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**NUTRITIONAL STATUS OF ICDS (Integrated
Child Development Services) BENEFICIARIES
WITH RESPECT TO PARTICIPATION**

BY

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THESIS

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for the Degree

DOCTOR OF PHILOSOPHY

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Department of Home Science
COLLEGE OF AGRICULTURE
Yellayani, Thiruvananthapuram

1993

DECLARATION

I hereby declare that this thesis entitled "Nutritional status of ICDS (Integrated child development services) beneficiaries with respect to participation" 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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CERTIFICATE

Certified that this thesis entitled "Nutritional status of ICDS (Integrated Child Development Services) beneficiaries with respect to participation" is a record of research work done independently by Smt. Mary Ukkuru Pulikkottil under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to her.



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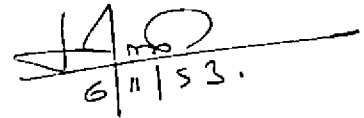
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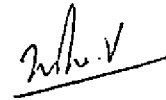
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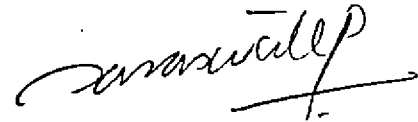

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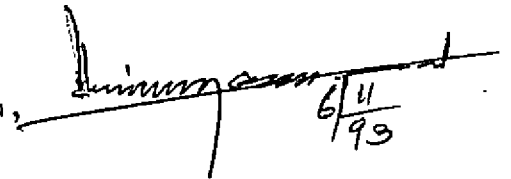
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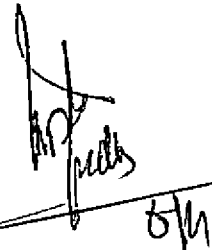
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EXTERNAL EXAMINER



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INTRODUCTION

1. INTRODUCTION

Protein energy malnutrition, anaemia and vitamin A deficiency are the most crucial nutritional problems confronting the women and children of the developing countries. About 150 million children under 5 years are under weight, and more than 20 million suffer from severe malnutrition. Two fifty million women have nutritional anaemia and 40 million children suffer from vitamin A deficiency. In a report published by FAO (1992), it has been stated that "malnutrition a man made disaster" is an avoidable tragedy with enormous social and economic costs in wasted human potential. It affects growth and reproduction and undermines health, learning and working capacity and overall quality of life and well being. According to Devadas (1986) malnutrition has a very devastating spiral effect on the society and cripples a nation's human resources. For any nation such a loss of human potential has social and economic consequences which no country could afford.

Saouma (1992) has opined that 1990's is emerging as a decade of change, challenging us all with the

opportunity to build a better future in which people are at the heart of development. Women and children who are the vulnerable sections of the population are the worst sufferers of malnutrition, but at the same time supremely important assets of a nation. Hence development programmes aimed at improving their well being should find a prominent place in our national plans so that they may grow up into robust citizens, physically fit, mentally alert and morally healthy, endowed with the skills and motivations needed by Society (Panse, 1979). "Health for all by 2000 AD" - a goal of the final decade of this century could be achieved only if the major health problems and their deeply underlying causes are resolutely tackled by appropriate strategies, mobilizing all human and material resources. (Jardel, 1989).

Realising the staggering dimension of the problems of childhood and maternal malnutrition, Government of India, State Governments and various voluntary agencies have given top priority in ameliorating childhood and maternal malnutrition. Thus many nutrition intervention programmes are in operation in our country. However many of these intervention programmes consisted of single, monofocal technical interventions, sometimes reflecting the disciplinary background and priorities of the 'intervener' more, than the real needs of the people. In contrast to this, Integrated Child Development Services (ICDS) Scheme is

India's most comprehensive and ambitious programme with multidimensional approach for solving the problems of women and children with curative, preventive, promotive and rehabilitative inputs. This programme is uniquely 'Indian' in the sense that unlike other conventional health and nutrition programmes which have their counterparts in other countries, it will be difficult to find such a massive national integrated programme with a broad agenda as that of ICDS in other countries. ICDS grew out as a national policy statement in 1975, and has been functioning in Kerala as early as its inception. As per the records of the Directorate of Social Welfare (1993) there are altogether 90 ICDS projects, including six urban and one tribal functioning in Kerala, covering 5,89198 preschool children and 1,25810 pregnant and nursing mothers with a financial outlay of Rs.14 crores.

Regular monitoring of the programme implemented make the problems more visible and serves as a mechanism to evolve, and improve quality and quantity of the feed back, and to generate actions at the earliest. There is also a need to evaluate the impact of the programme with respect to the participation of the beneficiaries in the programme which will give a more precise idea about its real impact. Though a few evaluative studies had been conducted on ICDS, indepth analysis pertaining to the above aspects are rare

and scanty. More over informations on the functioning and impact of ICDS in the State of Kerala, which displays a set of unusually high development indicators are lacking and needs special attention.

Hence an attempt has been made in the present study to analyse the impact of the ICDS programme, on its beneficiaries with due emphasis on their participation and nutritional status. The present study entitled "Nutritional status of ICDS beneficiaries with respect to participation" was outlined with the following objectives.

1. To assess the participation variance of selected beneficiaries of ICDS.
2. To assess the nutritonal status of beneficiaries with respect to participation and
3. To suggest measures for improving the participation of beneficiaries in ICDS programme, if necessary.

REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

For any research investigation, perusal of the available literature is absolutely essential. This helps in understanding what is already known regarding the problem under investigation. Review of the earlier research findings are furnished under the following headlines.

- 2.1 Prevalence of malnutrition
- 2.2 Role of intervention programmes and its impact on malnutrition.
- 2.3 Integral child development programme as an intervention programme.
- 2.4 Evaluation studies conducted on ICDS programme.

2.1. Prevalence of malnutrition

Devadas (1986) exhorted that vulnerable groups namely preschool children, expectant and nursing mothers are the worst sufferers of malnutrition.

Bakshi (1977) had remarked that, preschool children are the most important component of child population, since this age is the most inadequately protected emotionally and immunologically, and hence prone to develop malnutrition and various vitamin deficiencies. Devadas *et al*

(1983) observed that the chief killers of preschool years are severe forms of protein energy malnutrition (PEM), Kwashiorker, marasmus and other non-nutritional disorders. Barrett (1985) viewed that chronic energy malnutrition is the major nutrition problem among children in the world. High infant mortality and morbidity rates, high incidence of malnutrition, nutrition related diseases, temporary or irreversible disability and low literacy rates are reported to be some of the gloomy prospects staring at 110 million children under six years of age in India (ICDS, 1986).

Bhaskaran and Rao (1987) had reported that about 1 to 2 per cent of preschool children belonging to poor communities of India suffer from severe forms of protein energy malnutrition. According to Jeffry (1988) 85 per cent of the Indian children under 5 years are undernourished.

Nair (1984) reported that though maternal mortality and infant mortality rates in Kerala State are lower than the rest of India, the morbidity rate is rather high.

Ghosh (1987) reported that maternal mortality accounts for the largest proportion of deaths among women of reproductive age in India and in developing countries. She had also opined that in India, maternal mortality is around 500 per 100,000 live birth and this is about 50 times that of developed countries. Ghosh (1987) had observed that

nutritional anaemia, which is widespread among women of child bearing age contributed significantly to the morality and morbidity.

Puri (1989) stated that in India about 22 per cent women die due to complications in pregnancy and many more suffer from serious or permanent injuries.

According to UNICEF (1989) approximately half a million women die every year due to maternal causes. Indian women are estimated to spend the greater part of her reproductive years in pregnancy and lactation which result in maternal depletion, and which is seldom compensated, causing high maternal mortality rate in the country (UNICEF, 1990).

Ghosh (1977) pointed out that, the reason for malnutrition is not so much due to lack of food, but because of the child's dependence on his mother, who had no knowledge of his nutritional needs.

Gupta (1983) had reported that vast majority of mothers including those well educated are starkly ignorant about the modern nutrition concepts. Kennedy and Khudsen (1985) pointed out that an intergrated health and nutrition intervention providing a cadre of health, nutrition, family planning and sanitation services is the most effective means

of treating the tragedy of malnutrition among the vulnerable groups. According to Kumar (1986) simple actions initiated at home or in the community have a positive impact on health status of mothers and children. He has further stressed that preparation of healthy and literate women must be a priority in the intervention programmes so that a motivated and capable health volunteer exist in every family.

According to Ghosh (1989) women's health and nutrition is inextricably linked with child health and child survival.

In a report published by UNICEF (1989) it was indicated that improvement in mothers health would result in healthier infants, including better nutrition before birth and less vulnerability to infection and faster growth in the first few months of life.

2.2. Role of Intervention Programmes and its impact on malnutrition.

In order to provide some relief to the pressing problems of malnutrition and undernourishment, various nutrition programmes are introduced in our country with top priority to the vulnerable groups viz. children, pregnant and lactating mothers. Hoorweg (1988) stated that growing awareness about the nutritional problems in developing countries resulted in many manifold nutrition interventions.

Hoorweg (1988) is of the opinion that assessing the impact of nutrition intervention is notoriously complicated because of the difficulty in distinguishing between the impact of the programme and the influence of other factors.

Studies conducted in Guatemala, India, Colombia, Mexico, Canada and the United States had shown that prenatal supplementation can improve the outcome of pregnancy, but an equal or greater number had failed to demonstrate a positive effect (Iyenagar, 1967; Higgins *et al.* 1973; Chavez *et al.* 1974; Lechtig *et al.* 1975; Mora *et al.* 1979 and Kennedy *et al.* (1982).

Gopaldas *et al.* (1975) and Freeman *et al.* (1977) expressed that supplementary programmes implemented for infants and children had helped to decrease protein calorie malnutrition and helped to improve growth.

Chaddhury and Prince (1977) reported that morbidity status of children improved significantly after supplementation. They further revealed that eighty per cent of the mothers participating in the supplementation programme had adopted better food habits after their exposure to intervention programme.

Large scale sharing of the supplement by the siblings was reported by Mittal and Gupta (1980). A review

of feeding programme implemented with the help of CARE, revealed that only 62-83 per cent of the energy gap was filled by the calories provided on the supplementary food (Anderson, 1976).

Mehata *et al.* (1977) evaluated two supplementary feeding programmes implemented for preschool children of low socio-economic urban community and indicated that on the spot feeding had contributed beneficial effect on the dietary intake of children of 3 to 6 years, with reference to calories, vitamins and minerals.

Devadas *et al.* (1977) assessed the special nutrition programme implemented in Tamil Nadu and observed maximum increase in height and weight in children taking part in the "on the spot" feeding rather than in the "take home" feeding.

According to Kielmann *et al.* (1978), most positive results through supplementation programme can be achieved only by a combination of food, health care, and nutrition education.

Lal *et al.* (1978) evaluated three intervention programmes and revealed that percentages of normal children were found to be highest in the area where special nutrition programme, medical care and immunization facilities were

available to the children and were minimum in areas where only one programme is existing.

Stein *et al.* (1978) observed that most severely malnourished children gained significantly more benefit than the children less malnourished in a nutrition intervention programme. Beaton and Ghassemi (1979); Rao *et al.* 1979; Habicht and Yar brough (1980) had also expressed the same view.

Edozien *et al.* (1979) observed an increase in weight gain during pregnancy, an increase in the birth weight, an acceleration of growth and a reduction in the anaemia rate in all the participant categories of special supplement food programme for women, infants and children.

A recent review of over 200 intervention programmes throughout the world concluded that supplementary feeding is expensive for the observed benefit (Beaton and Ghassemi, 1979). He has also found that 30-80 per cent of supplementary food was not consumed by the recipient because of pilferage.

Mittal and Gupta (1980) had reported that there was no significant difference in the mean increment in height and weight of the children of the experimental and control groups attending the supplementary feeding.

According to Susan and Allene (1980) participants in the National school lunch programme had better overall diets than non-participants. Anderson *et al.* (1981) had revealed that over 50 million children in the developing countries, received some kind of food supplement in the year 1979 .

Beaton (1982) reviewed the impact of 43 supplementary feeding programmes on nutritional status and indicated that supplementary feeding programmes had a major impact on the nutritional status of the individual participating children and that the worse was the initial nutritional status of the child, the greater was the improvement in anthropometric indices.

Rao *et al.* (1982) commented that large scale supplementary feeding programmes so far undertaken to ameliorate the malady of protein energy malnutrition were found to have limited impact on the nutritional status of beneficiaries and no effect on changing the feeding practices of the community. Corazon *et al.* (1983) assessed the impact of one year dietary intervention on the nutritional status and growth of Philippine preschool children and found that experimental groups had significantly higher height, weight for age, weight for length and arm circumference for age.

Feachem (1983) was of the opinion that impact of supplementary feeding programme on nutritional status of the target groups as a whole, was found to be low or nonexistent.

Mora *et al.* (1979) reviewed the take home supplementation programme in Colombo and had found that, substantial amounts of food during the first three years of life helped to improve the nutritional status, but failed to create an effect on morbidity and growth.

Puri *et al.* (1983) evaluated the supplementary feeding programme run by Indian Council of Child Welfare (ICCW) in Chandigarh and had indicated that, diets of both beneficiaries and nonbeneficiaries were inadequate in quality and quantity.

Soebekti (1983) viewed that properly managed nutrition programmes can be used as a spearhead for development of primary health care and such programmes can achieve their goal through intersectoral co-ordination. Evaluation of Tamil Nadu Chief Minister's free meal programme had revealed that the programme had a significant positive impact in terms of physical and anthropometric parameters in children (Sundararajula *et al.* (1983).

Prenatal dietary supplementation is reported to improve birth weights and substantially reduce the incidence of low birth weight. (Nutrition Reviews, 1984). Demeke and Gabriel (1985) reviewed the impact of supplementary feeding programme in Addis Ababa and found that the programme did not result in significant reduction in the prevalence of malnutrition as expected.

Kumari *et al.* (1985) had found that a combined approach of food, supplement and nutrition education would be preferable in any nutrition intervention programme to achieve optimum results. Mittal *et al.* (1980) evaluated the special nutrition programme and reported about the large scale sharing of the food supplement among family members. Kennedy and Knudsen (1988) remarked that the most successful supplementation feeding programme those linked with a strong primary health care component.

2.3 Integrated Child Development service programme as an intervention programme

Integrated child development service (ICDS) programme which was initiated in India in 1975 is a nutrition and health integrated intervention programme for preschool children, pregnant and lactating mothers. It was started with 33 project blocks distributed all over the state (Tandon *et al.* 1981). Today it covers 1,738 projects

including 218 in the state sector (India, 1990). As per the details available from the Directorate of social welfare, there are altogether 12,241 anganwadi centres functioning in the Kerala state.

According to a report published by UNICEF (1987) it has been stated that from a small beginning just over a decade ago, ICDS now involves in promoting basic health care and preschool education for the poorest 20 per cent of nation's families. It was further stressed in the report that by 1990 it will double in size and reach 40 per cent and by the turn of the century it will be scheduled to serve the poor in every village and neighbourhood in India.

Gupta *et al.* (1984) stated that ICDS was launched with the objective of improving the nutritional and health status of children below 6 years of age and to promote proper psychological, physical and social development of the child, which comprises a package of services such as supplementary nutrition, immunization, health check-ups, referral services, health and nutrition education and non formal education. Ghosh (1986) stated that the main objective of ICDS is to promote health of children from birth to six years and look after pregnant and lactating mothers and cater to the under served segments of rural, tribal and urban population.

Chadha (1982) stated that the ICDS is an integration of preschool nutrition programme with health and education services. Bhan *et al.* (1986) reported that the ICDS, India's most comprehensive and ambitious programme is both preventive and developmental in design. It increases child survival and improve the quality of survival among children. Besides it promotes maternal health and nutrition because there cannot be child health without maternal health.

The experience of ICDS during its first decade (1975-85) in India indicated that it had the potential of becoming a silent revolution, a profound instrument of community development and human resource development (ICDS, 1986).

Saxena and Bagchi (1986) are of the opinion that ICDS is a well conceived and well implemented programme and largest nutrition related programme for child development in the country. Sohoni (1988) commented that ICDS is the single most massive programme for child development in India and possibly of the world and it serve as a vital conduit for child monitoring.

Pawar (1988) rightly pointed out that ICDS is based on the conviction that community development programmes can become catalytic agents for social change and

serve to improve the quality of life of present and future generations of the disadvantaged poor.

2.4 Evaluative studies conducted on ICDS programme

Chopdar (1979) evaluated the Subdega Tribal ICDS project and found that out of the 6252 child beneficiaries only 42.2 percent were found to be normal and rest were in different grades of malnutrition. Chandra (1982) in his evaluative study on ICDS in Calcutta had found that, the number of children with 3rd degree malnutrition decreased and there was a shift from 2nd or 3rd to 1st degree malnutrition or normal. Patel *et al* (1982) from their study, concluded that ICDS has produced tremendous impact on the nutritional status, immunization and morbidity pattern. According to the above study severe malnutrition was brought down from 15.7 to 4.6 per cent and the prevalence of common illness was also found to be declined. Sunderlal (1982) observed that severe malnutrition declined from 19.1 to 7.8 per cent in children within a period of 7 years. He further pointed out that infant mortality rate was reduced to 88.2/1000 live births in ICDS projects compared to the national estimate of 110/1000. Birth rate has also declined to 24.2 in ICDS projects compared to national estimate of 33.3 in 1982. Gopaldas (1986) and Tandon (1986) reported that there was considerable and progressive decline in the

prevalence of severe malnutrition among the children of ICDS projects.

In a report published by ICDS (1987), it has been indicated that evaluative studies conducted on ICDS by planning commission, All India Institute of Medical Sciences and National Institute of Public Co-operation and Child Development (NIPCCID) clearly depicted considerable decline in the prevalence of malnutrition in the ICDS areas. Mehata *et al* (1989) observed that the incidence of malnutrition was declined in the tribal block of Gujarath over a period of 3 years.

Bhandari *et al* (1981) reported that effective monitoring of severe protein energy malnutrition in the ICDS areas had made a positive and significant impact on the mortality rate of children. Infant mortality rate was reported to be 153.7/1000 live birth and that of maternal mortality 2.94/1000 live births in an urban ICDS project of Gorakhpur (Kushwaha *et al.*, 1983). Tandon *et al.* (1984) opined that co-ordinated approach for the delivery of health, nutrition and education services to mothers and infants through ICDS has helped in reducing the infant mortality rate in India. Prakash *et al.* (1985) found that birth rate and infant mortality rate were reduced significantly in the ICDS project of Haryana. Similar

results were also reported by Desai *et al.* (1989) from urban slums of Gujarat.

Shah *et al.* (unpublished) revealed that ICDS had a positive impact on maternal and child health and helped to bring down the infant mortality rate. Chadha (1982) observed that the occurrence of vitamin A and C deficiencies and that of infectious disorders except fever and conjunctivitis was decreased among the beneficiaries of ICDS. Anadan *et al.* (1985) had reported about the parasitic infestation among the child beneficiaries of ICDS in Tamil Nadu. The source of water, poor personal hygiene, poor environmental sanitation and open defecation were the reasons reported for the high prevalence of parasitic infestations in the area.

Durge *et al.* (1989) had reported that the haemoglobin level of 75 per cent pregnant women participating in the ICDS projects of urban slums of Nagpur was 8.5 to 11 g, per cent which is indicative of anaemia and that of serum protein varied from 5.9 to 7.75 g.

Lower prevalence of diarrhoea, dysentery and diseases of the skin and eyes were reported among the preschool beneficiaries of ICDS in Uttar Pradesh (Chadurvedi *et al.* 1987).

Ettahabadi *et al.* (1989) pointed out that major causes of morbidity among child beneficiaries in an ICDS block of Haryana were fever, eye problems, skin infections, gastro intestinal tract infections, respiratory infections and ear diseases. They also found that the incidence of morbidity was inversely related to nutritional status, literacy rate, age, income and occupational structure. Gupta and Srivastava (1989) observed a significant difference in the morbidity rate due to diarrhoea, eye diseases and skin infections among the ICDS and non ICDS beneficiaries. Kothari and Nataraj (1989) reported that ICDS programme had a positive impact on morbidity pattern of children. Narmada (1989) studied the morbidity pattern of children in the urban ICDS project Madras VI and had found that 63 per cent children had worm infestations, 30 per cent children had anaemia and 37 per cent had vitamin A deficiency. She had also noticed that environmental sanitation living conditions, and personal hygiene of the residents were very poor and drinking water supply was grossly inadequate.

Studies conducted in different parts of the country had indicated that ICDS had a definite impact on health and nutritional status of children (Mehendale *et al.* (1985) and Vivek *et al.* 1989). Bawaskar and Sathe (1989) had observed that nutritional status of children belonging to

the urban ICDS block was better than that of rural ICDS block in Aurangabad Pushpa *et al.* (1985) studied the nutritional status of pregnant mothers in urban slums of Nagpur and found that only 25 per cent of the mothers were normal.

Gupta and Srivastava (1989) and Thakar and Jyotsna (1990) had reported that nutritional status of the beneficiaries of the ICDS programme were relatively better than that of the non beneficiaries due to the impact of the package of services provided to them.

Chaturvedi *et al.* (1987) observed that mean weight and height measurements of both male and female children belonging to the ICDS projects were higher than those of non ICDS group. Sunderlal and Goomer (1989) had pointed out that the mean birth weight of male infants was found to be higher than that of the female infants by 50 g and the incidence was found to be high in economically weaker sections in a rural ICDS block. Gupta *et al.* (1984) pointed out that weight for age of children of ICDS group was significantly higher than that of control group.

Sunderlal (1982) had the opinion that growth monitoring appears to be much rewarding, feasible and practical way to deal with the problems of severely malnourished children. Sunderlal (1983) had commented that

growth monitoring envisaged in the ICDS programme is a good system of surveillance. However, Gopalan and Chatterjee (1985) observed that growth monitoring is successful only in small scale operations with a dedicated leadership. They further reported that in large scale programmes, results of growth monitoring were poor and were non commensurate with the costs of implementation.

Bagchi and Saxena (1986) revealed that monitoring was performed at the most unsatisfactory level in the ICDS centres. In an editorial in Lancet (1988) it was pointed out that only 20 per cent of the children in the ICDS areas were weighed every month.

Several studies have been conducted to evaluate the impact of ICDS components on the beneficiaries.

2.4.1 Immunization component of ICDS

Several studies conducted in India had revealed that ICDS brought a positive impact on the immunization and nutritional status of children (Thakur *et al.* 1984). Subramaniam, 1985; Bhandari *et al.* 1989; and Prasad *et al.* 1989). Gupta *et al.* (1984) reported that immunization coverage was significantly higher in the ICDS group than the control group.

Khanna *et al.* (1985) from their study in Beri, found that about 55 per cent children and 79 per cent pregnant women were immunized as against 13.18 per cent and 47.69 per cent respectively in non ICDS block.

Widge *et al.* (1986) expressed that the coverage of immunization was relatively higher than the coverage of vitamin A prophylaxis and iron and folic acid supplementation in ICDS programme.

