAKKORAI	269	260	96.7	3.3	269	256	95.2	274	270	98.5	1.5	274	259	94.5	247	247	100	–	247	235	95.1	293	293	100	–	233	222	95.3	228	228	100	–	228	218	95.6
87	JACKNARAI	180	175	97.2	2.8	180	160	88.9	164	160	97.6	2.4	164	141	86	159	159	100	–	159	154	96.9	151	151	100	–	151	138	91.4	178	178	100	–	198	154	88.5
88	BETALADA	76	74	97.4	2.6	76	60	78.9	83	80	96.4	3.6	83	69	83.1	93	93	100	–	93	80	88	57	57	100	–	57	49	86	58	58	100	–	55	48	82.8
89	ROBBOY	176	170	96.6	3.4	176	154	87.5	183	180	98.4	1.6	183	146	79.8	148	148	100	–	150	139	92.7	165	165	100	–	169	112	67.9	111	111	100	–	111	88	79.3
90	BYANGAI	55	55	100	–	55	50	90.9	53	53	100	–	53	44	83	54	134	100	–	54	53	98.1	50	50	100	–	50	48	96	47	47	100	–	47	45	95.7
91	NARACHIR	58	55	94.8	5.2	58	50	86.2	57	55	96.5	3.5	58	50	86.2	70	70	100	–	70	70	100	63	63	100	–	70	59	84.5	90	90	100	–	94	85	90.4
92	KADASHOLAI	62	60	96.8	3.2	62	59	95.2	82	80	97.6	2.4	77	71	92.2	86	86	100	–	86	83	96.5	94	94	100	–	94	82	87.2	94	94	100	–	94	80	85.1
93	BANCHAD	84	80	95.2	4.8	87	80	92	83	81	97.6	2.4	87	79	90.8	92	92	100	–	95	85	89.5	91	91	100	–	98	90	91.8	77	77	100	–	85	81	95.3
94	SUNDATTY	130	125	96.2	3.8	123	81	65.9	102	100	98	2	102	93	91.1	100	98	98	2	128	107	83.6	116	116	100	–	134	106	82.1	107	107	100	–	143	111	77.6
95	KADAILAMBATTY	84	80	95.2	4.8	94	77	81.9	87	85	97.7	2.3	107	94	87.8	106	106	100	–	117	106	90.5	93	93	100	–	113	86	76.1	86	86	100	–	96	79	82.2
96	KATHADUTHORAI	42	42	100	–	42	41	97.6	46	46	100	–	43	40	93	52	52	100	–	130	43	93.5	43	43	100	–	40	36	90	33	33	100	–	35	28	80
97	KAIRBATTA	228	220	96.5	3.5	207	207	100	196	190	96.9	3.1	193	188	97.4	248	243	97.9	2.1	233	222	95.3	147	145	98.6	1.4	181	141	77.9	224	222	99.1	0.9	189	151	79.9
98	KARPATTY	62	55	91.7	8.3	58	45	58.4	69	65	94.2	5.8	60	53	88.3	74	74	100	–	74	70	94.7	74	74	100	–	67	54	80.6	60	60	100	–	72	59	81.9
99	PON KOTTAIYAI	205	201	98.2		179	120	67	253	249	98.4	1.6	158	110	69.6	263	260	98.9	1.1	137	100	73	259	257	99.2	0.8	133	80	60.2	260	258	99.2	0.8	130	100	76.9
100	St. Mary's [illegible]	316	313	99	5.1	315	292	92.7	235	228	97	3	235	235	100	245	245	100	–	245	241	98.4	237	237	100	–	232	232	100	256	256	100	–	251	251	100

ANNEXURE IV

DISTRICTS, BLOCKS AND SCHOOLS COVERED UNDER INTERVENTION B

District	Block	Name of the School
Coimbatore	Perur	Panchayat Union Elementary School, Karumbukadai
		Panchayat Union Elementary School, Vallipalayam
		Panchayat Union Elementary School, Jadayampalayam
		Panchayat Union Elementary School, Nayyal Bridge
		Panchayat Union Elementary School, Konavaikalpalayam
Nilgiris	Gudalur	Government Tribal Residential School, Devala
		Government Tribal Residential School, Iyyankolly
		Government Tribal Residential School, Mukkatty
		Government Tribal Residential School, Kargudy
		Government Tribal Residential School, Thorapalli
Dharmapuri	Palakodu	Panchayat Union Elementary School, VEPPANNAPALLI
		Panchayat Union Elementary School, Sikkar-thanahalli
		Panchayat Union Elementary School, BELAHALLI
		Panchayat Union Elementary School, Kodiyur
		Panchayat Union Elementary School, Palakodu
North Arcot	Gudiyattam	Panchayat Union Elementary School, Kilpatty
		Panchayat Union Elementary School, Koppam-patty
		Panchayat Union Elementary School, ULLI
		Panchayat Union Elementary School, Karuniga Samuthiram
		Panchayat Union Elementary School, Kathan-kuppam.
Kanyakumari	Rajakamangalam	Panchayat Union Elementary School, Theroor
		Panchayat Union Elementary School, Vazzuhukam-parai
		Panchayat Union Elementary School, Pottayadi
		Panchayat Union Elementary School, Amanakan Vizhai
		Government Primary School, Kanyakumari
Ramanathapuram		Panchayat Union Elementary School, Alankanur
		Panchayat Union Elementary School, Udaikulam
		Panchayat Union Elementary School, Muthu-vijayapuram
		Panchayat Union Elementary School, Theiru-ruvelli
		Panchayat Union Elementary School, Vennir Vaikal

