

# **IMPACT OF INTEGRATED CHILD DEVELOPMENT SERVICES ON THE NUTRITIONAL STATUS OF PRESCHOOL CHILDREN**

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**THESIS**  
**SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT  
FOR THE DEGREE OF MASTER OF SCIENCE  
IN FOOD SCIENCE AND NUTRITION**

**FACULTY OF AGRICULTURE  
KERALA AGRICULTURAL UNIVERSITY**

**DEPARTMENT OF HOME SCIENCE  
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VELLAYANI, TRIVANDRUM**

**1990**

## DECLARATION

I hereby declare that this thesis entitled "the impact of ICDS on the nutritional status of pre-school children is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title of any other University or Society.

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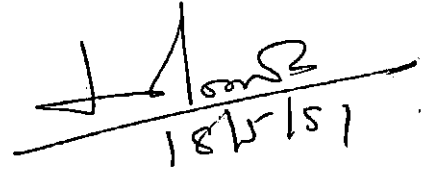
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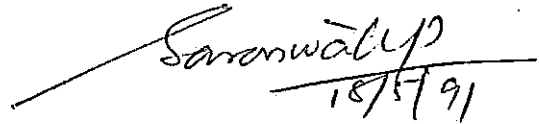
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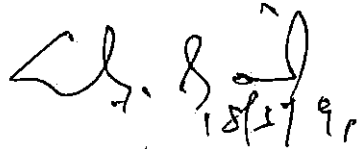
  
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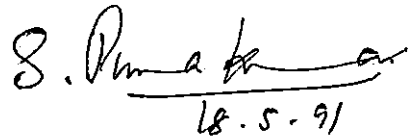
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## ACKNOWLEDGEMENT

I wish to place on record my deep sense of gratitude and indebtedness to the Chairman of my Advisory Committee, Dr (Mrs) L. Prema, Professor and Head, Department of Home Science for suggesting the problem, valuable guidance, excellent suggestions and sincere help during the course of investigation and in the execution of the thesis.

I extend my sincere gratitude to Dr (Mrs) P. Saraswathy, Associate Professor, Department of Agricultural Statistics for the sincere help and timely advice in the sample selection and statistical treatment of the data.

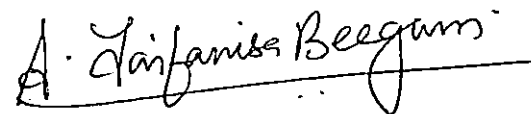
I am grateful to Dr A.G.G. Menon, Director of Extension, Kerala Agricultural University and Dr V. Usha, Assistant Professor, Home Science Department for functioning as the members of the Advisory Committee and for the sincere help and timely advice in the execution of thesis.

Smt N.K. Vimalakumari, Associate Professor, Department of Home Science, for the valuable advice and help throughout the period of study, *deserves my most sincere greatfulness.*

I wish to express my thanks to the staff and students of Home Science Department for their sincere co-operation.

Grateful acknowledgement is also given to the Dean,  
College of Agriculture for rendering the facilities during  
the course of investigation.

I also extend my gratitude to Rural Development  
Department for rendering deputation during the course of  
my study and for necessary financial assistance.

A handwritten signature in cursive script that reads "A. Jaifanisa Beegum". The signature is written in black ink and is positioned above a horizontal line.

A. JAIFANISA BEEGUM

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# INTRODUCTION

## INTRODUCTION

The most crucial issue before humanity today is the welfare and future well-being of the children of the world particularly in the developing Countries where poverty and malnutrition embounded with illiteracy, ignorance and superstition, hold out a serious threat to a very large section of the future citizens of the world (Reddy, 1979).

UNICEF (1988) in their report on the "State of world's children, have stated that out of 14.5 million infants nearly 5 million die before they celebrate their first birth day. According to Grant (1986) of about 34 million children born in South Asia each year, around 4 million do not survive their first birthday, another million die before the age of 5 and not all of those who survive grow upto healthy and productive adults.

Among developing Countries, India deserves special attention since in this Country the child population accounts for 40 percent of the population and they represent the most critical part of our human resources. It is the present state of health and nutrition of this crucial age group that will largely determine the quality and the calibre of our nation in 2000 AD and beyond (Gopalan, 1983). But the condition of these children are

appaling as exhibited by the under five mortality which is estimated to be at the rate of 154 per 1000 live births and the infant mortality around 101 per 1000 live births (UNICEF, 1988). Thus India has been classed among the Countries having "High USMR".

Gopalan (1983) reports that in India 15.5 million young children, between the ages from birth to 5 years die each year mainly as a result of malnutrition, diarrhoea, and respiratory diseases. The causes of infant mortality have been brought out by Murali et al. (1975) who have also pointed out that there is a definite correlation between socio-economic status and infant mortality in India.

The surveys conducted by National Nutrition Monitoring Bureau shows that nearly 2 to 3 percent of children between the ages of 1 and 3 years belonging to poor sections of India suffer from extreme forms of malnutrition. Shukla (1982) reports that vitamin A deficiency has handicapped atleast one million children in our Country and that 40 percent of infant and children have anaemia with the associated chain of incapacitations and complications, while 5 percent of preschool children of under privileged classes have been found to be suffering from frank or radiologically demonstrable rickets and an ever increasing



number of cases of convulsions in infants are being recognized as caused by infantile beriberi and other hyper vitaminosis B conditions. UNICEF (1988) reports that 33 percent of children under five in India are suffering from mild/severe forms of malnutrition.

The health profile of the children of our Country as reflected in the preceding lines is reported to be due to impoverished economic social and environmental conditions existing within the Country which impedes their physical and mental development (ICCW, 1984). Hence as reported by NIPPCD (1984), in order to develop a significantly sound and economically feasible nutrition strategy, all developmental efforts need to be focussed on children between the age group of 0-6 years. Vijayaraghavan (1989) is of the opinion that more than half of the child population is growing up, undernourished, subsisting on inadequate diets, and early detection and initiation of prompt and appropriate remedial measures are, therefore very important to control malnutrition.

As malnutrition continues to be a national problem in India, with little light of abatement, early detection and initiation of prompt and appropriate remedial measures are very important to control malnutrition. Control of malnutrition in India has passed through several stages,

from the stage of adhoc vertical and isolated programme, India has reached the plane of integrated multisectoral strategies (ICMR, 1986). Integrated Child Development Services is best understood as a programme for child protection as well as child development. It takes a holistic approach to the child and attempts to improve both his prenatal and postnatal environment. It extends beyond the existing health and education systems to reach children and their mothers in villages and slums and delivers to them integrated package of services such as non-formal preschool education, immunization, health check up, supplementary nutrition, medical referral services, nutrition and health education for women.

The integrated child development services scheme, as the largest single programme of child development in the Country, translates into action, the emphasis given in the national policy for children to the integrated delivery of early childhood services and services for expectant and nursing mothers (Krishnan, 1984).

The focal point of the convergence of these services is the Anganwadi or preschool child centre, located within the village itself. Each Anganwadi is run by an Anganwadi worker (AWW) and her helper, and usually covers a population of 1000 in rural and urban areas (ICCW, 1984).

Although the Anganwadi is a centre for treatment referral, its main emphasis is on the promotion of round mental and physical development by empowering families with both the knowledge and the necessary support to protect their own children's normal growth. In continuation with today's knowledge breakthroughs in the fields of immunization, breastfeeding, oral rehydration, growth monitoring, weaning and birth spacing, a "social breakthrough" such as Integrated Child Development Services is showing that it has potential to significantly reduce child death's and child malnutrition (UNICEF, 1987).

Because of its scale, the Integrated Child Development Services has become one of the most studied programmes anywhere in the developing world (UNICEF, 1987). There have been many independent evaluations, comprising of studies and surveys on Integrated Child Development Services, done by the Planning Commission, Medical Colleges, NIPCCD, Home Science Colleges, and many academicians, in depth. Two major evaluations were conducted by the Planning Commission in 1976 and 1978, on the basis of which the scheme was expanded in 1982. UNICEF sponsored an independent assessment of the scheme in 1981 to establish cost effectiveness of this programme. Subsequently various academicians have carried an impact evaluation on diverse aspects of the programme. However, these attempts have

by far been isolated and piece-meal in nature and cannot be called concurrent evaluation, which take stocks of existing situation of inputs viz-a-viz outputs or benefits flowing to the target groups from time to time (Sharma, 1984). But it is surprising to see that studies pertaining to implementation of ICDS in Kerala State are rare or poorly documented. A case study on Chavara Integrated Child Development Services rural project (ICCW, 1984) and a comparative study on the immunization status of children in ICDS and non-ICDS blocks of Kerala (Thankappan and Ramankutty, 1990) are a few studies conducted in Kerala which are worth mentioning. However studies that assess the impact of Integrated Child Development Services on the nutritional status of preschool children in Kerala are still remote and scarce. Hence the present study entitled "Impact of Integrated Child Development Services on the nutritional status of preschool children" was undertaken with the following objectives.

1. To determine the impact of Integrated Child Development Services on the nutritional status of preschool children.
2. To assess the attitude and knowledge of mothers towards the components of ICDS.

Although the Anganwadi is a centre for treatment and referral, its main emphasis is on the promotion of all round mental and physical development by empowering families with both the knowledge and the necessary support to protect their own children's normal growth. In continuation with today's knowledge breakthroughs in the fields of immunization, breastfeeding, oral rehydration, growth monitoring, weaning and birth spacing, a "social break through" such as Integrated Child Development Services is showing that it has potential to significantly reduce child death's and child malnutrition (UNICEF, 1987).

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3. To assess the extent of adoption of these components by the beneficiaries.
4. To make suggestions for programme improvement especially, with reference to nutrition education.

# REVIEW OF LITERATURE

## REVIEW OF LITERATURE

Malnutrition is a malady affecting all the developing countries which constitute two-third of the population of the world (Bhattacharya, 1978). This condition is widely prevalent in India and is seen in its worst form among the children between 1 to 5 years (Subramoniam, 1978). Mortality rate in this age group is also high, around 40 percent as against 6 percent to 8 percent in developed countries (Subramoniam, 1978). Forty four percent of children in our country, in the age group of 2 to 3 years, are reported to suffer from protein energy malnutrition (Geetha, 1986). According to Sharma and Nayar (1986), mild and moderate degrees of growth retardation due to protein energy malnutrition was found to be common among preschool children.

According to Cravioto et al. (1978) malnutrition during critical phases of early growth can lead to the stunting of physical growth, to sub-optimal intellectual development, and poor neuro-integrative competence in children. In a study conducted by Sauberlich et al. (1974) it was revealed that there were only 4.6 percent of boys and 6.3 percent of girls who weighed more than 80 percent of the normal standard. Indirabai et al. (1979) had also found out that the children in Rural Andhra Pradesh



weighed less than the normal standard at all ages. Forty five percent of the preschool population in India are estimated to suffer from moderate malnutrition which is associated with weight deficit and growth retardation, Gopalan (1984), Chandra and Thayar (1985) had conducted an initial survey of 3082 children in Tamil Nadu and found that only 5 percent of the children surveyed were normal and 20 percent were in severe degree of malnutrition.

Findings of Thyagarajan (1976) indicates that growth retardation of 90 percent of preschool children in our country is mainly due to malnutrition. Similar results are reported in a study conducted at Delhi by Seth et al. (1979) who had found out that comparison of weight and height between various groups of children revealed a significant effect of nutrition on growth. According to Bhan et al. (1986) stress should be given to growth promotion rather than assessment of malnutrition in any nutrition survey conducted.

Devadas (1979), Sreenath et al. (1978) and WHO (1979) have reported the determinants of malnutrition to be poverty, poor socio-economic status, inadequate food intake, ignorance, false believes, traditions, caste, poor living condition, poor recreational facilities and faulty food habits. According to Devadas (1978) and Arya (1979)

defective psychological functioning, lack of concentration, school failure, poor intellectual performance and lowered adaptive functioning and decreased response to stimulation are certain characters found to be prevalent in the survivors of early malnutrition. Reddy and Srekantia (1978) and WHO (1979) had reported failure of the immune system of infants and children to outside infections is a major indicator of malnutrition. According to Krishnamurthy et al. (1978) parental literacy and per capita income of the family had an impact on the nutritional status of pre-school children. Immediate consequences of malnutrition, according to WHO (1979) are high morbidity and mortality and the long term consequences are chronic under nutrition, retarded growth and mental development and stunted adult stature. An independent study conducted by Thimmayamma et al. (1981) indicated that socio-economic differences positively influence the dietary pattern and nutrient adequacies of preschool children.

Mohmud (1985) has revealed that seasonal fluctuations is an important determinant which may markedly affect the nutritional status of children. Visweswara Rao (1987) had suggested that socio-economic and literacy status of parents and significant seasonal variations were found influential on variations in health and nutritional status, intake of foods and dietary habits of preschool children.

Chopdar (1979) had conducted a survey among children in Western Orissa, results of the survey indicated that 42.2 percent of the children were found to be normal and the rest were in different grades of malnutrition. Studies by Sunder Lal (1982) revealed that home management and monitoring appears to be much rewarding, feasible and practical way to deal with the problems of severely malnourished children. According to Chatterjee (1984) the proximate determinants of child malnutrition are maternal factors and nutritional status and occurrence of infection in children. Studies of Mandowara (1986) conducted in an ICDS Block at Chhotisadri (Rajasthan) revealed that 10.10 percent of children were having severe grades of protein energy malnutrition. It was also found that maximum number of children (56.26 percent) were malnourished under 2 years of age and of these comparatively higher percentage (55.21 percent) were female children.

According to Ganasundaram and Santhanakrishnan (1986) less than 2.4 percent of the preschool children surveyed at urban slums of Madras had III and IV grades of malnutrition compared with the national figure of 8.5 percent. The observations of Devadas et al. (1976) had shown that consumption of food supplements had resulted in better nutritional returns among the vulnerable population. Naidu et al. (1979) opined that supplementary feeding had

beneficial impact on growth of under nourished children. Devadas (1980) has stated that prevention of malnutrition and ensuring good nutrition is a more desirable investment than spending money on several forms of productive developmental activity. Studies conducted by Sunder Lal and Ramesh Goomer (1984) revealed that incidence of low birth weights was 3.40 percent if the cut off level is used as 2000 gms.

According to Tandan and Sahai (1984) village level management of severely malnourished children by local workers is an acceptable effective approach. Well organized supplementary feeding programmes along with other health inputs are expected to improve the health status of children is one of the means suggested by Ganasundaram and Santhan (1986). According to Gopalan (1978) an aspect of supplementary feeding programmes, not often appreciated was that continuous contact among a group of malnourished person who could promote various cross infections and nullify the benefit of feeding programmes. He has suggested that the early home approach can be attempted in preference to in the spot feeding in order to meet this situation.

Mehta et al. (1980) conducted an evaluation study of supplementary feeding programmes for preschool children,

in the union territory of Chandigarh. They revealed that the special nutrition programme was not a success because there was no beneficial effect on growth and the calorie gap. Devadas (1982) revealed that nutrition intervention right from pregnancy through preschool age can prevent growth retardation and malnutrition in children. However, studies from Gambia had shown that consumption of food supplements of about 700 Kcal/day for 12 months or larger did not result in alteration in body weight (Prema Ramachandran, 1987). Rajendran (1980) opined that apart from re-approvalment of nutritional status, feeding programmes do contribute to the non-nutritional benefits such as social integration among children, community organization, channel to health and family planning and also income transfer to poverty groups. Studies conducted in selected rural, urban and tribal projects in four States of Karnataka, Nagaland, Rajasthan and Delhi by Widge et al. (1980) revealed that main attraction for the enrolment in anganwadi centres was the provision of supplementary food. Periodic deworming, iron supplements and therapeutic nutrition to children, proper attention and supervision, health and nutrition education are of paramount importance to prevent the recurrence of severity of the degree of malnutrition and improve their health status (Santhana Krishnan and Chandralekha, 1986). The study

can be higher in cognitive development than the non-participants. Through these feeding programmes socio-economic transformation of the under privileged was being achieved (Devadas, 1986). McNamara (1976) has commented that malnutrition is the severe contribution to the urban poverty syndrome. Mahadevan (1977) has reviewed that most critical nutritional problem in poor urban areas was the feeding, upto the age of three years. UNICEF (1977) pointed out that child malnutrition in poor urban areas had been shown to have a high co-relation with the mothers' income and it was also reported that efforts to create income generating activities for women were essential to alternate child malnutrition. Vijayakumar and Gupta (1975) observed that lesser the per capita income more was the prevalence of malnutrition. According to Kumar (1978) higher income from maternal employment was to alternate economic distress and to improve nutritional status of children. Atabong (1984) had the opinion that family health status and income status could be improved, if women were well trained in agriculture, nutrition, health practices as well as in vocational skills. According to Visweswara Rao and Gopalan (1972) under existing economic conditions and given food resources, limitations of the

family to three or less will significantly improve the nutritional status of preschool children. Khanna et al. (1984) had reported that child care practices were effected by mother's education, socio-economic status and size of the family. Studies of Chandrasekaran and Aswathy (1982) showed that according to family size, the nutritional status of the children might improve. They also revealed that urban families had less number of family members in comparison to tribal and rural families and there was an improvement in the nutritional status of urban children due to the small family size.

Terral et al. (1982) had identified development indicators that help to reduce infant mortality rate which include literacy of women, availability of medical services, awareness of family planning measures, economic independence of women of the reproductive age, employment opportunities in agriculture, industry and other services. Vyas (1986) had rightly pointed out that improvement in health status of the mothers and children could be achieved, if individuals, families and the communities participated actively in the low cost health care interventions, since such participation might result in some behavioural change. A considerable decline in the prevalence of malnutrition from 19.1 percent in 1976 to 7.8 percent in 1983 is reported by UNICEF (1987). PAG (1976) had reported

that the nutritional well being of a country determined its health status.

Nutritional status of an individual or community could be assessed by various yard sticks, as dietary survey such as recall method or weighment, physical anthropometry, bio-physical and bio-chemical tests and vital statistics (Blackburn, 1977). According to Gopalan (1977) a pre-requisite to plan for the well being of preschool children was thorough understanding of their dietary intake and their nutritional status. According to Brown and Nomani (1978) nutritional assessment was a necessary tool of any attempt to identify and analyse the nutritional problems of a community. In order to distinguish the well nourished from the malnourished and under nourished, assessing the nutritional status of the community was indispensable (Gopalan, 1978). The nutritional status of young children is probably the most sensitive indicators of sudden changes in food availability and health status (UNICEF, 1988).

Anthropometry is one of the most important methods of assessment of growth and development in rapidly growing children (Wakhlu, 1972). Martorell et al. (1980) had reported that height and weight were the simplest and most sensitive and useful indicator for the evaluation of nutrition interventions. Chaudary and Rao (1984) used a



combination of anthropometric measurement to evaluate various grades of undernutrition in children. NNMB surveys (1983) conducted in the States of Andhra Pradesh, Tamil Nadu, Orissa and Gujarath revealed that growth status in terms of weight for age of preschool children (1-5 years) was considered to reflect the general nutritional status of the community to which they belonged. In children, weight and height for age was the most widely used parameter for assessing growth and nutritional status (Prema Ramachandran, 1987). According to Behera et al. (1982) the mean weight increased with increase in age. The boys being heavier than the girls at all ages. The mean weight from 3-72 months was about 76.31 percent and of Harward standard and 98.06 percentage of ICMR average. Chopdar (1979) had conducted a survey in tribal Integrated Child Development Services Block and 5,592 preschool children were examined clinically for evidence of ocular changes due to vitamin A deficiency out of 5,592 children, 1,636 children (19.25 percent) were found to have definite ocular changes. Sunderlal et al. (1984) viewed that there was a rapid decline in the prevalence of corneal xerophthalmia leading to loss of sight. A study of Devadas (1986) indicated the impact of nutritional outcomes of a massive feeding programme in Tamil Nadu on the clinical picture of children. According to this study, 78 percent

were free from obvious deficiency signs.

According to Sunderlal (1983) growth monitoring by anganwadi workers was a good system of surveillance. Growth monitoring, properly done is an excellent tool for assessing the growth and development of a child, for detecting the earliest changes in growth and to bring about appropriate response to ensure that the growth continues uninterrupted (Bhan et al., 1986). According to these authors growth monitoring was used on the largest scale in Integrated Child Development Services. According to Rao (1987) the growth chart was one of the measures for identifying growth faltering, a sign of invisible malnutrition. Gopal Das (1987) had rightly pointed out that growth charts in the under five clinics could reduce the gap between prevention and cure of malnutrition. According to Vasudeva and Sunderlal (1980) there was evidence that Auxillary Nurses and Midwives (ANMS) were paying more attention to promotional health aspects of mothers and children.