Devadas *et al.* (1989) indicated that majority of study sample belonging to the rural ICDS block of Kerala were found to be immunized.

Meetakumar *et al.* (1988) had indicated that there was gross under utilization of tetanus-toxoid, immunization health check-ups and referral services, health and nutrition beneficiaries of ICDS in Delhi. Kanthimathi (1989) has the opinion that 90 per cent of the mothers were aware of the primary doses of immunization but only 50 per cent of these women completed the course of immunization. She further reiterated that mothers were not adequately motivated to get their children immunized. Khanna *et al.* (1985) revealed that, the main reason for incomplete immunization was found to be non availability of vaccines and lack of awareness about the immunization schedule and the fear of side effects. Main lacuna in the immunization

component of ICDS as identified by Kanthimathi and Saradha (unpublished) was lack of dispersion of information regarding the immunization schedule, availability, and the significance of immunization for preventing the dreaded diseases.

2.4.2 Supplementary nutrition component of ICDS

Supplementary feeding programmes are channels for health and nutrition education and since health centres often act as distribution points, they may stimulate attendance and increase the utilization of health care services.

A report published by Programme Evaluation Organization (PEO) in 1982 threw light into the fact that supplementary nutrition was the most popular component out of all six services of ICDS. Supplementary nutrition component of ICDS was ranked high in terms of awareness and coverage in the survey conducted by Widge *et al.* (1986); and Sharma and Chand (1989); Prema *et al.* (1990). In an evaluation done by PEO (1982) on ICDS, it was found that fifty seven per cent of the ICDS centres used local foods such as cereals, pulses and spices for supplementing, whereas 22 per cent used ready to eat foods.

Bhatnagar *et al.* (1983) had reported that women receiving supplementary nutrition of 300 calories and 16 g of proteins in the last trimester of pregnancy in an urban, ICDS programme had showed significantly higher weight gain as compared to the control group matched for age, weight, parity, social class and nutrient intake.

According to Widge *et al.* (1986) the main attraction for enrolment in anganwadi centres was found to be the provision of supplementary food. They also had pointed out that majority of the beneficiaries were found to be benefitting through supplements given. Meetakumar and Sharma (1988) from their study in Delhi, found that, only 25 per cent of the supplement was consumed by the beneficiaries themselves.

Desai (1989) observed that child beneficiaries of ICDS were found to consume only half or negligible amount of food supplements given to them.

Srivastava (1989) observed that eating behaviour of children attending the anganwadis was found to be improved significantly. He had also expressed that lunch provided in the anganwadi centres supplemented the home diets of the children.

Thakar and Jyotsna (1990) reported that children carried the food supplement to their homes and this increased the chances of sharing of the supplement.

2.4.3 Nutrition and health education component of ICDS

PEO (1978 and 1982) and Krishnamurthy and Nadkarni (1983) pointed out that nutrition and health education component of the ICDS scheme was poorly implemented because of lack of suitable nutrition health education materials and due to the lack of appropriate training for the functionaries. Sunderlal (1979) had revealed that 50 per cent of the anganwadi workers and Auxiliary Nurse Midwife (ANMS) did not use educational aids for nutrition and health education classes inspite of the fact that they possessed the same.

Vasudeva and sunderlal (1979) are of the opinion that health and nutrition education activities should be built up meaningfully with explicit messages. They also pointed out that regular monitoring and evaluation of these activities should be undertaken to strengthen the programme.

In a report published by PEO (1982) it has been revealed that the type and content of nutrition and health education offered in the ICDS centres were irrelevant and hence should be completely revamped.

Bagchi and Saxena (1986) had observed that nutrition and health education were found to be performed in most unsatisfactory level. Widge *et al.* (1986) remarked that health and nutrition education was conspicuously absent in most of the ICDS centres. Surveys conducted by various workers (Bapat and Modi, 1989, Kanthimathi 1989, Khanolkar *et al.* 1989, Thakar and Jyotsna 1990) felt that health and nutrition education component of ICDS had to be strengthened. Seshadri and Gopaldas (1989) critically commented that anganwadi workers had inadequate and unsatisfactory teaching material related to nutrition and health education. Seshadri and Gopaldas (1990) had pointed out that a major constraint in imparting nutrition and health education is the difficulty in finding a time convenient to both functionaries and the mothers.

Bhatnagar and Singhal (1984) studied the attitude of women participants towards ICDS in Rajasmand block of Udaipur district and indicated that majority of the participants had some knowledge about ICDS programme. According to the salient findings of the study age, caste, type of family, and education had a significant effect on the knowledge of the participants.

Kothari and Nataraj (1989) had opined that knowledge, attitude and practices of the mother

beneficiaries with respect to health aspects had improved considerably.

Beegum and Malathi (1989) studied the nutrition knowledge, attitude and practices of mother beneficiaries and revealed that there was significant difference in the nutrition knowledge and attitude on aspects like hygiene, sanitation and deficiency diseases, when compared to non beneficiaries. The practices of these mothers on hygiene, sanitation and general health practices improved significantly after their exposure to health education classes.

2.4.4 Health check-up component of ICDS

Gupta *et al.* (1979) were of the opinion that the health coverage of the population could be considerably improved provided the health staff adheres to their schedule of visits.

Bhan *et al.* (1986) were of the view that health system of ICDS should be reoriented and involved more effectively. They have further pointed out that special attention should be paid for ensurance of constant availability of inputs.

Aijaz (1987) had felt that delivery of health services needs to be improved further in the ICDS programme.

Sunderlal *et al.* (1989) were of the view that diarrhoea surveillance should become an integral part of ICDS. Patel (1984) had also pointed out the 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 paramedical workers and from drugs to health and nutrition education.

Prinja *et al.* (1989) have recommended that essential medicines should be ensured along with adequate support of an in-built referral system.

2.4.5 Referral service component of ICDS

Krishnamurthy and Nadkarni (1983) from their study conducted in 16 ICDS blocks in the states of Andhra Pradesh, Karnataka, Rajasthan, Maharashtra, Haryana, Uttar Pradesh, Nagaland, Bihar and Delhi had found that, arrangements for referral services were not made in many blocks, because of lack of awareness among the workers about this component. Kumar *et al* (1986) evaluated the referral system envisaged in the ICDS programme and commented that, the services should be given where the people are, rather than referring them. He also opined that referral service system should be reoriented. Mandowara and Bhandari (1989) had remarked that delivery of referral service by anganwadi workers was unsatisfactory.

2.4.6 Role of field functionaries in the implementation of the programme.

Anganwadi workers are the field functionaries at the grass root level responsible for the implementation of the programme. Ghosh (1977) critically commented that anganwadi workers spend most of their time in cooking, distribution of food and clearing up afterwards and hence spend less time in health and nutrition education, non formal education, and health care. Sunderlal (1979) had remarked that only 15 per cent of anganwadi workers were doing their work with enthusiasm and dedication, while rest were either average or had indifferent attitude.

Nair and Bansal (1989) remarked that 30 per cent of the time available for the anganwadi workers were spent on maintenance of registers, which distort their action of work. According to Bhan *et al.* (1986) nutrition education and community involvement should be stressed during training and in refresher courses offered to anganwadi workers.

Gopaldas (1988) is of the opinion that anganwadi workers should be trained in early detection and action of growth deterioration, because they were unable to detect the stationary growth phase. Prinja *et al.* (1989) opined that continuous training should be imparted to anganwadi workers, to enable them to manage common illness. He felt that

frequent and on the job training should be rendered to the ICDS field functionaries.

2.4.7 Popularity of ICDS programme

Gopaldas (1982) had pointed out that most vulnerable group namely children below 3 years, were hardly reached in ICDS Programme representing a distortion in the priorities within the vulnerable segments of the population.

Krishnamurthy and Nadkrani (1983) had reported that the substantial number of children attending anganwadies belonged to scheduled castes, scheduled tribes, and poorer sections of the society.

Aijaz (1987) reported that adequate emphasis was laid in enrolling socially disadvantaged group of children in the ICDS projects in the States of Karnataka, Rajasthan, Nagaland, and Delhi. Adhish *et al.* (1989) stated that ICDS programme was found to be accepted by lower social classes. Chand *et al.* (1988) revealed that peoples contribution in the programme was low mainly due to poor awareness, illiteracy and lack of faith and interest in the scheme. Paranjpi and Bhagwat (1989) pointed out that people belonging to the community of Maharashtra had inadequate awareness about ICDS Scheme, which led to their low level of participation in the programme.

Premila *et al.* (1989) had also reported about the lack of awareness among the public about ICDS.

A study conducted in an urban rural and tribal project in Rajasthan revealed that the level of awareness and participation of women respondents in ICDS services were low in all the three blocks, being lowest in the urban area and highest in the tribal project (Sharma and Chand, 1989).

According to Iyenkar and Krishnamoorthy (1987) lack of proper motivation by implementing agencies to stimulate community participation at various levels was the major draw back of the programme. This had been found correct in the studies conducted by Murthy (1987) in the ICDS project of Gujarat and Uttarpradesh.

Dev and Lal (1989) and Thakar and Patil (1990) had the opinion that community participation is essential for effective implementation of ICDS programme. Premila *et al.* (1989) also had reported about the lack of community participation in the ICDS centres. Evaluation done on the ICDS projects implemented in the state of Karnataka by Khaklader *et al.* (1989) had revealed that most of the beneficiaries were not benefitted from the scheme due to lack of community participation, lack of co-ordination between health and social welfare, lack of proper supervision, due to inaccessibility to the centre.

Tandon (1980) revealed that the major shortcomings of the ICDS programme were failure to establish nutrition therapy for severely malnourished children, unsatisfactory referral system, neglect of nutrition and health education, and poor coverage of needy population and children below 3 years old.

Chandra and Thayar (1985) rightly pointed out that a major obstacle in achieving the overall objective of the programme lies in the failure of providing supportive services like protected water supply, sanitation, education and community participation.

Review of the earlier studies undertaken on ICDS clearly indicate that need for an indepth analysis on the impact of the programme on the beneficiaries with respect to participation level.

MATERIALS AND METHODS

3. MATERIALS AND METHODS

The present study is an effort, to evaluate the impact of the ICDS Programme, on its beneficiaries with respect to nutritional status and participation. The methodology followed in the study is presented under the following heads.

- 3.1 Selection of the study Area.
- 3.2 Selection of the ICDS Project.
- 3.3 Selection of the ICDS Centres.
- 3.4 Selection of the respondents.
- 3.5 Variables selected for the study.
- 3.6 Techniques adopted for the measurement of variables.
- 3.7 Procedure employed in data collection.
- 3.8 Statistical tools used in the study.

3.1 Selection of the study area

Since the present study is an attempt of impact evaluation of the ICDS programme, the area selected must be the one, where the programme is in operation at least for a decade. ICDS programme of Kerala state was first implemented in the Malappuram district, during 1975-76 with

only one project. Hence this district was purposively selected for the present study (Fig 1).

3.1.1 Brief description of the locale

Malappuram district was formed on 16th June 1969 by merging the contiguous under developed regions of the erstwhile Palghat and Calicut districts. There are 4 taluks in Malappuram district viz Ernad, Tirur, Perinthalmanna and Ponnani and is composed of 122 revenue villages grouped under 13 revenue firkas. Ernad is the largest taluk while Ponnani is the smallest. The district is further divided into 13 community development blocks namely Malappuram, Kondotty, Manjeri, Wandur, Perinthalmanna, Mankada, Kuttipuram, Vengara, Tirurangadi, Tanur, Tirur, Ponnani and Andathode. The district is composed of 4 municipalities, viz Malappuram, Manjeri, Tirur and Ponnani.

Malappuram is basically an agricultural district about 80 per cent of the population depend directly or indirectly on agriculture for their livelihood. This district has got a sea coast of 70 kms which is 11.86 per cent of the total coast line of the state.

The important demographic features of the district in comparison with the state is depicted in (Table 1).

Table 1. Demographic features of Malappuram district in comparison with the Kerala State

Sl. No.	Demographic features	Malappuram	Kerala
1.	Area (sq. kms)	3548.00	35863.00
2.	Population (lakhs)	30.93	290.11
3.	Decadal growth rate (1981-91)	28.74	13.98
4.	Population of SC/ST	215973.00	2810857.00
5.	Population by Religion (in percentage)		
	a) Hindu	32.13	58.15
	b) Muslims	65.50	21.27
	c) Christians	2.37	20.56
6.	Density of population (sq. kms)	871.00	747.00
7.	Sex ratio	1054.00	1040.00
8.	Literacy	60.5	90.5
9.	Per capita Income Current prices (Rs.)	2492.00	3843.00

Source: Census (1991)

The total area of Malappuram district is 3548 sq.kms which is 9.13 per cent of the total area of the State. The total population of Malappuram district is 30.93 lakhs (1991 census) with the State total of 290.11 lakhs. The decadal growth of population for the period 1981-91 is 28.74 per cent as against 13.98 per cent of the

State. Among the districts of Kerala, Malappuram has registered the highest growth rate.

The under privileged population (SC/ST) of the district is 215973 which is 7.6 per cent of the total under privileged sections of the State. This region has another distinction for its predominant Muslim population (65.5 per cent).

As regards to the density of population, Malappuram has 871 persons/sq. kms where as the State average 747 in 1991 and occupies the 7th position in density of population. Sex ratio of Malappuram is highly favourable to females, as evidenced from the table (1054/1000) where as the State average is 1040/1000.

With regard to the literacy levels, total literacy of Malappuram is 60.5 where as the State literacy level is 90.5 in 1991. Apart from the above features, in per capita income also Malappuram district occupies the last position among the various districts of Kerala. Due to these reasons, the selected study area is considered as one of the backward districts of Kerala.

3.2 Selection of the ICDS Project

Malappuram ICDS Project is comprised of nine sub projects is comprised of nine sub projects, namely Vengara,

Ponnani, Kondotty, Tirur, Manjeri, Perinthalmanna, Tanur, Tirurangadi, and Vandoor. From the above ICDS projects, one project was selected at random for the study.

3.3 Selection of the ICDS centres

Anganwadi is the nodal point of ICDS, through which the various components envisaged in the programme is translated to its beneficiaries. The selected ICDS projects namely Ponnani, was composed of 121 such anganwadi centres during the period under study. From these anganwadi centres, fifteen centres were selected at random for the study.

3.4 Selection of the respondents

3.4.1 Selection of the macro sample

Beneficiaries of ICDS include, children in the age group of 0-3 years, preschool children, pregnant mothers and lactating mothers. Among the different categories of beneficiaries, vulnerable groups namely preschool children (p), pregnant mothers (P.M), and lactating mothers (L.M) were selected for the study.

Each anganwadi centre will generally select approximately 100 beneficiaries of which the major group will be preschool children, (approximately 40-50 children) and

children below 0-3 years. Approximately ten mother beneficiaries (both pregnant and lactating) will also be selected for each anganwadi centre.

From the identified anganwadi centre on an average 8 to 10 preschool children including both male and female and 2 to 4 mother beneficiaries (both pregnant and lactating) were selected for the conduct of the study on the basis of their availability, cooperation and benefit period. A total of 170 beneficiaries including 110 preschool children (both male and female) and 30 each of pregnant and lactating mothers composed the beneficiary group (Experimental group). The non beneficiary group (control group) included 70 respondents drawn from the same project area with similar socio-economic background. Thus a total of 240 respondents comprised the study group.

Frequency distribution of the selected respondents are shown in Table 2.

Benefit period was varying between preschool beneficiaries and mother beneficiaries. During the selection of preschool beneficiaries care was taken to see that they were in the rolls of ICDS programme for at least one year. So that the impact of the programme on their health status can be assessed more accurately. Whereas

mother beneficiaries were included in the roll of ICDS programme as and when they were identified as vulnerable population. For the present study the mother beneficiaries were selected from the enrolled list available in the anganwadi centres.

Table 2. Frequency distribution of selected respondents

Type of Respondents	Experimental group (E G)	Control group (CG)	Total
Preschool children(P)			
Male (M)	60	15	75
Female(F)	50	15	65
Pregnant Mothers(P.M)	30	20	50
Lactating Mothers(L.M)	30	20	50
Total	170	70	240

3.4.2 Selection of the respondents for indepth investigation

In depth investigations such as actual food intake, growth monitoring and biochemical investigations were carried out only in selected respondents. Details are given in Table.3. Willingness of the respondents, was taken as the criteria for including them in the indepth investigations.

Table 3. Distribution of selected respondents for indepth investigations

Type of investigation	EG			CG			Total
	P	P.M.	L.M.	P	P.M.	L.M.	
Actual Food intake	20	5	5	10	5	5	50
Bio chemical parameters	12	5	5	0	0	0	22
Growth monitoring	12	0	0	0	0	0	12
Total	44	10	10	10	5	5	84

3.5 Variables selected for the study

Inorder to achieve the objectives outlined in the study, measurement of the following variables were envisaged in the present study.

- 3.5.1 Socio economic, and personal characteristics of the respondents.
- 3.5.2. Appraisal of ICDS programme implemented in the study area.
- 3.5.3 Knowledge, Attitude and Practice (KAP) of the respondents with reference to ICDS programme
- 3.5.4 Nutritional status of the respondents based on:
 - 3.5.4.1 Dietary habits and food consumption has pattern
 - 3.5.4.2 Actual food intake
 - 3.5.4.3 Anthropometric measurements

3.5.4.4 Clinical assessment

3.5.4.5 Biochemical parameters and

3.5.4.6 Growth monitoring (pre school children)

3.5.5 Participation Index of the respondents

3.5.6 Nutritional status Index of the respondents

3.6 Techniques adopted for the measurement of variables

3.6.1 Measurement of socio-economic personal characteristics of the respondents

To elicit information on the socio-economic, personal characteristics of the study sample a questionnaire was developed. This schedule included information on religion, type of family, size and composition of the family, source of income and total monthly income, monthly expenditure pattern, possession of house and landed properties, infrastructural facilities available in the home, home production, animal husbandry, and morbidity pattern. Details pertaining to the educational and employment status, social status, marital status and exposure to mass media of the respondents were also included. The questionnaire structured specifically for the study is presented in Appendix I. Socio economic survey was conducted among the selected respondents using the questionnaire.

3.6.2 Appraisal of the ICDS Programme implemented in the study area

In order to get an appraisal of the ICDS programme implemented in the study area a schedule was prepared. This schedule included detailed information on the various aspects of ICDS such as supplementary nutrition, immunization, health inputs, health education, referral system and preschool education. Informations such as beneficiaries perception about ICDS, their awareness, participation, preferences, and satisfaction with regard to each component was also elicited. Besides, information about each component with reference to mode of implementation, frequency of availability, opinion of the beneficiaries, and suggestions for the improvement were also collected. The questionnaire developed was pretested and is presented in Appendix II. Appraisal of the programme implemented in the study area was carried out among the selected beneficiaries using the questionnaire developed for the purpose.

3.6.3 Assessing the knowledge, Attitude and Practice (KAP) of the respondents with reference to ICDS programme

3.6.3.1 Knowledge

English and English (1958) defined knowledge as a body of understood information possessed by an individual or

by a culture. Shankariah and Singh (1967) measured knowledge of the respondents using a teacher made test. Singh *et al.* (1968) adopted the method of self appraisal to determine the level of knowledge. While Jaiswal and Dave (1972) measured knowledge level by using score in which, knowledge score was found to be

$$\frac{\text{No. of correct answers}}{\text{Total raw score}} \times 100$$

According to Singh and Prasad (1974) knowledge was measured using the formula.

$$\text{Knowledge quotient} = \frac{\text{Observed knowledge score}}{\text{Actual total score}} \times 100$$

Singh and Singh (1974) developed a knowledge test based on the formula

$$\frac{X_i}{n} \times 100$$

where X_i = No. of correct answer

n = Total number of questions

For the present study, the teacher made test including simple question items and constant alternative items (True-False) as described by Remmers *et al.* (1967) was selected since it is simple and easy to operate.

Knowledge of the respondents regarding nutrition and health messages disseminated was measured using a teacher

type achievement test specifically developed for the study. A total of 60 statements on various aspects of health and nutrition were prepared. These statements were prepared from relevant literature and through informal interviews with field functionaries. These statements were circulated among the officials of ICDS 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 the suggestions made by experts, 40 statements were selected and were pretested. Five statements were discarded and remaining 35 items were selected for constructing the knowledge score. The number of statements selected in different areas of nutrition are as follows

Important areas of Nutrition	No: of Statements
1. Infant feeding Practices	3
2. Supplementary feeding Practices	3
3. Health care in children	5
4. Care during Pregnancy and lactation	7
5. Immunization	2
6. Diarrhoeal diseases	4
7. Sources of various nutrients and their deficiencies	7
8. Personal and food hygiene	4
	----- 35 -----

Each statement was provided with two response categories namely "yes" or "No" with a score of '1' for correct answer and '0' for wrong answer. Finally the scores were all added up to get the knowledge score for each respondent. The maximum score for the test developed was 35. The constructed knowledge test administered is appended (III). Nutrition knowledge of the respondents was measured using this test.

3.6.3.2 Attitude

Thurstone (1946) defined attitude as the degree of positive or negative effect associated with some psychological object towards which people can differ in varying degrees.

Sharma (1972) defined attitude as a personal disposition which implies an individual, to react to some objects or situations.

According to Mehrabian (1973) attitude is the degree of liking, positive evaluations and or preference of one person for another.

Results of research and experience of extension scientists and workers indicated that, attitude that an individual holds towards an innovation exercises significant influence on his/her accepting or rejecting that innovation (Prema *et al.* 1990).

The objective measurement of attitude requires a scale developed for the purpose. An attitude scale will contain statements (items) which can be selected by different methods. Items and their scale value are decided by a panel of judges in equal appearing interval scales and successive interval scales. Item analysis is the basis for selection of items in Likert scales. Scalogram analysis of Guttman can be followed in selecting items with unidimensionality.

An arbitrary scale was developed for the present study for measuring the attitude of the beneficiaries towards ICDS programme. In developing attitude scale, a large number of items (statements) each expressing some opinion about the psychological aspects under study namely ICDS were collected. These items were collected from relevant literature, informal interview with the workers in the field and experts. From all these sources, a total of 40 items were prepared. These items were edited according to the criteria suggested by Edwards (1957). After vigorous selection only 25 statements were retained. Care was taken to see the statements were worded to express positive and negative attitudes and to select equal number of positively and negatively worded statements in the scale. These statements were then circulated among the specialists to assess the appropriateness of these statements for an

attitude scale. In the light of the suggestions, made by specialists, the items were modified and a total of 20 items were selected.

The responses of each item were obtained on a five point continuum ranging from "strongly agree" to "strongly disagree". The score assigned were, for "strongly agree" 4, "Agree" 3 "undecided" 2 "Disagree" 1 "strongly disagree" 0. Negative statements were scored in the reverse manner. The attitude score of the beneficiaries were obtained by adding up the scores corresponding to their response pattern for each statement. Attitude scale developed is presented in appendix IV. Attitude scale was administered in the selected beneficiaries.