ANNEXURE V

CHIEF MINISTER'S NUTRITIOUS NOON MEAL SCHEME
ENROLMENT DATA.

1. Name of the School : P. U. School
2. Name of the village : Kadamalai.
3. No. of children enrolled in the School (A) before & (B) After launching chief Minister's Noon Meal Scheme.

Year	Class	No. of school age children in the village (census area)	Enrolment						Average attendance	
			Census area children		Others		Total			
[1]	[2]	[3]	[4]		[5]		[4+5]		[7]	
		Boys + Girls	B	G	B	G	B	G	B	G
[A] 1980-81	I		9	6	12	2	15	8	11	6
	II		2	4	8	2	10	6	7	5
	III		5	5	—	3	5	8	5	7
	IV		4	4	1	8	5	12	5	11
	V		—	2	3	2	3	4	3	4
	Total	36 26	14	21	24	17	38	38	31	33
1981-82	I		6	1	3	2	9	3	8	3
	II		5	2			5	2	4	2
	III		6	3			6	3	6	3
	IV		1	7			1	7	1	6
	V		4	5			4	5	4	5
	Total	30 25	22	18	3	2	25	20	23	19
[B] 1982-83	I		6	6	5	1	11	7	10	6
	II		6	3	3	2	9	5	9	5
	III		6	4			6	4	6	4
	IV		5	4			5	4	5	4
	V		1	4			1	4	1	4
	Total	39 42	24	21	8	3	32	24	31	24
1983-84	I		2	6	—	—	2	6	2	6
	II		2	4	5	1	7	5	7	5
	III		8	3	0	2	8	5	8	5
	IV		6	4	—	—	6	4	6	4
	V		5	4	—	—	5	4	5	4
	Total	36 40	23	21	5	3	28	24	28	24
1984-85	I		5	3			5	3	4	3
	II		4	5			4	5	3	4
	III		3	4	3	2	6	6	6	5
	IV		7	6			7	6	6	5
	V		5	4			5	4	4	4
	Total	36 29	24	22	3	2	27	24	23	21

30 JUN
School Seal
LANKE, COONOOR

Headmaster
School

Deputy Inspector of Schools

உயரம் செ.மீ.	எடை கி.கி.	மாதங்கள்											
தலைமுடி													
a) முடி வெடித்து காணப்படுதல்													
b) செம்பட்டை முடி													
c) முடி உதிருதல்													
d) முடி வறண்டு காணப்படுதல்													
கண்													
a) பீளை வடிதல்													
b) கண் சிவந்து காணப்படுதல்													
c) கண்களில் புள்ளி													
d) கண் வறண்டு காணப்படுதல்													
e) மாலைக்கண்													
f) கண்ணைச் சுற்றி கருப்பு வளையம்													
மூக்கு													
a) மூக்கும் வாயும் சேரும் இடத்தில் புண்													
b) மூக்கில் சளி													
c) மூக்கு அடைப்பு													
வாய்													
a) மைனுவாய்													
b) உதடுகளில் வெடிப்பு													
c) வாயில் நாற்றம் வீசுதல்													
பல்													
a) பல் சொத்தை													
b) கறைபடிந்த பற்கள்													
c) சுறுகளில் இரத்தம் வடிதல்													
நாக்கு													
a) நாக்கில் வெடிப்பு													
b) நாக்கில் புண்													
c) நாக்கு சிவந்து காணப்படுதல்													
d) வெளிறிய நாக்கு													
நகங்கள்													
a) நகத்தில் அழுக்கு													
b) நகத்தில் வெடிப்பு													
c) வெளிறிய நகம்													
d) எளிதில் உடையக்கூடிய நகம்													
e) நகத்தில் புள்ளி													
தோல்													
a) வறண்டதோல்													
b) வெடித்ததோல்													
c) சொறி சிரங்கு													
d) தேமல்													
e) தவளை சொறி													
வருகைக் குறிப்பு													
a) ஒழுங்கான வருகை													
b) அடிக்கடி விடுப்பு எடுத்தல்													
காரணங்கள்													
a)													
b)													
c)													

ANNEXURE VII

CHECK LIST FOR FINDING OUT THE SANITARY PRACTICES OF CHILDREN.