Integrated Child Development Services (ICDS) today covers 30 percent of a total 5143 community Development Blocks and 187 urban projects in India (ICDS, 1986). According to the monitoring report of the Department of Women and Child Development (1986) the percentage coverage

of health and nutritional services to preschool children in Integrated Child Development Services as on 1983 was 59.3 percent of the total child population in India. The coverage of pre-school children and pregnant and lactating women for supplementary nutrition under Integrated Child Development Services was reported to be 87.78 lakhs and 16.87 lakhs respectively (ICDS, 1986).

Integrated Child Development Services is the most comprehensive and ambitious programme both preventive as well as development in design. This programme is expected to increase child survival among children. A noticeable drop in the birth rate has been reported in areas where Integrated Child Development Services has succeeded in improving child health and survival (UNICEF, 1987).

Patel and Udani (1982) evaluated and studied the impact of various services provided through Integrated Child Development Services showed that this scheme has made tremendous impact on the health status of the most needy children from poorest socio-economic class. With the inception of Integrated Child Development Services, the coverage of children for immunisation and preschool education were also reported to be higher. This development programme is expected to cover vulnerable population available in rural (58 percent) tribal (31 percent) and

urban (11 percent) areas in our country (AIIMS Survey Report, 1983). The immunization rates and school enrolment levels were usually higher and school drop out rates were reported to be lower in Integrated Child Development Services areas (UNICEF, 1987). An analysis regarding the nutritional status of children in the age group of 0 to 6 in Madras urban project by Natarajan (1986) revealed that 50 percent of the children in the total population who had been benefited by Integrated Child Development Services were in the green group as per Indian Academy of Paediatric's nutritional grading. Bhan et al. (1986) after their studies in the Integrated Child Development Services project of Haryana concluded that stress should be given to growth promotion rather than assessment of malnutrition.

According to Sauberlich et al. (1974), the most objective mean for assessing the nutritional status and to evolve some normal patterns of deficiency would be based on biochemical analysis of blood and urine. Nelson and Swaminathan (1969) had pointed out that clinical examination adapted in nutrition survey was a careful medical examination of various symptoms and signs that were more or less associated with nutritional deficiencies. Gupta et al. (1978) had reported that clinical examination was

one of most essential and the simplest tool used in the evaluation of nutritional status.

With the advent of the Integrated Child Development Services the prevalence of severe grades of malnutrition (grade III & IV) declined markedly and the scheme was reported to bring increased maternal and child health services to the community (Sunderlal, 1980). Economic analysis of the implementation of Integrated Child Development Services was done by Makinen (1983) and the study revealed that the project expected significant reduction in the incidences of malnutrition and infant mortality and young child mortality (Makinen, 1983). Studies conducted on Integrated Child Development Services projects by All India Institute of Medical Science (1982-'83) revealed that by the implementation of the programme, a reduction in infant mortality to 88.2/1000 live births and early childhood was achieved. According to Tandon et al. (1984), the co-ordinated approach for the delivery of health, nutrition and education services to mothers and infants through Integrated Child Development Services model had helped in reducing the infant mortality rate in India. He had also reported a reduction from 15 to 3 percent in mortality due to severe malnutrition. A study conducted by Manohar and Tomar (1984) revealed that there

was a significant impact of Integrated Child Development Services scheme on children with severe grades of Protein-Energy Malnutrition in terms of nutritional status, immunization status, mortality and morbidity.

Various studies and surveys conducted by the planning commission, All India Institute of Medical Science, National Institute for Public Co-operation and Child Development, Home Science Colleges and many academicians revealed that Integrated Child Development Services had decreased malnutrition and anaemia, other preventable diseases and infant and childhood mortality (ICDS, 1986). Survey of the children in 15, of the original Integrated Child Development Services project Blocks in India had shown that severe malnutrition had fallen from 21 to 5.4 percent over 21 months (UNICEF, 1986). According to Bhandari et al. (1981) there was not much improvement in the status of nutrition and immunization among children under 6 years after the implementation of Integrated Child Development Services Scheme. Despite many teething problems faced by the Integrated Child Development Services, nutritional and health services had been brought much closer than ever before to rural and tribal target population (Tandon et al., 1981).

According to Bhandari and Mandowara (1985) achievements of the Integrated Child Development Services were slow and poor in the last four years. Report on Integrated Child Development Services (1986) prepared by Ministry of Human Resources Development, Government of India revealed that field experience should be continuously reviewed and utilized for improving man-power development activities. Continuous monitoring and evaluation were essential to prevent deterioration during the expansion phase. Kalyankrishnan (1987) had the opinion that Integrated Child Development Services was in operation for a decade and hence now the demand for various services should be generated from the beneficiaries itself.

Patil et al. (1982) had the opinion that success of the programme depends upon its functionaries. Ramniyate Kumar et al. (1979) had opined that Medical Officers were interested in the Integrated Child Development Services Scheme and they had varying opinion on the reliability of anganwadi workers and Auxillary Nurses and Midwives (ANMs).

According to Gupta et al. (1979) the health coverage of the population could be considerably improved, provided the health staff adheres to their schedule of visit. Udani et al. (1982) had suggested that the

morbidity could be brought down if local workers from the community were trained, equipped with drugs, nutrition supplements and information to impart person to person education.

Patel (1984) had opined that there was a vital need to change the strategy of management of severe malnutrition, with a need to shift the emphasis from hospital to domicilliary management from doctor to para-medical worker, from drug to health and nutrition education from late to early and prompt treatment of minor problems to prevent fatal outcome.

Vasudeva and Sunderlal (1979) had opinions that Auxillary Nurses and Midwives (ANMs) showed a frustration at the slow pace of health improvement, but had a self image of doing useful service in terms of health and nutrition education of the families. Bengoa (1964) rightly pointed out that supplementary feeding programmes were most effective in reaching all those in need, when they were carried out as part of nutritional surveillance on primarily health care programme. It is now recognized that nutrition programme should logically be directed to the family as a unit rather than to an individual child there in (Gopalan, 1978). An evaluation study conducted as special nutrition programme (SNP) in 1980 by Rajendran



concluded that the scope of Special Nutrition Programme (SNP) started for providing only nutrition. Supplements were now being gradually expanded with additional services to make it an effective package observation during visits to SNP centres and studies had indicated that children below 3 years formed a minority among the beneficiaries due to the fact that children of this age group were most difficult to reach (Rajendren, 1980).

According to Sunderlal (1981) indicators of severe malnutrition help to pick up children needing special intervention programmes. Blackburn (1977) considerable experiences gathered through supplementary feeding programmes would indicate that programmes for children which did not actually involve the mother and which ignored other children in the family, were for dommed to failure these programmes. Nutrition education was tool for living needed by all people and was the foundation on which any programme for nutritional improvement can be built (Robin et al., 1976). When nutrition and health concepts were integrated in the curriculum of the primary school children significant improvements in their nutrition knowledge hygiene practices and health status were observed, due to a carry home effects of the knowledge to the mothers (Devadas et al., 1978).

According to UNICEF (1985) empowering mothers with present knowledge and technique of child protection was the key for unlocking the present potential for a revolution in child health. The beneficial effects of nutrition and health education had also been demonstrated through Applied Nutrition Programme (Devadas et al., 1970). Studies by Devadas (1975) had established that children were the best messengers for disseminating nutrition and health education to the families. Hence nutrition and health education should be imparted in the preschool. If the feeding programme did not involve the family and if it did not have educational impact, only a small number of children between 3-6 years in age could be covered leaving out the important group of 0 to 3 years old (Mehta et al., 1980).

Nutrition education and demonstration of cheapest cereal and pulse based preparations at the door steps of the people in the slums at least at the feeding centre would help to improve the nutrition and health status (Ganasundaram et al., 1986).

According to Kalyan Bagchi (1987) nutrition education was usually measured in terms of knowledge, attitude and practice changes.

In a report on Integrated Child Development Services orientation workshops training in Kerala, it had been suggested that training of Integrated Child Development Services functionaries were effective and ensure optimum utilization of the anganwadi training centre and middle level training centres (Sharma, 1985).

According to Iyenkar and Krishnamurthy (1987) lack of proper motivation by the implementing agencies to stimulate community participation at various level had been the major draw back of nutrition programmes. This had been found correct in the studies conducted by Murthy (1987) in the Integrated Child Development Services project of Gujarat and Uttar Pradesh. He found that the programmes implemented at anganwadi level were not effective due to the lack of supervision, inputs and guidance.

# **MATERIALS AND METHODS**

## MATERIALS AND METHODS

The impact of Integrated Child Development Services (ICDS) on the nutritional status of preschool children of two age groups viz. 0 to 3 and 4 to 6 was conducted among selected preschool children by assessing.

1. Socio-economic status of the families
2. Food consumption pattern of the families
3. Nutritional status of the preschool children
4. Knowledge and attitude of the mothers towards the programme and rate of adoption of the components of Integrated Child Development Services

### A. Selection of area

The present study was undertaken in the Trivandrum urban project area, which included four project sectors, namely Vallakadavu, Poonthura, Paruthikuzhy and Veli with twentyfive project units each. These four project areas were located along the coastal belt of Trivandrum. Majority of the people were engaged in fishing and belonged to Christian and Muslim community. Their literacy level is very poor. From each sector five project units were selected for the study. These areas were selected because of the following reasons.

1. This programme was implemented in the above project areas for the last one decade.

2. Impact of the programme on the nutritional status of the preschool children had not been systematically evaluated earlier in these areas.
3. The above areas are underdeveloped coastal areas and thickly populated.

#### B. Plan of Action

In order to achieve the objectives, following action programmes were envisaged and conducted.

1. Collecting details related to the background, salient features of implementation of Integrated Child Development Services Programme, and base line data about the respondents of the study from secondary sources such as records available in the Anganwadi Centres, Project Offices and the State Directorate of Social Welfare.
2. Eliciting information on the socio-economic status and food consumption pattern of the families of selected preschool children from the project areas and from families of preschool children who were non-beneficiaries of ICDS from the same area, using stratified two stage sampling techniques.
3. Determining the nutritional status of selected preschool children through
  - a) dietary surveys and weighment studies

- b) anthropometric, clinical and relevant biochemical studies, and
  - c) monitoring growth and development of the preschool children for six months (beneficiaries as well as non-beneficiaries)
4. Assessing the knowledge and attitude of mothers of selected preschool children towards the components of Integrated Child Development Services
  5. Assessing the rate of adoption of the components of Integrated Child Development Services by the mothers of the selected preschool children
  6. Analysing the above data to locate lacunae in the present components of the programme and suggest remedies

C. Selection of samples

1. 120 preschool children (60 in the age group of 0 to 3 years and 60 in the age group of 3 to 6 years) were selected by two stage random sampling procedure from the four project sectors for assessing the socio-economic and food consumption pattern. Strata being project areas, and the units under each strata form the first stage units and the children from selected units form the second stage units.
2. Dietary habits, anthropometric, clinical and biochemical status of the same 120 preschool children were also assessed.

3. A sample of 30 preschool children (15 from the age group of 0 to 3 years and 15 from the age group of 3 to 6 years) with the similar socio-economic background but non-beneficiaries of the programme were selected as control, and the socio-economic status, food consumption pattern, anthropometric, clinical and biochemical status of these children were also assessed.
4. Six children each, in the age groups of 1-3 and 4-6 years were selected for assessing the dietary intake through weighment method, in order to get a more precise data on food consumption. The beneficiaries were selected by random sampling from 120 preschool children among whom the socio-economic and food consumption pattern were assessed. Weighment survey was also conducted among equal number of children randomly selected from control group.
5. Growth and development of the selected 150 preschool children (120 children from the experimental group and 30 from the control group) for 6 months were observed with the help of standard growth charts recommended by UNICEF.
6. 100 women beneficiaries who are the mothers of selected preschool children of the programme (25 from each sector) were selected for assessing the attitude and



knowledge about Integrated Child Development Services programme and rate of adoption of components of the programme.

D. Selection of methods of study

1. Interview method was used to elicit information from Government and non-Government functionaries of different levels involved in the implementation of the programme regarding the background and salient features of Integrated Child Development Services.
2. Interview with questionnaire was used to elicit information from 120 rural women who are the mother beneficiaries of Integrated Child Development Services and 30 rural women belonging to similar socio-economic background and mothers of non-beneficiaries of the programme.

The schedule was suitably structured, pre-tested at the field and finalised. The schedule is presented in Appendix I. The schedule comprises information on socio-economic status and food consumption pattern and general food habits of the families.

3. Weighment method was used to collect more reliable estimation of actual food consumption. Details of raw foods used for cooking for each day was weighed for

MEASUREMENT OF WEIGHT



MEASUREMENT OF MID ARM CIRCUMFERENCES



three consecutive days in randomly selected samples. Raw foods used for each meal by the family before cooking and the weight of these foods after cooking were recorded. Each time the individual consumption of the cooked food and the items remaining after eating by the selected preschool child of the family was recorded separately to find out the exact amounts of foods consumed by them. Raw equivalents for the food item consumed were then computed. The nutrients available from the food intake was computed using the food composition table of ICMR (1982). The schedule used for weightment survey is presented in Appendix II.

Standard techniques in anthropometric, clinical and biochemical estimations were used to assess the nutritional status of the preschool children. Anthropometric measurements namely height, weight, mid arm circumferences, head and chest circumferences were taken according to the techniques standardised by ICMR (1982) (Fig. 1 & 2).

Anthropometric measurements are reported to be an internationally accepted system for determining nutritional status (Ghosh et al., 1978). Methods of measuring these anthropometric measurements are presented in Appendix III.

Clinical examination is stated to be one of the most essential and the simplest tool used in the evaluation

CLINICAL EXAMINATION



HAEMOGLOBIN ESTIMATION



of human nutritional status (Gupta et al., 1978). The presence or absence of clinical deficiency symptoms in children which can be attributed to malnutrition was assessed by a qualified physician (Fig. 3). Proforma suggested by National Institute of Nutrition (NIN) for clinical surveys was used as model for preparing the schedule needed for assessing the clinical status. The schedule is presented in Appendix IV.

Under biochemical studies haemoglobin estimation of the preschool children was conducted by cyanmethaemoglobin method (Dacie et al., 1975) (Fig. 4). Details of the method is presented in Appendix V.

Growth and development of the selected preschool children for 6 months were observed with the help of growth charts recommended by UNICEF. The weights of the preschool children were recorded every month by the investigator for 6 months and the data were plotted. This method was internationally accepted as a useful target for prevention of malnutrition (Zurbrigge and Sheila, 1977) and sample growth chart used is presented in Appendix VI.

Knowledge and attitude of the mothers towards the six components of Integrated Child Development Services viz., supplementary nutrition, immunization, health check up and treatment, referral services, non-formal preschool

education and nutrition and health education was assessed by interview method using a suitably structured and pre-tested schedule (Likert, 1932). In this schedule about 60 statements on various aspects of the 6 components of Integrated Child Development Services were included. These items were collected from relevant literature and through informal interviews with the field functionaries. These statements were circulated among the officials of Integrated Child Development Services such as programme officers, project officers, administrators, specialists and field level change agents involved in the implementation of the programme and also among the experts in nutrition to suggest modifications. In the light of suggestions made by the experts and others, 30 statements were selected and these statements were once again pre-tested among the post-graduate and academic staff of the college. Finally 25 statements were selected from these 30 statements provided with five response categories, namely very much satisfied, satisfied, undecided, unsatisfied and totally unsatisfied with the scores 4, 3, 2, 1 and 0 respectively for evaluating the attitude of beneficiaries towards Integrated Child Development Services Programme.

Similarly 30 statements with two response category namely 'yes' and 'no' with the score of 1 and 0 respectively

were given for assessing the knowledge of mothers. The selected mothers were asked to respond towards the statements on the above rating points. General attitude and knowledge towards the programme were assessed by finding out the mean attitude scores and knowledge scores respectively. The total scores of a respondent was obtained by summing the weights of individual items responded. The schedule used for this is presented in Appendix VII and VIII.

The extent of adoption of components of Integrated Child Development Services by the selected beneficiaries were collected by interview method using a suitably structured schedule. The schedule included positive and negative statements provided with two response categories namely 'yes' and 'no' with the score 1 and 0. The selected beneficiaries were asked to respond towards the statements on the above rating points and from this assessed the extent of adoption of Integrated Child Development Services by the beneficiaries involved in this programme. The schedule used for this is presented in Appendix IX.

#### Statistical Analysis

Statistical significance of the changes in anthropometric measurements recorded for the six months were calculated using student's 't' test (Bennet and Franklin, 1967).

# RESULTS



## RESULTS

The study on the Impact of Integrated Child Development Services (ICDS) on the Nutritional Status of Preschool Children was mainly based on the following assessments:

1. Assessment of Socio-economic Status of the families.
2. Assessment of food consumption pattern of the families.
3. Assessment of the Nutritional Status of the preschool children.
4. Assessment of knowledge and attitude of the mothers towards the programme and also by the rate of adoption of the components of Integrated Child Development Services.

120 families were selected under experimental group and 30 families under control group.

### 1. Assessment of Socio-economic Status of the families

Details related to the religion and caste of the families were presented in Table 1.

As revealed in Table 1, 93.33 percent of the families in the experimental group and 63.33 percent of families in the control group were categorised as underprivileged section of the population.

Table 1. Religion and Caste of the families

Religion	Experimental group					Control group					
	Number of families	Per-cent	Caste	Number of families	Per-cent	Religion	Number of families	Per-cent	Caste	Number of families	Per-cent
1. Hindus	41	34.17	Nair	8	6.66	Hindu	23	76.66	Nair	11	36.60
			Asary	4	3.33				Asary	1	3.33
			Manan	1	0.84				Hindu Nadar	3	10.00
			Ezhava	10	8.33				Ezhava	8	26.67
			Scheduled Caste	12	10.0						
			Deewara	<u>6</u>	5.0						
			<u>41</u>								
2. Muslims	40	33.33	Islams	40	33.33	Muslim	3	10	Islam	3	10
3. Christians	39	32.5	Nadar	7	5.84	Christian	4	13.34	Nadar	4	13.33
			Mukkuva	32	26.66						
TOTAL	120	100		120			30	100		30	100

Details related to the type of families were presented in Table 2.

Table 2. Type of families

Type of families	Details of families			
	Experimental group		Control group	
	Number	Percent	Number	Percent
Nuclear family	99	82.5	26	86.67
Joint family	21	17.5	4	13.33
TOTAL	120	100	30	100

As revealed in Table 2, in the experimental group 82.5 percent of the families surveyed were nuclear families whereas in control group 86.66 percent of the families surveyed were nuclear families. Details related to the size of the families surveyed are presented in Table 3.

Table 3. Size of the families

No. of family members	Experimental group		Control group	
	Number	Percent	Number	Percent
Less than 3	19	15.83	1	3.33
3 - 5	69	57.5	25	83.34
6 - 8	24	20.0	4	13.33
Above 8	8	6.67	-	-
TOTAL	120	100	30	100

Table 3 depicted that 73.33 percent of the families in in experimental group and 86.67 percent families in control group were small size families having less than 5 members.

Age wise distribution of the members of the families surveyed were presented in Table 4.

Table 4. Age wise distribution of the members of the families

Details of family members age in years	Experimental group		Control group	
	No. of members	Percent	No. of members	Percent
0 - 10	276	47.75	67	49.26
11 - 20	50	8.65	3	2.21
21 - 30	134	23.18	39	28.68
31 - 40	92	15.92	17	12.5
41 - 50	13	2.25	4	2.94
51 - 60	9	1.56	2	1.47
Above 60	4	0.69	4	2.94
<b>TOTAL</b>	<b>578</b>	<b>100</b>	<b>136</b>	<b>100</b>

As revealed in the Table 4, 56.40 percent of the family members in the experimental group and 51.47 percent of the family members in the control group were in the

growing stage. Sexwise distribution of the members surveyed were presented in Table 5.

Table 5. Sexwise distribution of the members of the families

Sex	Experimental group		Control group	
	No. of members	Percent	No. of members	Percent
Male	268	46.36	61	44.85
Female	310	53.64	75	55.15
TOTAL	578	100	136	100

Table 5 depicted that the female population in the experimental group and control group were 53.64 percent and 55.15 percent respectively and was higher than that of male population in both the groups.

Educational status of the families surveyed were presented in Table 6.

Table 6 depicted the educational status of the family members. As revealed in Table 6, the literacy level of the adult male and female in both the experimental and control groups were comparable. Among the family members, adults who had acquired education above high school were very few in experimental group as well as in control groups.