3.6.3.3 Adoption or practice

Wilkening (1952) measured the adoption by using an index. The index was the percentage adopted, to the total number of practices applicable. He has also suggested differential weights in the adoption index. Marsh and Coleman (1955) used a practice adoption score computed as the percentage of application practices. Rogers (1962) defined adoption process as the mental processes through which an individual passes from first hearing about an innovation to its final adoption.

Chattopadhyaya (1963) defined adoption as the stage in the adoption process where decision making is complete regarding the use of a practice and action with regard to such a decision commences. Supe (1969) used an unweighted practice adoption score. Rogers and Shoemaker (1971) defined adoption as a decision to continue full use of an innovation as the best course of action. Jaiswal and Dave (1972) developed an adoption quotient with the components such as extent of adoption and potentiality of each practice.

In the present study, adoption of the messages disseminated was measured as suggested by Wilkening (1952). For measuring the adoption of the new innovations disseminated among the beneficiaries, a suitably structured schedule was developed. The schedule included positive and negative statements provided with two response categories namely 'yes' and 'no' with the score '1' and '0'. A total of 22 statements were included for this purpose.

The maximum score obtained by each beneficiary was assessed by summing up the scores. The schedule prepared for the purpose is presented in Appendix V. The schedule was administered on selected beneficiaries.

Nutrition practices tested among the respondents are as follows

Practices related to different aspects	Number of practices tested
Infant feeding	4
Health care	5
Hygiene	5
Food habits	3
Care during pregnancy and lactation	5
Total	22

3.6.4 Assessing the nutritional status of the respondents

According to Aebi, (1983) dietary assessment, actual food intake, anthropometric indices, presence of clinical deficiency signs and various biochemical estimations are widely used as direct parameters of nutritional status.

3.6.4.1 Dietary habits and Food consumption pattern

According to Ramachandran (1987) dietary intake has been widely used as an indicator of nutritional status. (Gopaldas and Seshadri, 1987) diet surveys constitute an essential part of any complete study of nutritional status of individuals or groups, providing essential information on nutrient intake levels, source of nutrients, food habits and

attitudes. Klaver *et al.* (1988) has the opinion that food consumption survey is designed to obtain qualitative and/or quantitative information on the food actually eaten.

A schedule was prepared for collection of data on dietary habits and food consumption pattern of the beneficiaries in the present study. This schedule contained detailed information on dietary habits of the families, expenditure pattern, food purchasing habits, frequency of use of various foods, meal pattern followed, cooking methods followed, preservation practices, foods prepared for special occasions and dietary modifications during different physiological conditions and during diseases. The pretested questionnaire structured for the survey is detailed in Appendix VI. Food consumption survey was conducted among the respondents using the prepared questionnaire.

3.6.4.2 Actual food intake of the respondents

Weighed food record is reported to be the most accurate dietary assessment method (Marr, 1977). Bandyopadhyay and Chattopadhyay (1980) opined that food intake survey is important for determination of caloric balance in a group of population.

According to Rao (1975) any single day or 2 day weighment method would be as efficient a tool as that of

7 days. Thimmayamma and and Rau (1983) had recommended three day weighment method for urban population. Guthrie *et al.* (1985) is of the opinion that one day food record alone was of limited value in estimating nutrient adequacy of a person's diet and to quantify the magnitude of the variation over a three day period.

In the present study three day weighment survey was conducted among the selected respondents to determine the actual food intake. Schedule was prepared for the conduct of food weighment survey and is given in Appendix VIII. The nutrients available from the food intake was computed using food composition table (Gopalan *et al.* 1989).

3.6.4.3 Anthropometric assessment

Anthropometric method is considered as one of the most objective and simple methods for assessing the nutritional status of the individuals (Jelliff, 1966). Fillmore (1984) opined that anthropometric indicators are the variety of body measurement used in conjunction with measurement values of a reference population. Anthropometry is the most useful tool for assessing the nutritional status of children for practical purposes (WHO 1986). Kim and Pollit (1987) viewed that this method is considered as a suitable technique to monitor health and nutritional status of individual children participating in health programmes.

Sharma and Kaila (1990) stated that nutritional anthropometry is one of the important and simple method of assessment of growth and development especially in the rapidly growing children.

In the present study anthropometric measurements viz. weight, height, head, chest and Mid Upper Arm Circumference (MUAC) were taken for the preschool children. In the case of mother beneficiaries only weight and height were recorded. These various measurements were taken as suggested by Jelliff (1966) details of which are given in Appendix VIII.

Various anthropometric indices are to be used for interpreting anthropometric data. As per the report published by WHO working group (1986) it has been stated that it is desirable to use more than one method for presenting and analysing the anthropometric data.

Gueri *et al.* (1980) recommended weight for age as an alternative method for Gomez classification for assessing nutritional status. Weight for age parameter can also be used for screening children suffering from protein energy malnutrition Grade III and IV. (Desai *et al.* 1985). Weight for height was recommended for wasting and height for age for stunting by WHO working group (1986).

Steinhoff *et al* (1983) suggested that children whose weight is < 2 Std. deviation below the mean weight for height value, as in indicator of acute malnutrition and children whose weight was < 2 Std. deviation below the mean height for age value as an indicator of chronic malnutrition.

WHO (1983) had recommended three main indicators viz. weight for age, height for age and weight for height for determining both acute and chronic malnutrition.

Weight for height and height for age combinations were found to be sensitive measures for detecting malnutrition. Jakher *et al.* (1989).

Weight/height² ratio was found to be 83.3 per cent sensitive and 80 per cent specific (Sen, 1980). According to Vandnsen *et al.* (1980) weight/height² gives a fair estimate of the magnitude of the protein calorie malnutrition. Weight for height was preferred in assessment of protein energy malnutrition (Desai and Desai, 1989).

$$\frac{\text{Weight}}{\text{Height}^{1.4}} \times 100 \text{ for male and } \frac{\text{Weight}}{\text{height}^{1.45}} \times 100$$

for female were found to be better indices for assessing nutritional status (Rao *et al.* 1989).

Mid upper arm circumference had been used extensively for children aged 1-5 years in judging the nutritional status of an individual. Gupta and Bhandari (1974) had reported that children having mid arm circumference/head ratio less than 0.31 had 'weight for age' less than 80 per cent. Rao *et al.* (1978) were of the opinion that arm circumference is affected significantly by severe forms of protein calorie malnutrition but less affected by mild forms of protein energy malnutrition.

An age constant arm circumference limit of 13.5 cm can identify nearly all children with severe or acute malnutrition by weight for age or weight for height (Anderson, 1979).

Merchant (1980) and Chen *et al.* (1980) had stated that weight/age and arm circumference/age were considered to be sensitive indices used to determine protein energy malnutrition.

For the present study following anthropometric indices were used for interpretation of anthropometric data collected.

- i) Weight for age
- ii) Height for age
- iii) Body mass index

- iv) Age constant arm circumference limit
- v) Head chest circumference ratio and
- vi) Weight for height ratio index in pregnant mothers

3.6.4.4 Clinical assessment

According to Swaminathan (1986) clinical examination is the most important part of nutritional assessment, giving direct information of signs and symptoms of dietary deficiencies prevalent among people. In the present study clinical examination of the respondents were conducted with help of a qualified physician. Schedule used for the purpose is give in Appendix IX.

3.6.4.5 Biochemical parameters

Sauberlich *et al.* (1977) stated that biochemical measurements represent the most objective assessment of the nutritional status of an individual. Aebi (1983) is of the opinion that biochemical parameters proved to be very informative in order to detect marginal cases of deficiencies.

In the present study, under the biochemical investigations, haemoglobin levels, of all the respondents were determined by cyanmethaemoglobin method (Reguramulu *et al.* 1983). The procedure is given in Appendix X. Other biochemical estimations conducted were estimation of serum

protein and serum albumin methods of which are given in Appendix XI.

3.6.4.6 Growth monitoring

Doloksaribu *et al.* (1983) had indicated that monthly weighing could be used as an indicator of the progress of nutrition programme, which is easier to do than other measurements of nutritional status while Sohoni (1988) is of the opinion that growth monitoring is very elementary but vital method of querrying, if and when a child's growth is flattering.

However, in the present study, growth monitoring of the selected preschool children was carried out using growth charts supplied by CARE.

3.6.5 Participation Index of the respondents

Participation of an individual in a programme is defined as the sum total of his/her involvement in the various activities of the programme. ICDS programme comprises a package of services of equal importance including supplementary feeding, immunization, health check-up, health education and preschool education. Among the three categories of beneficiaries of the programme, preschool beneficiaries are involved in all the above five components, whereas preschool education component is not

protein and serum albumin methods of which are given in Appendix XI.

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extended to pregnant mothers so also preschool education and immunization component to lactating mothers.

In order to assess the total participation of beneficiaries in the programme, their involvement in each component of the programme are to be accounted. Thus in the present study participation index of a beneficiary is the weighted average of participation coefficient in each of the components in which they are involved, the weights being the frequency of involvement in each activity.

In order to assess the participation coefficient of the respondents in supplementary nutrition, attendance of beneficiaries maintained in anganwadies for the previous 6 months of survey period was taken into account.

Participation coefficient of preschool beneficiaries in the immunization component was determined by observing whether the child beneficiary has immunized against B.C.G., D.P.T., polio and measles. A score of 0 to 4 was assigned to the beneficiaries depending upon number of immunization received. For pregnant mothers a score 1 to 0 was assigned on the basis of their receipt of tetanus toxoid injection.

Participation coefficient of the beneficiaries in the health check-up and health education activity was

assessed by assigning scores 2, 1 or 0 based on their regularity in attending the health check-ups and health education classes conducted in the centres as regularly, occasionally and never. 'Health check-ups' and health education classes conducted for the previous 6 months were taken into consideration while assessing the participation coefficient of the beneficiaries in the above components.

Preschool beneficiaries' participation in the education component was assessed by taking the attendance of the children from the registers maintained in the anganwadi centres. Attendance of the children for the previous 6 months were taken into consideration while assessing the participation coefficient of the each beneficiary.

3.6.6 Nutritional status index of the respondents

Suppose X_{ij} be the observation corresponding to j th variable for the i th sample, $w_j = 1/6j^2$, the weight assigned to the observation corresponding to j th variable, the nutritional status of i th individual is defined as

$$N_i = \sum_{j=1}^k W_j X_{ij}, \quad i = 1, 2, \dots, N.$$

N = No. of respondents

K = No. of variables

The nutritional status and index of the preschool children was defined in term of the characters weight, height and body mass index, head, chest and arm circumferences, clinical score and haemoglobin levels. In pregnant and lactating mother respondents, weight, height, body mass index, clinical score and haemoglobin levels were taken to develop the index.

3.7 Procedure employed in data collection

Interview method consists of face to face verbal interchange in which the interviewer gets an opportunity to elicit information or expression of opinion or belief from another person (Lindzey, 1954). According to Rangaswamy (1989) interview method is considered as one of the chief means of collecting data. More over compared to other methods, this is the most systematic method by which a person can enter more or less imaginatively into the inner life of a comparative stranger. Devadas and Kulandivel (1975), Bass *at al.* (1979) were of the opinion that interview method proceeds systematically and records the collected information quickly. Besides this technique also permits exchange of ideas and information. (Sindhu, 1984).

Because of these reasons in the present study, data was collected by interview method through house visits. In the case of preschool beneficiary, their mothers were

interviewed, and in mother beneficiaries respondents themselves were interviewed.

Apart from the interview method, observation method was also used to elicit information. Observation is considered as a careful systematic watching of factor as they occur in the course of nature, (Adiseshiah, 1989). It is the most refined of modern research technique (Sidhu, 1984). Restrictions imposed in the questionnaires or interviews will be absent in observation. Hence during the interviews, observation also gives many valuable data. Data related to the anganwadi centres, with respect to the cleanliness of the centres and the premises, eating and serving pattern, sharing of the food supplement and the behaviour of the anganwadi teachers were assessed more accurately through observation.

3.8 Statistical tools used in the study

The data collected from the respondents were tabulated, and analysed using suitable statistical methods. The statistical tools applied in the present study include

1. Percentage analysis
2. Mean score comparison
3. Simple correlation analysis
4. Test of significance (student 't')
5. Analysis of variances and
6. Chisquare Analysis

RESULTS

4. RESULTS

Results of the present study entitled "Nutritional status of the ICDS beneficiaries with respect to participation" are presented under the following head lines.

- 4.1 Socio-economic and personal characteristics of the study group.
- 4.2 An appraisal of the programme implemented in the study area.
- 4.3 Assessment of the Knowledge Attitude and Practice (KAP) of the beneficiaries.
- 4.4 Assessment of Nutritional status of the respondents which entails details of
 - 4.4.1 Food consumption and dietary habits
 - 4.4.2 Actual food intake.
 - 4.4.3 Anthropometric assessment.
 - 4.4.4 Clinical assessment
 - 4.4.5 Biochemical profile and
 - 4.4.6 Growth monitoring (preschool children).
- 4.5 Factors influencing participation and the participation index of the respondents.
- 4.6 Nutritional status index of the respondents and the inter relationship of various factors contributing to nutritional status including participation rate.

4.1 Social economic and personal characteristics of the study group

Socio-economic personal characteristics of the study group were assessed in terms of religion, type and size of family, profile of child population, marital status, economic, educational and employment status, monthly expenditure pattern, possession of house and land, nature of home production and utilization, and exposure to mass media.

4.1.1 Religion of the study group

Table 4 furnishes information on the religion of the study group.

Table 4. Percentage distribution of the families according to the religion

Religion	Experimental Group (EG)			Total	Control Group (CG)			Total
	P	PM	LM		P	PM	LM	
Hindu	72.73 (80)	70.00 (21)	66.67 (20)	71.18 (121)	56.67 (17)	25.00 (5)	30.00 (6)	40.00 (28)
Muslim	27.27 (30)	30.00 (9)	33.33 (10)	28.82 (49)	43.33 (13)	75.00 (15)	70.00 (14)	60.00 (42)
Total	(110)	(30)	(30)	(110)	(30)	(20)	(20)	(70)

Figures in parenthesis denote number of families

Among the total respondents studied, 71.18 per cent of the experimental group belonged to Hindu community, while 28.82 per cent were from Muslim community. In the

control group 60 per cent were Hindus. On further enquiry about the caste of the respondents surveyed it was observed that, majority of the respondents in both experimental and control groups (94.12 per cent and 90 per cent respectively) were from the backward and underprivileged sections of the community. Only 5.88 per cent in the experimental group and 2.86 percentage in the control group belonged to the forward communities.

4.1.2 Type of the families studied

Table 5 gives a clear picture of the type of the families of the respondents.

Table 5. Percentage distribution of the families according to their type of family

Type of family	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
Joint family	53.64 (59)	66.67 (20)	73.33 (22)	59.41 (101)	53.33 (16)	95.00 (19)	75.00 (15)	71.43 (50)
Nuclear family	46.36 (51)	33.33 (10)	26.67 (8)	40.59 (69)	46.67 (14)	5.00 (1)	25.00 (5)	28.57 (20)
Total	(110)	(30)	(30)	(170)	(30)	(20)	(20)	(70)

Figures in parenthesis denote number of families

In contrast to the typical nuclear type families existing in Kerala, more than 50 per cent of the families of both experimental and control groups belonged to either

extended or joint type families (59.41 and 71.43 per cent respectively). Nuclear type families constituted about 40.59 per cent in the experimental group and 28.37 per cent in the control group.

4.1.3 Size of the families studied

It was observed that in the both the groups about 77 per cent of families were having family members upto 10 and in 22 per cent families, it was still large ranging from 11 to 20.

4.1.4 Profile of child population in the families

Table 6 pictures the number of children in the families of the respondents.

Majority of the families in the experimental and control groups (74.12 per cent and 60 per cent respectively) were found to be small in size with one to three children. While in 23.53 per cent of the families in the experimental group and 34.29 per cent in the control group were large sized families. Two per cent in the experimental group and 5 per cent in the control group had no children being-young couples.

Table 6. Percentage distribution of the families based on the profile of child population

profile of child population	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
Number of children in the family								
1 to 3	72.73 (80)	80.00 (24)	73.33 (22)	74.12 (126)	50.00 (15)	65.00 (13)	70.00 (14)	60.00 (42)
4 and above	27.27 (30)	10.00 (3)	23.33 (7)	23.53 (40)	50.00 (15)	20.00 (4)	25.00 (5)	34.29 (24)
No children	0.00 (0)	10.00 (3)	3.33 (1)	2.35 (4)	0.00 (0)	15.00 (3)	5.00 (1)	5.71 (4)
Total	(110)	(30)	(30)	(170)	(30)	(20)	(20)	(70)
Number of dependent children								
1 to 2	27.27 (30)	56.67 (17)	33.33 (10)	33.53 (57)	43.33 (13)	40.00 (8)	20.00 (4)	35.71 (25)
3 to 4	49.09 (54)	33.33 (10)	30.00 (9)	42.94 (73)	36.67 (11)	20.00 (4)	40.00 (8)	32.86 (23)
5 and above	23.64 (26)	10.00 (3)	36.67 (11)	23.53 (40)	20.00 (6)	40.00 (8)	40.00 (8)	31.43 (22)
Total	(110)	(30)	(30)	(170)	(30)	(20)	(20)	(70)
Number of children below 6 years								
1 to 2	70.91 (78)	93.33 (28)	53.33 (16)	71.76 (122)	73.33 (22)	40.00 (8)	65.00 (13)	61.43 (43)
3 to 4	22.27 (30)	6.67 (2)	36.67 (11)	25.29 (43)	20.00 (6)	45.00 (9)	15.00 (3)	25.71 (18)
5 and above	1.82 (2)	0.00 (0)	10.00 (3)	2.94 (5)	6.67 (2)	15.00 (3)	20.00 (4)	12.86 (9)
Total	(110)	(30)	(30)	(170)	(30)	(20)	(20)	(70)

Figures in parenthesis denote number of families

Children below 14 years are considered as the dependent children: On analysing the profile of children in the families, it was found that 1 to 4 dependent children were observed in 76.4 per cent of the families in the experimental group and 68.5 per cent in the control group. More number of dependent children (5 and above) was observed in 23.5 per cent families of the experimental group and 31 per cent families in the control group.

The number of children below 6 years were found to be 1 to 2 in 71 per cent families of the experimental group and 61 per cent families of the control groups. 25 per cent families of both experimental and control group were found to have 3 to 4 children below 6 years of age.

4.1.5 Marital status of the respondents

As indicated in table 7, 46.47 and 57.14 per cent of the respondents of the experimental and control groups respectively had a marital life between 5 to 10 years. Marital life of less than 5 years was observed in 24.71 and 22.86 per cent of the respondents respectively in the experimental and control groups. Twenty eight per cent of the respondent of the experimental group and 20 per cent of the control group were having marital life of more than 10 years.

Table 7. Percentage distribution of respondents according to their marital status

Marital life	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
1 to 4 years	10.91 (12)	43.33 (13)	56.67 (17)	24.71 (42)	10.00 (3)	40.00 (8)	25.00 (5)	22.36 (16)
5 to 10 years	53.64 (59)	43.33 (13)	23.33 (7)	46.67 (79)	60.00 (18)	50.00 (10)	60.00 (12)	51.14 (40)
More than 10 years	35.45 (39)	13.33 (4)	20.00 (6)	28.82 (49)	30.00 (9)	10.00 (2)	15.00 (3)	20.00 (14)
Total	(110)	(30)	(30)	(170)	(30)	(20)	(20)	(70)

Figures in parenthesis denote number of respondents.

4.1.6^a Educational status of the respondents

Educational status of the respondents is depicted in Table 8. Fifty five per cent of the respondents in the experimental group and 48.57 per cent in the control group were found to have education from upper primary school level to college level. Twenty nine per cent of the respondents in the experimental group and 25 per cent in the control group were found to be educated up to lower primary school level. Fifteen and 25.71 per cent of the respondents respectively in the experimental and control groups were illiterates.

Table B. Percentage distribution of respondents according to their education status

Educational status	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
illiterate	11.82 (13)	20.00 (6)	23.33 (7)	15.29 (26)	23.33 (7)	30.00 (6)	25.00 (5)	25.71 (18)
L.P.S.	31.82 (35)	26.67 (8)	23.33 (7)	29.41 (50)	10.00 (3)	35.00 (7)	40.00 (8)	25.71 (18)
U.P.S	29.09 (32)	20.00 (6)	16.67 (5)	25.29 (43)	20.00 (6)	25.00 (5)	20.00 (4)	21.43 (15)
High school	26.36 (29)	26.67 (8)	36.67 (11)	28.24 (48)	46.67 (14)	10.00 (2)	10.00 (2)	25.71 (18)
College level	0.91 (1)	6.67 (2)	0.00 (0)	1.76 (3)	0.00 (0)	0.00 (0)	5.00 (1)	1.43 (1)
Total	(110)	(30)	(30)	(170)	(30)	(20)	(20)	(70)

Figures in parenthesis denote number of respondents.

4.1.7 Employment status of the respondents

As indicated in table 9 majority of the respondents in both the groups were found to be housewives (86.47 per cent in the experimental group and 97.14 per cent in the control group). Thirteen per cent respondents in the experimental group and 2.86 per cent in the control group were found to be employed outside the home.

As far as the nature of employment, it was observed that 13.05 per cent in the experimental group were government employees. While 78.28 per cent were engaged in

manual labour. 8.68 per cent in the experimental group and all in the control group were found to be self employed by running provision stores, tailoring shops and tea shops.

Table 9. Percentage distribution of respondents according to their employment status

Employment status	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
Housewife	80.91 (89)	93.33 (28)	100.00 (30)	86.47 (147)	96.67 (29)	100.00 (20)	95.00 (19)	97.14 (68)
Employed	19.09 (21)	6.67 (2)	0.00 (0)	13.53 (23)	3.33 (1)	0.00 (0)	5.00 (1)	2.86 (2)
Total	(110)	(30)	(30)	(170)	(30)	(20)	(20)	(70)

Figures in parenthesis denote number.

4.1.8 Economic status of the families

Table 10 depicts the monthly income of the families studied. Seventeen per cent of the families in the experimental group and 7 per cent in the control group were found to have a monthly income up to Rs.500/-. Monthly income of 58 per cent of families in the experimental group and 68 per cent in the control group ranged from Rs. 501-1,500/-. In another 20 per cent families in the control group, the monthly income was in the range of Rs.1,501/- to 2,500/-. Families having income above Rs.2,500/- per month was 3 per cent in the experimental group and 1 per cent in control group.

Table 10. Percentage distribution of the families with reference to their monthly income

Income	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
Upto 500	19.09 (21)	16.67 (5)	13.33 (4)	17.65 (30)	6.67 (2)	0.00 (0)	15.00 (3)	7.14 (5)
501-1000	38.18 (42)	40.00 (12)	33.33 (10)	37.65 (64)	46.67 (14)	35.00 (7)	45.00 (9)	42.86 (30)
1001-1500	20.91 (23)	16.67 (5)	23.33 (7)	20.59 (35)	26.67 (8)	30.00 (6)	20.00 (4)	25.71 (18)
1501-2000	11.82 (13)	20.00 (6)	13.33 (4)	13.53 (23)	10.00 (3)	30.00 (6)	20.00 (4)	18.57 (18)
2001-2500	7.27 (8)	6.67 (2)	6.67 (2)	7.06 (12)	6.67 (2)	5.00 (1)	0.00 (0)	4.29 (3)
2051-3000	2.27 (3)	0.00 (0)	10.00 (3)	3.53 (6)	3.33 (1)	0.00 (0)	0.00 (0)	1.43 (1)
Total	(110)	(30)	(30)	(170)	(30)	(20)	(20)	(70)

Figures in parenthesis denote number of families.