வினாக்கள்

வரிசை எண்	வினாக்கள்	ஆம்	இல்லை
1.	குப்பைகளைக் குப்பைத் தொட்டியில் போடுகின்றாயா?		
2.	எச்சில், கறி ஆகியவற்றை எச்சில் தொட்டியில் அல்லது கால்வாயில் துப்புகின்றாயா?		
3.	திறந்த வெளியை கழிப்பிடமாகக் பயன்படுத்தும் போது மலஜலத்தை மண் அல்லது இலையினால் மூடுகின்றாயா?		
4.	உனது பள்ளிக்கூடம், அல்லது வீட்டை சுற்றி அசுத்தமான சாக்கடை நீர் தேங்க விடுகின்றாயா?		
5.	வீடு அல்லது பள்ளிக்கூடத்தைச் சுற்றி தேவையில்லாத செடி கொடிகளை சுத்தப்படுத்துகின்றாயா?		
6.	உணவு உட்கொண்டபின், உட்கொண்ட இடத்தை பெருக்கி சுத்தப்படுத்துகின்றாயா?		
7.	அந்தந்த பொருளை அதனதன் இடத்தில் வைக்கின்றாயா?		
8.	பொதுவான குளம், கிணறு ஆகியவற்றை சுத்தமாக வைக்கின்றாயா?		
9.	நீ இருக்கும் இடத்தை தினமும் பெருக்கி சுத்தமாக வைக்கின்றாயா?		
10.	சுவற்றில் தேவையில்லாதவற்றை எழுதுவது அல்லது கிறுக்குவதை தவிர்க்கின்றாயா?		
11.	சாக்கள் மொக்காதபடி உணவுப் பொருட்களை மூடி வைக்கின்றாயா?		

ANNEXURE VII

CHECK LIST FOR FINDING OUT THE NUTRITIONAL PRACTICES OF CHILDREN.

கீழ் காணும் வினாக்களை நன்கு வாசித்து நீ அதை செய்கின்றாயா அல்லது இல்லையா என்பதை பொறுத்து ஆம், அல்லது இல்லை என்ற இடத்தில் (✓) ( ) இக்குறிகளை போடவும்.

வரிசை எண்	வினாக்கள்	ஆம்	இல்லை
1.	உனக்கு கொடுக்கப்படும் உணவுப் பொருட்களை வீணாக்காமல் உட்கொள்கின்றாயா?		
2.	கடையில் விற்கும் பலநித வண்ணங்கள் உடைய மிட்டாய் பலகாரம் போன்றவைகளை உண்கின்றாயா?		
3.	நீ எல்லா காய்கறிகளையும் விரும்பி உட்கொள்கின்றாயா?		
4.	நீ தினமும் உணவில் கீரைகளைச் சேர்த்துக் கொள்கின்றாயா?		
5.	பலவகையான தானியத்தை உணவில் சேர்த்துக் கொள்கின்றாயா?		
6.	தின் பண்டங்கள் வாங்கிச் சாப்பிடக் கொடுக்கும் பணத்தில், பப்பாளி, காரட், நெல்லிக்காய் நிலக்கடலை போன்றவைகளை வாங்கி உண்கிறாயா?		
7.	நீ உண்ணும் உணவில் பச்சைக் காய்கறிகளைச் சேர்க்கின்றாயா?		
8.	வயிற்றுப் போக்கு சீதபேதி போன்ற நோய் வந்திருக்கும் போது எப்போதும் போல உணவு உட்கொள்கின்றாயா?		
9.	தினமும் மூன்று வேளை உணவு உட்கொள்கிறாயா?		
10.	உன் உணவோடு பால், தயிர், மோர் போன்ற-வற்றை சேர்க்கின்றாயா?		
11.	தினமும் ஏதாவது பழம் உண்கிறாயா?		
12.	உண்ணும் போது உணவில் உள்ள வெங்காயம் கருவேப்பிலை ஆகியவற்றை வெளியே எறிந்து விடுகின்றாயா?		