Table 6. Educational status of the families

Educational Levels	Sex	Adults				Children			
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Illiterate	M	31	20.95	20	42.56	20	16.66	4	11.76
	F	46	29.87	10	45.45	35	22.44	2	6.07
Pre-primary	M	-	-	-	-	49	40.84	12	35.29
	F	-	-	-	-	57	36.53	15	45.45
Lower primary	M	32	21.62	22	46.80	28	23.34	11	32.36
	F	39	25.32	10	45.45	40	25.64	13	39.39
Upper primary	M	42	28.38	-	-	20	16.66	7	20.59
	F	37	24.02	-	-	17	10.89	3	9.09
High school	M	40	27.03	5	10.64	3	2.52	-	-
	F	30	19.48	2	9.10	7	4.48	-	-
College	M	3	2.03	-	-	-	-	-	-
	F	2	1.3	-	-	-	-	-	-
Total	M	148	100	47	100	120	100	34	100
	F	154	100	22	100	156	100	33	100

E - Experimental group

C - Control group

Occupational status of the Head of the families were presented in Table 7.

Table 7. Occupational status of the Head of the families

Occupational status	Experimental group		Control group	
	Number	Percent	Number	Percent
Labourer	60	50	29	96.67
Self Employment (Business)	12	10	1	3.33
Permanent Jobs in Government Sector	12	10	-	-
Traditional Job Fishermen	36	30	-	-
<b>TOTAL</b>	<b>120</b>	<b>100</b>	<b>30</b>	<b>100</b>

As revealed in Table 7, majority of the Heads of the families in experimental group (50 percent) were marginal labourers and in 30 percent of the families, they were engaged in traditional jobs, whereas 96.67 percent of the heads of the families in control group were marginal labourers. None of them were in traditional job. Only 10 percent of the Heads of families in experimental group and 3.33 percent in control group were engaged in permanent jobs and business.

Details regarding the economic status of the families surveyed were presented in Table 8.

Table 8. Economic status of the families

Income/month (in Rupees)	Experimental group		Control group	
	No. of families	Percent	No. of families	Percent
200 and below	32	26.67	28	93.34
201 - 400	54	45	2	6.66
401 - 600	17	14.17	-	-
601 - 800	13	10.83	-	-
Above 800	4	3.33	-	-
<b>TOTAL</b>	<b>120</b>	<b>100</b>	<b>30</b>	<b>100</b>

As revealed in Table 8, more than 71 percent of the families surveyed in experimental group and all the families surveyed in control group were below the poverty line.

## 2. Assessment of food consumption pattern of the families

Food consumption pattern of the beneficiaries are presented as the monthly expenditure pattern, details of the food purchasing habits and foods produced at home. Details related to the culinary practices, frequency of use of foods, and food preferences of the family members were also assessed.



Table 9 reveals the details of the monthly expenditure pattern of the families surveyed.

As revealed in Table 9, more than 60 percent of the family income in both the experimental and control groups were spent on food. Compared to food expenditure, expenditure on shelter, travel, education, entertainment and health were negligible, since only less than 10 percent was spent on these items in both the experimental and control groups of the families. Food purchasing habits of the families surveyed are presented in Table 10.

As revealed in Table 10, highly perishable foods like fish were purchased daily by all the families (100 percent). In both the groups 70.83 percent of the families in experimental groups and 83.33 percent of the families in control groups were in the habit of purchasing cereals daily and more than 70 percent of the families of both the groups purchased spices and condiments and milk daily. Food articles like leafy vegetables and eggs were purchased occasionally by more than 45 percent of the families in the experimental group and 100 percent of the families in the control group purchased leafy vegetables occasionally.

Table 11 furnishes details related to the food articles produced at home.

Table 9. Monthly expenditure pattern of the families (in percent)

Percentage income spent as various items of expendi- ture	Food		Clothing		Shelter		Travel		Education		Enter- tainment		Health		Savings		Other
	E	C	E	C	E	C	E	C	E	C	E	C	E	C	E	C	E
	Rs. 1-5	Nil	-	68.33	86.66	65	73.33	63.33	70	76.66	96.66	90	96.66	39.16	70	13.33	30
Rs. 6-10	-	-	30	13.33	35	26.66	36.66	30	23.33	3.33	10	3.33	60.83	30	-	-	-
Rs.11-15	-	-	1.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rs.16-20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rs.21-25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rs.26-50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rs.51-55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rs.56-60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rs.61-65	6.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rs.66-70	18.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rs.71-75	27.5	36.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rs.76-80	30.83	43.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Above Rs.80	16.66	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

E - Experimental group - 120 Nos.

C - Control group - 30 Nos.

Table 10. Food purchasing habits of the families

Food stuffs	Daily		Once in a week		Once in a month		Occasionally	
	E	C	E	C	E	C	E	C
Cereals	70.83	83.33	21.66	13.33	5.83	3.33	1.66	-
Pulses	37.5	26.66	29.16	36.66	22.5	3.33	10.83	33.33
Leafy vegetables	-	-	40.00	-	18.33	-	41.66	100
Other vegetables	50.83	-	40.83	6.66	4.66	20	5.0	73.33
Roots and Tubers	55.83	56.66	27.5	16.66	14.16	16.66	2.5	10.0
Milk and milk-products	87.5	70.00	4.16	20.00	1.66	6.66	6.66	3.33
Fruits	20.00	40.00	80.00	23.33	-	-	-	13.33
Fish	100	100	-	-	-	-	-	-
Meat	-	-	-	-	10	-	90	100
Egg	-	40	38.83	26.66	51.66	10	10	23.33
Nuts and Oilseeds	53.33	43.73	43.33	23.33	3.33	6.66	-	26.66
Spices and Condiments	70	76.66	26.66	20	3.33	3.33	-	-
Cooking oil	87.5	70.0	13.5	29.99	-	-	-	-
Sugar and Jaggery	70.84	86.67	7.49	-	21.67	13.33	-	-

E - Experimental group - 120 families

C - Control group - 30 families

Table 11. Food articles produced at home (in percent)

Approximate cost of food produced at home	Leafy vege- tables		Roots and Tubers		Egg		Milk		Coconut	
	E	C	E	C	E	C	E	C	E	C
0 - 5	12.5	23.33	-	-	-	13.33	-	6.66	-	6.66
6 - 10	-	-	-	-	3.33	-	-	-	-	-
11 - 15	5.8	-	-	-	21.66	-	-	-	-	-
16 - 20	-	-	15.83	-	-	-	-	-	-	13.33
21 - 25	-	-	-	-	-	-	-	-	-	-
26 - 30	-	-	-	-	-	-	-	-	-	-
31 - 35	-	-	-	-	-	-	5.8	-	2.5	-
36 - 40	-	-	-	-	-	-	3.33	-	-	-
Above 40	-	-	-	-	-	-	19.16	-	11.66	23.33

E - Experimental group

C - Control group

Table 12. Methods adopted in cleaning of dry food articles after purchase  
(in percentage)

Just after buying	Experi- mental group	Control group	Just before cooking	Experi- mental group	Control group	Frequency of washing just before cooking	Experi- mental group	Control group
Cleaning	20	100	Cleaning	100	-	Once	-	100
Winnowing	76.66	100	Winnowing	100	50	Twice	50	-
						Three	45.83	-
Drying	3.33	-	Drying	-	-	More than three	29.16	-
Washing	-	-	Washing	100	100			

As revealed in Table 11, food articles such as green leafy vegetables, roots and tubers, egg, milk and coconut were produced at home. Of these coconut and milk were found to be the major food items produced by the families of the experimental groups. In the case of control groups, the home production of foods were comparatively negligible.

Table 12 presents details related to the methods adopted in cleaning different food articles after purchase.

As revealed in Table 12, all the families in both experimental and control groups were in the habit of cleaning the dry food articles immediately after the purchase to remove dirt and other filth matters before storage.

Table 13 presents details related to washing of perishable food articles like vegetables before cooking.

Table 13. Washing of perishable food articles like vegetables before cooking

Frequency of washing	Experimental group		Control group	
	Number	Percent	Number	Percent
Once	66	55	30	100
Twice	49	40.83	-	-
Thrice	3	2.5	-	-
More than thrice	2	1.67	-	-

in the control group were in the habit of washing these food articles once before cooking. While 40.33 percent families in the experimental groups washed these food articles thrice and remaining families in this group washed these food articles more than thrice before cooking.

Table 14 presents the details on methods adopted for cleaning fruits before use.

Table 14. Practice of cleaning fruits before use

Practice	Experimental group		Control group	
	Number	Percent	Number	Percent
a. Just after buying	59	49.17	-	-
b. Just before eating or using	61	50.83	21	70
c. Not at all washing	-	-	9	30

As revealed in Table 14, 49.17 percent of the families in the experimental groups were in the habit of washing fruits just after purchase while none of the families in the control groups were in the habit of washing fruits just after purchase. 50.83 percent in the

experimental group and 70 percent in control group of the families washed these food articles before use.

Table 15 presents details regarding cutting and washing of food articles before cooking.

Table 15. Cutting and washing of food articles before cooking (in percentage)

Foods	Types of cutting of foods				Washing before cutting		Washing after cutting	
	Big		Small		E	C	E	C
	E	C	E	C				
Fruits	85.83	76.66	14.16	23.33	73.33	100	26.66	-
Vegetables	56.66	43.33	43.33	56.66	19.16	23.33	76.66	76.66
Meat	5.0	-	86.66	100	96.66	-	3.33	100
Fish	55	-	45	100	1.66	-	98.33	100

E - Experimental group

C - Control group

As revealed in Table 15, most of the families in both experimental and control groups were in the habit of cutting fruits as pieces. Food articles like meat were cut into very small pieces and they were in the habit of washing food articles like fruits and meat before cutting, while food articles like vegetables and fish were washed after cutting into small pieces.



Table 16. Cooking practices of the families (in percentage)

Methods of cooking	Cereals		Pulses		Roots and Tubers		Leafy vegetables		Other vegetables		Meat and fish		Egg	
	E	C	E	C	E	C	E	C	E	C	E	C	E	C
Absorption	12.5	Nil	100	100	-	-	80.7	-	90	-	-	-	-	-
Cooking in large quantities of water and straining	87.5	100	-	-	19.16	-	-	-	-	-	-	-	-	-
Curries	-	-	-	-	26.67	20	1.6	13.33	-	100	76.67	100	-	6.67
Straining and curries	-	-	-	-	54.17	80	-	-	-	-	-	-	-	-
Boiling and frying	-	-	-	-	-	-	-	-	-	-	-	-	41.67	36.66
Boiling	-	-	-	-	-	-	-	-	-	-	-	-	58.33	56.67
Frying	-	-	-	-	-	-	18.33	-	10	-	23.33	13.33	-	-

E - Experimental group

C - Control group

Table 16 presents the details related to the cooking practices of the families.

As revealed in Table 16, the families in both groups were in the habit of cooking cereals in large quantities of water and straining the excess water. Methods used for cooking other food articles were very common methods like boiling and frying.

Table 17 presents details related to the processing methods commonly used by these families.

Table 17. Processing methods commonly used by the families

Foods	Drying with salt				Pickling			
	Experiment		Control		Experiment		Control	
	Num- ber	Per- cent	Num- bers	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
Fruits (Mango)	-	-	-	-	38	31.66	12	40
Fish	90	75	17	56.66	3	2.5	-	-

As revealed in the table, the fruits like mango and fish were commonly processed by these families.

Frequency of use of various food articles by the families, food preference of the preschool children, serving practices observed by the families and persons

responsible in serving meals to the preschool children threw light on the food habits of the families.

Table 18 presents frequency of use of various food articles by the families.

As revealed in Table 18, food articles like cereals, fish, oil, sugar and jaggery were daily used by all the families (100 percent) in experimental and control groups. Food articles such as roots and tubers, vegetables, milk and milk products were used daily by more than 50 percent of the families in both the groups. Food articles like pulses were used by 23.33 percent of the families in the experimental group and 26.66 percent in control groups. Eggs were used daily by 23.33 percent of the families in the experimental group and 46.66 percent of the families in the control group. But green leafy vegetables were found to be not popular among majority of the families in both the groups.

Table 19 presents the food preferences of preschool children.

As revealed in Table 19, sweets and fried foods purchased as well as sweet porridges prepared at home and fruits were found to be the popular foods preferred by the children in both the experimental and control groups.

Table 20 presents the frequency of purchasing the foods mostly preferred by the children.

Table 18. Frequency of use of various food articles by the families (in percentage)

Foodstuffs	Daily		Three times in a week		Twice a week		Once in a week		Occasionally		Not at all	
	E	C	E	C	E	C	E	C	E	C	E	C
Cereals	100	100	-	-	-	-	-	-	-	-	-	-
Pulses	23.33	26.66	34.16	6.66	15.83	10	10	30	16.66	26.66	-	-
Roots and Tubers	57.5	60.00	8.33	23.33	14.16	6.66	6.66	3.33	13.33	6.66	-	-
Other vegetables	50.83	53.32	24.16	6.66	16.66	13.33	8.33	20	-	6.66	-	-
Green leafy vegetables	14.16	-	19.16	-	20	-	14.16	23.33	32.5	76.66	-	-
Fruits	36.66	26.66	22.5	40	9.16	10	23.33	10	8.33	13.33	-	-
Meat	-	-	-	-	-	10	-	Nil	90	100	-	-
Fish	100	100	-	-	-	-	-	-	-	-	-	-
Egg	23.33	46.66	35	36.66	6.66	-	9.16	6.66	25.83	10	-	-
Fats and oils	100	100	-	-	-	-	-	-	-	-	-	-
Sugar and jaggery	100	100	-	-	-	-	-	-	-	-	-	-
Processed foods	-	-	11.66	10	5	26.66	-	6.66	27.5	56.66	-	-
Bakery items	15	26.66	18.33	46.66	30	10	26.66	10	10	6.66	-	-
Milk and milk products	61.66	70	12.5	16.66	5.83	-	6.66	-	13.33	13.33	-	-

E - Experimental group

C - Control group

Table 19. Food preference of children

Food items	Experimental group		Control group	
	Number	Percent	Number	Percent
Tapioca and fish	5	4.16	-	-
Fried foods (purchased)	115	95.83	30	100
Greengram and other pulses	8	6.66	-	-
Uppuma	82	68.33	-	-
Sweet porridges	68	56.66	-	-
Cakes and Biscuits	23	19.16	-	-
Fruits	98	81.66	28	93.33
Fish	70	58.33	28	93.33
Sweets purchased	118	98.33	24	80
Curd	-	-	2	6.6
Rice and Curries	-	-	13	43.33

Table 20. Frequency of purchasing the foods mostly preferred by the children

Frequency	Experimental group		Control group	
	Number	Percent	Number	Percent
Daily	38	31.66	12	40
Weekly once	27	2.5	-	-
Once in two days	24	20.0	-	-
Occasionally	27	22.5	9	30.0
Once in a month	-	-	-	-
Special occasions	14	11.66	-	-
Thrice in a week	-	-	9	30.0

As revealed in Table 20, 31.66 percent of the families in experimental group and 40 percent of the families in control group were in the habit of purchasing such foods to the children daily. While 22.5 percent of the families in experimental groups purchased such food gifts once in a week and 30 percent of the families in control groups purchased such food gifts thrice in a week.

Table 21 presents the details of the serving practices observed by the families.

Table 21. Serving practices observed by the families

Method of serving	Experimental group		Control group	
	Number	Percent	Number	Percent
Along with all members in the family	43	35.83	28	93.33
First given to the head of the family than others	15	12.51	2	6.67
First given to the children than parents	55	45.83	-	-
First given to the male members of the family than females	7	5.83	-	-
TOTAL	120	100	30	100

As revealed in Table 21, 35.83 percent of the families in experimental group and 93.33 percent of the families in the control group were in the habit of taking their meals together, while 45.83 percent of the families in experimental groups were in the habit of giving meals to the children first. Only very few families (5.83 percent) in experimental group and none among the control group were in the habit of giving preference in serving food to the male members of the families.

Table 22 furnishes details related to serving meals to preschool children.

Table 22. Serving meals to preschool children with elder members

Experimental group				Control group			
Yes		No		Yes		No	
Number	Percent	Number	Percent	Number	Percent	Number	Percent
103	85.83	17	14.16	28	93.33	2	6.66

As revealed in Table 22, 85.83 percent of children in experimental group and 93.33 percent of children in control group were taking their meals along with their elder members while 14.16 percent of the children in experimental group and 6.66 percent of the children in control group were served food separately.

Further details related to these, are presented in Table 23.

Table 23. Persons responsible for serving meals to preschool children

Foods given by	Experimental group		Control group	
	Number	Percent	Number	Percent
Mother and Father (Along with their meal)	48	40	2	6.67
Self eating	70	58.33	28	93.33
By elder child	-	-	-	-
Grand Mother	2	1.67	-	-
Grand Father	-	-	-	-
Servants	-	-	-	-



As revealed in Table 23, 58.33 percent of children in experimental group and 93.33 percent of children in control group were in the habit of taking meals alone. While 40 percent of children in experimental group and 6.66 percent of children in control group were sharing the meals taken by their mothers and fathers. Mothers or grand mothers were responsible for feeding the pre-school children.

### 3. Assessment of the nutritional status of the selected preschool children

Nutritional status of the selected preschool children were assessed through (i) weighment survey (ii) anthropometric studies (iii) clinical tests (iv) haemoglobin estimation and (v) monitoring the growth of children for 6 months using growth charts.

Similar assessments were done among 30 preschool children who were non-beneficiaries of Integrated Child Development Services and who functioned as control group in the study.

#### i) Actual food intake of preschool children assessed by weighment survey

The actual dietary intake of preschool children belonging to experimental group and control group were

found out by weighment survey and the nutrients present in their diets were computed using the nutritive value table of ICMR (1982).

Average quantity of foods consumed/day by the pre-school children (1-3 year) of experimental and control groups are presented in Table 24.

As revealed in Table 24, in the diets of the pre-school children of both experimental and control groups, food groups such as cereals, roots and tubers and flesh foods (mainly fish) were more than their requirements. Food items like milk and milk products and other vegetables were below 50 percent of the requirements of the pre-school children in experimental as well as in control group. Food like green leafy vegetables, fruits etc. were included only in negligible amounts while foods like pulses and fats and oils, were 85 percent and 75 percent respectively by experimental group and 52 percent and 50 percent respectively by control groups. The quantities of pulses, flesh foods, milk and milk products were higher in the daily diets of preschool children of the experimental group when compared to the diets of preschool children of the control group.

The average nutrients intake of the preschool children (1-3 year) in the experimental and control groups are presented in Table 25.

Table 24. Average food consumption of the pre-school children (1 to 3 years old)

Food groups	Suggested balanced diets of 1 to 3 years old children	E			Percentage of suggested balanced diet met	C	
		Amount consumed (gms)				Amount consumed (gms)	Percentage of suggested balanced diet met
		At home	At Anganwadi	Total			
Cereals	175	127.1	65	192.1	109.77	178	101.71
Pulses	17.5	5	10	15	85.71	9.1	52
Green leafy vegetables	40	3			7.5	1.6	4
Other vegetables	20	6.9			34.5	9.6	48
Roots and tubers	10	15			150	13	130
Fruits	-	14.5				11.6	
Milk and milk products	300	137.4			45.8	40	13.33
Fats and oils	15+5	7	8	15	75	10	50
Flesh foods	30	55			183.33	52	173.33
Sugar or jaggery	30	22			73.33	22	73.33

E - Experimental group

C - Control group

Table 25. Average nutrient intake of preschool children (1-3 years)

Nutrients	RDA	E		C	
		Average nutrient intake	Percentage of RDA met	Average nutrients intake	Percentage of RDA met
Protein (g)	22	31.5	143.18	26.19	119.04
Energy (Kcal)	1220	1155.5	94.71	967.08	79.26
Calcium (g)	0.4 to 0.5	0.45	112.50	0.29	72.50
Iron (mg)	20 to 25	14.7	73.50	10.5	52.50
Vitamin A	1000	524	52.40	194.8	19.48
Thiamine (mg)	0.6	0.72	120.00	0.47	78.33
Riboflavin (mg)	0.7	1.4	200.00	0.273	39.00
Niacin (mg)	8.0	7.68	96.00	7.109	88.86
Vitamin C (mg)	40	14.23	35.58	9.046	22.62

E - Experimental group

C - Control group

As revealed in Table 25, the protein intake of children belonging to the two groups were higher than their requirements as per recommended daily allowance. The intake of calories from the diet of children of experimental groups were found to be satisfactory which met, 94.7 percent of the requirement whereas the calorie consumption of control groups were only 79.2 percent of recommended daily allowances. Calcium intake of the children belonging to the experimental group was quite adequate whereas in the case of control group only 72.5 percent of recommended daily allowance was met. Iron intake was insufficient and less than the recommended daily allowances in both the groups. Compared to the experimental group it was highly inadequate in the control group. The iron intake in the experimental group was 73.5 percent of recommended daily allowance but it was only 52.5 percent in the case of control group. Vitamin A and vitamin C intake were less than recommended daily allowances in both the groups. But the percentage of these nutrients in the diet of the control groups were highly insufficient. The quantity of thiamine and riboflavin were found to exceed the recommended allowances in the case of experimental group whereas thiamine intake was only 78.33 percent, and riboflavin 39 percent of recommended daily allowance in the case of control group. Compared to the diets of experimental groups, nutrients such as protein,

energy, calcium, iron, vitamin A, thiamine, riboflavin, niacin and vitamin C were less in the diets of control group.