As far as the number of earning members are concerned, it was observed that, 68 per cent families of the experimental group and 70 per cent families of the control groups, 1 to 2 number of earning members were found. The number of earning members ranged 3 to 4 in 29 per cent families of the experimental group and 25 per cent families of the control group. Earning members above 4 were noticed only in a few families in both the groups.

Engagement in subsidiary occupation as a means of supplementing their total income was found to be negligible in both the groups. Only 0.59 per cent families in the experimental group and 1.43 per cent families of the control group were found to be engaged in works such as tailoring, book binding, and match box making as a subsidiary occupation for augmenting their total income.

Monthly expenditure pattern of the families for various items were ascertained and the data are presented in Table 11. As evidenced from the table, a major share of the income was found to be spent on food items by both the groups. Around 41 per cent families in both the groups were found to spend 51 to 75 per cent of their income for food. Twenty six to fifty per cent of the income was spent for food by 31 per cent families in the experimental group and 28 per cent families in the control group. More than 75 per cent of the income was found to be incurred for buying food articles, by 21 per cent families in the control group. It was also noticed that, around 8 per cent families in both the groups were found to borrow money from others for meeting their daily expenses.

Table 11. Percentage distribution of families with reference to the monthly expenditure pattern

Items of expenditure	Percentage of income spent	Experimental Group	Control Group	Total
Food	1 - 25	4.10(7)	1.50(1)	03.30(8)
	26 - 50	31.80(54)	28.60(20)	30.80(74)
	51 - 75	41.20(70)	41.40(29)	41.20(99)
	76 - 100	14.10(24)	21.40(15)	16.30(39)
	> 100	8.80(15)	7.10(5)	8.30(20)
Health	Upto 5	39.30(67)	41.40(29)	40.00(96)
	06 - 10	31.80(54)	37.10(26)	33.30(80)
	11 - 15	19.40(33)	14.30(10)	17.90(43)
	16 - 20	9.40(16)	7.10(5)	8.80(21)
Clothing	Upto 5	77.60(132)	70.00(49)	75.40(181)
	6 - 11	22.40(38)	30.00(21)	24.60(59)
Housing	Upto 5	83.5 (142)	85.70(60)	84.20(202)
	6 - 10	11.20(19)	14.30(10)	12.10(29)
	> 10	5.30(9)	0.00(0)	3.70(9)
Education	Upto 5	72.40(123)	70.00(49)	71.70(172)
	6 - 10	22.40(38)	22.90(16)	22.50(54)
	> 10	5.20(9)	7.10(5)	5.80(14)
Transporation	Upto 5	83.50(142)	90.00(63)	85.30(205)
	6 - 10	12.40(21)	8.50(6)	11.20(27)
	> 10	4.10(7)	1.40(1)	3.30(8)
Recreation	Upto 5	96.90(165)	97.10(68)	97.00(233)
	> 5	3.10(5)	2.90(2)	3.00(7)
Saving	Upto 10	74.60(115)	79.50(43)	75.80(158)
	11 - 20	20.70(32)	12.90(7)	18.70(39)
	> 20	4.50(7)	7.40(4)	5.20(11)

Figures in paranthesis denote number of families

The monthly expenditure incurred for health was found to be upto 10 per cent in majority of the families of both the groups (71.0 and 78.5 per cent in the experimental and control groups respectively) 19.4 per cent families of experimental group and 14.2 per cent families of the control group were found to utilize to 11 to 15 per cent of their income for health purposes.

The share of income utilized monthly for purposes such as clothing, housing, education, transportation and for recreation was found to be only upto 5 per cent in majority of the families in both groups. Apart from the above expenses, majority of the families in both the groups (75.8 per cent) kept aside 1 to 10 per cent of their income as savings. Twenty per cent of their income as savings. Twenty per cent families in the experimental group and 12.9 per cent families in the control group were found to save 11 to 20 per cent of their income.

4.1.9 Possession of house and physical amenities available in the families of the respondents

Possession of a house is one of the factor determining the economic status of a family. In the present study 98.24 per cent of the experimental group and all the respondents in the control group were observed to have a house of their own.

Physical facilities available within a house will indirectly indicate the economic status of the residents. Table.12 gives an account of the same.

Table 12. Percentage distribution of the families according to the availability of physical facilities

Facilities available	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
None	29.09 (32)	40.00 (12)	16.67 (5)	28.82 (49)	30.00 (9)	40.00 (8)	40.00 (8)	35.71 (25)
Electricity	28.18 (31)	33.33 (12)	33.33 (5)	30.00 (49)	40.00 (9)	35.00 (8)	15.00 (8)	31.43 (25)
Drinking water	47.27 (52)	33.33 (10)	60.00 (18)	47.06 (80)	60.00 (18)	15.00 (3)	15.00 (3)	34.29 (24)
Toilet	58.18 (64)	56.67 (17)	33.33 (25)	62.35 (106)	56.67 (17)	45.00 (9)	55.00 (11)	52.86 (37)
All the 3 facilities	22.73 (25)	30.00 (9)	33.33 (10)	25.88 (49)	36.67 (11)	10.00 (2)	5.00 (1)	20.00 (19)

Figures in parenthesis denote number of families

As reported, 28.82 per cent families in the experimental group and 38.71 per cent in the control group were not found to have the basic amenities such as electricity, drinking water and toilets in their houses. Electricity facility was enjoyed by 30 per cent families of the experimental group and almost an equal per cent (31.43) in the control group. None of the families surveyed had the

pipe facilities for water. However many of them possessed a well (47.06 per cent in the experimental group and 34.29 per cent in the control group) which cater their needs for water. Open defecation is the source of contamination, leading to various sorts of infectious diseases. In this study it was interesting to note that more than 50 per cent families in both the groups possessed (62.35 per cent in the experimental group and 51.43 per cent in the control group), toilet facilities in their own houses. However all the above three facilities were enjoyed by only 25 per cent families in the experimental group and 20 per cent families in the control group.

4.1.10 Possession of land and home production practices of the families

An assessment of the possession of land by the families indicated that almost all the families in both the groups possessed landed properties (98.24 per cent in the experimental group and 100 per cent in the control group).

On further enquiry about the area of land possessed by the families indicated that 3 per cent families of the experimental group and 47 per cent families of the control group possessed only limited area of land (upto 5 cents). (Table.13). Six to 15 cents of land was possessed by 28 and 22 per cent families of the experimental and control groups respectively.

Table 13. Percentage distribution of families according to the availability of cultivable land

Area of land (Cents)	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
Upto 5 Cents	25.45 (28)	33.33 (10)	83.33 (25)	37.06 (63)	16.67 (5)	40.00 (8)	100.00 (20)	47.14 (33)
6 - 15	22.73 (25)	20.00 (6)	13.33 (4)	20.59 (35)	16.62 (5)	30.00 (6)	0.00 (0)	15.71 (11)
11 - 15	8.18 (9)	10.00 (3)	3.33 (1)	7.64 (13)	16.67 (5)	0.00 (0)	0.00 (0)	7.14 (5)
16 - 20	11.82 (13)	13.33 (4)	0.00 (0)	10.00 (17)	0.00 (0)	5.00 (17)	0.00 (0)	1.43 (1)
21 - 50	17.27 (19)	13.33 (4)	0.00 (0)	13.53 (23)	26.67 (8)	20.00 (4)	0.00 (0)	17.14 (12)
> 50	14.55 (16)	9.92 (3)	0.00 (0)	11.17 (19)	23.30 (7)	5.00 (1)	0.00 (0)	11.43 (8)
Total	110	(30)	(30)	(170)	(30)	(20)	(20)	(70)

Figures in parenthesis denote number of families

Another 23 and 18 per cent families of the experimental and control groups possessed land ranging from 16 to 50 cents. Above 50 cents of land was possessed by about 11 per cent families of both experimental and control groups.

Eventhough agriculture is the major occupation of the rural families, the available land was not found to be

utilized properly by the families as evidenced in this study. Thirty five per cent of the experimental group and 25.71 per cent in the control group kept their available land idle. Among the cultivators, coconut was found to be the most important crop cultivated by majority of the families in both the groups (65.29 per cent in the experimental group and 74.29 per cent in the control group). (Table, 14) thirty seven per cent of the experimental group and 45.71 per cent of the control group were found to cultivate vegetables in their land. Vegetables such as amaranthus, ladiesfinger, drumstick, tapioca, plantain, yam, coleus and diascorea were some of the vegetables cultivated by these families. Paddy was cultivated by 17.65 per cent of the experimental group and 4.29 per cent of the control group.

Table 14. Percentage distribution of families according to the type of crops cultivated

Type of crops cultivated	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
Paddy	11.82 (13)	10.00 (3)	46.67 (14)	17.65 (30)	6.67 (2)	5.00 (1)	0.00 (0)	4.29 (3)
Coconut	69.09 (76)	33.33 (10)	83.33 (25)	65.29 (111)	63.33 (19)	90.00 (18)	75.00 (15)	74.29 (52)
Vegetables	45.45 (50)	13.33 (4)	66.67 (20)	37.65 (74)	33.33 (10)	35.00 (7)	75.00 (15)	45.71 (32)
None	30.91 (34)	60.00 (18)	16.67 (5)	35.86 (57)	36.67 (11)	10.00 (2)	25.00 (5)	25.71 (18)

Figures in parenthesis denote number of families

An assessment to understand the utilization pattern of the crops cultivated indicated that, among the families cultivating paddy, almost all the families were utilizing the same fully at home in both the groups (Table 15).

Table 15. Percentage distribution of the families according to the utilisation pattern of the home produce

Utilization pattern	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
Paddy								
Fully utilized	92.86 (13)	6.67 (2)	23.33 (7)	95.65 (22)	6.67 (2)	5.0 (1)	0.00 (0)	100.00 (3)
Partially utilized	7.14 (1)	0.00 (0)	0.00 (0)	4.35 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Coconut								
Fully utilized	69.23 (45)	30.00 (9)	50.00 (2)	77.55 (76)	46.67 (14)	75.00 (15)	60.00 (12)	93.18 (41)
Partially utilized	30.77 (20)	0.00 (0)	50.00 (2)	22.45 (22)	6.67 (2)	5.00 (1)	0.00 (0)	6.82 (3)
Vegetables								
Fully utilized	76.60 (36)	75.00 (3)	90.00 (18)	80.29 (57)	80.00 (8)	58.39 (7)	100.00 (4)	73.08 (19)
Partially utilized	23.40 (11)	25.00 (1)	10.00 (2)	19.72 (14)	20.00 (2)	41.66 (5)	0.00 (0)	26.92 (1)

Figures in paranthesis denote number of families

Among the cultivators of coconut, 77.55 per cent of the experimental group, and 93.18 per cent of the control group utilized its produce fully at home. Where as 22.45 per cent in the experimental group did not use them fully, but used as a means of increasing their income. Among the vegetable growers 80.29 per cent families in the experimental group and 73.08 per cent in the control group were found to utilize them fully at home. Around 20 per cent in the experimental group and 26 per cent in the control group were found to utilise the produce only partially at home.

Income obtained by the families by cultivation, was not found to contribute much to their total income, since in 88 per cent families in the experimental group and 95 per cent in the control group, the income contributed was only upto Rs. 100/- per month.

Home production of animal foods was not taken up by 38.82 per cent families in the experimental group and 52.82 per cent in the control group. Among the families surveyed, only 4 per cent had taken up rearing of animals as an occupation seriously.

Income from the rearing of animals was not found to contribute significantly to the total income of the

families, since the amount contributed was only upto Rs.100/- per month in almost all the families of both experimental and control groups.

Utilization pattern of the animal products obtained from rearing of the animals is depicted in Table 16.

Table.16 Percentage distribution of families according to the utilization pattern of animal produce

Utilization pattern	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
Milk								
Fully utilized	10.00 (11)	13.33 (4)	26.67 (8)	57.5 (23)	16.67 (5)	40.00 (8)	10.00 (2)	42.86 (15)
Partially utilized	12.73 (14)	3.33 (1)	3.33 (1)	40.00 (16)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Not at all utilized	0.00 (0)	0.00 (0)	3.33 (1)	2.55 (1)	6.67 (2)	0.00 (0)	10.00 (2)	11.43 (4)
Egg								
Fully utilized	34.55 (38)	6.67 (2)	36.67 (11)	85.00 (51)	30.00 (9)	10.00 (2)	10.00 (2)	81.25 (13)
Partially utilized	1.82 (2)	0.00 (0)	0.00 (0)	3.92 (2)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Not at all utilized	2.73 (3)	0.00 (0)	13.33 (4)	11.67 (7)	10.00 (3)	0.00 (0)	0.00 (0)	18.75 (3)

Figures in paranthesis denote number of families.

As indicated in Table, milk was fully utilized by 57.5 per cent of experimental group and 42.86 per cent of the control group. 40 per cent families of the experimental group partially utilized the milk obtained, whereas 11.43 per cent families in the control group did not utilize the produce at home.

In contrast to milk, egg was utilized by majority of the families (80 per cent). Non-utilization of the produce was more in the control group when compared to the experimental group.

4.1.11 Decision making in the families

Details collected regarding the decision makers of the families indicated that in both the groups the elder member or the husband of the respondents were found to be the key decision makers (80 per cent in the experimental and 67.14 per cent in the control group). In less than 10 per cent of the families in both the groups, equal opportunity was given to all the members for making major decisions. Very few families in both the groups (1.18 per cent in the experimental group and 5.71 per cent in the control group) the respondents had the freedom for 'self decision making'. The earning member of the family also seems to influence major decisions in 9.41 per cent families of the

experimental group and 18.57 per cent families in the control group.

On further enquiry about the satisfaction of the respondents, with the decisions taken, it was observed that 79.41 per cent of the experimental group and 87.41 per cent of the control group were discontented with the decisions taken at home. But it was noted that the respondents did not have the freedom to express it.

While making the decisions, the major decision maker considered the opinion of the respondents in 64.12 per cent families in the experimental group. Whereas only in 44.29 per cent of the control group, decision maker was found to consult the respondent.

In spite of the cultural restrictions, respondents in both the groups had the freedom for going out of the houses for various social and religious commitments (85.29 per cent in the experimental group and 70 per cent in the control group). But for this, prior approval from husband or elder family members needs to be taken by the women.

Participation of the families in various social and voluntary organisations was analysed and it was observed that their participation was found to be negligible. Ninety eight per cent respondents in the

experimental group and centum in the control group were not found to participate in the activities of social organizations such as mahila smajams and rural youth clubs.

4.1.12 Exposure to different mass media among the respondents

On analysing the exposure of the respondents to various mass media revealed that majority of the respondents (72 per cent) in both groups were not in the habit of reading newspaper which is the most popular media. (Table.17)

Table 17. Percentage distribution of respondents according to exposure to mass media

Type of media	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
Habit of reading Newspaper	34.55 (38)	10.00 (3)	16.67 (5)	27.06 (46)	23.33 (7)	40.00 (8)	20.00 (4)	27.14 (19)
Habit of reading Magazines	57.27 (63)	66.67 (20)	53.33 (16)	58.24 (99)	73.33 (22)	55.00 (11)	75.00 (15)	68.57 (48)
Habit of listening to radio programmes	27.27 (30)	23.33 (7)	36.67 (11)	28.24 (48)	43.33 (13)	55.00 (11)	25.00 (5)	41.43 (29)
Habit of viewing TV programmes	87.27 (96)	90.00 (27)	90.00 (27)	88.24 (150)	90.00 (27)	95.00 (19)	95.00 (19)	92.86 (65)

Figures in paranthesis denote number of respondents.

However 27 per cent in both the groups read newspapers. Assessing the various reasons for not reading the newspapers, 'lack of interest' scored the highest (27 per cent in both the groups) followed by 'lack of affordability', (17.06 per cent of the experimental group and 14.29 per cent of the control group) unavailability of time and illiteracy were the other reasons reported by them.

In contrast, reading of various magazines were found to be encouraging among the respondents of both groups (58.24 per cent in experimental group and 68.57 per cent in the control group).

Contrary to the reading habit, listening to radio was found to be more popular among the respondents of experimental group. Seventy one per cent of the respondents of the experimental group enjoyed listening to radio, while only 58.57 per cent of the control group enjoyed listening to radio. It was also noted that, those who listen to the programmes were found to possess a radio in their own houses (70.59 per cent in the experimental group and 58.57 per cent in control group).

With regard to the viewing of television (TV), majority of the respondents were not in the habit of viewing TV. Only 11.76 per cent of experimental group, and 7.14 per cent of the control group were found to watch TV programmes.

On further enquiry, it was found that, majority of the respondents in both the groups did not possess a TV. Unavailability of this medium may be the major reason for their lack of exposure.

4.1.13 Curiosity in knowing health related subjects among the respondents

Curiosity of the respondents in knowing the health related subjects were analysed, and it was observed that almost all the respondents (99.41 per cent in the experimental group and 100 per cent in the control group) in both the groups were found to be enthusiastic in knowing the health related matters.

Table 18 indicate that media, anganwadi and health workers act as the source of transferring health related information among 31.18 per cent of the experimental group. Anganwadi alone serves as a source of information in 20 per cent of the experimental group while anganwadi and media together act as a source of information in another 20 per cent of the experimental group. In contrast to the above picture, media was found to be the most accessible source of communication among 58.57 per cent of the control group. Apart from media, health workers also serves as a source of communication for 37.15 per cent of the respondents of control group.

Table 18. Percentage distribution of the respondents as per the sources of communication for health related subjects

Sources of communication	Experimental Group			Total	Control Group			Total
	P	PM	LM		P	PM	LM	
Media, anganwadi, and health workers	35.45 (39)	30.00 (9)	16.67 (5)	31.18 (53)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Media and anganwadi	15.45 (17)	16.67 (5)	40.00 (12)	20.00 (34)	6.67 (2)	0.00 (0)	0.00 (0)	2.86 (2)
Media and health workers	18.18 (20)	16.67 (5)	16.67 (5)	17.65 (30)	33.33 (10)	40.00 (5)	40.00 (8)	37.15 (26)
Media alone	0.91 (1)	0.00 (0)	3.33 (1)	1.18 (2)	60.00 (18)	55.00 (11)	60.00 (12)	58.57 (41)
Anganwadi alone	22.73 (25)	26.67 (8)	3.33 (1)	20.00 (34)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Camps, anganwadi, health workers, neighbours and relatives	6.36 (7)	10.00 (3)	20.00 (6)	9.41 (16)	0.00 (0)	5.00 (1)	0.00 (0)	1.43 (1)

Figures in paranthesis denote number of respondents.

Another noticeable feature observed among the respondents was that, eventhough both the groups were found to be very eager to understand the health related subjects, majority of respondents hardly practised such informations gathered in their day to day life (94.12 per cent in the experimental group and 92.86 per cent of the control group). Major constraints in practising such informations gathered was reported to be economic difficulties.

4.2 An appraisal of the programme implemented in the study area

An appraisal of the ICDS programme implemented in the study area will provide valuable informations pertaining to the programme performance and its resource utilization, which will be of immense help for further improvement of the programme. An indepth analysis of the various components of ICDS programme implemented in the study area was carried out, and the highlights are presented in this section.

4.2.1 General evaluation of ICDS programme

4.2.1.1 Duration of participation of the respondents in the programme

Participation of an individual in a programme will help in modulating his concept about programme. In the present study, all the preschool beneficiaries were participants in the programme for more than one year. (Table 19) Twenty three per cent of the pregnant mothers and 56 per cent of the lactating mothers were participants in the programme for a shorter period ranging from 6 months to 1 year. Majority of the pregnant mothers (76.6 per cent) and lactating mothers (20 per cent) were beneficiaries of the programme for less than 6 months. Another 23 per cent of the lactating mothers were participants for more than 1 year.

Table 19. Percentage distribution of the respondents as per the duration of participation

Duration of participation	Experimental Group			Total
	P	PM	LM	
Less than 6 months	0.00 (0)	76.67 (23)	20.00 (6)	17.06 (29)
6 months to 1 year	0.00 (0)	23.33 (7)	56.67 (17)	14.12 (24)
Above 1 year	100.00 (110)	0.00 (0)	23.33 (7)	68.82 (117)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis denote number of beneficiaries.

4.2.1.2 ICDS as perceived by the beneficiaries

Motives behind the participation of the respondents in the programme were elicited and as indicated in the Table 20, 47.6 per cent respondents including all the three categories became beneficiaries with a view of getting nutritious food so as to improve their health, to inculcate good food habits and to enrich their knowledge. This motive was supported mainly by the mothers of preschool children. Out of the total respondents 31 per cent were of the view that the programme will bring out various benefits to them. This opinion was supported by majority of the pregnant and lactating mothers (65 per cent). The other motives enlisted

were care available to the child (16.36 per cent), accessibility to free food (7.06 per cent) and advantage of acquainting the child to the school surroundings (4.5 per cent).

Table 20. Percentage distribution of respondents based on motive for participation

Motives	Experimental Group			Total
	P	PM	LM	
To inculcate good food habits, to get food and to improve health and for education	65.45 (72)	0.00 (0)	30.00 (9)	47.65 (81)
Programme will bring various benefits to them	13.64 (15)	66.67 (20)	63.33 (19)	31.76 (54)
Care for the child	16.36 (18)	0.00 (0)	0.00 (0)	16.36 (18)
For free food	0.00 (0)	33.33 (10)	6.67 (2)	7.06 (12)
Acquainting the child to the school surroundings	4.55 (5)	0.00 (0)	0.00 (0)	4.55 (5)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis denote number of beneficiaries.

Various purposes for which the respondents approached the ICDS functionaries were assessed and the details are presented in Table 21. As evidenced from the table 'food, medicine and immunization' facilities attracted

45.88 per cent respondents. 'Food, education and health check-ups' were the main point of attraction for 32.35 per cent respondents.

Table 21. Percentage distribution of the respondents according to the purpose of participation

Purpose	Experimental Group			Total
	P	PM	LM	
Food alone	0.91 (1)	10.00 (3)	10.00 (3)	4.12 (7)
Food, medicine and immunization	31.82 (35)	83.33 (25)	60.00 (8)	45.88 (78)
Food, medicine, education and immunization	21.82 (24)	6.67 (2)	13.33 (4)	17.65 (30)
Food, education and health check-ups	45.45 (50)	0.00 (0)	16.67 (5)	32.35 (55)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis denote number of beneficiaries.