ANNEXURE VII

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வரிசை எண்	விவரக்கள்	ஆம்	இல்லை
13.	மூடி வைத்துள்ள தில் பண்டங்களை வாங்குகின்றாயா?		
14.	அளவான நீரில் சமைத்த சாதத்தை நறுக்குவதை விரும்புகின்றாயா?		
15.	காய், கறிகளை பெரும் துண்டுகளாய் நறுக்குவதை விரும்புகின்றாயா?		
16.	காய்கறிகள் வாடிப்போகாமல் இருக்க குளிர் சாதனை பாகையை பயன் படுத்துகின்றாயா?		
17.	வீட்டின் பிற்புறத்தில் காய் கறி, கீரை அல்லது பழமரம் வளர்க்கின்றாயா?		
18.	காய்கறி பழங்கள் அதிகமாக கிடைக்கும் காலங்களில் ஊறுகாய், பழரசம், வற்றல் தயாரிக்கும் பழக்கம் உள்ளதா?		
19.	பள்ளிக்கூட தோட்டத்தில் காய்கறி பழம், கீரை, பயிரிட உதவி செய்கின்றாயா?		
20.	உணவுப் பள்ளி கூடத்தில் வழங்கும் மதிய உணவில், விடுமுறை நாட்களிலும் உணவு உட்கொள்கின்றாயா?		

ANNEXURE VII

CHECK LIST FOR FINDING OUT THE HEALTH PRACTICES OF CHILDREN.

வரிசை எண்	வினாக்கள்	ஆம்	இல்லை
1.	தினமும் பல் தேய்க்கின்றாயா?		
2.	பல் தேய்க்க சாம்பல், மண், செங்கல் முதலியவற்றை பயன்படுத்துகின்றாயா?		
3.	நீ தினமும் குளித்து சுத்தமான உடை அணிகின்றாயா?		
4.	நீ தினமும் ஒழுங்காகக் காலைக் கடன்களை முடிக்கின்றாயா?		
5.	உணவு உண்ணுமுன்பும், உட்கொண்டபின்பும் கை கழுவுகின்றாயா?		
6.	உணவு உட்கொண்டபின் வாய் கொப்புளிக்கின்றாயா?		
7.	கழிப்பிடம் சென்று வந்தபின் கை, கால்களை கழுவுகின்றாயா?		
8.	தும்மலின்போதும், இருமலின்போதும் கை-குட்டையைப் பயன்படுத்துகின்றாயா?		
9.	நகங்களை வெட்டி அழுக்கை நீக்கி சுத்தமாக வைத்திருக்கின்றாயா?		
10.	உன்னுடைய பிரஷ், சீப்பு, டவல், சோப்பு போன்றவற்றை மட்டும் பயன்படுத்துகின்றாயா?		
11.	நீ நகங்களை பற்களினால் கடிக்கின்றாயா?		
12.	தண்ணீர் குடிக்கும்போது எச்சில் படாமல் இருக்க டம்ளரைத் தூக்கி குடிக்கின்றாயா?		
13.	உட்காரும்போதும், நிற்கும்போதும் நேராக நிமிர்ந்து உட்காருகின்றாயா?		
14.	குடிக்கும் நீரை பாகையிலிருந்து எடுக்க தனிப்பாத்திரம் அல்லது டம்ளரைப் பயன்படுத்துகிறாயா?		

ANNEXURE VII

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வரிசை எண்.	வினாக்கள்	ஆம்	இல்லை
15.	சிலேட்டை சுத்தம் செய்ய எச்சிலைப் பயன்படுத்துகிறாயா?		
16.	மூக்கு சளியை துடைக்க கையைப் பயன் படுத்துகிறாயா?		
17.	திண் பண்டங்களை மற்றவர்களுடன் பகிர்ந்து கொள்ளும் போது எச்சில் வைத்து கொடுக்கின்றாயா?		
18.	பல்லிலுள் இருக்கும் அழுக்கை கையை விட்டு எடுக்கின்றாயா?		
19.	மூக்குச் சளியை சிந்தியபின் அழுக்கை கையை எடுக்கின்றாயா?		
20.	மூக்கிலுள் இருக்கும் அழுக்கை கையினால் அகற்றுகின்றாயா?		
21.	உன்னுடைய படுக்கை, போர்வை, துணி ஆகியவற்றை வெயிலில் உலர்த்தி காய வைக்கின்றாயா?		
22.	கண்ணிலுள்ள பிளையை எடுக்க கைவிரலைப் பயன்படுத்துகின்றாயா?		
23.	நீ தினமும் தலை சீவுகின்றாயா?		
24.	தலையை சுத்தப்படுத்தி பேன் இல்லாமல் வைத்திருக்கின்றாயா?		

ANNEXURE-VIII

MODEL LESSON PLAN

Class: V

Subject: Geography

Lesson: Food crops of your district.

Nutrition Integration: Cereals- a source of energy- Basic five food group-Need for eating a mixed cereal diet.

Motivation

Tr.Q.: What is the name of the district in which you live?

Pupil: I live in Coimbatore district.

Tr.Q.: List some of the occupations of the people of your district.