Average quantity of foods consumed by preschool children aged between 4-6 years in experimental and control groups were presented in Table 26.

As revealed in Table 26, the consumption of cereals and fish in both groups of children were more than the recommended allowances. Quantity of pulses included in the diet of experimental group was higher than recommended allowances while in the case of control group it was only 56.5 percent of recommended allowances, consumption of roots and tubers was higher in the experimental group but the consumption of this food article was only 46.5 percent of recommended allowance in the control group. Consumption of green leafy vegetables and milk and milk products were highly inadequate in the experimental as well as in the control group. Consumption of other vegetable is only 62.6 percent of recommended allowance in the case of experimental group and 41.0 percent of recommended allowance in the case of control group. Consumption of fats and oil was adequate in the case of experimental groups whereas it met only 48 percent of recommended allowance in the control group. Intake of sugar and jaggery was

Table 26. Average food consumption of pre-school children (4-6 years)

Food groups	Suggested balanced diets of 4-6 years old children	E			Percentage of suggested balanced diet met	C	
		Amount consumed		Total		Amount consumed (g)	Percentage of suggested balanced diet met
		At home	At Anganwadi				
Cereals	270	214.9	65	279.9	103.66	280	103.70
Pulses	17.5	7.7	10	17.7	101.14	9.9	56.57
Green leafy vegetables	50	0.5			1.00		0
Other vegetables	30	18.8			62.66	12.3	41.00
Roots and tubers	20	21.5			107.50	9.3	46.50
Fruits		16.6				15	
Milk and milk products	250	26			10.40	25	10.00
Fish	30	52.9			176.33	55.6	185.33
Sugar or jaggery	40	20			50.00	25	62.50
Fats and oils	25	18	7	25	100.00	12	48.00

E - Experimental group

C - Control group

Table 27. Average nutrients intake of preschool children (4-6 years age)

Nutrients	RDA	E		C	
		Average nutrients intake	Percentage of RDA met	Average nutrients intake	Percentage of RDA met
Protein (g)	29.4	34	115.64	32.1	109.18
Energy (KCal)	1720	1405.5	81.71	1353.3	78.66
Calcium (g)	0.4 to 0.5	0.32	80.00	0.27	67.50
Iron (mg)	20 to 25	15.88	79.40	14.25	71.25
Vitamin A (ug)	1200	137.82	11.48	111.67	9.31
Thiamine (mg)	0.9	0.89	98.88	0.62	68.88
Riboflavin (mg)	1.0	0.31	31.00	0.41	41.00
Niacin (mg)	11	10.14	92.18	10.20	92.72
Vitamin C	40	11.6	29.00	6.29	15.73

E - Experimental group

C - Control group



only 50 percent of recommended allowance in the experimental group whereas it was 62.5 percent in the control group.

The average nutrient intake of preschool children (4-6 years) in the experimental and control groups are presented in Table 27.

As presented in Table 27, protein intake exceeded the recommended allowance in both the groups. Calorie requirement was met around 81.7 percent of recommended daily allowance in the experimental groups and 78.6 percent of recommended daily allowance in the control group. The intake of vitamin A and vitamin C were found to be negligible when compared to the recommended allowances in both the groups. Riboflavin intake was 31 percent of recommended daily allowance in the experimental group and 41 percent of recommended allowance in the control group. Other vitamins and minerals like calcium, iron, thiamine, niacine etc. the intakes were found to be satisfactory, in the experimental group whereas in the control group only niacin requirements is satisfactory and other vitamins like calcium, iron and thiamine were met 67.5 percent, 71.25 percent and 68.8 percent respectively.

## 2. Anthropometric studies

Anthropometric measurements such as body weight,

height, left mid arm circumferences, head and chest circumferences of the preschool children belonging to experimental and control groups were collected. Weight for age was classified according to Gomez classification and height for age was classified according to Visweswara Rao's classification (Gopal Das, 1987). Weight for height, mid arm circumferences and weight/height were classified according to Rao and Singh's classification (Gopal Das, 1987). Average measurements of these two groups were compared with the ICMR standards.

Weight for age profile of the two groups of preschool children were presented in Table 28.

As revealed in the Table 28, the average weights of the preschool children in the experimental and control groups according to their age, when compared with standard weights of the preschool children of the same age, it was seen that 100 percent of children in experimental group were below standard whereas in control group 6.6 percent of female children in the age group of 30-35 months were above standard weight and others below standard.

The children were classified by Gomez system of classification of weight for age that is 60 percent weight for age, grade III malnutrition, 61 to 75 percent, weight for age, grade II malnutrition and 76 to 90 percent, weight for age normal.

Table 28. Comparison of mean final weights for age of preschool children of experimental and control groups with the standard

Age range in (months)	Sex	Number of children		Observed weight (kg)						*Standard values (kgs)	Percentage of standard weight of the children	
				E			C				E	C
				Mean	±	SD	Mean	±	SD			
12 - 17	M	2	-	8.25	±	0.701	-	-	-	9.50	86.80	-
	F	2	-	8.37	±	0.68	-	-	-	8.70	96.20	-
18 - 23	M	2	1	9.0	±	0.48	9.0	±	0.00	10.50	85.70	85.0
	F	2	2	9.5	±	1.23	8.5	±	0.18	9.80	96.93	86.0
24 - 29	M	6	1	9.33	±	1.79	10.5	±	0.00	11.25	82.93	93.0
	F	5	1	9.95	±	1.07	10.0	±	0.00	10.50	94.76	95.0
30 - 35	M	10	1	10.47	±	0.96	12.0	±	0.00	12.50	83.76	96.0
	F	9	2	9.38	±	1.65	11.5	±	1.65	11.30	83.0	100.0
36 - 41	M	8	2	11.56	±	2.05	12.25	±	0.75	13.75	84.0	89.0
	F	11	5	11.06	±	1.50	11.8	±	1.21	13.25	90.28	96.0
42 - 47	M	2	3	13.25	±	1.44	13.3	±	0.47	14.75	89.8	90.0
	F	13	4	11.80	±	1.67	12.0	±	0.93	13.30	88.72	90.0
48 - 53	M	6	-	12.75	±	0.51	-	±	-	15.75	80.95	-
	F	10	-	12.58	±	1.13	-	±	-	14.45	87.5	-
54 - 59	M	6	-	13.16	±	1.22	-	±	-	17.25	76.28	-
	F	9	4	11.63	±	0.39	14.25	±	0.24	15.65	74.3	91.0
60 - 65	M	1	3	13.0	±	-	14.0	±	0.23	18.25	63.4	76.0
	F	10	1	12.9	±	1.03	12.5	±	0.00	16.90	76.3	73.0
66 - 71	M	2	-	13.0	±	1.39	-	±	-	20.50	63.41	-
	F	3	-	13.16	±	1.22	-	±	-	19.50	67.4	-
72 - 77	M	-	-	-	±	-	-	±	-	-	-	-
	F	1	-	15.00	±	0.00	-	±	-	19.50	76.9	-
Total		120	30									

E - Experimental group

C - Control group

\*Shantighosh (1986)

FIG.5. WEIGHT, FOR AGE OF THE PRE - SCHOOL CHILDREN (MALE).

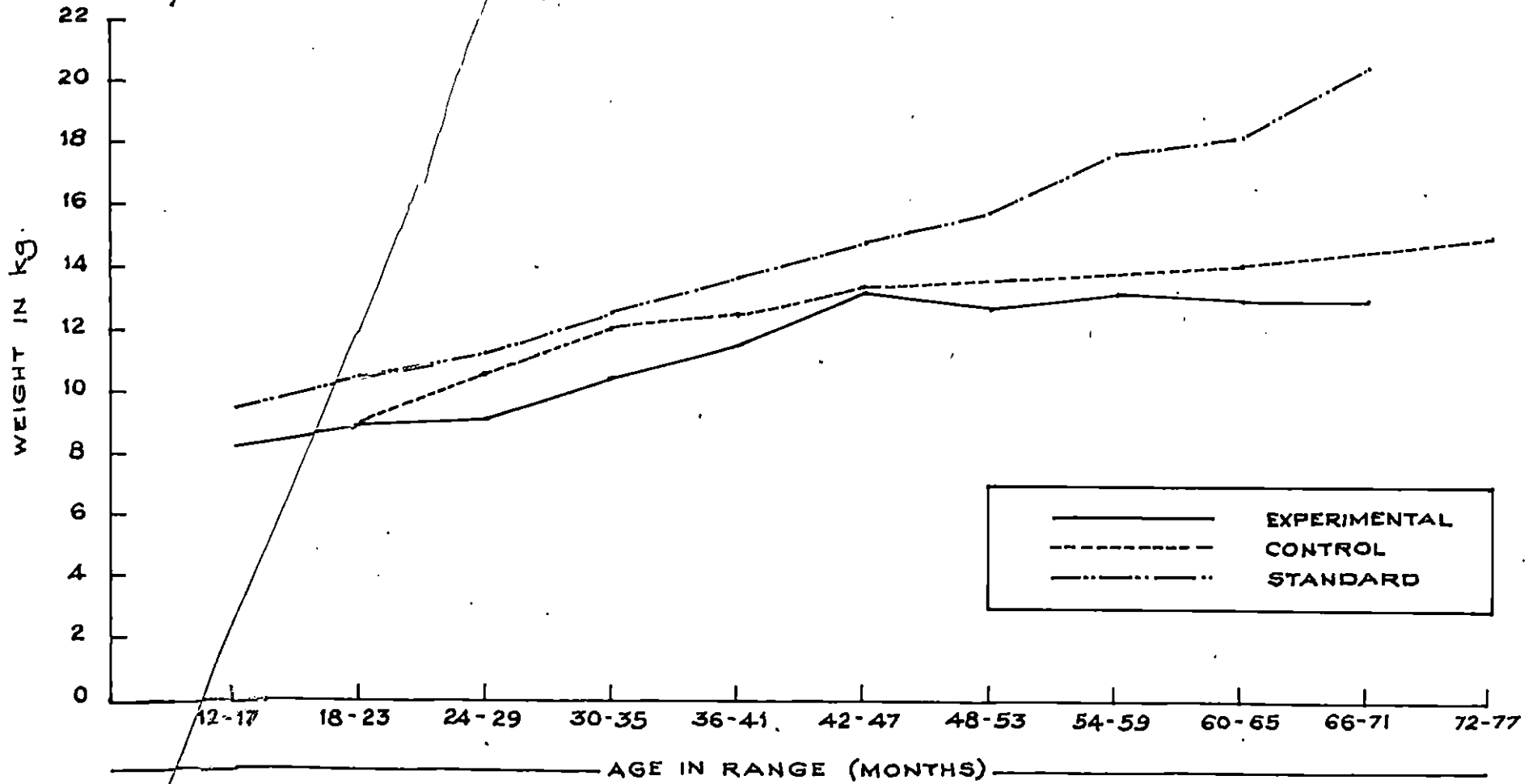
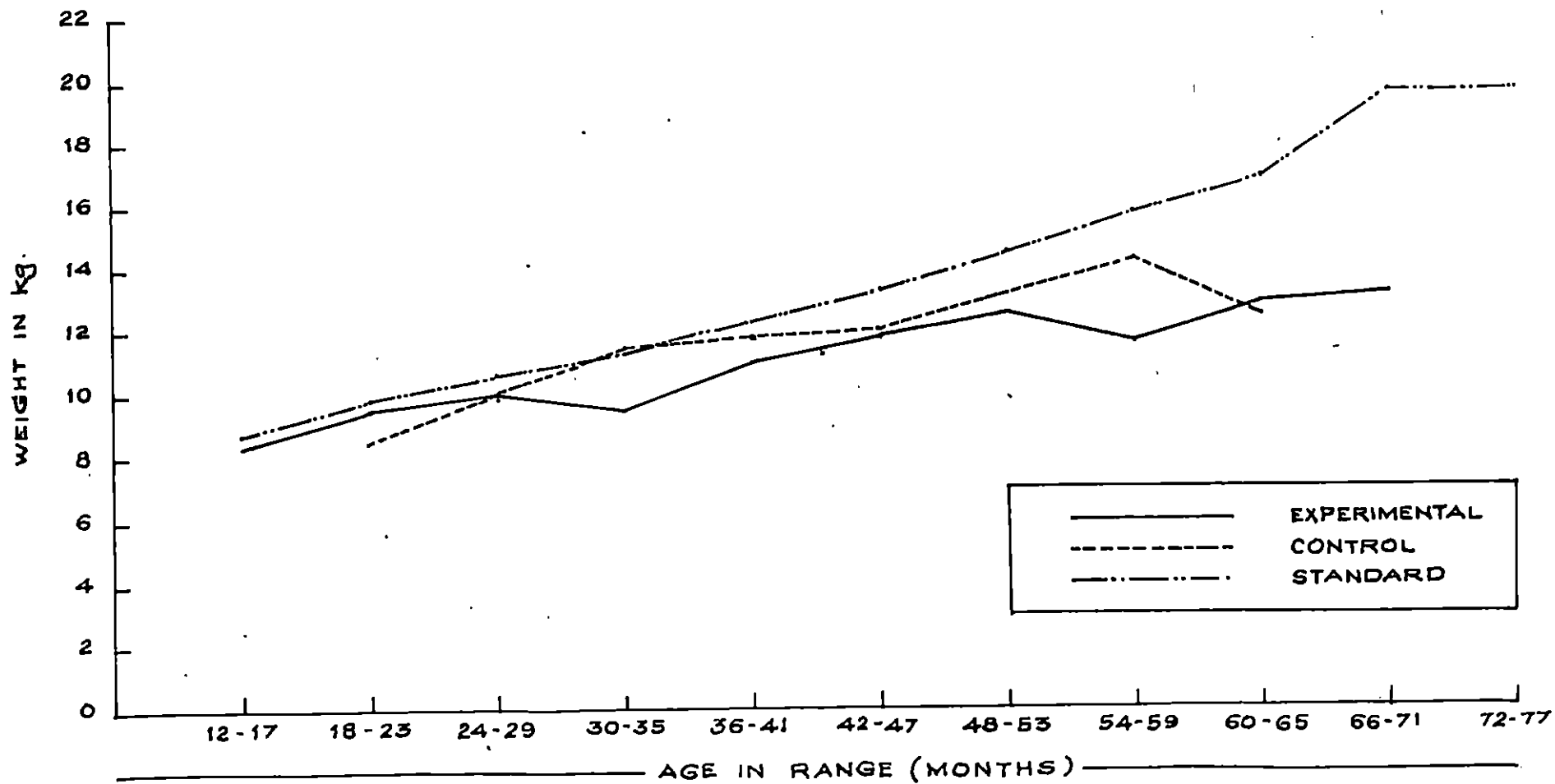


FIG. 6. WEIGHT FOR AGE OF THE PRE-SCHOOL CHILDREN (FEMALE).



Percentage distribution of preschool children belonging to experimental and control groups surveyed according to their weights in each age groups with the degree of malnutrition is presented in Table 29.

Table 29. Percentage distribution of preschool children according to their weights in each age groups with the degree of malnutrition

Age group (in range)	Sex	Total No. of chil- dren		Normal		1st grade malnu- trition		IInd grade malnu- trition		IIIrd grade malnu- trition	
		E	C	E	C	E	C	E	C	E	C
12 - 17	M	2	-	-	-	2	-	-	-	-	-
	F	2	-	1	-	1	-	-	-	-	-
18 - 23	M	2	1	-	1	2	-	-	-	-	-
	F	2	2	1	2	1	-	-	-	-	-
24 - 29	M	6	1	-	1	6	-	-	-	-	-
	F	5	1	3	1	2	-	-	-	-	-
30 - 35	M	10	1	-	1	10	-	-	-	-	-
	F	9	2	4	2	5	-	-	-	-	-
36 - 41	M	8	2	-	-	8	2	-	-	-	-
	F	11	5	4	5	6	-	1	-	-	-
42 - 47	M	2	3	-	3	2	-	-	-	-	-
	F	13	4	2	4	6	-	5	-	-	-
48 - 53	M	6	-	-	-	6	-	-	-	-	-
	F	10	-	2	-	8	-	-	-	-	-
54 - 59	M	6	-	-	-	6	-	-	-	-	-
	F	9	4	1	4	6	-	2	-	-	-
60 - 65	M	1	3	-	-	-	-	1	3	-	-
	F	10	1	1	-	6	-	3	1	-	-
66 - 71	M	2	-	-	-	-	-	2	-	-	-
	F	3	-	-	-	2	-	1	-	-	-
72 - 77	M	-	-	-	-	-	-	-	-	-	-
	F	1	-	1	-	-	-	-	-	-	-
Total		120	30	20	24	85	2	15	4	-	-

E - Experimental group

C - Control group

As revealed in Table 29, in almost all age groups 100 percent of male children in experimental group belonged to 1st grade malnutrition except in age group ranging from 60 to 71 months in which 100 percent of the boys were having IIInd grade malnutrition when compared to boys in all age groups. More girls belonged to the normal group in the experimental group except in age groups from 36 to 47 months and 54 to 71 months in which girls belonged to IIInd grade malnutrition. In all most all age groups in the control sample most of the boys and girls belonged to the normal group.

Table 30 presents the comparison of the mean height for age of preschool children in experimental and control groups with the standard.

As revealed in Table 30, the mean heights for age of preschool children in experimental and control groups when compared with the standard height of the preschool children for the respective age groups, it was seen that in the age groups 12-17 months all children had above standard heights. In the control group all children were having below standard heights. But in both groups majority of the children were having more than 90 percent of the standard heights in each age group.

Table 30. Comparison of the mean height for age of preschool children in experimental and control group with the standard heights (cm)

Age group in range (months)	Sex	Number of children		E			C			*Standard heights (cms)	Percentage of standard heights	
		E	C	Mean	±	SD	Mean	±	SD		E	C
12 - 17	M	2	-	72.5	±	2.5	-	±	-	72.0	Above 100	-
	F	2	-	73.5	±	3.27	-		-	72.8	Above 100	-
18 - 23	M	3	1	77.5	±	5.5	75	±	0.00	79.5	97	94
	F	2	2	75.5	±	4.27	75	±	4.16	78.5	96	95
24 - 29	M	6	1	77.6	±	4.30	83	±	0.00	85.0	91	95
	F	5	1	81.0	±	4.01	82	±	0.00	83.8	96	97
30 - 35	M	10	1	87.5	±	4.45	87	±	0.00	90.0	97	96
	F	9	2	83.3	±	4.57	86	±	1.00	88.5	94	97.2
36 - 41	M	8	2	90.25	±	4.57	93.5	±	8.5	94.0	96	96
	F	11	5	87.8	±	4.10	91.2	±	5.84	92.8	94.6	98
42 - 47	M	2	3	96.5	±	3.5	96.6	±	6.23	98.0	98.4	98
	F	13	4	91.23	±	6.65	92.75	±	5.53	97.0	94.0	95.6
48 - 53	M	6	-	95.0	±	3.5	-		-	101.5	93.5	-
	F	10	-	91.1	±	6.65	-		-	100.3	90.8	-
54 - 59	M	6	-	95.66	±	3.94	-		-	105.0	91.0	-
	F	9	4	95.44	±	5.27	105	±	0.72	104.0	91.7	98
60 - 65	M	1	3	95.0	±	0.00	99.6	±	1.69	108.0	87.0	92
	F	10	1	94.9	±	7.1	90.0	±	0.00	108.0	87.8	83
66 - 71	M	2	-	96.0	±	6.0	-		-	114.0	84.0	-
	F	3	-	98.6	±	5.0	-		-	114.0	86.0	-
72 - 77	M	-	-	-		-	-		-	-	-	-
	F	1	-	96.0	±	0.00	-		-	114.0	84.0	-
Total		120	30									

E - Experimental group

C - Control group \*Shantighosh (1986)



FIG. 7. HEIGHT FOR AGE OF THE PRE-SCHOOL CHILDREN (MALE).