For 17.65 per cent of the respondents, 'food', 'medicine', and 'educational and immunisation facilities' were the persuading factors. Only 4.12 per cent of the respondents approached the ICDS functionaries to obtain free food. A further analysis among the three categories indicated that, 71.67 per cent mother beneficiaries attended anganwadi centre for getting 'food, medicine and immunization benefits', whereas 45 per cent mothers sent

their children to the anganwadi, for education, and for improving health, apart from the food.

In the present study none of the beneficiaries had expressed, about the inconvenience of the location of the anganwadi.

4.2.1.3 Preference for various components of ICDS

ICDS offers a package of service to its beneficiaries, including supplementary nutrition, immunization, preschool education, health check-ups, health education and referral services. The respondents were asked to record their preference for these components. The results are presented in Table 22.

Among the various components, supplementary nutrition component was recorded as the first preference for 64.12 per cent of respondents comprising all the three categories of beneficiaries. In all the groups, weightage given to this component was found to be more or less similar. Preschool education was recorded as their first preference by 24.71 per cent respondents. These respondents were mainly mothers of preschool children and lactating mothers probably, who were the actual beneficiaries of the

service. 'Health check-up' component was the next preferred component (6.47 per cent) followed by 'health check-up' (4.71 per cent). It was observed that none of the respondents recorded immunisation of referral services as their first choice.

'Health check-up' component was the second choice among 41.76 per cent of the respondents, irrespective of their categories, followed by supplementary nutrition (27.06 per cent), preschool education and health education (11 per cent each) and immunization (8.82 per cent). Among the three categories more than 50 per cent mother beneficiaries recorded second preference for health check-ups whereas only 36.36 per cent of mothers of preschool children, recorded their second preference to 'health check-ups' followed by supplementary nutrition (30.91 per cent) and preschool education (16.36 per cent). None of the respondents gave their second preference for referral services.

Third preference of the respondents for various components indicated that, preschool education and health check-up were equally preferred by 30 per cent respondents. At the same time 35 per cent respondents did not record their order of preference for various components.

Table 22. Percentage distribution of the respondents based on their preference for various ICDS components

Preference	Components of ICDS				
	1	2	3	4	5
First preference					
P	61.82 (68)	34.55 (36)	0.00 (0)	0.91 (1)	2.73 (3)
PM	73.33 (22)	0.00 (0)	0.00 (0)	10.00 (3)	16.67 (5)
LM	63.33 (19)	13.33 (4)	0.00 (0)	13.33 (4)	10.00 (3)
Total	64.12 (109)	24.71 (42)	0.00 (0)	4.71 (8)	6.47 (11)
Second preference					
P	30.91 (34)	16.36 (18)	9.09 (10)	36.36 (40)	7.27 (8)
PM	16.67 (5)	0.00 (0)	16.67 (5)	53.33 (10)	13.33 (4)
LM	63.33 (7)	3.33 (1)	13.33 (4)	50.00 (15)	10.00 (3)
Total	27.06 (46)	11.78 (19)	11.18 (19)	41.76 (71)	8.82 (15)
Third preference					
P	0.91 (1)	40.00 (44)	0.00 (0)	41.82 (46)	0.00 (0)
PM	10.00 (3)	6.67 (2)	0.00 (0)	3.33 (1)	0.00 (0)
LM	13.33 (4)	16.67 (5)	0.00 (0)	13.33 (4)	0.00 (0)
Total	4.71 (8)	30.00 (51)	0.00 (0)	30.00 (57)	

Figures in parenthesis denote number of beneficiaries.

1. Supplementary nutrition 2. Preschool education
3. Immunization 4. Health check-up 5. Health education.

4.2.1.4 Utility value of the various ICDS components

Utility value of the various ICDS components as perceived by the respondents was assessed in detail. A score of 0-3 was assigned depending on the utility value viz 'most useful' - 3, 'useful' - 2, less useful - 1 and 'not useful' - 0. Mean score, for the utility value of various ICDS components is depicted in Table (23).

Table 23. Mean score for the utility value of ICDS components

Components	Experimental Group			Average mean score
	P	PM	LM	
Supplementary Nutrition	2.90	2.70	2.90	2.80
Immunization	2.80	2.60	2.80	2.70
Preschool education	2.90	2.60	2.70	2.70
Health check-up	2.80	2.50	2.70	2.60
Health education	2.60	2.50	2.60	2.50
Referral service	0.20	0.03	0.00	0.07

It is evident from the table that the respondents felt supplementary nutrition as the most useful component of ICDS (2.8) followed by preschool education (2.7) immunization (2.7) and health check-up (2.6). A mean score of 2.5 was obtained for health education. Referral service component was found to be least useful to the respondents.

4.2.2 Evaluation of the ICDS components

4.2.2.1 Assessment of the supplementary nutrition component of ICDS implemented in the study area

According to Kennedy and Knudsen (1989) supplementary feeding programmes are the most common form of nutrition intervention in developing countries. One of the major components of ICDS is supplementary nutrition. This component is assumed to bring definite impact on the beneficiaries, and profoundly influence the participation of the beneficiaries in the programme. Nutrition planners were of the view that, food supplement act as model agent for disseminating the simple nutrition messages. Correct perception of this component is essential for bringing out the expected changes. Hence the details regarding the supplementary nutrition component of ICDS were ascertained.

Main reason reported by the respondents for their participation in the supplementary nutrition component was the availability of nutritious food and its impact on health. Ninety per cent of the respondents irrespective of their categories supported this view. Ten per cent mothers of preschool beneficiaries and negligible per cent of mother beneficiaries remarked that they participated as the food served was 'free of cost'.

All most all the respondents (98 per cent) consumed and relished the food served in the anganwadi. It

was also observed that 89.41 per cent of the respondents including all the three categories were satisfied with the quantity of food served. However negligible per cent of (6 per cent of each) of pregnant and lactating beneficiaries reported about the insufficiency of the quantity of food served. Nine per cent mothers of preschool children expressed that the quantity of food served was excess.

On further enquiry about the utilization of the food served in the anganwadi by the respondents, it was observed that only 67.65 per cent respondents fully utilized the food served in the anganwadi and the rest reported the incomplete utilization of the food supplement. Among the three categories of beneficiaries, complete utilization of the food supplement was observed more among the lactating mother beneficiaries (80 per cent).

On further enquiry about the left over food supplement, it was noted that, 83 per cent respondents shared the food supplement with other family members. However among the incomplete utilizers, 16 per cent were reported to consume the same after some time. It was observed that sharing the food supplement was more or less similar among the three categories of beneficiaries.

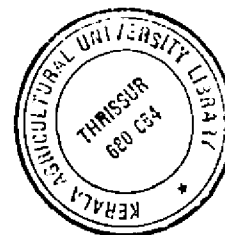
Opinion of the respondents regarding the suitability of anganwadi food for improving the health of

the beneficiaries were found to be positive, since all the respondents irrespective of their category affirmatively opined that the anganwadi food was suitable for improving their health.

Surveyed beneficiaries had the correct perception regarding the dishes served in the anganwadi centre, as evidenced from the views of 86.67 per cent mother beneficiaries who opined that 'uppumma' was the dish meant for them. Similarly all mothers of child beneficiaries correctly pointed out that, uppumma, kanji and greengram and at times payasam were served at the anganwadi for their children.

Generally four types of "food distribution system" are followed under the supplementary nutrition component of ICDS. In the first system, the beneficiaries are insisted on consuming the food supplement "on the spot" whereas in the second system the beneficiaries are permitted to carry the cooked food home. In the third type a person other than the beneficiary is permitted to carry the cooked food home for the beneficiary and in the fourth type raw food in bulk is distributed instead of cooked food.

In this study area, both 'spot feeding' and 'take home system' were observed. Table 24 gives an idea about the food distribution system followed in the centres and as



seen in the table, 72.94 per cent of the respondents including all the three categories of beneficiaries carried the cooked food (mainly uppumma) home. Only 18.24 per cent respondents adhered to the 'Spot feeding' system. This indicates that strict rules were not observed in enforcing a particular distribution system in the study area. Eight per cent of the beneficiaries reported that they followed both the system according to their convenience and did not pursue any particular system.

Table 24. Percentage distribution of the respondents under the different food distribution system

Particulars	Experimental Group			Total
	P	PM	LM	
Spot feeding	18.18 (20)	20.00 (6)	16.67 (5)	18.24 (3)
Take home	71.82 (79)	73.33 (22)	76.67 (23)	72.94 (124)
Both	10.00 (11)	6.67 (2)	6.67 (2)	8.82 (15)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis denote number of beneficiaries.

Since, strict regimen was not imposed on the beneficiaries with regard to the food distribution, all the beneficiaries were found to be fully contented with the food distribution system prevailed in the centres.

It was encouraging to note that religious or cultural objections were not raised by majority of the respondents (98.82 per cent) in eating the food with other beneficiaries, or mingling with other beneficiaries in the centre.

Adequacy of space in the centres was assessed and 84.71 per cent respondents reported that, there was adequate space to sit and eat the food supplement served in the centre. However 14.4 per cent remarked, about the inadequacy of space in the centres.

The time of serving the food supplement was found to convenient and appealing to all the respondents irrespective of their categories. Complaints against this component were lodged only by a very few respondents (4 per cent). These complaints were related to the quality of food supplement and inadequacy of building and space.

4.2.2.2 Assessment of the immunization component of ICDS implemented in the study area

The well known synergism between malnutrition and childhood infections, necessitates, preventive measures and hence ICDS included immunization as an important in-built component, safeguarding the health of the beneficiaries against vaccine preventable diseases.

Details regarding the immunization status of the respondents were collected and it was found that only 41.82 per cent child beneficiaries received all the four types of immunization namely BCG, D.P.T., polio and Measles. Ninety two per cent child beneficiaries received 3 types of immunization. The child beneficiaries who were not received any type immunization were found to be only 5 per cent. With regard to the immunization against 'Tetanus' by the pregnant and lactating mother beneficiaries, 76.66 per cent respondents received Tetanus Toxoid injections, while 23.33 per cent did not receive it. Among the total respondents 11.76 per cent of the respondents were not in receipt of any immunization.

Reasons for not availing the immunization facility offered at the centre were enquired. Among the nonreceptients of immunization, 40 per cent reported their own indifference as the reason. Thirty five per cent did not feel the necessity of immunization and 25 per cent reported 'family members' objection as the reason for their non participation.

Table 25 gives an account of the type of immunization received by the child beneficiaries. It was observed that majority of the child beneficiaries had received BCG (91 per cent), DPT (92 per cent) and polio (93

per cent) vaccines. However only 40 per cent child beneficiaries received measles vaccine.

Table 25. Percentage distribution of the respondents as per the type of immunization received

Type of beneficiary	Type of Immunization received				
	BCG	DPT	Polio	Measles	Tetanus toxoid
P	91.82 (101)	92.73 (102)	93.64 (103)	40.91 (45)	0.00 (0)
PM	- Not applicable -				36.67 (26)
LM	- do -				56.67 (17)

Figures in parenthesis denote number of beneficiaries.

On further enquiry about the completion of the course of immunization, it was revealed that only 82.3 and 83 per cent child beneficiaries had completed the course of D.P.T. and polio vaccination respectively (Table 26). Around 17 per cent were not found to complete the course of vaccination for DPT and polio among the child beneficiaries. Mother beneficiaries reported that all of them had completed the course of Tetanus Toxoid vaccination.

Table 26. Percentage distribution of the child beneficiaries based on the course of completion of immunization

Type of immunization	Completed	Not completed
DPT	82.35 (84)	17.65 (18)
Polio	83.50 (86)	16.50 (17)

Figures in parenthesis denote number of child beneficiaries.

The place from where the respondents get immunized was collected and the results indicated that majority of the child beneficiaries (72.28 per cent) and lactating mother beneficiaries (70.59 per cent) were found to be immunized through anganwadi centres itself. However only 42 per cent of pregnant mother beneficiaries were immunized through anganwadi. Forty six per cent immunized through other local agencies like government hospitals. Only very few respondents seeked the help of private hospitals for getting immunized.

Opinion of the respondents regarding the necessity of taking immunization indicated that majority of the respondents (96.10 per cent) strongly agreed the need for immunization. Only very few respondents (3.90 per cent) had a negative view regarding immunization.

Motivation behind taking immunization by the respondents was looked into, and it was noted that only 38

per cent respondents were found to take initiative by themselves. In majority of the cases, the respondents were motivated to utilize the facility extended. (61 per cent) The sources of motivation were mainly identified as anganwadi workers (87.23 per cent). It was observed that in 95 per cent child beneficiaries, anganwadi workers had solely taken the responsibility for getting the child immunized. In the case of pregnant mother beneficiaries apart from anganwadi workers, doctors (22.2 per cent) and health workers (11.1 per cent) were found to play a role in motivating them.

Details pertaining to the occurrence of diseases, after getting immunization were assessed. None of the child beneficiaries were found to be attacked by diphtheria or polio after getting immunization. However a few child beneficiaries were found to be attacked by tuberculosis (3.64 per cent) and whooping cough (2.73 per cent) after getting immunized. In the case of measles, the incidence reported was found to be 10 per cent. None of the mother beneficiaries reported similar incidences.

Short comings of this component, or suggestions for improvement of the existing facility were not extended by the respondents.

Inorder to combat the tragedy of blindness occurring in the children due to vitamin A deficiency and

anaemia in women and children, distribution of medicines (vitamin A drops, iron and folic acid tablets) were envisaged in the ICDS programme. A medicines for common ailments and for deworming were also distributed to the beneficiaries, through ICDS.

Availability of such medicines to the beneficiaries were enquired, and it was observed that majority of the respondents (84.70 per cent) were observed to receive various medicines. However 15 per cent respondents reported that they were not getting any medicines. Compared to the mother beneficiaries, child beneficiaries were found to receive medicines more promptly. Among the total respondents 85 per cent of the child beneficiaries received both vitamin A drops, iron and folic acid tablets. Whereas only 73 per cent of the mother beneficiaries were in receipt of iron and folic acid tablets. Other medicines such as B complex tablets (19 per cent), medicines for fever (32 per cent) and for deworming (5 per cent) were found to be received by the respondents to a lesser extent.

Ninety three per cent of the respondents including all the three categories were found to have regular in taking medicines distributed to them. The respondents who were irregular in taking medicines were only around 7 per cent.

Awariness of the respondents regarding the purpose of taking such medicines was assessed and the results indicated that 30 per cent of mothers of child beneficiaries and 50 per cent of mother beneficiaries were found to be correctly perceived the idea as they had stated that the medicines distributed were for the formation of blood and for preventing vitamin A deficiency. 50 per cent mother beneficiaries correctly pointed out that iron folic acid tablets were distributed for the formation of blood. However 10 per cent of the total beneficiaries were found to be vaguely aware of the purpose of distribution of medicines, and another 33 per cent were unaware of the purpose.

Opinion about the suitability of medicines distributed for the betterment of their health was enquired and majority of the respondents (81.76 per cent) reacted affirmatively. However this view was not held by 26 per cent of the mothers of child beneficiaries and 22 per cent of mother beneficiaries.

Drawbacks pertaining to the distribution of medicines in the study area were assessed and fifty per cent respondents reported about the shortage of supply of medicines.

Regular supply of medicines (89 per cent) and provision for the supply of additional medicines (10 per cent) were the suggestions pointed out by the respondents for the improvement of the programme.

4.2.2.3 Assessment of 'Health check-up' component of ICDS

Regular health check-up facility for the beneficiary was one of the outstanding features of the ICDS.

Participation of the respondents in health check-ups conducted in the centres were collected and the results are depicted in Table 27. Majority of the respondents (80 per cent) participated regularly in the 'health check-ups' organised by the functionaries. Ten per cent of the

Table 27. Percentage distribution of the respondents as per the participation in the health check-up component

Rate of participation	Experimental Group			Total
	P	PM	LM	
Regularly participating	83.64 (92)	70.00 (21)	80.00 (24)	80.59 (137)
Occasionally participating	12.73 (14)	3.33 (1)	6.67 (2)	10.00 (17)
Not at all participating	3.64 (4)	26.27 (8)	13.33 (4)	9.41 (16)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis denote number of respondents.

respondents occasionally participated while another 9 per cent were reluctant to participate in the health check-ups conducted in the centres. Among the three categories, pregnant mother beneficiaries were found to be more irregular in participation than the other beneficiaries in the 'health check-ups' conducted.

Reasons for their non participation as reported by the irregular respondents were lack of time (50 per cent), conduct of health check-ups without prior notice (25 per cent) and due to lack of interest (25 per cent).

Views of the respondents regarding the health 'check-up facility' extended were collected and 96.88 per cent viewed this as a beneficial one for them. Only 4 per cent respondents, negatively reacted to this service of the ICDS. The essentiality of health check-up facility was enquired and it was observed that 98 per cent of the respondents reported that this facility was essential to them. The respondents also pointed out that in the absence of such health check-up facility, in the centres, they will be forced to seek the assistance of other doctors, which would create additional expenses to them. Hence almost all the respondents viewed that health check-up facility should be maintained in the centres.

Growth monitoring is considered as a preventive and pre-emptive step towards growth promotion. Hence monthly growth monitoring of the children was envisaged in the package of services of ICDS.

Details regarding the various aspects of growth monitoring was assessed and the results indicated that ninety seven per cent of the mothers of child beneficiaries were aware of the regular monitoring of the weight of the children in the anganwadi centres. It was encouraging to note that 62 per cent mothers were found to have correct perception about the reason for growth monitoring. Only two per cent mothers were found to be not aware of the growth monitoring aspects of ICDS. But they all agreed that growth monitoring charts should be maintained in the ICDS centres.

4.2.2.4 Assessment of the 'referral service' component of ICDS in the study area

Referral service system is designed in the ICDS with the view that the beneficiaries who are "at risk" and also who require assistance of a specialist can be referred in time, so that this timely 'alarm' can save the life of the beneficiary.

Functioning of the referral service system in the study area was explored and the results revealed that 90 per cent respondents were not utilizing this facility. The

reason for under utilization of this service extended as reported by majority of the respondents (82 per cent) was that the 'need was not arised'.

However majority of the respondents (94.7 per cent) were found to be not confident about the referral service system available, since they have stated that, in emergency conditions, they will seek the assistance of the specialists, by themselves. Further analysis revealed that 94 per cent respondents reported that referral service facility was not useful to them.

4.2.2.5 Assessment of health education component of ICDS in the study area.

No health intervention programme would be successful, unless the health and nutrition education component is tailored along with other inputs. Hence with the objective of improving the nutrition knowledge of the beneficiaries, ICDS has incorporated health and nutrition education component also as one of its basic inputs.

Detailed informations pertaining to this component were collected from the respondents. Assessment of the participation of the respondents in the health education classes revealed that only 62.94 per cent of the respondents regularly paricipataed in the classes conducted (Table 28). Among the three categories of beneficiaries pregnant

mothers were found to participate more regularly than the other two groups. Twenty per cent respondents including all the three categories were found to be occasional participants and another 16 per cent were found to be non-participants in the health education classes conducted. Among the non participants, mother beneficiaries were found to be the highest when compared to other two groups. Main barriers for their non participation in the health education classes conducted were lack of time (28 per cent), lack of interest (28 per cent), heavy household chores (17 per cent), job responsibilities (16 per cent) and distance (16 per cent).

Table 28 Percentage distribution of the beneficiaries based on their participation in health education classes

Rate of participation	Experimental Group			Total
	P	PM	LM	
Regularly participating	61.82 (68)	73.33 (22)	56.67 (17)	62.94 (107)
Occasionally participating	25.45 (28)	3.33 (1)	20.00 (6)	20.59 (35)
Not at all participating	12.73 (14)	23.33 (7)	23.33 (7)	16.47 (28)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis denote number of beneficiaries.

Personnel responsible for the conduct of such health education classes in the centres were found to be health workers (53.5 per cent), anganwadi teachers (37 per cent), supervisors (8 per cent) and doctors (6 per cent).

Various messages disseminated through health education classes were assessed. Some of such messages, which are found to be grasped and popular among the respondents were environmental hygiene and sanitation (77.46 per cent) child rearing (36.62 per cent), principles of balanced diet, significance of vegetables and greens in the diet (44.37 per cent). Importance of immunization (41.55 per cent) and Diarrhoea and oral rehydration therapy (30.28 per cent).

Adoption of such messages, in the daily life of the respondents were analysed. Only 64 per cent respondents were found to adopt the messages disseminated. A less percentage of the respondents (9 per cent) partially adopted such messages. Environmental hygiene and sanitation, child rearing, immunization, oral rehydration therapy and food habits, were some of the messages found to be adopted and practised in their daily life.

Essentiality of such classes were enquired. Majority of the respondents (71.76 per cent) expressed that health education classes were essential. However 28

per cent negatively reacted to the health education component of ICDS.

Inadequacies of this component was assessed and only 16 per cent responded. Among the respondents, reacted, 67 per cent were of the opinion that experts were not handling the classes. Inconvenience of time and place were some of the difficulties expressed by the respondents. Among the beneficiaries 98 per cent respondents viewed that such education classes should be conducted more frequently.

As part of this component regular house visits by the field functionaries are conducted to improve the personal contacts which would definitely influence to gain confidence in them. Participation of the respondents in the programme, and their co-operation can be achieved through such direct contacts. Personal contacts through house visits also act as a powerful channel for communicating most essential messages needed for the betterment of their families.

Detailed information pertaining to the house visits conducted by the field functionaries were assessed. Majority of the respondents (97.65 per cent) reported that, anganwadi workers do make house visits.

On assessing the purpose of these house visits

conducted as perceived by the respondents were for disseminating nutrition messages (34 per cent) for informing the arrangements made for immunization health check-up and health education classes (27.11 per cent), for taking weights of their children (18.67 per cent) and for survey work (19 per cent).

However all the respondents were found to appreciate such house visits conducted by the field functionaries.

4.2.2.6 Assessment of the preschool education component of ICDS implemented in the study area.

Preschool education plays an important role in moulding a child into a useful and good citizen of the nation. Good habits inculcated in the early years of childhood help him, to bring out his potentialities to its fuller extent. Preschool education was also given an equal importance in ICDS. Anganwadi act as the nodal agent for imparting preschool education to the child.

On assessing the views of the respondents regarding the preschool education it was revealed that, all the mothers of child beneficiaries were found to be satisfied with the content of preschool education imparted. They also expressed that sending the child to the anganwadi is good to the child.

The respondents were asked to record their opinion about the various beneficial effects derived from sending the child to the anganwadi. Thirty two per cent mothers were of the opinion that anganwadi take care of their children, educate them and discipline them. Thirty per cent mothers expressed that the anganwadi helped to improve the health of their children, by inculcating good food habits and hygiene. Another 36 per cent mothers remarked that anganwadi helped to educate their children through food and play.

Infrastructure facilities available in the anganwadi centres may influence the beneficiaries participation. Provision for safe drinking water, environmental hygiene and toilet facilities are very essential for the proper functioning of the anganwadies. Besides, these may definitely influence the child's growth and development. Amenities provided in the anganwadies were assessed in detail and the data are presented in Table 29.