Pupil: Agriculturists, agricultural labourers, mill workers, industrial labourers, teachers, doctors, lawyers etc.,

Tr.Q.: How many of you are from agricultural families?

Pupil: (Raise their hands).

Tr.Q.: What food crops does your father raise?

Pupil: Vegetables, sugarcane, cholam, kambu, paddy, and ragi.

Presentation.

Tr. : Yes, Coimbatore district raises many food crops and in today's class we will learn about crops grown in Coimbatore district. We grow vegetables like brinjal, tomato, ladies finger, cucumber etc., Among the cereals, paddy, cholam, kambu, and ragi are grown. Besides we raise ground nuts and gingely seeds.

Tr.Q.: Do you think all the crops can be grown in all the other districts also?

Pupil: No

Tr.Q.: Why do you think all crops cannot be grown in all the districts?

Pupil: Crops will not grow.

Tr. Expl: Yes, different crops need different kinds of soil, climate, fertilizers, and different amounts water.

Tr.Q.: Have you ever observed the different types of soil?

Pupil: Yes.

Tr. Expl: There are red soil, clayey soil, sandy soil, black soil etc., Paddy needs a black soil, while cholam, kambu, ragi, and ground nut need a red soil. Paddy needs a large amount of water than cholam or kambu.

Tr.Q.: Do you know what is the staple food of South Indians?

Pupil: Rice.

Tr. Expl: An extensive area in Tamil Nadu is under the cultivation of Paddy. The district of Tanjore is known as the "Rice Bowl" of Tamil Nadu.

Nutrition Integration.

Tr.Expl: Rice is one of the sources from which we get energy.

Tr.Q.: Why do we need energy?

Pupil: We need energy to play and work.

Tr.Expl: Yes. We need energy to live and carry out the vital functions such as breathing, circulation, digestion, thinking,excretion etc., When we do not get enough energy, we will not be able to live. We will be lazy. We must eat adequate food to get energy. We must eat the

right kind of food. Just like different kinds of crops need different kinds of soil, amounts of water, temperature etc., our body needs different nutrients to carry out the different functions. Nutrients are supplied by different foods like cereals, pulses, vegetables, fruits, fleshy foods, oil seeds, sugar and jaggery. According to the nutrients present in the foods, foods are classified into 5 groups which are known as "Basic Five". When we include some foods from each of the five food groups in our daily diet, the diet becomes a "Balanced Diet". By doing this, nutrients which are not present in one food is supplied by the other. Similarly we should include different cereals in our diet. Balanced diet is not an expensive one. All of us can afford it.

Review:

1. List the main crops grown in your district.
2. All the crops cannot be grown in all the districts of Tamil Nadu. Why?
3. What kind of soil is needed to raise cholam?
4. Why do we need energy?
5. How can you make your diet a "Balanced Diet"?

Assignment.

1. Collect pictures of food belonging to different groups of "Basic Five" food groups and make an album.
2. Find out how much of area is under cultivation of a) Paddy, b) Cholam, c) Ragi.
3. Bring samples of cereals that people eat in Coimbatore distict.

ANNEXURE

அகில உலக குழந்தைகள் ஆண்டில் பரப்ப வேண்டிய செய்திகள்

1. முடிந்த வரைக்கும் உங்கள் குழந்தைகளுக்கு தாய்ப்பால் கொடுங்கள் புட்டிப்பால் கொடுப்பதைத் தவிர்த்து விடுங்கள்.

2. குழந்தைகளுக்கு, 4-வது மாதம் முதல் தாய்ப்பாலுடன் எளிய திட உணவையும் கொடுங்கள்.

3. குழந்தைகளுக்கு சத்துணவைப் பகிர்ந்த மூன்று வேளை உணவிலும் கொடுங்கள்.

4. குழந்தைகளுக்கு ஒரு வயது முடிவதற்குள் தடுப்பு ஊசிகளைப் போடுங்கள்.

5. குடிப்பதற்கும், சமைப்பதற்கும் சுத்தமான நீரையே பயன்படுத்துங்கள்.

6. வீட்டிலும், பள்ளியிலும் கழிவு நீரைப் பயன்படுத்தி காய்கறி செடிகளை பயிரிடுங்கள்.

7. வீடு, பள்ளிக்கூடம், மற்றும் சுற்றுப் புறத்தையும் சுத்தமாக வைத்துக் கொள்ளுங்கள்.

8. வீட்டிலும், பள்ளியிலும், கிராமப் பொது இடங்களிலும் எச்சில் துப்புதலுக்கு தனியிடமும், கழிப்பிடங்களும் இருக்க வேண்டும் அதனை சரியான முறையில் பயன்படுத்துங்கள்.