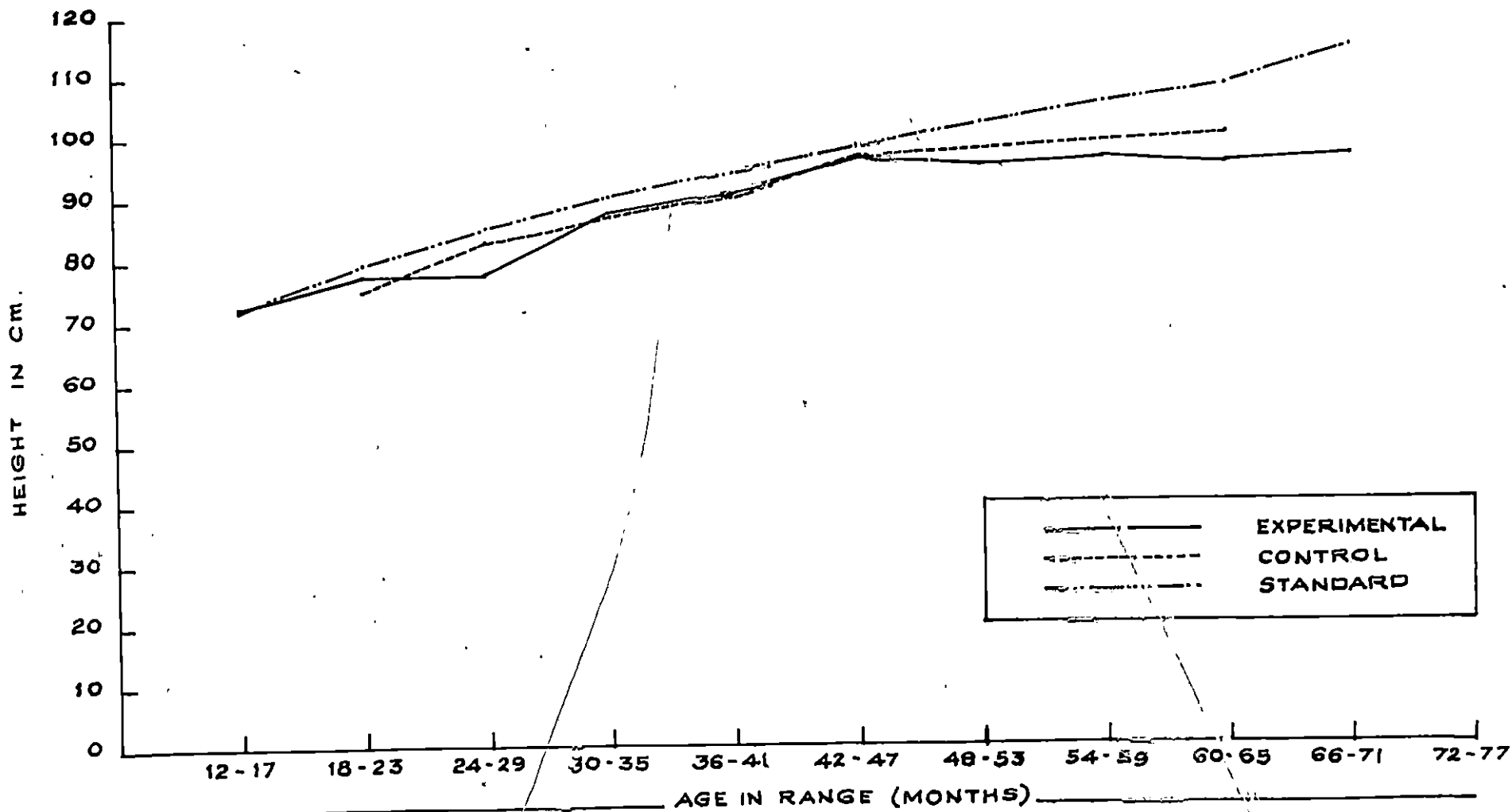
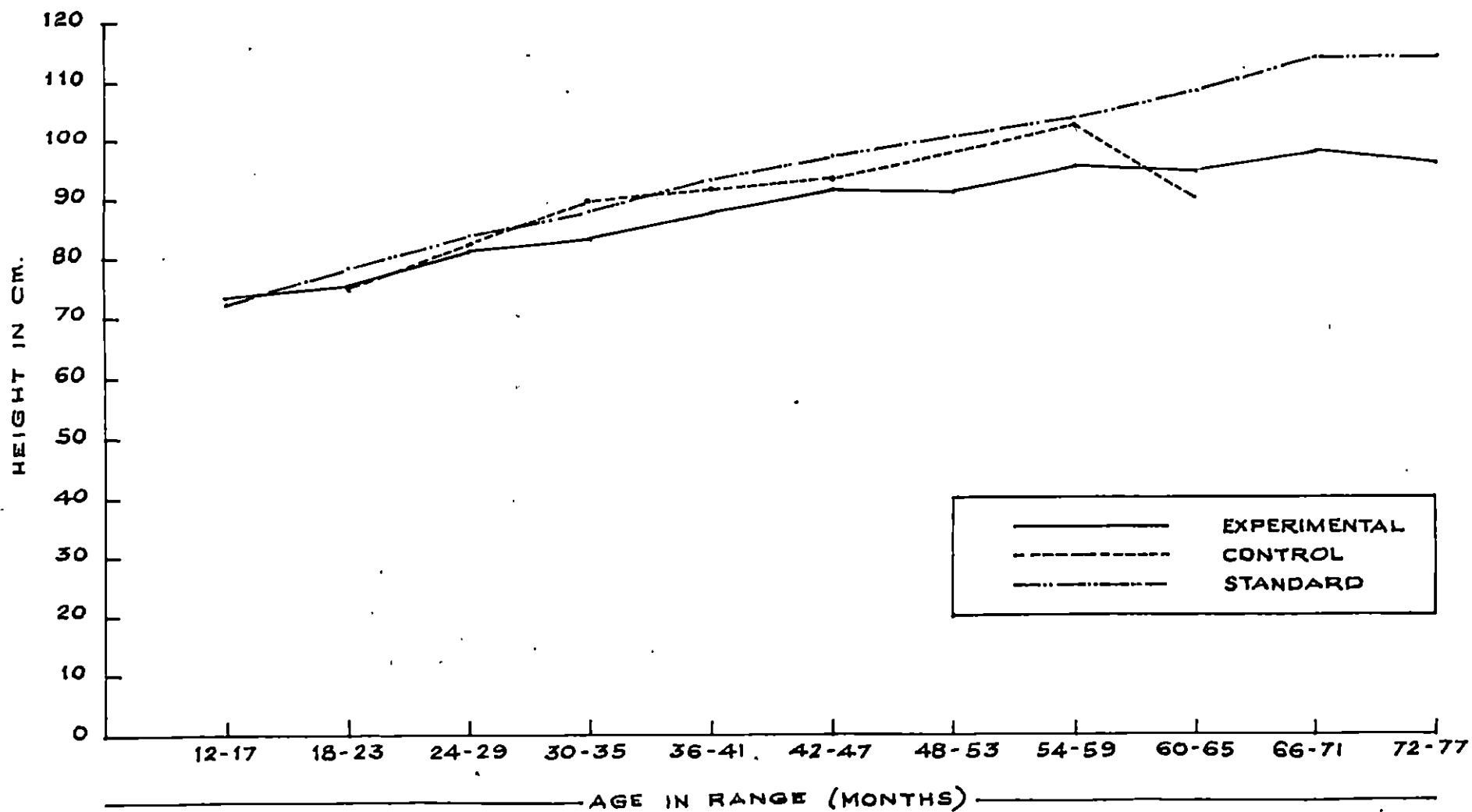


FIG. 8. HEIGHT FOR AGE OF THE PRE-SCHOOL CHILDREN (FEMALE).



According to Visweswara Rao (1987) height for age is classified as 80 percent of standard as poor, 80 to 90 percent of the standard as mild retardation and 90 to 100 percent of the standard as normal. The data is classified according to the classification.

Percentage distribution of preschool children belonging to experimental and control group surveyed according to their height for age with the degree of growth retardation is presented in Table 31.

Table 31. Percentage distribution of preschool children according to their height for age with the degree of growth retardation

Age group (in range)	Sex	Total No. of chil- dren		Normal		Mild retar- dation		Poor	
		E	C	E	C	E	C	E	C
12 - 17	M	2	-	2	-	-	-	-	-
	F	2	-	2	-	-	-	-	-
18 - 23	M	2	1	2	1	-	-	-	-
	F	2	2	2	2	-	-	-	-
24 - 29	M	6	1	6	1	-	-	-	-
	F	5	1	5	1	-	-	-	-
30 - 35	M	10	1	10	1	-	-	-	-
	F	9	2	9	2	-	-	-	-
36 - 41	M	8	2	8	2	-	-	-	-
	F	11	5	11	5	-	-	-	-
42 - 47	M	2	3	2	3	-	-	-	-
	F	13	4	13	4	-	-	-	-
48 - 53	M	6	-	6	-	-	-	-	-
	F	10	-	10	-	-	-	-	-
54 - 59	M	6	-	6	-	-	-	-	-
	F	9	4	9	4	-	-	-	-
60 - 65	M	1	3	-	3	1	-	-	-
	F	10	1	-	-	10	1	-	-
66 - 71	M	2	-	-	-	2	-	-	-
	F	3	-	-	-	3	-	-	-
72 - 77	M	-	-	-	-	-	-	-	-
	F	1	-	-	-	1	-	-	-
Total		120	30	83	29	17	1	-	-

E - Experimental group      C - Control group

Table 32. Comparison of the mean weight for height profile of preschool children in experimental and control group with the standard

Standard weight for the pre-school	Standard height (cm) for weight	Mean observed height (cm)		Percentage of weight for height	
		E	C	E	C
9.5	87	76.65	Nil	88.10	Nil
10	89.5	87.5	81	97.76	90.50
10.5	92	Nil	83	Nil	90.21
11	94.75	87.8	Nil	95.43	Nil
11.5	97.5	92.30	90.1	94.66	92.4
12	100	Nil	90.08	Nil	90.08
12.5	102.5	93.66	90.0	91.37	87.80
13	105	96.35	96.6	91.76	92
13.5	106	Nil	Nil	Nil	Nil
14	110.5	Nil	100.8	Nil	91.22
14.5	113.0	Nil	Nil	Nil	Nil
15	115.5	96	Nil	83.1	Nil

E - Experimental group

C - Control group

As revealed in Table 31, 100 percent of the children in both experimental and control groups in the age group 12-59 months were found to be normal whereas in the age group from 60-77 months in both the groups, all children were having mild growth retardation.

Weight for height profile of preschool children belonging to both experimental and control groups were compared with reference standard and the results are presented in Table 32.

As indicated in the Table 32, the height of the selected preschool children in the experimental as well as control groups were below the standard data available under height for weight.

Rao and Singh (1987) had classified weight/height<sup>2</sup> index as 0.0015 as normal, between 0.0013-0.0015 as moderate malnutrition and below 0.0013 as under nutrition.

Weight/height<sup>2</sup> profile of preschool children in experimental and control groups with respect to degree of malnutrition are presented in Table 33.

As depicted from the table in the age group 30-35 months, both in the experimental as well as in the control group all the preschool children were under nourished. In the age group 18-23 months, all the female children in the

Table 33. Weight/height<sup>2</sup> profile of preschool children in experimental and control group with respect to degree of malnutrition

Weight/height <sup>2</sup>		Age in range (months)																				
		12-17		18-23		24-29		30-35		36-41		42-47		48-53		54-59		60-65		66-71		72-77
Group		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
0.0015 (normal)	E				2																	
	C			1	2																	
0.0013-0.0015 moderate mal- nutrition	E	2	2	2		6	5			8	11	2	13	6	10	6	9	1	10	2	3	
	C	-	-			1	1			2	5	3	4	Nil	-	-	4	3	1			
0.0013 (under nutri- tion)	E							10	9													
	C							1	2													

E - Experimental group      C - Control group

experimental group and both the male and female children in the control group were found to be normal. All other children in experimental and control groups were moderately malnourished.

According to Tara Gopal Das et al. (1987) classification children with 12.5 cm and below mid arm circumference had severe malnutrition, 12.5 to 13.5 cm moderate malnutrition and 13.5 cm belonged to normal group.

Comparison of the mean mid-arm circumference of preschool children in experimental and control group with the degree of malnutrition were presented in Table 34.

As revealed in Table 34, majority of the children in experimental group belonged to the normal group having mid-arm circumference above 12.5 cms. In the control group majority of the children had moderate malnutrition with mid-arm circumference between 12.5 and 13.5 cm.

According to Tara Gopal Das et al. (1987), head/chest circumference ratio is classified as  $>1$  normal and  $\leq 1$  malnourished.

Head/chest circumference ratio of the preschool children surveyed were presented in Table 35.

As indicated in Table 35, in the experimental group 3.3 percentage of children belonged to the age

Table 34. Comparison of the mean mid arm circumference of preschool children in experimental and control group with the degree of malnutrition

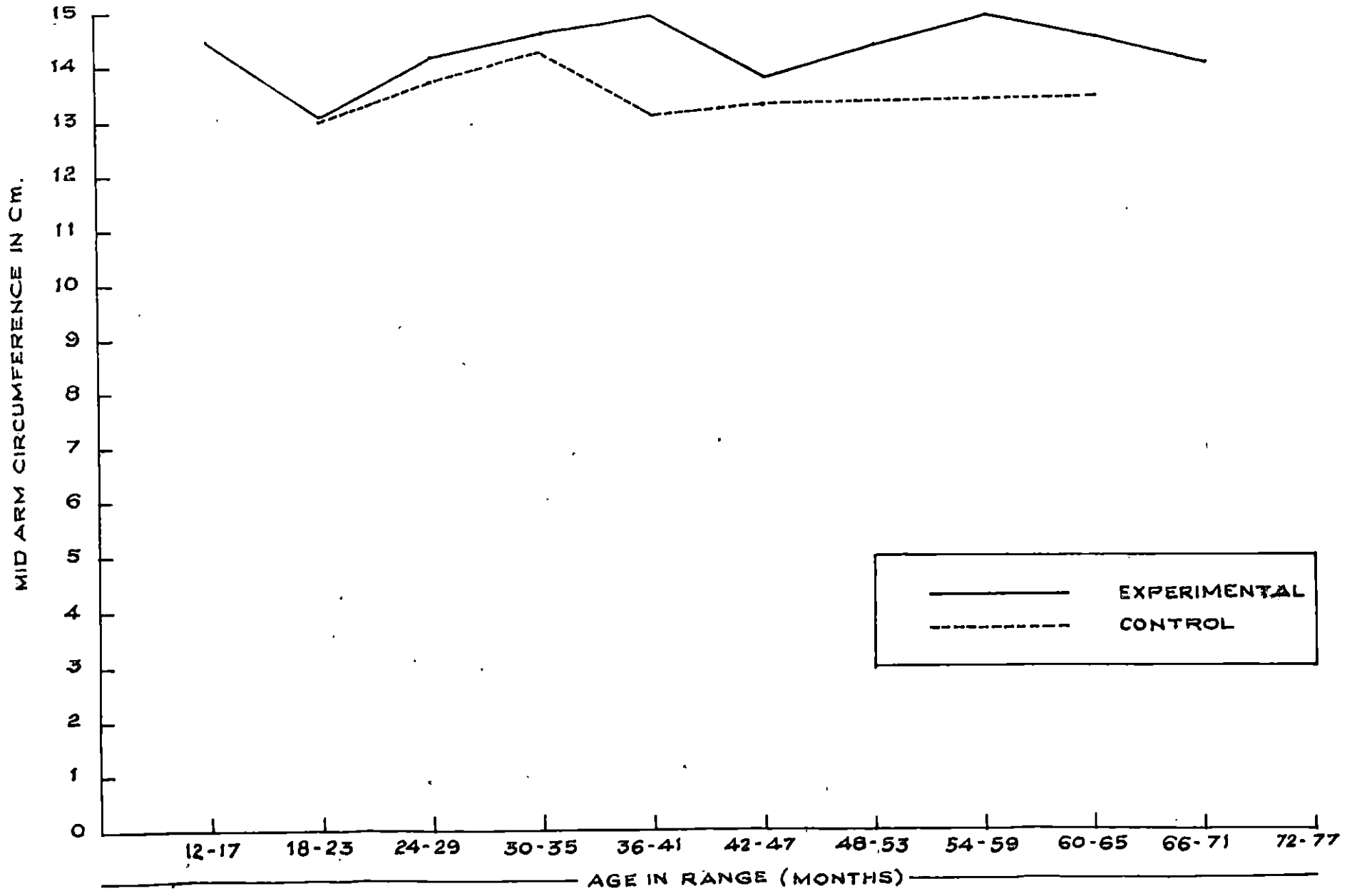
Mid arm circum- ferences	Group	Age range (in months)																					
		12-17		18-23		24-29		30-35		36-41		42-47		48-53		54-59		60-65		66-71		72-77	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
13.5 cm normal	E	2				6	5	10	9	8	11	2	13	6	10	6	9	1	10	2	3		1
	C	-				1	-	1	-										1				
12.5-13.5 moderate mal- nutrition	E	-	2	2	2																		
	C	-	-	1	2	-	1		2	2	5	3	4	-	-	Nil	4	3					
12.5 and below severe mal- nutrition	E																						
	C																						

E - Experimental group

C - Control group



FIG. 9. MID ARM CIRCUMFERENCE OF MALE CHILDREN.



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FIG. 10. MID ARM CIRCUMFERENCE OF FEMALE CHILDREN.

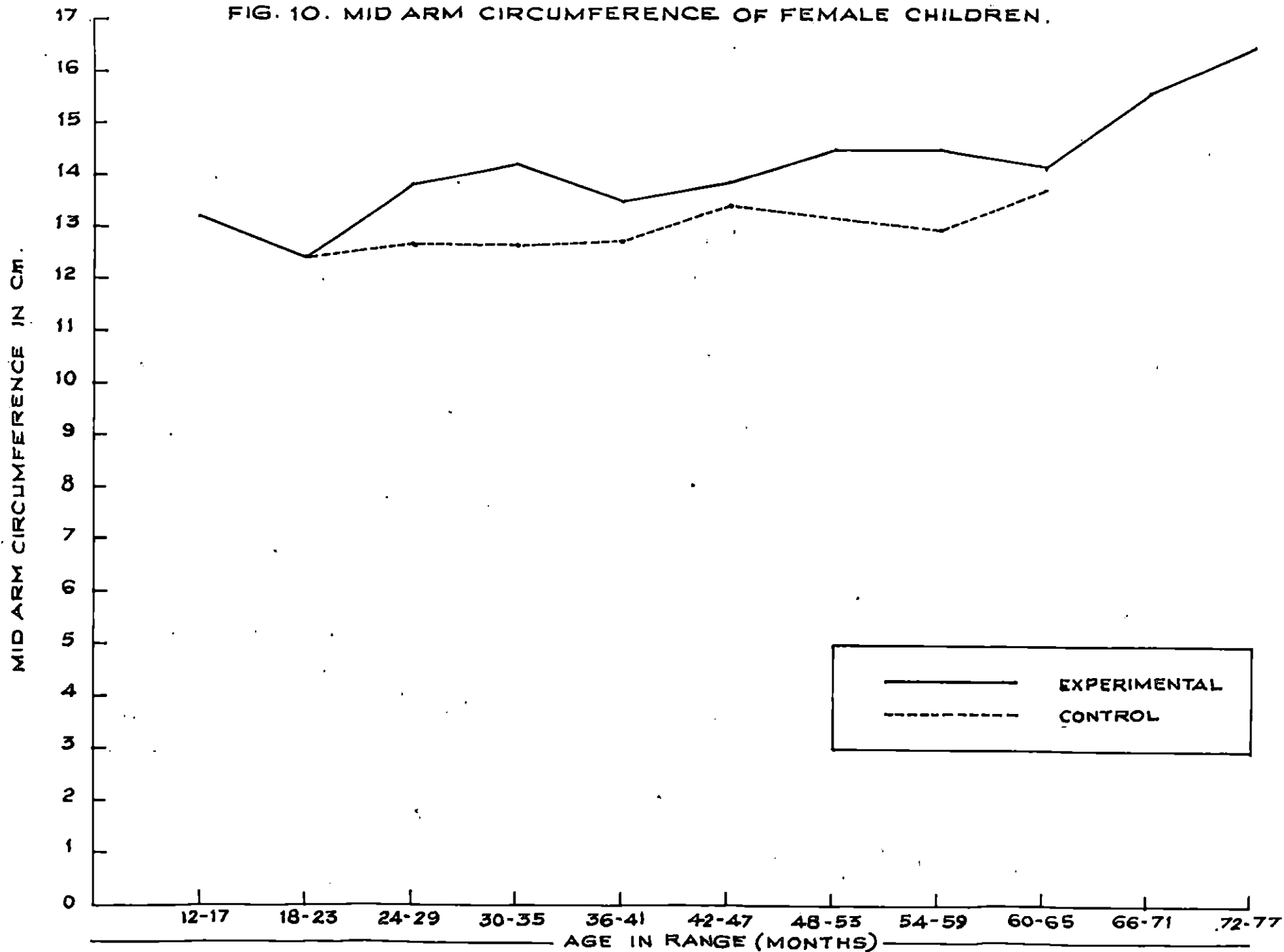


Table 35. Preschool children in experimental and control group having head/chest circumference ratio less than one

Group	Age in range (months)	Total percentage of children	Sex	Percentage of children with head/chest circumference ratio less than 1 (<1)
Experimental	18 - 23	2.2	M	Nil
			F	1.1
Control	30 - 35	10	M	3.3
			F	Nil

group 18-23 months out of which 1.1 percent of female children were having the head/chest circumference ratio less than one (<1). In the control group 10 percent of children belonged to the age group of 30-35 months, out of which 3.3 percent of the male children were having head/chest circumference ratio less than one (<1). All children in the other age groups both in experimental and control groups were having head/chest circumference ratio > 1 (greater than 1).