Among the 15 anganwadies studied only 66 per cent anganwadies had the provision for safe drinking water. Sixteen per cent anganwadies were found have this facility partially whereas 17 per cent did not have any such provision. Seventy seven per cent anganwadies observed environmental hygiene in the premises whereas 18 per cent

observed the same partially. The anganwadies, with poor environmental hygiene were found to be negligible. It was observed that only 11 per cent anganwadies surveyed had toilet facilities. Many of the anganwadies investigated were not found to possess adequate furniture (34 per cent).

Table 29 Percentage distribution of anganwadies as per the facilities available

Facilities	Fully Available	Partially available
Safe drinking water	66.36 (73)	16.36 (18)
Environmental Hygiene	77.27 (85)	18.18 (20)
Furniture in the centre	34.55 (38)	22.73 (25)
Sleeping facilities	45.45 (50)	38.18 (42)
Facility for play	74.55 (82)	6.36 (7)
Building facility	36.36 (40)	16.36 (18)
Toilet facility	11.82 (13)	1.82 (2)
Facility for preparing food	52.73 (58)	15.45 (17)

Figures in parenthesis denote number of Anganwadies.

Facilities required by children for sleeping were found to be inadequate in 55 per cent anganwadies. However majority of the anganwadies visited, had the facility for playing. Proper building and kitchen facilities were found only in 36 per cent and 56 per cent anganwadies respectively.

However all the mothers of the child beneficiaries affirmatively opined that, anganwadies play a major role in improving the child's health. They were also of the view that, anganwadies are essential for the betterment of their children. All the mothers were also found to appreciate the behaviour of the anganwadi teachers.

Assessing the education imparted to the children, it was found that mothers were satisfied with the education given to the children in the centres.

Respondents were asked to point out the inadequacies in the preschool education component of ICDS. The shortcomings pointed out by the respondents were lack of proper facilities in the anganwadi (65.57 per cent).

Mothers remarked that, more such anganwadies should be formulated. They were also of the opinion that amenities in the centres needs to be improved.

4.3 Assessment of Knowledge, Attitude and Practice (KAP) of the beneficiaries

4.3.1 Ascertaining nutritional knowledge among the respondents

Nutrition messages disseminated through health and nutrition education classes in ICDS programme will improve the nutritional cognition among the beneficiaries. A comparison between nutritional cognition among the beneficiaries and non beneficiaries, indirectly reflects the impact of the programme.

Nutritional cognition among the study group was ascertained by administering suitably developed scale. The percentage scores obtained by the respondents of the experimental and control groups are presented in Table 30.

Table 30 Percentage distribution of the respondents according to knowledge score

Knowledge score in percentage	Experimental Group				Control Group			
	P	PM	LM	Total	P	PM	LM	Total
80 - 100	80.0 (88)	73.3 (22)	86.7 (26)	80.0 (136)	46.0 (12)	30.0 (6)	55.0 (11)	41.4 (29)
50 - 79	19.1 (21)	23.3 (7)	13.3 (4)	18.8 (32)	56.6 (17)	35.0 (7)	35.0 (7)	44.3 (31)
<50	0.9 (1)	3.3 (1)	0.0 (0)	1.2 (2)	3.3 (1)	35.0 (7)	10.0 (2)	14.3 (10)
Total	(110)	(30)	(30)	(170)	(30)	(20)	(20)	(70)

Figures in parenthesis denote number of respondents.

As indicated in Table 30 eighty per cent of the respondents of the experimental group (including all the three categories) secured a score above 80 per cent while only 41.40 per cent of the control group secured a similar score. Among experimental group only negligible per cent of the respondents (1.20 per cent) obtained a score below 50 per cent. Whereas 14.30 per cent respondents of the control group secured a similar score. Among the respondents 18 per cent respondents of the experimental group and 44.30 per cent of the control group were found to secure a percentage score between 50 - 79. Scores obtained by the experimental and control group for nutritional cognition when tested statistically, showed a significant difference between the experimental and control groups in all the three categories of the beneficiaries (Table 31).

Table 31 Comparison of the nutritional cognition among the respondents

Category	Number of respondents		Mean score		't' values
	EG	CG	EG	CG	
Preschool children	110	30	29.88	26.06	4.8422*
Pregnant mothers	30	20	28.97	25.80	3.6838**
Lactating mothers	30	20	30.67	26.60	3.0810**

* Significant at 5 per cent level

** Significant at 1 per cent level

Nutritional knowledge of the two groups of the respondents with regard to important areas of nutrition viz., infant feeding and supplementary feeding practice, health care during childhood, 'pregnancy and 'lactation', 'immunization' and 'diarrhoeal disease', sources of various nutrients and 'personal and food hygiene' was tested. Mean score obtained by the experimental and control groups for individual statements pertaining to each area of nutrition is given in Table 32.

As revealed in Table 32, the total mean score obtained by the experimental group for infant feeding practices was 0.85 as against 0.71 in the control group. Both the experimental and control groups were found to be well aware of the fact that breast milk is good for child as both the groups secured a mean score above 0.90 for the statement related to it. The mean score obtained for the statement on the day of starting breast feeding was 0.67 and 0.52 respectively for the experimental and control groups. A mean score of 0.91 and 0.71 respectively were secured by the experimental and control groups for the statement on 'artificial feeding'.

Table 32. Mean score for the nutritional cognition

Statements	Mean score	
	EG	CG
1. <u>Infant feeding practices</u>		
a. Breast milk is good for child	0.98	0.92
b. Breast milk should be given to the child from the day of birth onwards	0.67	0.52
c. Artificial feeding is good for child	0.91	0.71
Total mean score	0.85	0.71
2. <u>Supplementary feeding practices</u>		
a. Supplementary foods should be introduced to children after 3 months	0.95	0.67
b. Supplementary foods can be prepared at home using pulses and cereals	0.95	0.78
c. Fruit juices should not be given to the children	0.66	0.48
Total mean score	0.85	0.64
3. <u>Health care in children</u>		
a. Growth charts are useful for assessing the child's health	0.89	0.67
b. Health check-ups are essential for children.	0.95	0.85
c. Deworming of the children should be done once in 6 months	0.88	0.82
d. Sick children should be isolated	0.94	0.77
e. Toilet training should be given to the children	0.87	0.70
Total mean score	0.90	0.76
4. <u>Immunization</u>		
a. B.C.G. vaccination should be given to the children	0.96	0.77
b. Tripple and polio vaccination should not be given to the children	0.81	0.52
Total mean score	0.88	0.64
5. <u>Care during pregnancy and lactation</u>		
a. Poor nutritional status of mother affects the health of the babies	0.87	0.70
b. Tetanus Toxoid injection should not be given to pregnant mothers	0.80	0.64
c. Routine health check-ups are essential for pregnant mothers	0.98	0.88
d. Additional food is not required during pregnancy	0.60	0.45
e. Green leaves, milk, egg and fruits should be included in the daily diets of pregnant mothers	0.92	0.72
f. Repeated pregnancies will affect the health of the mother	0.95	0.88
g. Lactating mothers do not require nutrient rich foods	0.61	0.45
Total mean score	0.81	0.67

(contd...)

6. <u>Diarrhoeal diseases</u>		
a. ORS should be given to children suffering from diarrhoea	0.96	0.88
b. Discontinue 'feeding' during diarrhoeal diseases	0.75	0.75
c. Repeated diarrhoeal disease affects the health of the children	0.95	0.90
d. Poor hygiene is the causative agent for diarrhoeal diseases	0.98	0.94
Total mean score	0.91	0.86
7. <u>Sources of various nutrients</u>		
a. Proteins are essential for children, pregnant and lactating mothers	0.91	0.70
b. Pulses are good sources of proteins	0.83	0.58
c. Vegetables and greens are rich in vitamins and minerals	0.92	0.70
d. Fruits are poor sources of vitamin C	0.57	0.50
e. Anaemia is caused due to lack of iron	0.93	0.57
f. Calorie deficiency causes marasmus in children	0.08	0.07
g. Night blindness is due to vitamin A deficiency	0.74	0.50
Total mean score	0.71	0.51
8. <u>Personal and food hygiene</u>		
a. Foods should be washed thoroughly before cooking	0.98	1.00
b. Spoiled foods produce various diseases	0.99	0.97
c. Foods kept open are harmful	0.86	0.85
d. Hands should be washed before and after the intake of food	1.00	0.98
Total mean score	0.95	0.95

The total mean score obtained by the experimental group for the knowledge on supplementary feeding was 0.85 as against 0.64 by the control group. The mean score obtained for the statement 'introduction of supplementary food' was 0.95 and 0.67 respectively for the experimental and control

groups while knowledge related to the introduction of fruit juices was comparatively poor among the two groups (mean score 0.66 and 0.48 respectively in the experimental and control groups). Experimental group secured a mean score of 0.95 for the knowledge on the preparation of home made supplementary foods as against 0.78 by the control group.

The total means scores obtained by the experimental and control groups for the knowledge related to health care in children were 0.90 and 0.76 respectively. The control group was found to be less aware of the significance of growth charts as an essential tool for assessing the health status, as they secured only a mean score of 0.67 as against 0.89 by the experimental group. The mean score obtained for the statements on 'isolation' of sick children' and 'toilet training' were 0.94, and 0.87 respectively in the experimental group while it was 0.77 and 0.70 in the control group.

Total mean scores of 0.88 and 0.64 was secured by the experimental and control groups for knowledge on immunization knowledge of the respondents regarding diarrhoeal diseases was found to be fairly good in both the groups, as they had secured total mean score of 0.91 and 0.86 respectively in the experimental and control groups. However both the groups were found to be less aware of the

feeding practices during diarrhoeal diseases, as they secured only a mean score of 0.75. Knowledge related to introduction of ORS, (Oral Rehydration solution) its impact on health, and the causes of diarrhoeal diseases was found to be fairly good in both the groups.

Total mean scores obtained by the experimental and control groups for the care during pregnancy and lactation was 0.81 and 0.67 respectively in the experimental and control groups. Both the groups were found to have fairly good knowledge regarding the ill effects of repeated pregnancies, and the need for additional food during pregnancy, as they secured a mean score above 0.88 for the statements related to it. Control group secured only a mean score of 0.45 each for the statement related to the inclusion of nutrient rich foods in the dietaries of pregnant and lactating mothers as against 0.60 in the experimental group. Besides, the control group secured only a score of 0.64 for the importance of taking Tetanus Toxoid injections during pregnancy as against 0.80 by the experimental group.

A total mean score obtained by the experimental group for the knowledge related to the sources of nutrient and their deficiencies was 0.71 while control group secured only 0.51.

Both experimental and control groups secured a total mean score of 0.95 for the knowledge related to personal and food hygiene. All the four statements, regarding 'hygiene' was found to be answered almost correctly by both the experimental and control groups since they secured a score above 0.85 for each statements.

4.3.2 Adoption of nutrition messages disseminated among the beneficiaries

Adoption of various nutrition messages disseminated through the ICDS services in the daily life of the beneficiaries were assessed. The percentage scores obtained by the three categories of the beneficiaries are presented in Table 33.

Table 33. Percentage distribution of the respondents as per the adoption of nutrition messages

Percentage score	Experimental Group			Total
	P	PM	LM	
90 - 100	36.47 (40)	23.30 (7)	50.00 (15)	36.50 (62)
80 - 89	41.80 (46)	30.00 (9)	20.00 (6)	35.90 (61)
70 - 79	10.90 (12)	26.70 (8)	20.00 (6)	15.30 (26)
60 - 69	8.20 (9)	16.70 (5)	6.70 (2)	9.40 (16)
Below 60	2.70 (3)	3.30 (1)	3.30 (1)	2.90 (5)

Figures in parenthesis denote number of the beneficiaries.

As indicated in Table 33 the beneficiaries were found to adopt the important nutrition messages disseminated in their daily life, as 87.70 per cent beneficiaries had secured a score above 70 per cent. Twelve per cent beneficiaries had secured a score below 66. Among the three categories of beneficiaries, a score above 70 per cent was secured by 90 per cent lactating mothers, 89 per cent mothers of preschool children and 80 per cent pregnant mothers.

Adoption of the various nutrition messages adopted by the beneficiaries related to the different aspects viz. infant feeding, health care, hygiene, food habits, care during pregnancy and lactation were analysed. Mean score obtained by the beneficiaries, for each message is depicted in Table 34.

It is obvious from the table, that all the three groups of the beneficiaries were found to adopt practices such as giving breast milk from the first day onwards, 'introduction of supplementary foods at the correct time' and 'preparation of home made infants foods', since the beneficiaries had secured a mean score of 0.91 for the above statements. However the beneficiaries were not found to give more feeds to the children than adults since the mean score secured for the above practice was 0.60.

Table 34 Mean score of the beneficiaries for the adoption of nutrition messages

Nutritional practices adopted	Mean score
<u>1. Infant feeding practices</u>	
a. Giving breast milk to children from first day onwards	0.98
b. Introducing supplementary food to the infants after 3 months	0.94
c. Preparing home made infant foods	0.92
d. Giving more number of feeds to children than adults	0.60
Total	0.83
<u>2. Health care</u>	
a. Immunizing the children	0.95
b. Giving ORS to children	0.99
c. Deworming the children	0.94
d. Conducting health check-ups for children	0.90
e. Isolating sick children	0.64
Total	0.88
<u>3. Hygiene</u>	
a. Training the children to washing hands before taking food	1.0
b. Bathing the children	1.0
c. Toilet training	0.90
d. Keeping the cooked foods closed	1.0
e. Keeping the house and premises clean	0.99
Total	0.97
<u>4. Food habits</u>	
a. Including greens and vegetables in the daily diet	0.29
b. Including locally available fruits in the daily diet	0.62
c. Cutting the vegetables into medium size to avoid nutrient loss	0.68
Total	0.53
<u>5. Care during pregnancy and lactation</u>	
a. Giving tetanus toxoid injection to pregnant mothers	0.96
b. Conducting health check-ups for pregnant mothers	0.92
c. Approaching hospitals for deliveries	0.81
d. Providing additional food to pregnant women	0.69
e. Providing nutrient rich foods to lactating mothers	0.75
Total	0.82

The total mean score obtained by the three categories of the beneficiaries for the 'health care' practices was 0.88. All the categories of the beneficiaries were found to follow practices such as immunization of the child, providing ORS for diarrhoeal children, conducting health check-ups for children and regular deworming of the children, since all the three categories of beneficiaries had secured a mean score of 0.94. The score obtained by the beneficiaries, for isolation of sick children was only 0.64.

Total mean score obtained by the three categories of the beneficiaries for the adoption of messages related to hygienes was found to be 0.97. The various practices adopted under hygiene were toilet training of children (0.90), training to wash hands before and after taking meals (1.0), keeping the cooked foods closed (1.0) bathing the children daily (1.0) and keeping the house and the premises clean (0.99).

The total mean score obtained by the three categories of the beneficiaries for practices related to food habits was found to be 0.53. The practice of inclusion of green leafy vegetables in the daily diet was found to be least among the beneficiaries as the mean score obtained was only 0.29.

The mean scores obtained for the practices such as inclusion of low cost fruits in the dietaries and practices related to conserve nutrient while cooking were comparatively low. (0.62 and 0.68 respectively). Practices related to care during pregnancy was found to be fairly good since they secured a score of 0.82 for the above practice. The various practices adopted by the three categories of the beneficiaries were giving tetanus toxoid injection to pregnant mothers (0.96) conducting regular health check-ups (0.92), approaching hospitals for deliveries (0.81), providing additional food to pregnant mothers (0.69) and providing nutrient rich food for lactating mothers (0.75).

4.3.3 Assessing the attitudes of the beneficiaries towards various components of ICDS

Attitude of the beneficiaries towards various components of ICDS programme was assessed using suitably administered attitude scale. Total score obtained by the three categories of the beneficiaries for attitude scale is furnished in Table 35.

As revealed in Table 35 a score above 70 per cent were obtained by 94 per cent of the mothers of preschool children, 90 per cent of pregnant mothers and 96.7 per cent of the lactating mother beneficiaries. Beneficiaries (including all the three categories) who had secured a percentage score below 70 per cent were only 6 per cent.

Table 35 Percentage distribution of the respondents based on scores for attitude scale

Percentage score	Experimental Group			Total
	P	PM	LM	
90 - 100	10.90 (12)	20.00 (6)	16.70 (5)	13.50 (23)
80 - 89	48.20 (53)	33.30 (10)	63.30 (19)	48.20 (82)
70 - 79	35.40 (39)	36.70 (11)	16.70 (5)	32.40 (55)
60 - 69	5.50 (6)	10.00 (3)	3.30 (1)	5.90 (10)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis denote number of the beneficiaries.

Attitude of the beneficiaries towards each component of ICDS programme was analysed. From the total score obtained by the beneficiaries for individual statements pertaining to the attitude towards various ICDS components, mean score obtained by the beneficiaries for each statement was computed. Total mean score obtained by the three categories of the beneficiaries for each component are depicted in Table 36. Mean score between 3 and 4 indicates favourable to highly favourable attitude whereas mean score below 3 show comparatively less favourable attitude.

Table 36 Mean score for attitude scale

Various components	Experimental Group				
	Number of statements	P	PM	LM	Average mean score
1. General attitude towards ICDS	5	3.6	3.4	3.5	3.5
2. Attitude towards supplementary nutrition components	2	3.6	3.7	3.8	3.5
3. Attitude towards health check-up component	6	2.9	3.2	3.3	3.1
4. Attitude towards referral service component	1	2.3	2.4	2.7	2.5
5. Attitude towards health education component	2	2.5	2.7	2.7	2.6
6. Attitude towards immunization component	2	3.1	3.0	3.5	3.2
7. Attitude towards preschool education component	2	3.5	3.5	3.6	3.5

As indicated in the table among the various component attitude towards supplementary nutrition component had highest score in all the three categories of the beneficiaries. Attitude towards 'ICDS in general' and to that of preschool education had secured a mean score of 3.5

each, followed by immunization (3.2), 'health check-up component' (3.1) and health education component (2.6). Attitude towards referral service-component was favoured with a mean score 2.5.

4.4 Assessment of Nutritional status of the respondents

4.4.1 Food consumption and dietary habits of the respondents

Food consumption surveys provide an insight into the dietary habits, food buying practices and pattern of food consumption of subjects under study. Such informations are useful in interpreting and analysing the nutritional status of individuals.

Highlights of the analysis of the data on food consumption pattern of the subjects are presented below.

4.4.1.1 Food purchasing habits

Table 37 gives an account of the food purchasing habits of the families of the experimental and control groups.

Rice which is the most important staple cereal of Keralites was not found to be purchased by a very few families being 2.36 per cent in the experimental group and 2.86 per cent in the control group. This is mainly due to the production of the same at the household level.

Table 37. Percentage distribution of families as per the food purchasing practices

Type of food purchased	Experimental Group								Control Group							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
CEREALS																
Rice	2.36 (4)	2.36 (4)	0.00 (0)	0.00 (0)	85.82 (146)	1.18 (2)	8.24 (14)	0.00 (0)	2.86 (2)	10.00 (7)	0.00 (0)	0.00 (0)	75.71 (53)	1.43 (1)	10.00 (7)	0.00 (0)
Wheat	7.06 (12)	0.00 (0)	0.00 (0)	0.00 (0)	76.47 (130)	1.18 (2)	10.00 (17)	5.29 (9)	21.43 (5)	0.00 (0)	0.00 (0)	0.00 (0)	42.86 (30)	0.00 (0)	18.57 (13)	22.86 (12)
Maida	35.29 (60)	4.12 (7)	3.53 (6)	1.76 (3)	23.53 (4)	3.53 (6)	7.06 (12)	21.18 (36)	27.14 (19)	2.86 (2)	7.14 (5)	2.86 (2)	34.29 (24)	0.00 (0)	2.86 (2)	22.86 (16)
Semolina	32.94 (56)	8.82 (15)	5.88 (10)	1.18 (2)	22.35 (38)	3.53 (6)	5.88 (10)	19.41 (33)	44.29 (31)	0.00 (0)	4.29 (3)	2.86 (2)	25.71 (18)	1.43 (1)	4.29 (3)	17.14 (12)
PULSES																
Greengram	41.76 (71)	0.00 (0)	1.76 (3)	1.18 (2)	22.35 (38)	1.76 (3)	15.88 (27)	15.29 (26)	45.71 (32)	15.71 (11)	1.43 (1)	0.00 (0)	14.24 (10)	0.00 (0)	17.14 (12)	20.00 (14)
Bengalgram	53.53 (91)	17.06 (24)	0.00 (0)	0.00 (0)	13.53 (23)	11.76 (20)	3.53 (6)	0.59 (0)	47.14 (33)	17.44 (12)	0.00 (0)	0.00 (0)	15.71 (11)	0.00 (0)	12.86 (9)	22.86 (16)
Redgram	17.06 (24)	4.71 (8)	3.53 (6)	4.12 (7)	48.24 (82)	1.18 (2)	12.94 (22)	8.24 (14)	32.86 (23)	0.00 (0)	0.00 (0)	0.00 (0)	40.00 (28)	0.00 (0)	11.43 (8)	15.71 (11)
GREEN LEAFY VEGETABLES	52.94 (90)	17.06 (29)	5.29 (9)	0.00 (0)	0.59 (1)	11.76 (20)	1.76 (3)	10.59 (18)	47.14 (33)	0.00 (0)	8.57 (6)	5.71 (4)	11.43 (8)	5.71 (4)	1.43 (1)	20.00 (14)
ROOTS AND TUBERS																
Potato	14.71 (25)	3.53 (6)	9.41 (16)	7.06 (12)	41.76 (71)	2.35 (4)	3.53 (6)	17.65 (30)	5.71 (4)	0.00 (0)	17.14 (12)	4.29 (3)	44.29 (31)	0.00 (0)	1.43 (1)	27.14 (19)
Tapioca	5.88 (10)	16.47 (28)	25.88 (44)	12.35 (21)	25.29 (43)	0.00 (0)	0.00 (0)	14.12 (24)	4.29 (3)	7.14 (5)	35.71 (25)	8.57 (6)	27.14 (19)	0.00 (0)	0.00 (0)	17.14 (12)
Other tubers (Coleus, Yam)	37.65 (64)	1.18 (2)	2.35 (4)	1.76 (3)	17.06 (29)	2.35 (4)	2.94 (5)	34.71 (59)	34.29 (29)	0.00 (0)	1.43 (1)	2.86 (2)	14.29 (10)	0.00 (0)	0.00 (0)	47.14 (33)
OTHER VEGETABLES	7.06 (12)	2.35 (4)	3.53 (6)	7.65 (13)	61.18 (104)	2.35 (4)	1.18 (2)	14.71 (25)	5.71 (4)	5.71 (4)	11.43 (8)	0.00 (0)	64.29 (45)	0.00 (0)	2.86 (2)	10.00 (7)
Milk	50.59 (86)	40.00 (68)	0.00 (0)	0.00 (0)	4.71 (8)	0.00 (0)	0.00 (0)	4.71 (8)	51.43 (36)	41.43 (29)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	4.29 (3)
Meat	17.65 (30)	3.53 (6)	4.28 (3)	0.00 (0)	18.24 (31)	4.12 (7)	28.24 (45)	25.88 (44)	14.29 (10)	4.29 (3)	2.86 (2)	0.00 (0)	42.86 (30)	2.56 (2)	24.29 (17)	8.52 (6)
Fish	0.00 (0)	90.59 (154)	3.53 (6)	1.18 (2)	1.76 (3)	0.39 (1)	1.18 (2)	1.18 (2)	2.86 (2)	97.14 (68)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Egg	37.06 (63)	7.06 (12)	1.76 (3)	2.94 (5)	27.06 (46)	4.12 (7)	2.94 (5)	17.06 (29)	38.57 (27)	12.86 (9)	0.00 (0)	1.43 (1)	35.71 (25)	0.00 (0)	4.29 (3)	7.14 (5)
Fats & oil	0.00 (0)	8.24 (14)	0.59 (1)	0.59 (1)	28.82 (49)	20.00 (39)	40.00 (68)	1.76 (3)	0.00 (0)	27.14 (19)	2.86 (2)	0.00 (0)	45.71 (32)	0.00 (0)	24.29 (17)	0.00 (0)
Nuts & oilseeds	89.41 (152)	1.76 (3)	0.00 (0)	0.00 (0)	2.35 (4)	5.29 (9)	1.18 (2)	0.00 (0)	91.43 (64)	1.43 (1)	0.00 (0)	0.00 (0)	4.29 (3)	1.43 (1)	1.43 (1)	0.00 (0)
Sugar	0.00 (0)	12.94 (22)	5.29 (7)	1.18 (2)	47.06 (86)	17.06 (24)	14.71 (25)	4.29 (3)	0.00 (0)	37.14 (26)	2.86 (2)	0.00 (0)	48.57 (34)	0.00 (0)	11.43 (8)	0.00 (0)
Condiments and spices	0.00 (0)	3.53 (6)	0.59 (1)	0.59 (1)	26.47 (45)	7.65 (13)	60.00 (102)	1.18 (2)	0.00 (0)	17.14 (12)	0.00 (0)	0.00 (0)	31.43 (22)	2.86 (2)	45.57 (34)	0.00 (0)
Bakery items	65.29 (11)	0.00 (0)	18.82 (32)	2.35 (4)	5.29 (9)	2.4 (5)	53.00 (8)	1.76 (3)	74.29 (5)	0.00 (0)	0.00 (0)	0.00 (0)	1.43 (1)	0.00 (0)	0.00 (0)	24.29 (17)

Figures in paranthesis denote number of families

1. Do not buy 2. Daily 3. Weekly thrice 4. Weekly twice
5. Once in a week 6. Fortnightly 7. Once in a month 8. Occassionally

With regard to the habit of purchasing wheat, which is not cultivated in Kerala 76.47 per cent of the experimental group and 42.86 per cent families of the control group purchased it 'once in a week'. It was observed that wheat was less popular compared to rice. In the control group purchase of wheat was nil or occasional in 21 and 22 per cent families respectively. Purchase of wheat 'once in a month' was observed in 18 per cent families of the control group.