9. குப்பைகளை உரக்குழியில் போடுங்கள். பிராணிகளின் கழிவுப் பொருட்களையும் உரக் குழியிலேயே போடுங்கள்.

10. நீர் நிலைகளை அசுத்தப் படுத்தாதீர்கள்.

11. உடலை சுத்தமாக வைத்துக் கொள்ளுங்கள், பற்கள் நகங்கள் சுத்தமாக இருக்க தனி கவனம் செலுத்துங்கள்.

ANNEXURE - X

KNOWLEDGE TEST.

கீழ்காணும் வினாக்கள் எல்லாவற்றிற்கும் விடையளிக்கவும்

மொத்த மதிப்பெண்கள்: 30

நேரம் : 1 மணி.

கோடிட்ட இடத்தை பூர்த்தி செய்யவும்:

1. நாம் உண்ணும், தானியம், பருப்பு, காய்கறிகள் ஆகியவற்றில் எல்லா உணவுச் சத்துக்களும் ---------- இல்லை.

2. ஒருவரின் புரதம், வெப்பச்சக்தி ஆகியவைகளின் தேவையானது, அவர்கள் செய்யும் தொழில், பாலி, ---------- ஆகியவற்றைப் பொறுத்து மாறுபடுகிறது.

3. காய்கறிகள், பழங்கள் ஆகிய உணவுப் பொருட்கள் ---------- வெப்பம் ஈரப்பசை போன்ற காரணங்களால் கெட்டு போகின்றன.

4. சூரியன் மறைந்தவுடன் பார்வை மங்கி காணப்படும் நிலைக்கு ---------- என்று பெயர்.

5. பொதுவான நீர் நிலைகள், சாலைகள், பூங்கா போன்றவைகளைச் சுத்தமாக வைத்தலை ---------- என கூறுகிறோம்.

6. மிகக் குறைந்த செலவில் அமைக்கும் கழிப்பிடங்களில் ஒன்று ---------- கக்கூசு ஆகும்.

7. கழிப்பிடங்கள் ---------- அருகில் அமைத்தல் கூடாது.

8. ----------, ---------- போன்றவை போனதைப் பொருட்களாகும்.

9. மது அருந்துவதினால் உடலினுள்ள ---------- அகற்றப்பட்டு நிசுக்கள் உலர்ந்து விடுகின்றன.

10. உணவுப் பொருட்களில் அடங்கியுள்ள சத்துக்களைப் பொறுத்து உணவினை ---------- வகையாகப் பிரிக்கலாம்.

11. ---------- உணவை உட்கொள்வதின் மூலம் ஒரு உணவில் இல்லாத உணவுச் சத்துக்களை மற்ற உணவிலிருந்து பெறலாம்.

12. குறைந்த வெப்ப நிலையில் உணவுப் பொருட்களை சேமிக்கும் போது ---------- ஏற்படும் மாறுதல் உண்டாவதில்லை.

கீழ்க்காணும் வினாக்களுக்கு ஓரிரு வாக்கியங்களில் விடையளிக்கவும்:

1. சரிவிகித உணவு என்றால் என்ன?

2. அடிப்படை ஐந்து என்றால் என்ன?

3. புரதக்குறைவினால் ஏற்படும் நோயின் பெயர் என்ன? அதன் அறிகுறிகள் இரண்டினை எழுதுக.

4. ஒரு குழிக் கக்கூஸ் அமைக்கத் தேவையான குழியின் அளவு என்ன?

5. குழிக் குக்கூசு அமைப்பதினால் ஏற்படும் நன்மைகள் யாவை?

6. குடிப்பழக்கத்தினால் ஏற்ப்படும் தீமைகளில் ஏதேனும் இரண்டினைக் குறிப்பிடுக.

7. காய்கறிகள், பழங்கள் அழுகாமல் இருக்க என்ன செய்வாய்?

8. கலப்படம் செய்யப்படும் உணவுப் பொருட்கள் இரண்டினை எழுது.

பொருத்துக:

1.	புகையிலையைப் சுவைப்பதால்	கலப்படம் செய்யப்படாத உணவு என்பதைக் குறிக்கும் முத்திரை.
2.	எடை குறைவு	புரதச்சத்து, மாவுச்சத்துக் குறைவில் அறிகுறி
3.	நீரைக் கொதிக்க வைப்பதின் மூலம்	பருவாகப் பயன் படுத்தலாம்
4.	மைனா வாய் என்பது	வாய் ஓரங்களில் புண் காணப்படுதல்
5.	வஸ்பதி	ரவை கலப்படம் செய்யப்படுகிறது
6.	பிறருடைய பிரஷ்ஷ சீப்பு	இயற்கையாக கிருமி நாசினி
.	கோப்பு, டவல் போன்றவை பயன்படுத்துவதால்	புற்று நோய் ஏற்பட வாய்ப்புண்டு
7.	குழியில் உள்ள கழிவுப்பொருள் மக்கிய பின்	தொற்று நோய்கள் பரவுகின்றன.
8.	சூரிய ஒளி	
9.		