(iii) Clinical signs and symptoms of malnutrition

Clinical examination is the most essential part of nutrition surveys, since the ultimate objective is to assess levels of health of individuals and population

groups as influenced by the diet they consume (Swaminathan, 1974). Clinical assessment includes details related to general appearance of preschool children like skin changes, changes in the tongue, shining eyes etc. The details collected through clinical examination are presented in Table 36.

Table 36. Prevalence of clinical signs of malnutrition among preschool children (experimental and control groups)

Clinical signs	Experimental group of children				Control group of children			
	0-3 years		4-6 years		0-3 years		4-6 years	
	Nos.	Per-cent	Nos.	Per-cent	Nos.	Per-cent	Nos.	Per-cent
Anaemia	8	13.33	32	53.33	2	13.33	8	53.33
Angular stomatitis	-	-	4	6.66	-	-	3	20.0
Dental caries	1	1.66	5	8.33	-	-	6	40.0
Firm liver	2	3.33	4	6.66	-	-	-	-
Soft liver	1	1.66	3	5	-	-	-	-
Conjunctival xerosis	-	-	3	5	-	-	-	-
Photo phobia	1	1.66	-	-	-	-	-	-
Knock knee	-	-	1	1.66	-	-	-	-
Hair dis-coloured	1	1.66	-	-	-	-	-	-
Hair sparse	1	1.66	-	-	-	-	-	-
Marasmus	3	5	4	6.66	-	-	-	-

As revealed in Table 36, Anaemia was the common deficiency symptom among children of this area in both experimental and control group. Other common deficiency symptoms manifested by the control group were angular stomatitis (20 percent) and dental caries (40 percent). Other clinical symptoms like firm liver (9.99 percent) and marasmus (11.66 percent) was seen only in experimental group children.

(iv) Haemoglobin estimation

Clinical symptoms of anaemia was confirmed by estimating blood haemoglobin.

Data on haemoglobin estimation carried out in children in the experimental and control groups are presented in Table 37.

Table 37. Haemoglobin level of preschool children in the experimental and control groups

Haemoglobin mg/100 ml	E		C	
	Nos.	Percent	Nos.	Percent
8 - 9	7	5.8	1	3.3
9.1 - 10	12	10	11	36.6
10.1 - 11	18	15	8	26.6
11.1 - 12	30	25	3	10.0
12.1 - 13	29	24.1	4	13.3
13.1 - 14	13	10.8	2	6.6
14.1 - and above	11	9.1	1	3.3
Total	120	100	30	100

E - Experimental group      C - Control group

Table 38. Influence of birth order on the prevalence of anaemia

Age in months	Birth order of children					Total No.	Percent
	Ist	IIInd	IIIrd	IVth	Vth		
6 - 12	1					1	0.55
12 - 17		3				3	5.88
18 - 23				2		2	3.93
24 - 29	1	1	1			3	5.88
30 - 35			4		1	5	9.80
36 - 41	4		7			11	21.57
42 - 47		8				8	15.69
48 - 53				6		6	11.76
54 - 59		3		3		6	11.76
60 - 65		1				1	1.96
66 - 71			1			1	1.96
72 - 77			1	1	1	3	5.88
Total No.	6	16	14	12	2	50	
Percent	12.00	32.00	28.00	24.00	4.00	100	

Normal level of haemoglobin content of blood is reported to be 11 mg/100 ml for preschool children (Santhi Ghosh, 1986). As revealed in the table, <sup>37</sup>30.8 per cent of children belonging to experimental group and 66.5 percent of children in control group were having haemoglobin levels below normal. More children belonging to the control group were found to suffer from anaemia and ill health.

Birth order is an important factor which may influence the health condition of children in the growing stage. In the present study the influence of birth order on the prevalence of anaemia was assessed and among the 150 children studied (120 experiment and 30 control), 50 children were identified to suffer from anaemia.

Influence of birth order on the incidence of anaemia of their children were assessed and the results are presented in Table 38.

As revealed in Table 38, the prevalence of anaemia was more among the preschool children in the age group of 36-59 months. The prevalence of anaemia is found to increase with the advance in age among children in the early preschool period (6-35 months). The influence of birth order on the prevalence of anaemia was influenced by the birth order of children.

Table 39. Percentage difference in body weights of preschool children from growth charts recorded for 6 months period

Age groups	Mean initial weight (kg)				Mean final weight (kg)				Percentage difference			
	E		C		E		C		E		C	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
12-17	8.19	8.0	Nil	Nil	8.25	8.37	Nil	Nil	0.06	0.37	1.25	Nil
18-23	8.92	8.75	8.5	8.0	9.0	9.5	9.0	8.5	0.084	0.75	0.5	0.5
24-29	9.14	9.53	10.0	9.5	9.33	9.95	10.5	10.0	0.19	0.42	0.5	0.5
30-35	10.4	9.00	11.75	11.25	10.47	9.38	12.00	11.50	0.07	0.38	1.28	0.5
36-41	11.20	11.00	12.0	11.5	11.56	11.06	12.25	11.80	0.36	0.06	0.25	0.3
42-47	12.125	11.20	12.5	11.8	13.25	11.80	13.3	12.0	1.131	0.51	0.8	0.2
48-53	12.5	11.75	Nil	Nil	12.75	12.58	-	-	0.25	0.83	Nil	Nil
54-59	11.5	11.5	Nil	12.0	13.16	11.63	Nil	14.25	1.66	0.13	-	2.25
60-65	12.0	11.50	13.0	12.30	13.0	12.9	14	12.5	1.0	0.9	1.00	0.29
66-71	12.5	13.0	-	-	13.0	13.16	-	-	0.5	0.16	-	-
72-77	-	13.21	-	-	Nil	15.00	-	-	-	1.79	-	-

E - Experimental group      C - Control group



Among the children in the age of 6-35 months the anaemia was found to be more common among children who were IIIrd in birth order. The table further revealed that among the children of 4-6 years, anaemia was found to be more prevalent among children who were having IInd, IIIrd and IVth birth orders.

(v) Growth monitoring of children for 6 months using growth charts

Percentage difference in body weights of preschool children both experimental and control groups from growth charts recorded for six months period is presented in Table 39.

As revealed in Table 39, the percentage difference in the body weights recorded for 6 months indicated that the growth rate was more for male children in the age groups 36-47 months and in 66-71 months when compared to the growth rate of male children in the control group of the same age. In the case of female children growth rate was found to be more in female children of the control group except in the age group 42-47 and 60-65 months.

Mean body weight of 0-3 years old children in experimental and control groups from growth charts recorded for 6 months periods are presented in Table 40.

Table 40. Mean body weight of 0-3 years old children in experimental and control groups from growth charts recorded for 6 months periods

Month	E		'F value'	C		't value'
	Male	Male		Female	Female	
	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.		
Ist	9.80±1.70	11.40±0.86	1.22	9.93±1.63	10.92±1.49	1.69
IIInd	9.85±1.65	11.45±0.84	1.26	9.99±1.62	10.94±1.50	1.72
IIIrd	9.99±1.72	11.45±0.84	1.22	10.06±1.65	10.97±1.51	1.66
IVth	10.25±1.68	11.80±0.80	1.25	10.21±1.70	11.25±1.51	1.63
Vth	10.28±1.66	11.85±0.86	1.26	10.27±1.71	11.31±1.48	1.63
VIth	10.30±1.73	11.90±0.86	1.21	10.28±1.68	11.36±1.50	1.65

E - Experimental group      C - Control group

Table 41. Mean body weight of 4-6 years old children in experimental and control groups from growth charts recorded for 6 months periods

Month	E			C			't' value	E			C			't' value
	Male			Male				Female			Female			
	Mean	±	S.D.	Mean	±	S.D.		Mean	±	S.D.	Mean	±	S.D.	
Ist	12.14	±	1.40	13.21	±	0.51	1.677	11.69	±	1.59	12.56	±	1.23	1.76
IIInd	12.24	±	1.38	13.21	±	0.51	1.70	11.87	±	1.53	12.57	±	1.22	1.81
IIIrd	12.35	±	1.45	13.21	±	0.51	1.62	12.02	±	1.49	12.57	±	1.21	1.86
IVth	12.57	±	1.51	13.63	±	0.54	1.50	12.11	±	1.51	13.03	±	1.29	1.82
Vth	12.78	±	1.35	13.67	±	0.55	1.73	12.33	±	1.54	13.00	±	1.29	1.79
VIth	12.78	±	1.41	13.67	±	0.55	1.66	12.04	±	2.39	13.06	±	1.25	1.20

E - Experimental group

C - Control group

As revealed in Table 40, the mean body weights of children (0-3) belonging to both the experimental and control group in each month indicated that mean body weight was more for control group children (0-3 years) than the children of experimental group, but the difference was not statistically significant.

Mean body weight of 4-6 years old children in experimental and control group from growth charts recorded for 6 months periods ~~were~~ presented in Table 41.

As revealed in Table 41, the mean body weights of children (4-6 years) belonging to both the experimental and control group in each month indicated that mean body weight was more for control group children (4-6 years) than the children of experimental group. But the difference was not statistically significant.

4. Assessment of knowledge and attitude of the mothers towards the programme and also by the rate of adoption of the components of Integrated Child Development Services

A. Knowledge of the mothers towards various programme implemented under Integrated Child Development Services programme

Four statements on supplementary nutrition were

included in the scale administered and the knowledge of the mothers regarding this component of Integrated Child Development Services are furnished in Table 42.

Table 42. Knowledge of mothers about supplementary nutrition of ICDS programme

Statements	(Percent)	
	Yes	No
1. Foods supplied through Anganwadi Centres are highly nutritious	80	20
2. Foods supplied at Anganwadi Centres are sufficient to meet the needs of children	7	93
3. Preparation mixed with green leafy vegetables are nutritious and tasty	98	2
4. It is necessary to include protein foods like milk, pulses, oil seeds, nuts, egg, fish, meat etc. in the dietary pattern of children below five years	81	11

As revealed in Table 42, majority of the mothers are found to be fully aware of the nutritional significance of foods including protein foods as well as Anganwadi diets in the meal pattern of the preschool children. However 93 percent of the women were of the view that food supplied under Anganwadi centres were insufficient to meet the nutritional needs of the children.

Eight statements regarding the various aspects of immunization and health education components of Integrated Child Development Services were included in the scale administered and the knowledge of the mothers regarding their components of Integrated Child Development Services is furnished in Table 43.

Table 43. Knowledge of mothers about the immunization and health education components of ICDS programme

Statements	Percent	
	Yes	No
1. Disease occur when uncooked foods are eaten	90	10
2. Children should be trained to wash hands before meal	100	-
3. Spoiled foods should never be given to children	92	8
4. Fever and cough are not contagious	14	86
5. Immunization against whooping cough, diphtheria and Tetanus is given to children during the first three months period	88	12
6. Unhygienic environment is responsible for occurrence of diarrhoea in children	97	3
7. Deworming is done regularly in children at Anganwadi centre	100	-
8. Worm troubles are prevented if the nails are kept clean	80	20



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As revealed in Table 43, majority of the mothers were found to be fully aware of the significance of immunization activity under Integrated Child Development Services programme. Mothers in general were found to be fully aware of the origin and occurrence of various contagious diseases and the importance of deworming the children to maintain their proper health.

Six statements related to health check up, referral services and non-formal preschool education were included in the scale administered and the knowledge of the mothers regarding these components of Integrated Child Development Services were furnished in Table 44.

Table 44. Knowledge of mothers about the health check up, referral services and non-formal preschool education of ICDS programme

Statements	Percent	
	Yes	No
1. Growth charts are maintained in the Anganwadi to assess the health condition of children	100	-
2. Weights of children are recorded periodically	99	1
3. Regular periodical check up for the benefit of children are done by the doctor from Primary Health Centre	93	7
4. ANMS visits the centre weekly and distributes medicines and tablets to the children	24	76
5. It is not advisable to teach children coming from different families at a common place	2	98
6. Daily morning before taking classes AWW is responsible for checking the health and hygienic habits in children	96	4

As revealed in Table 44, mothers were found to be fully aware of the significance of maintaining growth charts in the Anganwadi Centres and importance of visits of health personnel to the centre. Among the health personnel response was more for the visit of Doctors, when compared to ANMS. 93 percent of the mothers considered that the visits of the Doctors from primary health centres were more beneficial for the periodical check up of the children. Women were also found to be fully aware of the concept of preprimary education at the Anganwadi level.

Seven statements related to nutrition education component of ICDS programme were included in the scale administered and results are revealed in Table 45.

Table 45. Knowledge of the mothers about the nutrition and health education of ICDS programme

Statements	Percent	
	Yes	No
1. Green leafy vegetables give pure blood, good sight and eradicate anaemia	93	7
2. Leafy vegetables are good sources of Vitamins and minerals	94	6
3. Children grow if they are given only carbohydrate foods	16	84
4. Pulses contain proteins which are needed for the growth of children	90	10
5. It is good to give egg daily to child	98	2
6. Vitamin A is necessary to eye sight	98	2
7. Vitamin C content is greater in amla than in orange	76	24



As revealed in Table 45, majority of the mothers were found to be aware of the significance of various nutrients like carbohydrate, protein and vitamins. They had also recognised the role of locally available nutritious foods such as green leafy vegetables, pulses and fruits in the daily diets of preschool children.

B. Attitude of mothers towards various programmes implemented under Integrated Child Development Services programmes

Six statements related to supplementary nutrition programmes were included in the attitude scale administered and results are furnished in Table 46.

Table 46. Attitude of mothers towards supplementary nutrition (percent)

Statements	Very much satisfied	Satisfied	Undecided	Unsatisfied	Totally unsatisfied
1. Supplementary feeding for the benefit of children	19	19	22	12	28
2. Distribution of supplementary food at Anganwadi	27	42	-	5	26
3. Methods of selection of preschool children	12	42	32	-	14
4. Method of selection of mothers for supplementary feeding	18	55	24	2	1
5. Quality control of foods distributed to the children	16	35	29	2	18
6. Scientific cooking practices of foods at the Anganwadi centres	-	27	13	20	40

As revealed in the Table 46, about 40 percent of the women surveyed were found to be not satisfied about the conduct of supplementary nutrition programme at Anganwadi level, since they had negatively reacted to it. Similarly about 27 percent of the mothers had not positively reacted to the methods used for selecting preschool children and mothers as beneficiaries under Integrated Child Development Services programmes. 49 percent of the mothers surveyed were found unsatisfied about the quality of foods distributed at Anganwadi and 60 percent of the mothers were not impressed about the scientific cooking practices said to be adopted at the Anganwadi.

8 statements related to the attitude of mothers towards immunization, health check up programme and referral services implemented under Integrated Child Development Services programmes were included in the scale administered and results were furnished in Table 47.

As revealed in Table 47, 40 percent of the mothers had a negative attitude towards the implementation of immunization programmes. 35 percent of the mothers were found to be unsatisfied about the way in which the growth charts are monitored at Anganwadi centre. However majority of women (95 percent) were found to have a positive attitude towards the health care programmes and 65 percent

Table 47. Attitude of mothers towards immunization, health check up and referral services under ICDS programme

Statements	Very much satisfied	Satisfied	Undecided	Unsatisfied	Totally not satisfied
1. Immunization programmes implemented for the benefit of children	28	32	28	2	10
2. Monitoring growth charts at Anganwadi centres	36	29	23	-	12
3. Attention given to the health of children at AWC	55	40	2	-	3
4. Environmental sanitation in and around Anganwadi	26	39	10	5	20
5. Visiting and medical check up of the Doctors from primary health centre at Anganwadi	23	25	19	3	30
6. House visits and services done by nurses of primary health centre	19	34	18	4	25
7. Distribution of medicine for the benefit of children, pregnant and lactating mothers	17	23	19	11	30
8. Facilities for referral services	22	20	38	2	18

of the mothers had reacted positively to the daily care and maintenance of the Anganwadi centre.

29 to 33 percent of mothers had negatively reacted to the services extended by health personnel at Anganwadi level and 41 percent of the mothers were not satisfied about the distribution of medicines to the beneficiaries.

Six statements related to the attitude of mothers towards the non-formal preschool education of Integrated Child Development Services programmes were included in the scales administered and results are furnished in the Table 48.

Table 48. Attitude of the mothers towards non-formal preschool education

Statements	(percent)				
	Very much satisfied	Satisfied	Undecided	Unsatisfied	Totally not satisfied
1. Starting of Anganwadies in rural areas	32	46	22	-	-
2. Pre-primary education given to the child	20	54	25	1	-
3. House visits by Anganwadi workers	22	43	23	7	5
4. Face to face talk with mother by Anganwadi worker	34	36	19	7	4
5. Distribution of play materials for the benefit of Anganwadi children	40	22	13	7	18
6. Educational status and knowledge of Anganwadi children	27	36	20	7	10

As revealed in Table 48, this component of Integrated Child Development Services was found to be more popular among mothers than the remaining five components of Integrated Child Development Services. However 30-38 percent of the mothers had a negative attitude towards the services of Anganwadi worker other than teaching at the Anganwadi Centre.

Five statements related to the attitude of the mothers towards the nutrition and health education components of Integrated Child Development Services were included in the scale administered and results were furnished in the Table 49.

Table 49. Attitude of mothers towards nutrition and health education components of ICDS

Statements	Very much satisfied	Satisfied	Undecided	Unsatisfied	Totally not satisfied
1. Discussion classes about health and nutrition for the benefit of housewives	12	30	18	8	32
2. The educational film shows and other audio-visual aids used for discussion classes for the benefit of mothers	7	33	33	15	12
3. Demonstration classes conducted at Anganwadi	20	27	19	22	12
4. Monthly mothers meeting conducted by the Anganwadi Worker	12	31	13	2	42

As revealed in Table 49, only about 40-42 percent of the mothers had a positive attitude towards the programmes implemented under nutrition and health education. 60 percent of the mothers were not satisfied regarding the educational film shows and other audio visual aids used for this purpose. Regarding the demonstration classes only 47 percent reacted positively and regarding the monthly mothers meeting 57 percent of the mothers had a negative approach.

C. Rate of adoption of the components of Integrated Child Development Services by mothers of the preschool children

Rate of adoption of new household practices acquired through Integrated Child Development Services programmes were tested by a few statements related to the major components of Integrated Child Development Services programme among the mothers of preschool children who were the beneficiaries of Integrated Child Development Services programme.

Six statements related to supplementary nutrition were included in the scale administered and the rate of adoption of new practice regarding this matter by the mothers are furnished in Table 50.

Table 50. Rate of adoption of mothers of preschool children towards supplementary nutrition

Statements	Rate of adoption (percentage)	
	Yes	No
1. Low cost nutritious foods like green leafy vegetables were included in the dietary pattern of the children	70	30
2. Children were given nutritious foods at home along with the foods distributed at the Anganwadi	87	13
3. Green leafy vegetables were included in the diets of pregnant women and children	88	12
4. Children were given nutritious snacks prepared with groundnuts and gingelly seeds	52	48
5. Pulses were given for the proper growth and development of the children	100	-
6. Fruits and vegetables were included in the daily diet of children	63	37

As revealed in Table 50, all the mothers had adopted the practice of including low cost nutritious foods like pulses, fruits and vegetables (63 percent) and green leafy vegetables (70 percent). Most of them had also adopted the practice of including green leafy

vegetables in the daily diets of pregnant women and to supplement the Anganwadi foods with other nutritious foods.