Purchase of cereal products such as maida, semolina were not very popular among the studied sample. Thirty five per cent of the families of experimental group and 27.14 per cent of the control group were not in the habit of purchasing maida. Only 23.53 per cent families of the experimental group purchased maida 'once in a week'. This was 34 per cent in the control group. Occasional purchase of maida was observed in 21 per cent families in both the groups. Similarly semolina was also found to be less popular among the study group. Sixtyseven per cent of the experimental group and 53 per cent of the control group did not buy semolina for their daily meals.

Redgram was found to be purchased more frequently among the pulses. A comparison of the two groups indicated that 48.24 per cent families of the experimental group and

40 per cent families of the control group bought redgram 'once in a week'. Less purchase of redgram was noticed among the control group when compared to the experimental group. Other pulses purchased by the families were greengram and bengalgram but only less frequently. Forty three and 53 per cent of the families in the experimental and control groups were not in the habit of purchasing greengram and bengalgram.

Among the experimental group 17 per cent families were in the habit of buying green leaves daily while none in the control group had adopted such purchasing habits. Twenty two per cent of the families in the experimental group and 25 per cent in the control group purchased green leaves either fortnightly or occasionally. However 41.76 per cent families in the experimental group and 45.71 per cent in the control group were not in the habit of purchasing greens.

Among the roots and tubers potato and tapioca were popular followed by other tubers like yam and colocasia. Forty one per cent families in the experimental group and 44 per cent in the control group were found to purchase potato 'once in a week'. With regard to tapioca, purchase of this food article 'once in a week' was observed in 25 and 27 per cent of the families of the experimental and control

groups respectively. Another 25 per cent families of the experimental group and 35 per cent families of the control group purchased it more frequently at least three times a week. Other tubers like coleous and yam were purchased occasionally by 40 per cent families in both the groups.

Majority of the families in both the groups ie. 61.18 per cent in the experimental group and 64.29 per cent in the control group purchased vegetables once in a week. Daily purchase was not found to be a practice in majority of the families in both the groups.

Purchase of milk was not practised in about 50 per cent of the families, in both the groups. However 40 per cent of the families in both the groups who were in the habit of purchasing milk purchased the same daily.

Purchase of meat was found to be more common among the control group when compared to the experimental group. Forty two per cent of the control group purchased meat once in a week and only 18 per cent of the experimental group purchased meat once in a week.

In contrast to all the food items, fish was purchased daily by more than 90 per cent families in both the groups, which clearly indicate that fish is a highly preferred food item for these families.

Egg was not found to be a frequently purchased food item by 37 per cent families in the experimental group and 38 per cent families in the control group. Purchase of egg 'weekly once' was observed 27 per cent in the experimental group and 35 per cent in the control group. 'Daily purchase' of egg was noticed in 12 per cent families in the control group while 17 per cent families in the experimental group purchased egg occasionally.

With regard to the purchase of cooking oil 40 per cent in the experimental group and 24 per cent in the control group purchased oil 'once in a month', 'weekly once' purchase was observed in 28 per cent families of the experimental group and 45 per cent in the control group. Among the control group another 27 per cent purchased cooking oil daily. Majority of the families in both the groups were not in the habit of purchasing coconut, as it was obtained mainly from their own fields. A similar trend was observed among the two groups with regard to the purchase of sugar and jaggery. Forty seven per cent families in the experimental group and 48 per cent in the control group purchased it 'weekly once'. 'Daily purchase' was observed in 12 per cent families in the experimental group and 37 per cent families in the control group.

Frequency of purchase of condiments and spices was found to be 'once in a month' in 60 per cent families among the experimental group and 48 per cent families in the control group. Another 26 per cent in the experimental group and 31 per cent in the control group purchased them once in a week.

Bakery items were not frequently purchased among the families of both the groups. Sixty five per cent in the experimental group and 74 per cent in the control group were not in the habit of purchasing bakery items.

4.4.1.2 Frequency of use of various foods among the families

Frequency of consumption of various foods by the families are presented in Table 38.

Among the different food groups, cereals especially rice which is the staple cereal of the Keralites was found to be consumed daily by all the families in both the groups. Next to rice, roots and tubers were the staple foods and they were included in the meal at least 3 times a week by 40 per cent and 30 per cent families respectively in the experimental and control groups. Another 21 per cent in the experimental group and 31 per cent in the control group included roots and tubers 'weekly thrice' in their meals.

Table. 3B Percentage distribution of families as per the Frequency of use of various foods (in percentage)

Food items	Experimental Group									Control Group								
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
Cereals	100.00 (170)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	100.00 (70)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Pulses	2.75 (4)	0.00 (0)	17.06 (29)	37.06 (63)	10.00 (34)	2.35 (4)	2.35 (4)	12.84 (26)	3.33 (0)	0.00 (0)	0.00 (0)	2.86 (2)	22.86 (16)	31.43 (22)	0.00 (0)	2.86 (2)	28.57 (20)	11.43 (8)
Greens	2.35 (4)	0.00 (0)	31.18 (53)	23.53 (40)	18.24 (31)	3.53 (5)	1.18 (2)	17.01 (29)	2.44 (5)	0.00 (0)	0.00 (0)	2.14 (5)	17.14 (12)	24.29 (17)	2.86 (2)	2.86 (2)	42.86 (30)	2.86 (2)
Roots & tubers	12.94 (22)	0.00 (0)	40.18 (70)	22.94 (39)	14.12 (24)	4.12 (7)	0.00 (0)	4.12 (7)	0.00 (0)	4.29 (3)	0.00 (0)	30.00 (21)	31.43 (22)	20.00 (14)	2.86 (2)	0.00 (0)	11.42 (8)	0.00 (0)
Vegetables	4.12 (7)	0.00 (0)	20.39 (35)	20.59 (35)	42.35 (72)	0.00 (0)	0.00 (0)	11.76 (20)	0.00 (0)	4.29 (3)	0.00 (0)	11.43 (8)	10.00 (7)	52.86 (37)	0.00 (0)	1.43 (1)	20.00 (14)	0.00 (0)
Milk	38.24 (65)	0.00 (0)	0.00 (0)	0.00 (0)	2.35 (4)	0.00 (0)	2.35 (4)	2.35 (4)	54.71 (93)	47.14 (33)	2.86 (2)	1.43 (1)	1.43 (1)	1.43 (1)	0.00 (0)	0.00 (0)	4.29 (3)	41.43 (29)
Meat	2.94 (5)	2.94 (5)	7.06 (12)	7.06 (12)	10.59 (18)	0.00 (0)	18.24 (31)	51.82 (57)	17.65 (30)	10.00 (7)	10.00 (7)	1.43 (1)	4.29 (3)	37.14 (26)	1.43 (1)	12.86 (9)	8.57 (6)	14.29 (10)
Fish	96.47 (164)	0.00 (0)	1.18 (2)	0.00 (0)	1.18 (2)	0.00 (0)	0.00 (0)	1.18 (2)	0.00 (0)	92.86 (65)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.43 (1)	0.00 (0)	5.71 (4)
Egg	4.71 (8)	0.00 (0)	7.06 (12)	14.12 (24)	15.29 (26)	0.00 (0)	1.76 (3)	25.29 (43)	31.18 (50)	17.14 (12)	0.00 (0)	1.43 (1)	8.57 (6)	17.14 (12)	2.86 (2)	0.00 (0)	21.43 (15)	31.43 (22)
Nuts & oilseeds	98.24 (167)	0.00 (0)	0.00 (0)	0.00 (0)	1.18 (2)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	100.00 (70)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Fats&oil	100.00 (170)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	100.00 (107)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Sugar & jaggery	100.02 (170)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	100.00 (70)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Bakery	1.76 (3)	0.00 (0)	0.00 (0)	1.76 (3)	4.71 (8)	0.00 (0)	1.18 (2)	22.94 (34)	67.65 (115)	0.00 (0)	0.00 (0)	0.00 (0)	5.71 (4)	1.43 (1)	0.00 (0)	1.43 (1)	1.43 (1)	1.43 (1)

Figures in parenthesis denote number of families

- | | | |
|-------------------|-------------------|-----------------|
| 1. Daily | 4. Weekly twice | 7. Monthly once |
| 2. Alternate days | 5. Weekly once | 8. Occasionally |
| 3. Weekly thrice | 6. Monthly thrice | 9. Do not use |

These food articles were included 'once in a week' by lesser number of families in the two groups viz. 14 per cent in the experimental group and 20 per cent in the control group. It was surprising to note that, in contrast to the other parts of Kerala, where tapioca is a preferred tuber, in the present study, the subjects seemed to prefer potato, yam, colocasia and other tubers.

Next to staple foods, fish was found to be most frequently included item by the families of both groups since more than 90 per cent families in both the groups were found to consume it daily in the diet.

Nuts and oil seeds especially coconut, fats and oils, and sugars were the other foods included very frequently by both the groups. Major reason for inclusion of these articles very frequently in the diet is that these items are essential commodities in the preparation of various meals.

Frequency of consumption of pulses were found to be poor among the studied families. Thirty seven per cent families in the experimental group and 22 per cent families in the control group consumed pulses only twice weekly. Twenty per cent families in the experimental group and 31 per cent families in the control group consumed it 'weekly once'. Pulses did not find a place in the diets of

11 per cent families among the control group as against 3 per cent in the experimental group.

Consumption pattern with regard to the vegetables indicated that 42 per cent of the experimental group and 52 per cent of the control group used vegetables only 'weekly once'. However when compared to the control group, inclusion of vegetables in the daily dietaries were noted more among the experimental group. Twenty per cent families in the experimental group consumed vegetables 'weekly thrice', while another 20 per cent consumed these food articles 'weekly twice'. Occasional users of vegetables were only 20 per cent, in each group.

Similarly inclusion of green leafy vegetables in the daily dietaries were observed more among the experimental group. Thirty one per cent and 23 per cent families in the experimental group and 7 per cent and 15 per cent in the control group included green leafy vegetables weekly thrice and twice respectively. These food article was found to be used less frequently by both the groups as evidenced from the data. Daily users were found to be negligible in both the groups, occasional users were more in the control group than in the experimental group (42.86 per cent in the control group and 17.06 per cent in the experimental group).

With regard to the milk more than half of the experimental group (54 per cent) and 41 per cent in the control group were not in the habit of including milk in their daily dietaries. However 38 per cent families in the experimental group, and 47 per cent in the control group used milk daily for making coffee/tea but with very small quantities.

On analysing the inclusion of meat, it was observed that 37 per cent families of the control group included meat weekly once, while 10 per cent included meat 'daily' in the dietaries. In contrast to this, the experimental group (51 per cent) included meat only occasionally in the dietaries. Non users of meat was 17.6 per cent in the experimental group and 14.2 per cent in the control group.

With regard to the inclusion of egg in the daily diet, 31 per cent families in both the groups were not in the habit of using egg and it was an occasionally used food article in 25 per cent families of the experimental group and 21 per cent families of the control group. However 17 per cent families in the control group were found to use eggs either 'daily' or 'weekly once' as against 14 per cent and 15 per cent families in the experimental group respectively.

The inclusion of bakery items was not so popular among the experimental and control group. Majority of the families surveyed (67.65 per cent in the experimental group and 90 per cent in the control group) were not in the habit of including these items in the daily dietaries. It was an occasionally used food item in 22 per cent families of the experimental group.

The above data were analysed further to get more precise information with regard to the frequency of use of various foods by experimental and control groups. The food use frequency was measured in 8 point scale using the formula applied by Reaburn et al. (1979), which is given in Appendix XII. Using this scale percentage of frequency of food use for various food groups were calculated. Food use frequency scores obtained by the respondents in the experimental and control groups for various food groups viz. cereals, pulses, roots and tubers, vegetables, greens and milk are presented in Table 39. Respondents of both the experimental and control group scored maximum for the food groups such cereals, fats and oils, sugar and jaggery, nuts and oil seeds and fish. This was followed by roots and tubers, vegetables, and pulses by the experimental group as against roots and tubers, milk and meat in the control group. Bakery items were found to be the lowest in both the groups.

Table 39. Food use frequency scores for different food groups

Food items	Percentage of maximum scale	
	Experimental Group	Control Group
Cereals	100.00	100.00
Fats & oils	100.00	100.00
Sugar and jaggery	100.00	100.00
Nuts & oilseeds	98.83	100.00
Fish	98.09	96.07
Roots & Tubers	68.15	58.93
Greens	33.52	31.07
Milk	40.30	52.86
Vegetables	55.08	48.40
Meat	40.30	52.86
Pulses	51.39	36.43
Egg	30.08	36.61
Bakery items	8.38	9.32

Based on the scores obtained for various food groups foods were classified and the results are presented in Table 40. Foods most frequently used by the respondents of both groups were cereals, fish, nuts and oilseeds sugar and jaggery and fats and oils. Medium frequently used foods by the experimental group were roots and tubers, vegetables,

and pulses, as against roots and tubers, milk and meat in the control group. Less frequently used foods among the experimental group were milk, greens, meat and egg and in the control group, the foods were greens, vegetables, egg and pulses. Bakery items were found to be the least used food item in the dietaries of both experimental and control groups.

Table 40. Frequency of inclusion of various food groups in the dietaries of the food use frequency among the study group

Frequency of use	Experimental Group	Control Group
Most frequently used foods (score 76-100)	Cereals, fish, nuts & oilseed, sugar & jaggery, and fats & oils	Cereals, fish, nuts & oilseeds, sugar & jaggery, fats & oils
Medium frequently used food (score 51-75)	Roots & tubers, vegetables, pulses	Roots & tubers, milk, meat
Less frequently used foods (score 26-50)	Milk, greens, meat, egg	Greens, vegetables, egg pulses
Least frequently used food item (score \leq 25)	Bakery items	Bakery items

4.4.1.3 Food combinations followed in the meal preparations of the families

An assessment of food combinations followed in the daily meal pattern will indicate the preference of the family members for various food articles and also the frequency with which every food item is repeatedly used in a day. This also may help to ascertain their food habits. One day recall was conducted among the respondents to assess the meal combinations followed in the dietaries. On analysing the data it was observed, that 35 per cent families of both the groups followed "cereal, pulse, coconut" for their breakfast. Other food combinations followed by the study group for breakfast were 'cereal coconut' (30 per cent in the experimental group and 27 per cent in the control group), and 'cereal, pulse, vegetable' combinations (11 per cent and 27 per cent respectively by the experimental and control groups). 'Cereal, tuber' combination was also found to be adopted by 11 per cent families of the experimental group. Whereas it was found to be less frequently followed combination among the control group. Combinations such as left over food with pickle or chammanthi (preparation with coconut, chillies, salt and tamarind) or gruel with fish preparations were not found to be favourite items among both the groups for breakfast.

In some parts of Kerala, the people are in the habit of taking an additional meal around midmorning. In the present study, it was observed that majority of the families in both the groups were not in the habit of taking meals during midmorning (71 per cent in the experimental and 67 per cent in the control groups). However 29 per cent families in the experimental group and 33 per cent in the control group were found to take meals during midmorning. Most favourite combinations followed for midmorning meals were gruel (rice) with pickle/ chammanthi or fish/left over curries.

Lunch which is the main meal of the day of the study group was served mainly with rice and fish by 45 per cent families of the experimental group and 41 per cent families of the control group. Rice with vegetable preparation (18.24 per cent and 15 per cent in the experimental and control groups respectively), cereal, pulse, vegetable combinations (13.53 per cent and 7 per cent respectively), and rice with nonvegetarian preparations (11 per cent in the control group and 4 per cent in the experimental group) were the other combinations followed by study group for their lunch.

Majority of the families in both the groups took only 'tea' during evening (87.65 per cent in the

experimental group and 88.57 per cent in the control group). Accompaniments along with 'tea' was found only in 7 per cent families in the experimental group and 11 per cent in the control group. For the dinner also, rice with fish was found to be the most favourite combination followed in the majority of the families of both the groups. Fifteen per cent families in the experimental group and 8.57 per cent in the control group included rice and vegetables for dinner. Another 10 per cent in the experimental group and 8.57 per cent in the control group included rice, vegetables and fish for dinner.

4.4.1.4. Various food groups included in the daily dietaries of the respondents

Various foods commonly used for daily meals are categorized on the basis of their sources of nutrients and such food groups permit a family to achieve nutrient intakes as specified by Recommended Dietary Allowances (R.D.A) On analysing the various food groups included in the daily dietaries as evidenced from the 'recall' survey, 84.94 per cent families in the experimental group and 94.29 per cent in the control group included only cereal and fish in the daily dietaries (Table 41) followed by cereal, pulse, fish combination by both the groups (35 per cent and 38 per cent respectively in experimental and control groups).

Cereals, pulse, fish, vegetables including roots and tubers (28 per cent families of the experimental group and 24.29 per cent of the control group) and 'cereal, fish, vegetables and greens' combination (by 23 per cent in the experimental group and 17 per cent families in the control group) were the other conspicuously used food combinations among the study group.

Table 41. Percentage distribution of the families as per the food combinations followed in the daily meal pattern

Food groups	EG	CG
Cereal + fish	82.94 (141)	94.29 (66)
Cereal + pulse + fish	35.29 (60)	38.57 (27)
Cereal + pulse + fish + vegetables including tubers	28.82 (49)	24.29 (17)
Cereal + fish + vegetables + greens	23.53 (40)	17.14 (12)
Cereal + pulse + vegetables	9.41 (16)	8.58 (6)
Cereal + fish + meat + pulse + vegetables	4.12 (7)	5.71 (4)
Cereal + vegetables	7.65 (11)	0.00 (0)

Figures in paranthesis denote number of families

4.4.1.5 Cooking methods preferred by the families

Culinary practices vary from place to place and even from house to house. Nutrient losses in cooking depends upon the method of cooking followed in the families and also on the stability of nutrients in the cooked foods. Culinary practices preferred by the respondents were assessed and the highlights are presented.

Table 42 depicts the preference for the various methods of cooking by the families. All the families of experimental and control groups preferred 'boiling and straining the water' for cooking rice. Majority of the families in both the groups apply the method of simple boiling for pulses (97 per cent in the experimental group and 94 per cent in the control group), roots and tubers (23.5 and 45.7 per cent in the experimental and control groups respectively) and vegetables (51 and 61 per cent in the experimental and control groups respectively). It was also observed that 31 per cent families of the experimental group and 10 per cent of the control group were not in the practice of straining the water used for boiling roots and tubers especially in the tapioca. However 30.59 and 42.86 per cent respectively in the experimental and control groups practised both methods viz, 'boiling and straining' and absorption, for the preparation of roots and tubers.