ANNEXURE XI

TEST ON PROBLEM SOLVING ABILITY

கீழே நமது அன்றாட வாழ்வில காணப்படும் சில சூழ்நிலைகளும் அவற்றை சமாளிக்கும் விதங்களும் கொடுக்கப்பட்டுள்ளன. அதை வாசித்து உன் விடைக்கான காரணத்தை அதன் காரணத்திற்கு நேராக (✓) என்ற குறியிடவும்

1. உன்னுடைய வீட்டில் அப்பா, அம்மா, மற்றும், பாலர் பள்ளிக்குச் செல்லும் தம்பி ஆகியோர் உள்ளனர். உன் வீட்டில் இரண்டே கோழிகள் முட்டை இருக்கின்றன. அவற்றை யாருக்கு கொடுக்க வேண்டும் என்று நினைப்பாய்?

   1. வீட்டில் உள்ள நான்கு பேர்களுக்கும் சரி சமமாகப் பங்கிடுவாய்
   2. அப்பாவிற்கும், அம்மாவிற்கும் கொடுக்க விரும்புவாய்
   3. நீயும் உன் தம்பியும் எடுத்துக் கொள்வீர்கள்.

உன் விடைக்கான காரணம்:

   1. வீட்டில் உள்ள அனைவருமே முக்கியமானவர்கள்
   2. அப்பாவும் அம்மாவும் வேலைக்கு செல்வதால் அவர்கள் உண்பதே சரி?
   3. தம்பியும் நீயும் வளரும் பருவத்தில் உள்ளதால் எங்களுக்கு அதிக புரதம் தேவைப்படுகிறது. எனவே நாங்கள் உண்பதே சரி.

2. உன் அம்மா உன்னிடம் பருப்பு வாங்கிவரும்படி ரூபாய் கொடுத்துள்ளார்கள் அவர்கள் உன்னை நல்ல தரமான பருப்பு வாங்கி வரும்படி கூறியிருக்கின்றார்கள் உன் வீட்டின் அருகில், பெட்டிக்கடை, மற்றும் தனியார் நடத்தும் கடை, கூட்டுறவு அங்காடி உள்ளது. நீ எந்தக் கடைக்குச் செல்வாய்?

   1. பெட்டிக்கடைக்கு தென்று வாங்கி வருவேன்
   2. தனியார் நடத்தும் கடைக்குச் செல்வேன்
   3. என்ற முத்திரையிடப்பட்டு பாலித்தீன் பைகளில் அடைத்த பருப்பை வாங்க வருவேன்.

உன் விடைக்கான காரணம்:

   1. பெட்டிக்கடை வீட்டிற்கு மிக அருகில் உள்ளது. எனவே அதிக தூரம் நடக்கத் தேவையில்லை
   2. தனியார் கடைகளில் வாங்கும் பொருள் தரமானது
   3. என்ற முத்திரையிடப்பட்ட பொருள் கலப்படமில்லாதது. அரசாங்கத்தினரால் விலை நிர்ணயிக்கப்பட்டுள்ளது.

3. உனது கிராமத்தில் பரவலாக அம்மை நோய் கண்டுள்ளது. அது பரவாமல் தடுக்க நீ என்ன செய்வாய்?

1. உன் கிராமத்திற்கு அருகிலிருக்கும் சுகாதார நிலையத்திற்கு அறிவித்து அம்மை பால் வைத்துக் கொள்ள ஏற்பாடு செய்வேன்.

2. நோய் பரவுவதை அறிந்தும், பேசாமல் இருந்து விடுவேன்.

3. எப்போதும் போல நோய் கண்டவர் வீட்டிற்கு சென்று வருவேன்.

4. மேற் கூறிய எதையும் செய்ய மாட்டேன்.

4. உனக்கு இரத்த சோகை நோய் உண்டென்றும், எனவே மீன், ஈரல், கீரை, பாகற்காய் ஆகியவற்றை உணவில் சேர்த்துக் கொள்ளும்படி மருத்துவர் கூறியிருக்கின்றார். உன்னிடம் அவ்வகைப் பொருட்களை வாங்க போதிய பணம் இல்லை. அப்போது நீ என்ன செய்வாய்?

1. மருத்துவர் சொன்ன எந்த உணவும் உட்கொள்ளாமல் சாதாரணமாக உண்ணும் உணவை உண்பேன்.

2. கையில் உள்ள பணத்தில் டானிக், மாத்திரைகள் வாங்குவேன்.

3. மற்றவரிகளிடம் கடன் வாங்குவேன்.