Nine statements related to immunisation and referral services are included in the scale administered and the rate of adoption of new practices regarding this matter by the mothers were furnished in Table 51.

Table 51. Rate of adoption of mothers towards immunization and referral services

Statements	Rate of adoption (percent)	
	Yes	No
1. House and its premises were kept clean	100	-
2. Nail cutting done periodically for children	100	-
3. Children were trained to wash their hands before taking meals	100	-
4. Children were immunized at the correct time	97	3
5. To prevent worm troubles among children latrines were built at the household level	78	22
6. During pregnancy period, injections were taken to prevent tetany	98	2
7. Adequate attention was given to the personal hygiene of children	100	-
8. Every six months deworming was done for children	98	2
9. Vaccines were taken to prevent measles	83	17



As revealed in Table 51, all the mothers were found to be particular in keeping the premises clean and inculcating good habits in their children. The table also revealed that majority of the mothers were very conscious about the immunization to be taken and 78 percent of the mothers built latrines at the household level.

Two statements each in the health check up and non-formal pre-primary education were included in the scale administered and the rate of adoption of new practices regarding this matter by the mothers were presented in Table 52.

Table 52. Rate of adoption of mothers towards health check up and pre-primary education

Statements	Rate of adoption (percent)	
	Yes	No
1. Children were taken to periodical medical check up	98	2
2. Boiled and cooled water were given to the children for drinking	68	32
3. Visiting Anganwadi centre periodically to enquire about education of the child	93	7
4. Children were sent to the Anganwadi regularly	100	-

As revealed in Table 52, all the mothers were very particular about sending their children to Anganwadi regularly. About 93 to 98 percent of the mothers developed the habit of visiting the Anganwadi for periodically to enquire about their child's education and periodical medical check up of their children.

Six statements on nutrition and health education were included in the scale administered and rate of adoption of new practices regarding this matter by the mothers were given in Table 53.

Table 53. Rate of adoption of mothers towards nutrition and health education programmes

Statements	Rate of adoption (percent)	
	Yes	No
1. Production of vegetables and green leafy at the household level	28	72
2. Egg is given daily to pregnant women	42	58
3. Other foods are given to 3 months old child along with breast milk	82	18
4. Poultry keeping is taken up at the household level to give egg to children	43	57
5. Vegetables are not cut into small pieces to avoid loss of nutrients	65	35
6. Vegetables and green leafy vegetables are cooked in covered vessels	16	84

As revealed in Table 53, all the mothers viewed that to conserve nutrients in the cooked foods proper cooking methods should be adopted. Home production of foods were also taken up by few mothers (28 percent) to improve the composition of their daily diet.

The adoption of various health and nutrition aspects by the mothers revealed that eventhough they had given adequate attention in adopting better practices ensuring the better health of their children. Such enthusiasm was not shown in their own cases.

#### Lacunae located in the present components of Integrated Child Development Services

Among the six components of Integrated Child Development Services Lacunae were located in six components namely supplementary feeding, immunization, health check up, referral services, non-formal education and nutrition and health education.

1. Supplementary feeding under Integrated Child Development Services was considered as a substitute for regular home meals by 87 percent of mothers interviewed, hence the basic objective of the supplementary nutrition programme was defeated.

## 2. Preschool education, nutrition and health education

As per the guidelines of Integrated Child Development Services one Anganwadi centre was sanctioned for the benefit of thousand population each and in each Anganwadi centre 90 preschool children are admitted. The observations made in the present study indicated that many of the Anganwadi centres (65 percent) were not fully utilized since the student's strength were found to be inadequate. Reasons given by the Anganwadi workers for this was the distance between two centres. Reasons given by the mothers (62 percent) were irregular management and indifference of Anganwadi workers. The improper timing of running the Anganwadi centre and supplementary feeding was also pointed out as a reason by 78 percent of mothers. Preschool education was not properly conducted (92 percent of mothers). Play space was most inadequate in all anganwadies. Space provided was not even safe for children.

## 3. Immunization, health check up and referral services

For the effective implementation of the immunization programme the ANM's are expected to visit each Anganwadi centre every month. As per the views of 89 percent of mothers the timings fixed for immunization by ANM and Anganwadi workers were not convenient to

them. In remote area like Paruthikuzhy project unit, the rate of immunization was very poor here (25 percent). 42 percent of mothers had stated that the Anganwadi centres were not visited regularly by ANM's or other medical personnels.

4. Nutrition and health education classes were not regularly conducted (94 percent). Mothers' camps were not conducted (90 percent).

# DISCUSSION

## DISCUSSION

The study was conducted among preschool children, coming under Integrated Child Development Services programme of Trivandrum urban project area which included 4 project sectors namely Vallakadavu, Poonthura, Paruthikuzhy and Veli. Comparative study was conducted among preschool children who were non beneficiaries of Integrated Child Development Services selected from the same areas and socio economic group.

### Socio economic status of the families

Majority of families surveyed in experimental group (93.33 percent) and in the control group (63.33 percent) were categorised as under privileged section of the population. Nuclear type of families were found to be common in both the groups. As pointed out by Dhanadeve (1982), the family set up of urban areas mostly consisted of nuclear type of families.

As reported by Gupta et al. (1976) there is a significant direct relation between family size and overall nutritional status of family members. In the present study 73.33 percent of the families in experimental group and 86.67 percent families in the control group belonged to small families having less than 5 members. 56.4 percent of the family members in the experimental group and

51.46 percent of the family members in the control group were in the growing stage. Female population was found to be more in families of both groups. Regarding the educational status 50.82 percent of adults in the experimental group and 88.01 percent of adults in the control group were found to be illiterates.

As per the occupational distribution of the families in experimental and control groups majority were marginal labourers (50 and 96.66 percent respectively). The only source of livelihood in 30 percent of the families in experimental group were fishing. The economic status of the families indicated that 71 percent of families in the experimental group and all the families in control group were below the poverty line.

More than 60 percent of the family income in both the experimental and control groups were spent on food.

#### Food habits and consumption pattern of the families

All the families surveyed in both the groups were habitual non-vegetarians with fish being the important non-vegetarian food in their daily diet. In experimental and control groups foods like rice (70.83 and 83.33 percent respectively), tapioca (55.83 and 56.66 percent respectively), Fish (100 percent in both), Spices and Condiments (70 and 76.66 percent respectively) and Coconuts (53.33



and 43.73 percent respectively) were purchased daily since they were daily wage earners. Purchase of food articles like green leafy vegetables (41.66 and 100 percent respectively) and meat (90 and 100 percent respectively) were found to be occasional.

In the control group, home production of foods by the families were found to be negligible while coconut and milk were found to be the major food items produced by the families of experimental groups.

Culinary practices is an important factor which may influence the availability of nutrients from the foods prepared. This will also include the hygienic handling of raw foods. In the present study all the families were in the habit of cleaning the dry food articles immediately after purchase. Majority of the families were in the habit of washing perishable foods like vegetables once before cooking. Regarding fruits, majority of the families washed fruits just before eating. Food articles like meat were cut into very small pieces and they were in the habit of washing fruits and meat before cutting while vegetables and fish were washed after cutting into small pieces. Among the various cooking methods adopted by the families surveyed, majority of the families in both the groups cooked rice by straining method. Tapioca was boiled and strained before preparing the curries.

Eventhough the use of leafy vegetables was very occasional, 80 percent of the families in the experimental group prepared it by absorption method. Fish was mainly consumed in the form of curries and in fried forms. Fruits like mango and fish were commonly processed by these families.

The frequency of use of various food items showed that the daily diet mainly comprised of rice with tapioca as staple, fish, coconut, fats and oils used for seasoning fish and tapioca, small quantity of sugar and milk mainly from the coffee or tea. Earlier studies conducted by Lina and Reddy (1984) revealed that a typical Kerala dietary pattern, would be based on rice, fish, tapioca and coconut.

Children in both experimental and control groups were found to have unhealthy food preferences. They preferred sweets and fried foods and majority of the families purchased such foods to children daily. In 55 percent of the families in experimental group, first preference was given to children by mothers in serving meals probably because of the influence of nutrition education programmes implemented under Integrated Child Development Services programme. Whereas in the control group majority of the families (93.33 percent) served food to children along with other members in the family. These children were in the habit of taking meals alone without assistance

or care from other elder members of the family.

Actual food and nutrient intake of preschool children

The average food consumption of the preschool children 1-3 years old of both experimental and control groups revealed that the quantity of foods such as cereals, roots and tubers, flesh foods (mainly fish) were more than their requirements. Average consumption of pulses in the dietaries of preschool children in the experimental group was found to be 85.71 percent of recommended daily allowances whereas it was only 52 percent in the case of control group children. Protective foods like milk, green leafy vegetables and other vegetables were found to be negligible in both the groups. But on an average the daily diets of preschool children of the experimental group was found to contain more quantities of food than the control group eventhough the quantities were below the recommended allowances of foodstuffs.

Regarding the nutrients intake of preschool children of both the groups, since their consumption of fish was high, the availability of protein from the daily diet was above the recommended daily allowances. The intake of calories from the diets of children of experimental groups were found to be satisfactory (94.7 percent of R.D.A.) whereas calorie consumption of control group

were unsatisfactory (79.2 percent). Nutrients like iron, vitamin A and vitamin C were found to be highly insufficient in both the groups. Compared to the diets of experimental groups nutrients such as protein, energy, calcium, iron, vitamin A, vitamin C, thiamine, riboflavin and niacin were less in the diets of control groups.

Average quantity of foods consumed by preschool children of 4-6 years in both the groups showed that the quantity of cereals and fish were more than the recommended daily allowance. The quantity of green leafy vegetables, milk and other vegetables were negligible. The dietaries of experimental group included sufficient quantities of pulses, roots and tubers and fats and oils. Their nutrient intake showed that protein intake exceeded the recommended allowance in both the groups because of the daily consumption of fish. Calorie intake was met around 81.7 percent of recommended allowance in experimental group and 78.6 percent of recommended daily allowances in the control group. Nutrients like vitamin A and vitamin C was found to be highly insufficient for both the groups. The intakes of other vitamins like thiamine and niacin and minerals like calcium and iron were found to be satisfactory in the experimental group when compared to the control group. The food consumption pattern of preschool children, in the experimental group, were found to be better, when compared

to the children of control group. This may probably be due to the influence of nutrition education component of Integrated Child Development Services.

#### Anthropometric studies

When weight for age was compared between experimental and control group with the standard it was seen that 100 percent of children in the experimental group were below standard whereas in the control group 6.6 percent of female children in the age group of 30-35 months were above standard weight and others below standard. The Gomez system of classification of weight for age revealed that in almost all the age groups in the control sample, most of the male and female children belonged to the normal group. In almost all age groups in the experimental group 100 percent of the male children belonged to 1st grade malnutrition except in the age group ranging from 60-71 months. Majority of the females in experimental group belonged to the normal group. In both the groups majority of the children were having more than 90 percent of the standard heights in each age groups. The height for age with the degree of growth retardation revealed that 100 percent of the children in both the experimental and control groups in the age group from 12-59 months were found to be normal. The height of the selected preschool children in the experimental as well as control group were

below the standard data available under height for weight. Weight/height<sup>2</sup> index depicted that in the age group of 30-35 months all the children in experimental and control groups were undernourished.

Mid-arm circumference measurements indicated that majority of the children in the experimental group belonged to the normal group having mid-arm circumference above 12.5 cm. In the control group majority of the children had moderate malnutrition, the head/chest circumference ratio indicated that in the experimental group in the age group of 18-23 months more female children were having head/chest circumference ratio less than 1, whereas in the control group, in the age group of 30-35 months more male children were having head/chest circumference ratio less than one. All children in other age groups in experimental and control groups were having head/chest circumference ratio greater than one.

#### Clinical signs and symptoms of malnutrition

Clinical examination to locate nutritional deficiency symptoms in preschool children indicated that anaemia was the common deficiency symptom among children of these areas in both the groups. In the control group children a high incidence of angular stomatitis (20 percent) and Dental caries (40 percent) were observed. Dental

caries was also observed among less number of experimental group children (9.99 percent). This indicated the prevalence of faulty habits among children of these areas. Other clinical symptoms like firm liver (9.99 percent) and marasmus (11.66 percent) was seen only in experimental group children. The clinical signs of anaemia was confirmed by haemoglobin estimation which indicated that 30.8 percent of children belonging to experimental group and 66.5 percent of children in the control group were having haemoglobin levels below normal. In general anaemia was found to be more prevalent among children of IInd, IIIrd and IVth birth orders.

#### Growth monitoring of preschool children for 6 months

Growth monitoring for 6 months using growth charts indicated that the mean body weights of children 0-3 age group was found to be more among control group children, but the difference was not statistically significant. The same pattern was observed among children of 4-6 age groups regarding their body weights.

#### The assessment of knowledge and attitude of the mothers towards the programme and the rate of adoption of the components of Integrated Child Development Services

Regarding the knowledge of the mothers towards the programme all the mothers had sufficient knowledge regarding

the various components of Integrated Child Development Services except in the areas of health education (86 per cent) and referral services (76 percent).

The attitude of the mothers towards the programme revealed that all the mothers had positive attitude towards the programme except in the cooking practices of foods in the anganwadi centres (60 percent) and distribution of medicines for the beneficiaries (41 percent). The rate of adoption of new practices acquired through Integrated Child Development Services programmes revealed that majority of the mothers had adopted improved practices through Integrated Child Development Services except the home production of vegetables (72 percent) and poultry keeping (57 percent). This may be due to lack of space around their houses.

#### Lacunae located and suggestions for improvement

The observations made in the present study indicated that about 65 percent of the anganwadi centres were not fully utilized due to inadequate students strength. 62 percent of the mothers reported the reason being the irregular management and indifference of the anganwadi workers. The improper timing for supplementary feeding was also pointed out as a reason by 78 percent of mothers. According to mothers, play space was inadequate in all



the anganwadies. 89 percent of the mothers reported their inconvenience towards the timing fixed for immunization. Majority of the mothers stated that the anganwadi centres were not visited regularly by ANM's or medical personnels. According to mothers, nutrition and health education classes and mothers camps were not conducted regularly.

Since majority of the mothers had definite positive and negative opinions regarding the six components of the Integrated Child Development Services programme, it was clear that in the implementation of the programme all the six different components were not given equal weightage. This stresses the need for giving equal importance to all the six components, for frequent visits by ANMS and other medical personnels and for proper supervision by senior field officials so as to correct the problems located.

# SUMMARY

## SUMMARY

The present study to find out the impact of Integrated Child Development Services on the nutritional status of preschool children was conducted in Trivandrum urban project area which included four project sectors namely Vallakadavu, Poonthura, Paruthikuzhy and Veli. Comparative study was conducted among preschool children who were non-beneficiaries of Integrated Child Development Services selected from the same area and socio-economic group, since such data is not available at present. Information regarding the socio-economic background and dietary habits of the families with special reference to the nutritional status of preschool children were collected through weighment, anthropometric, clinical, biochemical and growth monitoring studies.

The results of the study showed that majority of the families surveyed in both experimental and control group were of nuclear type belonging to the under privileged section of the community. The main occupation in majority of families were manual labour and fishing.

In majority of adult members in the control group were found to be illiterates. Whereas 50.82 percent of adults in experimental group were found to be illiterates. Economic status of the families indicated that the majority

of the families were below the poverty line in both experimental and control group. The monthly expenditure pattern revealed that more than 60 percent of the family income were spent on food.

All the family members were non-vegetarians since majority of them were daily wage earners, they had a daily purchasing pattern of food articles. Rice, tapioca, fish and coconut were found to be the major ingredients in their daily meal pattern. Children in both experimental and control groups were found to have unhealthy food preferences like sweets and fried foods. In the experimental group majority of the mothers gave first preference to children in serving meals whereas in the control group majority of the mothers served food to children along with other members in the family. The preference given to children in serving meals in the experimental group may be due to the influence of nutrition education programmes implemented under Integrated Child Development Services programmes.

Results of the food weighment survey indicated that the diets of preschool children (1-3 years and 4-6 years) of both experimental and control groups were inadequate and unbalanced. The intake of many protective foods were too low the intake of calories from the diets

of children of experimental group were found to be satisfactory whereas calorie consumption of control group were unsatisfactory. Since consumption of fish was high the availability of protein in the daily diet were above the daily recommended allowances in both the groups. But in control group this high protein intake become inadequate in the face of calorie inadequacy as protein would be utilized for purposes of providing energy. These observations may therefore be interpreted as indicating that protein deficiency in our preschool children is conditioned to a considerable extent by low intake of calories and that primary bottleneck in the current dietaries of poor Indian children is not protein but calories.

Results of the anthropometric measurements pointed out varying degrees of growth retardation in both the groups. While many of the measurements were found to be between 80 to 90 percent of the standard, body weight was below the standard in both the groups. Anaemia was the common deficiency symptoms manifested among children of these areas in both the groups. In the control group children a high incidence of angular stomatitis and dental caries were observed. The growth monitoring for 6 months using growth charts indicated that the mean body weights of preschool children of control group was found to be more but the difference was not statistically significant.

All the mothers had sufficient knowledge regarding the various components of Integrated Child Development Services except in the areas of health education and referral services. The attitude of the mothers towards the programme revealed that all the mothers had positive attitude towards the programme except the method of cooking foods in the Anganwadi centres and distribution of medicines for the beneficiaries. Majority of the mothers had adopted improved practices through Integrated Child Development Services except the home production of vegetables and poultry keeping.

The lacunae located in the present study as suggested by the mothers were inadequate students strength in Anganwadies due to irregular management and indifference of the Anganwadi worker, the improper timing for supplementary feeding and immunization, lack of play space in Anganwadies lack of referral services, nutrition and health education classes.

Since majority of the mothers had definite positive and negative opinions regarding the six components of the Integrated Child Development Services programme, it was clear that in the implementation of the programme all the six different components were not given equal weightage. This stresses the need for giving equal

importance to all the six components, frequent visits by Auxiliary Nurses and Midwives and other medical personnel and for proper supervision by senior field officials so as to correct the problems located.

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# APPENDICES

APPENDIX I

KERALA AGRICULTURAL UNIVERSITY  
COLLEGE OF RURAL HOME SCIENCE

Questionnaire to elicit information on socio economic and food consumption pattern of selected Anganwadi children in Trivandrum urban project area.

A

1. Project Sector . . . . . 2. Place . . . . .  
. . . . .  
3. Anganwadi Number . . . . .  
4. Name of the child . . . . .  
5. Address . . . . .  
. . . . .  
. . . . .  
6. Age of the child . . . . . Year . . . . . Months  
7. Religion 8. Caste  
A. 1. Details of admission of children in the Anganwadi

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Less than 1 year	1 year	1-2 years	2-3 years	More than three years
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2. Is the child regularly sent to the Anganwadi? Yes/No

B. If no give reason

3. Distance between Anganwadi and home

Time	Distance of home from A.W. units	Mode of moving	Time taken of the journey
Morning	Within $\frac{1}{2}$ km		Less than 15 minutes
	Within 1 km		Less than $\frac{1}{2}$ hr
After noon	Within 2 km		Less than 1 hr
	More than		More than
Evening	2 kms		1 hr

4. Is the child sent to any other Balwadi before enrolling in the Anganwadi 1. Yes/No

5. What is the provision for sending your child to this Anganwadi

B

Family details of the selected child

1. Family

(a) Nuclear family

(b) Joint family



#### 4. Monthly Expenditure pattern of the family

Sl. No.	Items	Expenditure	
		Rs.	Ps.
1	Food		
2	Clothing		
3	Shelter		
4	Journey		
5	Education		
6	Entertainment		
7	Health		
8	Savings		
9	Others		
	1.		
	2.		
	3.		
	4.		
	5.		



## 6. Frequency of use of food materials

Items	Frequency of different food materials					
	Daily	Thrice in a week	Twice in a week	Once in a week	Occa- siona- lly	Never
Cereals						
Pulses						
Roots and tubers						
Other vegetables						
Green leafy vegetables						
Fruits						
Milk and milk products						
Meat						
Fish						
Egg						
Oils						
Sugar						
Jaggery						
Processed foods						
eg. Jam, Squash etc.						
Bakery items						

## 7. Different methods of cooking

Items	Boiling		Steam- ing	Fry- ing	As such (raw)	Othe- rs
	Absor- ption	Strain- ing				
Cereals as pulses						
Green leafy vegetables						
Roots and tubers						
Other vegetables						
Fruits						
Meat and fish						
Egg						
Milk and milk products						
Other food- stuffs						

## 8. Different methods of food preservation

Food items	Methods of preservation	Various of the respondent
Cereals		
Pulses		
Green leafy vegetables		
Other vegetables		
Fruits		
Milk		
Meat		
Fish		
Egg		
Other foods		

9. Foods preferred by the child

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Food materials	Preparations	Reason
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a) Is the foods are purchased from shops? or produced at home.

b) Frequency of use of the foods preferred by the child

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Daily	Once in two days	Once in a week	Occasiona-ly	Special occasions
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10. Is there any special foods prepared for the child

Yes/No

If yes give details

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Prepa- rations	Ingre- dients	Reasons	Frequency of given these foods				
			Once in a day	Thrice in a day	Weekly once	Twice in a week	Occa- siona- lly

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11. Details of persons who are responsible to give foods to the child

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Mother	Self	Elder child	Father	Grand father or Grand mother	Ser- vants	Others
--------	------	-------------	--------	------------------------------------	---------------	--------

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Foods to the child in the habit of eating with eldest children and eldest members in the family

Yes/No

12. Meal serving

- a) All members of the family eat together
- b) First given to the head of the family then others
- c) First given to the children then adults
- d) First given to the male members of the family then families

13. Methods of preparing various food articles prior to eating

i) Dry food articles (like cereals)

- a. Cleaning/winnowing, washing and drying (soon after purchase)
- b. Cleaning/winnowing and washing (just before cooking)
- c. Any washing just before eating (raw rice)
- d. Washing vegetables just before cooking
  - 1. Once
  - 2. Thrice
  - 3. More than thrice

ii) Fresh food items like fruits and vegetables

- a. Washing soon after purchase
- b. Washing just before eating or use
- c. No washing at all

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Items	Size of cutting	Materials used for cutting	Washing before cutting	Washing after cutting
Fruits				
Vegetables				
Meat				
Fish				

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Foodstuffs	Weight in grams
47. Butter	
48. Ghee	
49. Hydrogenated Oil	
50. Cooking Oil	
<u>Other Foodstuffs</u>	
51. Betel leaves	
52. Biscuit, Salt	
53. Biscuit, Sweet	
54. Bread, White	
55. Sugar	
56. Jaggery	
57. Papad	
58. Sago	
59. Toddy	
60. Horlicks	
61. Farex	
62. Amul	
63. Amulspray	
Others	

Dietary information

Meal pattern	Type of preparation	Ingredients used	Raw amount used (g/ml)	Total cooked amount g/ml
a	b	c	d	e
Early morning				
Breakfast				
Mid morning				
Lunch				
Evening Tea and Snacks				
Dinner				
Others				

## APPENDIX III

### Methods for taking anthropometric measurements

#### a) Procedure for weighing the child

A spring balance was used to take the weight of the children. It was hung and the child was made to sit on it with minimum clothing and the weight was recorded in Kilograms with an accuracy of 0.1 kg.

#### b) Procedure for height measurement

The subject was made to stand erect on a level ground with heels together and arms hanging. He was made to lean on a smooth wall on which markings upto 0.1 cm accuracy were made. The occipit shoulders, buttocks and heels were made to be in the same plane and perpendicular to the ground. A rod was held on the back of the subject and it was held perfectly vertical and parallel to the mid-sagittal plane. The reading was taken by keeping a wooden head piece gently on the head (Vertex region). The line coinciding with the wooden piece was read and the reading was recorded accurately upto 0.1 cm.

#### c) Procedure for measuring mid-arm circumference

Mid arm circumference was measured to the nearest 0.1 cm with a fibre glass tape by placing gently but firmly around the limb to avoid compression of the soft tissues. The left arm was measured while hanging at its mid point.

d) Procedure for measuring head circumference

For taking head measurements, the child's head was steadied and the greatest circumference was measured by placing the tape firmly round the frontal bones just superior to the supra orbital, ridges, passing it round to the head at the same level on each side and laying it over maximum occipital prominence at the back. Measurements were made to the nearest 0.1 cm.

e) Procedure for measuring chest circumference

The flexible non-stretch fibre glass tape was used to measure the chest of the child at nipple line. The average of the inspired and expired chest measurement to the nearest 0.1 cm is taken as the chest measurement.



APPENDIX IV

KERALA AGRICULTURAL UNIVERSITY

Nutritional assessment schedule

State:                      Dist.                      Taluk:                      Village:  
 Serial No.                      Family:                      Block:  
 Name of the child:                      Sex:  
 Name of the guardian/parent:  
 Occupation of parent :  
 Annual income :  
 Date of birth of child :                      years                      months  
 Source - Parent/Record :

ANTHROPOMETRY

- |                               |                        |
|-------------------------------|------------------------|
| 1. Height:                    | 5. Head circumference: |
| 2. Weight:                    | 6. Chest:              |
| 3. Arm circumference (upper): | 7. Knee-ankle:         |
| 4. Lower arm circumference :  | 8. Foot                |

Clinical Examination:-

Hair sparse	01*	Corneal opacity	12
Discoloured	02*	Night blindness	13
Easily plucked	03*	Photophobia	14
Moon face	04*	Anaemia	15
Parotid enlargement	05	Nasolabial dyssebacia	16
Oedema	06	Angular stomatitis	17
Emaciation	07	Chelosis	18
Marasmus	08	Red & raw	19
Conjunctival xerosis	09	Tounge Papillae	20
Bitot's spot	10	atrophie	
Corned xerosis/ Kerotomalacia	11	Papillae hypertrophic	21
		Pellagra	22

\* for children below 5 yrs.

Craz. Pavement dermatosis	23
Pigmentation at kwickles/ fingers/toes	24
Phrynoduma	25
Koilonyehia	26
Gums-spongy bleeding	27
Cranotahes	28
Ephiphyseal Enlargement	29
Beading of ribs	30
Knockknee/bowlegs	31
Frental parietal boosing	32
Teeth caries	
" Mottled enamel	33
Enlargement of spleen	34
Enlargement of liver	36
soft -	
firm -	
hard -	
Thyroid enlargement	37
Others	38

## APPENDIX V

### Haemoglobin - Cyanmethaemoglobin method

Principle Haemoglobin is converted into cyanmethaemoglobin by the addition of KCN and potassium ferricyanide. The colour of Cyanmethaemoglobin is read in a photoelectric calorimeter at 540 n.m against a standard solution. Since cyanide has the maximum affinity for Hb, this method estimates the total Hb.

Reagent Drabkin's solution: Dissolve 0.05 g of KCN, 0.2 g of potassium ferricyanide and 1 g of sodium bicarbonate in one litre of distilled water.

Procedure 20  $\mu$ l of blood was measured accurately from a haemoglobin pipette and delivered on to a whatman No. 1 filter paper disc. The filter paper is air dried, labelled and can be stored upto one week. The portion of filter paper containing the blood is cut and dipped in 5 ml Drabkin's solution taken in a test-tube. Wait for 30 minutes and mix the contents on a vortex mixture and take the readings.

### Construction of standard curve

If the blood drawn from the subject contain Hb 15 g/dL after estimation then prepare 3 reference standards as follows.

1. Reference standard A: 4 ml blood in 1000 ml Drabkin's reagent contain Hb 15 g/dL.
2. Reference standard B: 300 ml of Reference standard A + 200 ml Drabkin's reagent contain Hb concentration of 10 g/dL.
3. Reference standard C: 200 ml of Reference standard A and 300 ml Drabkin's reagent contain a Hb concentration of 7.5 g/dL.

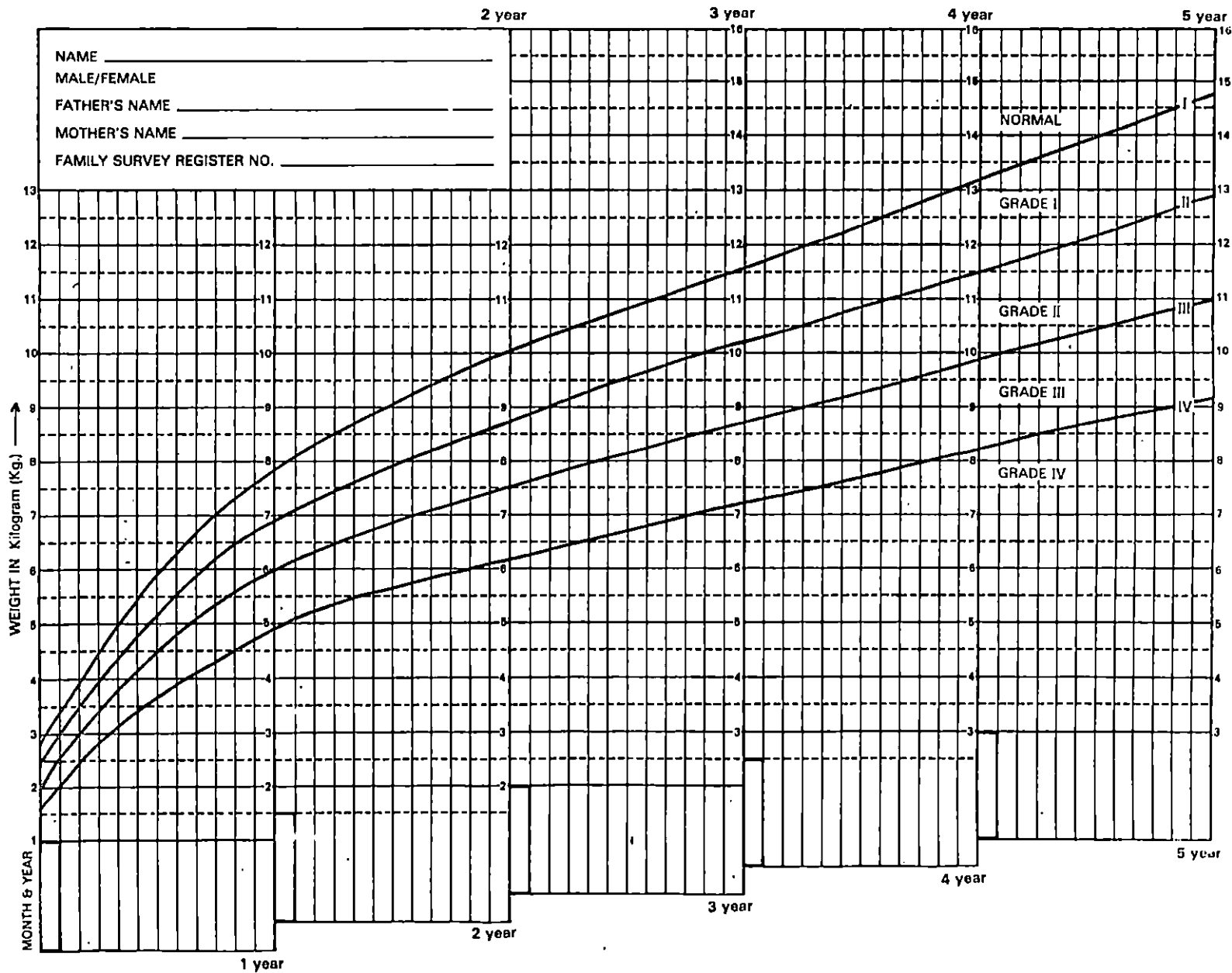
Thus we have 3 reference standards at three levels of Hb concentration. Use 5 ml from each standard whenever Hb estimations are done.

4. Reference standard D:

50 ml of reference standard A + 2000 ml  
Drabkin's

5. Blank - Drabkin's reagent

**GROWTH CHART FROM BIRTH TO 5 YEARS OF AGE**



APPENDIX VII

A questionnaire to elicit the attitude of mothers towards various programmes implemented under ICDS programmes

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	Very much satis- fied	Satis- fied	Unde- cided	Unsa- tis- fied	Totally unsa- tis- fied
1. Starting of Anganwadies in rural areas.					
2. Pre-primary education given to the child					
3. Supplementary feeding for the benefit of children					
4. Visiting and medical check up of the Doctors from PHC at Anganwadi					
5. House visits and services done by Nurses of PHC					
6. Immunization programmes implemented for the benefit of children					
7. Distribution of medicine for the benefit of children, pregnant and lactating mothers					
8. Discussion classes about health and nutrition for the benefit of housewives					

---

Very much satis- fied	Satis- fied	Unde- cided	Unsa- tis- fied	Totally unsatis- fied
--------------------------------	----------------	----------------	-----------------------	-----------------------------

9. Facilities for referral services
10. About the supplementary food distributed in the Anganwadi
11. Monitoring growth charts at Anganwadies
12. The educational film shows conducted at Anganwadi
13. Methods of selection of preschool children for supplementary feeding
14. Method of selection of mothers for supplementary feeding
15. Quality control of foods distributed to the children
16. Scientific cooking practices of foods at the Anganwadi centres
17. Audio-visual aids used for discussion classes for the benefit of mothers
18. House visits by Anganwadi worker

Very much satis- fied	Satis- fied	Unde- cided	Unsa- tis- fied	Totally unsa- tisfied
--------------------------------	----------------	----------------	-----------------------	-----------------------------

19. Face to face talk with mother by Anganwadi worker
20. Demonstration classes conducted at Anganwadi
21. Attention given to the health care of children at Anganwadi centres
22. Distribution of play materials for the benefit of Anganwadi children
23. Monthly mothers meeting conducted by the Anganwadi worker
24. Educational status and knowledge of Anganwadi children
25. Environmental sanitation in and around Anganwadi



## APPENDIX VIII

### Questionnaire to test the knowledge of mothers about the ICDS Programmes

Yes      No

1. Foods supplied through centres are highly nutritious
2. Foods supplied at Anganwadi centres are sufficient to meet the nutritional need of children
3. Preparations mixed with green leafy vegetables are nutritious and tasty
4. It is not advisable to teach children coming from different families at a common place
5. It is necessary to include protein foods like milk, pulses, oil seeds, nuts, egg, fish, meat etc. in the dietary pattern of children below five years
6. Disease occur when uncooked foods are eaten
7. Train children to wash hands before meals
8. Spoiled food materials are never given to children
9. To assess the health conditions of children growth charts are kept at Anganwadi
10. Weight of the children are recorded periodically
11. Regular medical check up for the benefit of children are done by the doctor from PHC
12. ANMS visits the centre weekly and distributions medicines and tablets to the children

Yes No

13. Fever and cough are not contagious
14. Immunization against whooping cough, diphtheria and tetanus is given to children during the first three months period
15. Unhygienic environment is responsible for diarrhoea occurrence of children
16. Daily morning, before taking classes, ANW is responsible for keeping health and hygiene habits in children
17. Deworming is done regularly in children of Anganwadi centre
18. Green leafy vegetables give pure blood, good sight and eradicate anaemia
19. Leafy vegetables are good sources of vitamins and minerals
20. Children grow only if they are given only carbohydrate foods
21. Pulses contain proteins which are needed for the growth of children
22. It is good to give egg daily to child
23. Vitamin A is necessary to have good eye sight
24. Vitamin C content is greater in amla than in orange
25. Worm trouble is prevented if the nails are kept cleaned

## APPENDIX IX

### Q questionnaire to elicit in formations about the Adoption of the new household practices acquired through Integrated Child Development Services programme

- |   | Yes | No |
|---|-----|----|
| 1. House and its premises are kept clean  |     |    |
| 2. Low cost nutritious foods like green leafy vegetables are included in the dietary patterns of the children |     |    |
| 3. Production of vegetables and green leafy vegetables at the household level                                 |     |    |
| 4. Egg is given daily to pregnant women   |     |    |
| 5. Nail cutting is done periodically for children   |     |    |
| 6. Other foods are given to 3 months old child along with breast milk   |     |    |
| 7. Children are taken to periodical medical check up.   |     |    |
| 8. Children are given nutritious foods at home along with the foods distributed at the Anganwadi              |     |    |
| 9. Visiting Anganwadi centre periodically to enquire about education of the child                             |     |    |
| 10. Poultry keeping is taken up at the household level to give egg to children                                |     |    |
| 11. Green leafy vegetables are included in the diets of pregnant women and children                           |     |    |
| 12. Children are trained to wash their hands before taking meals  |     |    |
| 13. Children are given immunization at the correct time   |     |    |

Yes . No

14. Children are sent to the Anganwadi regularly
15. Children are given the nutritious snacks food such as groundnut and gingelly
16. To prevent worm troubles among children latrins are built at the household level
17. Vegetables are not cut into small pieces to avoid loss of nutrients
18. Boiled and cooled water are given to the children for drinking
19. During pregnancy period injections are taken to prevent tetany
20. Pulses are given for the proper growth and development of the children
21. Adequate attention is given to the personal hygiene of children
22. Vegetables and green leafy vegetables are cooked in covered vessels to conserve nutrients
23. Every six months deworming is done for children
24. Fruits and vegetables are included in the daily diet of children
25. Vaccines are taken to prevent measles

## APPENDICES

1. Schedule for socio-economic and food consumption pattern
2. Schedule for weightment survey
3. Methods for taking anthropometric measurements
4. Schedule for clinical survey
5. Estimation of haemoglobin cyanmethaemoglobin method
6. Model of growth charts
7. Schedule to test knowledge of mothers towards the component of Integrated Child Development Services
8. Schedule to test attitude of mothers towards the components of Integrated Child Development Services
9. Schedule to test the adoption of mothers towards the components of Integrated Child Development Services

# **IMPACT OF INTEGRATED CHILD DEVELOPMENT SERVICES ON THE NUTRITIONAL STATUS OF PRESCHOOL CHILDREN**

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**ABSTRACT OF THE THESIS  
SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT  
FOR THE DEGREE OF MASTER OF SCIENCE  
IN FOOD SCIENCE AND NUTRITION**

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1990

## ABSTRACT

The present study to find out the impact of Integrated Child Development Services on the nutritional status of preschool children was conducted in Trivandrum urban project area which included four project sectors viz. Vallakadavu, Punthura, Paruthikuzhy and Veli. Comparative study was conducted among preschool children who were non-beneficiaries of Integrated Child Development Services selected from the same area and socio-economic group, since such data is not available at present. Information regarding the socio-economic background and dietary habits of the families with special reference to the nutritional status of preschool children were collected through weighment, anthropometric, clinical, biochemical and growth monitoring studies.

The results of the study showed that majority of the families surveyed in both experimental and control groups were of nuclear type families belonging to the under privileged section of the community, their main occupation were manual labour and fishing. Majority of the adult members in both the groups were found to be illiterates. Majority of the families subsisted below the poverty line and spent more than 60 percent of the family income on food. All the families were habitual non-vegetarians.

Rice, tapioca, fish and coconut were found to be the major ingredients in their daily meal pattern. Children in both the groups were found to have unhealthy food preferences like sweets and fried foods. In the experimental group the preference given to children in serving meals may be due to the influence of nutrition education programmes implemented under Integrated Child Development Services programmes.

Results of the food weightment survey indicated that the diets of preschool children in both the groups were inadequate and unbalanced. The consumption of protective foods were too low. Calorie consumption in control group of children were unsatisfactory. Since consumption of fish was high in both the groups the availability of proteins in the daily diet were above the Recommended Daily Allowance. But in control group this high protein intake become inadequate in the face of calorie inadequacy as protein would be utilized for purpose of providing energy. These observations may therefore be interpreted as indicating that protein deficiency in our preschool children is conditioned to a considerable extent by low intake of calories and that primary bottleneck in the current diets of poor Indian children is not protein but calories.

Results of the anthropometric measurements pointed out varying degrees of growth retardation in both the



groups. Anaemia was the common deficiency symptoms manifested among children of these areas in both the groups. In the control group children, a high incidence of angular stomatitis and dental caries were observed. Growth monitoring for 6 months using growth charts indicated that the mean body weights of preschool children of control group was found to be more but the difference was not statistically significant.

All the mothers had sufficient knowledge regarding the various components of Integrated Child Development Services except in the areas of health education and referral services. The attitude of mothers towards the programme revealed that all the mothers had negative attitude towards the method of cooking foods in the anganwadi centres and distribution of medicines for the beneficiaries. Majority of the mothers had not adopted the home production of vegetables and poultry keeping.

✓ The lacunae located in the present study as reported by the mothers were inadequate students strength in Anganwadies due to irregular management and indifference of the anganwadi worker, improper timing for supplementary feeding and immunization, lack of play space in Anganwadies, lack of referral services and nutrition and health education classes.

From the present study it was clear that in the implementation of the Integrated Child Development Services programme all the six different components were not given equal weightage. This stresses the need for giving equal importance to all the six components, frequent visits by Auxiliary Nurses and Midwives and other Medical Personnels and for proper supervision by senior field officials, so as to correct the problems located.