4. சமையலறையின் பின்புறத் தோட்டத்தில் இரும்புச்சத்து அதிகமாயுள்ள காய்கறி கீரைகளை வளர்த்து உணவில் சேர்ப்பேன்.

5. உனது கிராமத்தில் கழிப்பிடங்கள் இல்லை. ஆனால் திறந்த வெளியுண்டு. திறந்த வெளியில் மலம் கழிப்பதால் ஈக்கள் உட்கார்ந்து நோய் பரவும் இந்நிலையை எவ்வாறு சமாளிப்பாய்?

1. ஊருக்கு ஒதுக்குப்புறமான இடத்தை மலம் கழிக்கப் பயன்படுத்துவேன்.

2. நடை பாதை சாலை ஓரங்களைப் பயன்படுத்துவேன்

3. திறந்த வெளியைப் பயன்படுத்தினாலும், மலத்தை மண்ணினாலோ அல்லது, சாம்பல், இலை போன்றவற்றினால் மூடிவிடுவேன்.

4. மேலே குறிப்பிட்ட எதையும் செய்ய மாட்டேன்.

ANNEXURE XII

PARENT'S INTERVIEW SCHEDULE.

கீழ் குறிக்கப்பட்ட உணவு பழக்கங்களில் எதை பின்பற்றுகிறீர்கள் என(✓) குறியின் மூலம் குறிப்பிடவும்.

1) அரிசியை வேக வைக்கும் போது

அ) அவ்வான நீரை பயன்படுத்துதல்

ஆ) வைக்கோல் பெட்டி பயன்படுத்துதல்

இ) அதிக அளவு நீரில் வேகவைத்து கஞ்சியை வடித்து விடுதல்

ஈ) வடித்த கஞ்சியை ரசம், அல்லது குழம்பு வைக்கப் பயன்படுத்துதல்.

2) கீரை, காய்கறிகள் சமைக்கும்போது:

அ) காய் கறிகளை கழுவிய பின் நறுக்குதல்

ஆ) பெரிய துண்டுகளாக நறுக்குதல்

இ) காய்கள் வேகவைத்த நீரை கீழே ஊற்றி விடுதல்

ஈ) சோடா உப்பு பயன்படுத்துதல்

எ) காய்களை மூடி வைத்து வேகவைத்தல்

ஏ) மிக சிறு துண்டுகளாக நறுக்குதல்

3) உணவு பரிமாறும் போது:

அ) சிறு குழந்தைகள், கர்ப்பிணி, பாலூட்டும் தாய்மாருக்கு முக்கியத்துவம் கொடுத்தல்

ஆ) கணவருக்கு முக்கியத்துவம் கொடுத்தல்

இ) எல்லோரையும் சமமாக கருதுதல்

4) வீட்டில் யாவருக்காவது வயிற்றுப்போக்கு, சீத பேதி கண்டிருக்கும்போது:

அ) அதிகமான அளவு தண்ணீர் குடிக்கச் செய்தல்

ஆ) எப்போதும் போல உணவு உட்கொள்ளச் செய்தல்

இ) உணவை குறைத்து அரைப் பட்டினி போடுதல்

ஈ) மந்திரித்தல்

5) கடைகளில் சாமான்கள் வாங்கும்போது:

அ) முத்திரையிட்ட பொருட்களை வாங்குதல்

ஆ) தரமானப் பொருட்களை வாங்குதல்

இ) கலப்படம் செய்யப் பட்டிருந்தாலும் விலை குறைவான பொருட்களை வாங்குதல்

ஈ) கவர்ச்சியான, வண்ண அடர்வு நிறைந்த பொருட்களை வாங்காமலிருத்தல்.

6) காய்கறிகள், பழங்கள் அதிகமாக வீட்டில் விளையும்போது:

அ) ஜாம், பழரசம், ஊறுகாய் தயாரித்தல்

ஆ) பாதுகாப்பு முறை தெரியாததினால் கிடைக்கும் சமயத்தில் மட்டும் பயன்படுத்துதல்

இ) மிகவும் மலிவான விலைக்கு விற்று விடுதல்

7) உணவுப் பொருட்கள், உணவுச் சத்துக்கள் வீணாவதைத் தடுக்க:

அ) உணவை திட்டமிட்டு சமைத்தல்

ஆ) சத்துப் பொருட்கள் வீணாகாமல் சமைக்கும் முறைகளைப் பின் பற்றுதல்

இ) மாற்று உணவுப் பொருட்களை ( ) விலை அதிகமான சர்க்கரைக்குப் பதிலாக ..... வெல்லம் அரிசிக்குப் பதில்- . சோளம், கம்பு கேழ்வரகு ஆகியவை பயன் படுத்துதல்.