Table 42. Percentage distribution of the families based on their preference for cooking methods

Type of food	1	2	3	4	5	6	7	8	9
<u>EXPERIMENTAL GROUP</u>									
Cereals	0.00 (0)	0.00 (0)	0.00 (0)	100.00 (170)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Pulses	0.00 (0)	0.00 (0)	97.05 (165)	2.94 (5)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Roots & Tubers	0.59 (1)	0.00 (0)	23.53 (40)	14.70 (25)	30.59 (52)	0.00 (0)	0.00 (0)	0.00 (0)	30.59 (52)
Greens	4.24 (7)	0.00 (0)	3.53 (6)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	157.00 (0)	0.00 (0)
Vegetables	0.00 (0)	0.00 (0)	51.76 (85)	0.59 (1)	6.47 (11)	38.82 (66)	1.76 (3)	0.00 (0)	1.76 (3)
Milk	0.00 (0)	0.00 (0)	100.00 (170)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Fish	0.00 (0)	10.50 (18)	30.00 (51)	0.00 (0)	0.00 (0)	3.53 (6)	95.88 (15)	0.00 (0)	0.00 (0)
Egg	0.00 (0)	9.00 (10)	78.24 (133)	0.00 (0)	0.00 (0)	15.88 (27)	0.00 (0)	0.00 (0)	0.00 (0)
Meat	0.00 (0)	0.00 (0)	37.06 (63)	0.00 (0)	0.00 (0)	18.24 (31)	0.00 (0)	28.23 (48)	0.00 (0)
<u>CONTROL GROUP</u>									
Cereal	0.00 (0)	0.00 (0)	0.00 (0)	100.00 (70)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Pulses	0.00 (0)	0.00 (0)	94.29 (66)	1.43 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	4.29 (3)
Roots & Tubers	0.00 (0)	0.00 (0)	45.71 (32)	17.14 (12)	10.00 (71)	0.00 (0)	1.43 (1)	0.00 (0)	42.86 (30)
Greens	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	7.14 (5)	95.59 (65)	0.00 (0)
Vegetables	1.43 (1)	0.00 (0)	61.43 (43)	0.00 (0)	1.43 (1)	27.14 (19)	7.14 (5)	1.43 (1)	0.00 (0)
Milk	0.00 (0)	0.00 (0)	100.00 (70)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Fish	0.00 (0)	8.57 (6)	11.43 (8)	0.00 (0)	0.00 (0)	4.29 (3)	75.71 (53)	0.00 (0)	0.00 (0)
Egg	0.00 (0)	15.71 (11)	68.57 (48)	0.00 (0)	0.00 (0)	15.71 (11)	0.00 (0)	1.43 (1)	0.00 (0)
Meat	0.00 (0)	0.00 (0)	17.14 (12)	0.00 (0)	0.00 (0)	50.00 (35)	32.86 (23)	0.00 (0)	0.00 (0)

Figures in parenthesis denote number of families

- | | | |
|-------------|-----------------------------|---------------------------|
| 1. Steaming | 4. Stewing | 7. Absorption & frying |
| 2. Frying | 5. Absorption | 8. Shallow frying |
| 3. Boiling | 6. Boiling & shallow frying | 9. Straining + Absorption |

Majority of the families in both the groups preferred shallow frying for green leafy vegetables. 'Boiling and shallow frying' was also found to be another favourite method of cooking for vegetables (38 per cent in the experimental group and 27 per cent in the control group).

Milk is a food item which needs less processing. 'Boiling' milk is a common method, and all the families in the study groups were found to practice the same in their dietaries since it is an item which is used only for making tea or coffee in the families of the study group. Methods of cooking generally followed in the case of fish, were boiling (30 per cent families in the experimental group and 11 per cent in the control group) and frying (55 and 75 per cent in the experimental and control groups). Comparatively lesser per cent families in both the groups preferred the method of 'frying' for fish (10 and 8 per cent respectively in the experimental and control groups).

Boiling was found to be the most preferred and practised method of cooking for egg (78 per cent in the experimental group and 68 per cent in the control group). Frying was another method used for preparing egg followed by 'boiling and shallow frying' among the respondents of both the groups.

In the case of meat, boiling and shallow frying was the most preferred method of cooking for the control group (50 per cent) whereas 37 per cent of the experimental group preferred simple boiling method. Thirty two per cent families in the control group followed absorption and then deep frying for meat as against simple shallow frying in the experimental group (28 per cent).

4.4.1.6 Preservation methods followed in the families

Preservation methods followed in the families indicated that 84 per cent families in the experimental group and 62.86 per cent families in the control group were in the habit of preserving food. The favourite method of preservation practised among the families of both groups was found to be pickling. Seventy one per cent of the families in the experimental group and 52.86 per cent families in the control group were found to prepare pickles using like mango, lime, amla etc. It was also observed that a small per cent of the families in the experimental group were found to use vegetables like bittergourd and papaya for pickling. Sixteen per cent families in both the groups preserved both vegetable and fruits.

4.4.1.7 Special food prepared by the families

Habit of preparing special foods during occasions

like birthdays, marriages, festivals, religious occasions and death ceremonies was assessed and the details are presented in Table 43.

Table 43. Percentage distribution of the families based on the preparation of special foods.

Foods prepared	Birthday, Marriage Feast		Religious functions		Death ceremonies	
	EG	CG	EG	CG	EG	CG
No special foods prepared	12.94 (22)	15.71 (11)	81.76 (139)	80.00 (56)	88.82 (151)	90.00 (63)
Sweet dishes	75.67 (112)	62.71 (37)	45.16 (14)	85.71 (12)	42.11 (8)	57.14 (4)
Fried items	11.96 (7)	10.17 (6)	12.90 (4)	0.00 (0)	0.00 (0)	0.00 (0)
Sweet, fried and non veg. dishes	19.59 (29)	27.12 (16)	41.93 (13)	14.28 (2)	57.89 (11)	42.86 (3)

Number of families are given in paranthesis

Majority of the families in both the groups prepared special foods during birthdays, marriages and festivals. 'Sweet dishes' recorded the highest preference among the majority of the families of both the groups (75.67 per cent in the experimental group and 62.71 per cent in the control group). It was also observed that majority of the families in both the groups were not in the habit of preparing special foods during religious functions and during death ceremonies. Among the families where special

foods were prepared, sweet dishes were preferred by 45 per cent families of the experimental group followed by sweet, fried and non vegetarian foods by another 41 per cent. In the control group 85.71 per cent families prepared sweet dishes, while 14.2 per cent families prepared sweet, fried and non-vegetarian dishes. Among those who prepare special foods during death ceremonies, 57.14 per cent in the group and 42.86 per cent in the control group prepared sweet fried and non vegetarian dishes while the rest in both the groups prepared only sweet dishes.

4.4.1.8 Intrafamily distribution of food in the families

Intrafamily distribution of food is generally influenced by the practice followed in 'taking meals' within the family. As indicated in Table 44, in 42 per cent families in the experimental group and 40 per cent families in the control group, meals were served to children first followed by the other members of the family. In certain families male members along with children were served food first followed by the rest of the family members (31.18 per cent and 40 per cent families in the experimental and control groups respectively). About 10 per cent families in both the groups older members were treated along with the children for serving the meals. It was observed that, all the members of the family take meals together only in few

families (13.53 per cent in the experimental group and 8.57 per cent in the control group). In all the families surveyed, no preference was given to the vulnerable population especially pregnant and lactating mothers for taking meals.

Table 44. Percentage distribution of the families based on the intrafamily food distribution system

Preference given in food distribution	EG	CG
Children first followed by other family members	42.35 (72)	40.00 (28)
Male member and children first and the rest of the family members	31.18 (53)	40.00 (28)
Older members and children first and the rest of the family members	10.00 (17)	11.43 (8)
All members together	13.53 (23)	8.57 (6)
No particular order	2.94 (5)	0.00 (0)

Figures in paranthesis denote number of families

4.4.1.9 Dietary care during different stages of life cycle

Physiological conditions such as infancy, pregnancy and lactation impose additional nutrient requirements in the body. In order to meet such needs, certain dietary modifications are essential. In the present

study, modifications made during such physiological conditions. As indicated that majority of the families in both the groups (80.59 per cent in the control group and 75.71 per cent in the experimental group) were found, to bring dietary modification in infant's diet, to suit to their nutritional requirements. However not much alterations were found to be made in the diets of pregnant and lactating mothers of the study group. When compared to the control group the experimental group were found to introduce some modifications. Main modification made was with regard to the quantity of food.

Information elicited on infant feeding practices indicated that supplementary food were introduced in the infant's diet by both the groups (Table 45). Important supplementary foods which are thus included were found to be plantain flour and ragi (59.85 per cent families in the experimental group and 79.25 per cent families in the control group) and plantain flour, ragi and boiled banana (17.52 per cent families in the experimental group and 15.09 per cent families in the control group). Other foods found to be included were fruit juices, boiled tubers, and egg. A notable feature was that, more variety of foods were found to be included in the diets of infants in the experimental groups than in the control group.

Table 45. Percentage distribution of the families according to the supplementary foods given to the infants

Foods included	EG	CG
Plantain flour + ragi	59.85 (82)	79.25 (42)
Plantain flour	10.22 (14)	0.00 (0)
Plantain flour + ragi + boiled banana	17.52 (24)	15.09 (8)
Fruit juices	4.34 (6)	0.00 (0)
Plantain + boiled banana	3.65 (5)	1.43 (1)
Ragi + milk + boiled banana + boiled tubers	0.73 (1)	3.77 (2)
Fruits + egg + flour + boiled banana	3.65 (5)	0.00 (0)

Number of families are given in paranthesis

4.4.1.10 Morbidity status of the study group

Details related to the occurrence of infectious diseases among the children of the study groups are presented in Table 46 Diarrhoea was found to be the most commonly occurring disease among the children in majority of the surveyed families of both the groups. The occurrence was more in the control group than in the experimental group (91.43 per cent in the control group and 82.94 per cent in the experimental group). Next frequently occurring disease

was found to be measles (48.32 per cent in the experimental group and 51.43 per cent in the control group) followed by whooping cough (15.88 per cent in the experimental group and 21.43 per cent in the control group). Occurance of diphtheria was recorded only in few families (2 per cent). In all all these cases control group children supercedes the experimental group.

Table 46. Percentage distribution of the families based on the morbidity status

Occurrence of various diseases	Experimental Group	Control Group
Diarrhoea	82.94 (141)	91.43 (64)
Measles	48.32 (83)	51.43 (36)
Whooping cough	15.88 (27)	21.43 (15)
Diphtheria	2.35 (4)	2.86 (2)
Polio	2.35 (4)	2.86 (2)
Jaundice	0.00 (0)	2.86 (2)

Figures in paranthesis denote number of families

4.4.1.11 Alterations made in the diets during sickness

Changes made in the diets of the children during disease conditions were enquired and it was observed that 74.12 per cent families in the experimental group and 65.71 per cent in the control group seemed to make some alterations in the diets during diseases. Foods such as spicy, fat rich and fried items were found to be avoided by 46 per cent families in both the groups. Protein rich foods such as milk, and egg were found to be avoided by 33 per cent families in the experimental group and 37 per cent families in the control group. Seventeen per cent families in the experimental group were found to restrict salt and fat in the diets during sickness. Three per cent families in the experimental group and 15 per cent in the control group reported to change the consistency of food (solid to liquid).

4.4.2 Actual food intake of the respondents

Actual food intake of the three categories of the beneficiaries belonging to the experimental and control groups was carried out by 3 day weightment survey which enabled to determine the quality and quantity of the food consumed by the respondents and to locate their adequacy or inadequacy in the dietaries.

Weighment survey was carried out drawing 10 subjects each, from male and female preschool children of the experimental group and 5 children each, from the control group and among the mother beneficiaries, 5 respondents each from pregnant and lactating mothers in experimental and control groups.

4.4.2.1 Average food consumption of the respondents

The actual quantity of food intake of the three categories of the beneficiaries in comparison with the suggested dietary allowances are presented in Tables 47,48 and 49.

Among the different food stuffs, consumption of cereals was found to be sufficient in male and female children of the experimental group whereas only 81 and 73 per cent of the R.D.A. (Recommended dietary allowance) was met for cereals in male and female children of the control group respectively. Among the mother respondents, cereal consumption was met above the R.D.A. in lactating mothers of both experimental and control group whereas 90 per cent of R.D.A. was met in pregnant mothers of both the groups. Intake of pulses was above the specification of R.D.A. in male and female children of the experimental group whereas only 57 and 68 per cent of R.D.A. was met in the male and female children of the control group. In contrast pulse

consumption was low among the pregnant and lactating mothers, belonging to the experimental and control groups. This particular food item was absent in the dietaries of the pregnant mothers of the control group.

Table 47. Average food consumption of the preschool children

Food groups	*Suggested food allowance gm	Experimental Group				Control Group			
		Average intake g		Percentage of R.D.A.		Average intake g		Percentage of R.D.A.	
		M	F	M	F	M	F	M	F
Cereals	270	260	270	96	100	220	198	81	73
Pulses	17.5	28	31	160	177	10	12	57	68
Green leaf vegetables	50	8	14	16	28	14	8	28	16
Other vegetables	30	15	3	50	26	9	8	30	10
Fish	30	44	32	146	107	39	36	130	120
Milk & milk products	250	100	76	40	30	47	36	19	14
Fats & oils	25	13	13	52	52	8	10	32	40
Sugar & jaggery	40	19	10	47	25	18	15	45	37
Nuts & oil seeds	0	0	28	30	0	0	25	20	0
Fruits	0	0	33	20	0	0	28	20	0

* Source ICMR 1981 (4 - 6 years)

Table 48. Average food consumption of the pregnant mothers

Food groups	*Suggested food allowance	Average intake		Percentage of R.D.A.	
		EG	CG	EG	CG
	g	g	g		
Cereals	445	400	406	90	91
Pulses	27	16	0	59	0
Leafy vegetables	100	0	0	0	0
Other vegetables	40	57	26	142	65
Roots & tubers	50	7	0	14	0
Milk & milk products	200	45	20	22	10
Fish	30	50	90	166	300
Oils & fat	30	17	9	56	30
Sugar & jaggery	30	20	24	66	80
Coconut	0	38	55	0	0
Fruits	0	32	40	0	0

* Source ICMR (1981)

Table 49. Average food consumption of the lactating mothers

Food groups	*Suggested food allowance	Average intake		Percentage of R.D.A.	
		EG	CG	EG	CG
		g	g		
Cereals	470	563	528	120	112
Pulses	35	14	5	40	14
Leafy vegetables	100	5	2	5	2
Other vegetables	40	50	28	125	70
Roots & tubers	50	61	0	122	0
Milk & milk products	200	17	0	8	0
Fish	30	55	85	183	283
Oils & fat	30	17	16	56	53
Sugar & jaggery	30	22	22	73	73
Coconut	0	46	86	0	0
Fruits	0	10	2	0	0

* Source ICMR (1981)

In all the three groups of respondents belonging to the experimental and control groups, fish consumption was very high and exceeded the R.D.A. suggested and the control group superceded the experimental group in fish consumption.

Consumption of roots and tubers was 35, and 10 per cent of the R.D.A. respectively in the male and female children of the experimental group as against 90 and 80

per cent in the control group. However among the mother respondents, consumption of roots and tubers was 14 and 61 per cent respectively in the pregnant and lactating mothers of the experimental group and this food item was not found to be consumed by the mothers identified under the control group.

Green leafy vegetable consumption was found to be very low among the preschool children of both the groups and almost negligible, in the dietaries of the mother respondents belonging to the two groups. Vegetables included in the diets of male and female children of the experimental group was found to be 50 and 26 per cent of their requirements. Vegetable consumption was found to be still low in the dietaries of the control group. However, in the case of mother respondents of the two categories vegetable consumption was high meeting the R.D.A. specified, while only 65 and 70 per cent of the requirement of this food item was met in the dietaries of the pregnant and lactating mothers of the control group respectively.

Milk and milk products included in the diets, was found to be sufficient to meet only 76 and 40 per cent of the R.D.A. of male and female children of the experimental group, while only 19 and 14 per cent of R.D.A. for this item was met for the male and female children of the control group respectively. Milk consumption was found to be very

low among the mother respondents of both the experimental and control groups.

Apart from the above food stuffs, consumption of fruits, and nuts and oil seeds (especially coconut) which contributed appreciable amounts of calories and other nutrients in the dietaries of the three categories of the beneficiaries belonging to the two groups.

Consumption of sugar and jaggery and fats and oil was insufficient in all the categories of the respondents of the experimental as well as in the control group.

Another feature observed while conducting weighment survey was that the food supplement provided for the preschool children during the lunch period (kanji and green gram) was relished fully by both male and female children. Whereas food supplement served in the evening (uppumma) was not fully consumed (only by 40 per cent of female children and 70 per cent male children). Similarly among the mother beneficiaries, all the pregnant mothers and 90 per cent of the lactating mothers were found to consume only half the quantity of the food supplement served.

4.4.2.2 Mean nutrient intake of the respondents

The intake of nutrients of the respondents was computed, from the quantity of foods consumed by them and

the details in comparison with the R.D.A. are presented in Table 50,51,52.

As depicted in tables, the energy intake of preschool children of the experimental group was observed to meet 85 and 87 per cent of the R.D.A. specified for the male and female children while the diets of preschool children in the control group was found to meet only 71 and 66 per cent of R.D.A. Among the mother respondents the energy intake was met above R.D.A. in the pregnant and lactating mothers belonging to the experimental and control groups. Protein intake of the male and female preschool

Table 50. Average nutrient intake of the preschool children

Nutrients	*R.D.A (4-6 years)	Experimental Group				Control Group			
		Average nutrient intake		Percentage of R.D.A		Average nutrient intake		Percentage of R.D.A	
		M	F	M	F	M	F	M	F
Calories (Kcals)	1690	1435	1479	85	87	1202	1115	71	66
Proteins(g)	30	38	39	127	130	26	28	86	93
Iron (mg)	18	18	18	100	100	14	11	77	61
Calcium (mg)	400	311	207	78	52	176	198	43	49
Retinol (mg)	400	86	59	21	15	41	47	10	11
Thiamin (mg)	0.9	0.9	1.0	100	111	0.6	0.6	67	67
Riboflavin(mg)	1.0	0.2	0.3	20	30	0.3	0.2	30	20
Vitamin C (mg)	40	20	13	50	32	15	12	37	30

* Source ICMR (1989)

Table 51. Average nutrient intake of the pregnant mothers

Nutrients	*R.D.A	Average nutrient intake		Percentage of R.D.A	
		EG	CG	EG	CG
Calories (Kcals)	2100	2139	2390	102	113
Proteins (g)	65	57	65	87	100
Iron (mg)	38	28	30	73	78
Calcium (mg)	1000	165	190	16	19
Retinol (mg)	600	127	71	21	11
Thiamin (mg)	1.1	1.2	1.1	109	100
Riboflavin (mg)	1.3	1.2	1.0	92	76
Vitamin C (mg)	40	22	14	55	35

* Source ICMR (1989)

Table 52. Average nutrient intake of the lactating mothers

Nutrients	*R.D.A	Average nutrient intake		Percentage of R.D.A	
		EG	CG	EG	CG
Calories (K cals)	2350	2588	2420	110	103
Proteins (g)	75	65	70	86	93
Iron (mg)	30	30	28	100	93
Calcium (mg)	1000	926	221	92	22
Retinol (mg)	950	127	295	13	31
Thiamin (mg)	1.2	1.3	1.0	108	83
Riboflavin (mg)	1.4	1.2	1.0	85	71
Vitamin C (mg)	80	49	22	61	27

* Source ICMR (1989)

children of the experimental group was adequate whereas the diets of children of the control group, met only 81 and 93 per cent of the R.D.A. respectively. Protein in the diet of pregnant and lactating mothers was found to meet 86 per cent of the R.D.A. whereas it was almost met in the case of mothers belonging to the control group. Iron intake was sufficient in both male and female preschool children as well as in lactating mothers of the experimental group. However, only 77 and 61 per cent of R.D.A. specification was met by 73 per cent of the male and 78 per cent of female children of control group. In the case of pregnant mothers of experimental and control groups only 73 and 78 per cent of iron requirement was found to be met.

Retinol intake was found to be very negligible in all the categories of respondents belonging to both experimental and control groups. Calcium intake and was found to meet 78 and 52 per cent of R.D.A. requirement respectively in male and female children of the experimental group. While in the case of pregnant mother of the same group only 16 per cent of the requirement was found to be met. The diets of lactating mother of experimental group was found to be supplying 92 per cent of their requirement. The calcium intake of the three categories of respondents in the control group was less than their counterparts in the experimental group. The intake of B complex vitamin viz,

thiamine was adequate in all categories of beneficiaries of experimental group, whereas it was insufficiently met in the control group except in the case of pregnant mothers. In the experimental group, the percentage of R.D.A. met for riboflavin was 20, and 30 per cent for the male and female children, 92 per cent for the pregnant and 85 per cent for lactating mothers. The riboflavin content of the diets of all the categories of the control group was found to be more deficient than the experimental group. Unlike other nutrients, vitamin C intake was found to be very low in all the categories of respondents of both the experimental and control groups.

4.4.3 Assessment of Anthropometric measurements of the respondents.

Anthropometric measurements are considered as the best tool for detecting the various degrees of growth retardation among the population and also to ascertain the impact of various nutrition intervention programmes.

In the present study anthropometric measurements viz. weight, height, midarm, head and chest circumference were recorded in preschool children, whereas in the mother beneficiaries weight and height measurements were accounted.

4.4.3.) Anthropometric measurements of the preschool children

4.4.3.1.1 Weight for age profile of the children

The most recognised indicator of protein energy malnutrition is 'weight for age' [Belliffee 1966]. Comparison of the weight for age value with the standards recommended at the corresponding ages will help to determine the degree of underweight in a community. According to Gopaldas and Seshadri (1987), this index is effectively used to determine the current state of nutritional status of children.

Details of the body weight of the children belonging to the experimental and control groups were analysed and compared with the suggested national and international standards and also according to their grades of malnutrition.

Anthropometric standards developed by Gosh (1986) is used in the present study for comparison as national standard whereas anthropometric standards developed by National Centre for Health Statistics U.S.A. (NCHS), as international reference standard which was recommended by the WHO expert group (1987).

Weight for age profile of the two groups of the children according to the different age classes in comparison with national and international standards are presented in Table 53.

As indicated in Table 53 (Figure 2) mean weight for age of the male children of different age groups belonging to the experimental group was found to range between 11.20 kg to 12.68 kg as against 9.75 kg to 12 kg in the control group. The mean weight for age of the female children of the different age groups belonging to the experimental group was found to be between 10 kg to 12.45 kg, as against 9.80 kg to 11.50 kg in the control group (figure 3). The mean weight for age of the children of both the experimental and control groups was found to be much lower than the national and international standards for all age groups.

When the data was tested statistically it was found that the mean weight for age of the experimental children (both male and female) was found to be 'on par' with Indian standard, in the first two age classes whereas it was significantly lower than the standard in the control group, except in the male children of the age group (42-47 months). However, in the higher age groups, the mean weight of the experimental and control groups children was

Table 53. Weight for age profile of children in comparison with National and International standards

Age (in months)	Sex	Mean weight for age (kg)		National standard (Shanti Ghosh 1986)	't' value		Iner- national standard NCHS (1987)	't' value	
		EG	CG		EG	CG		EG	CG
36-41	M	11.20(10)	9.75(4)	13.75	1.592** (9)	4.178* (3)	15.1	2.434*	5.829**
	F	10.00(3)	9.80(3)	13.25	1.876(2)	11.836** (2)	14.8	2.771	17.206**
42-47	M	11.21(17)	11.83(3)	14.75	2.090** (16)	2.318(2)	16.2	2.941*	4.70
	F	10.60(11)	10.40(4)	13.30	1.755** (10)	6.110** (3)	15.7	3.335**	11.124**
48-53	M	11.97(19)	11.60(5)	15.75	3.562** (18)	4.640** (4)	17.1	4.834**	6.149**
	F	12.12(25)	10.80(6)	14.45	1.212** (24)	2.457(5)	16.4	2.277*	3.782*
54-59	M	12.68(14)	12.00(3)	17.25	3.214** (13)	6.062** (2)	18.2	3.881**	7.159*
	F	12.45(11)	11.50(2)	16.25	2.393* (10)	3.662(1)	17.6	2.933*	4.313

Figures in paranthesis of column 3 and 4 denote number of children and that of 6 and 7 denote degrees of freedom (d.f)

** Significant at 1 per cent level

* Significant at 5 per cent level

Figure 2.

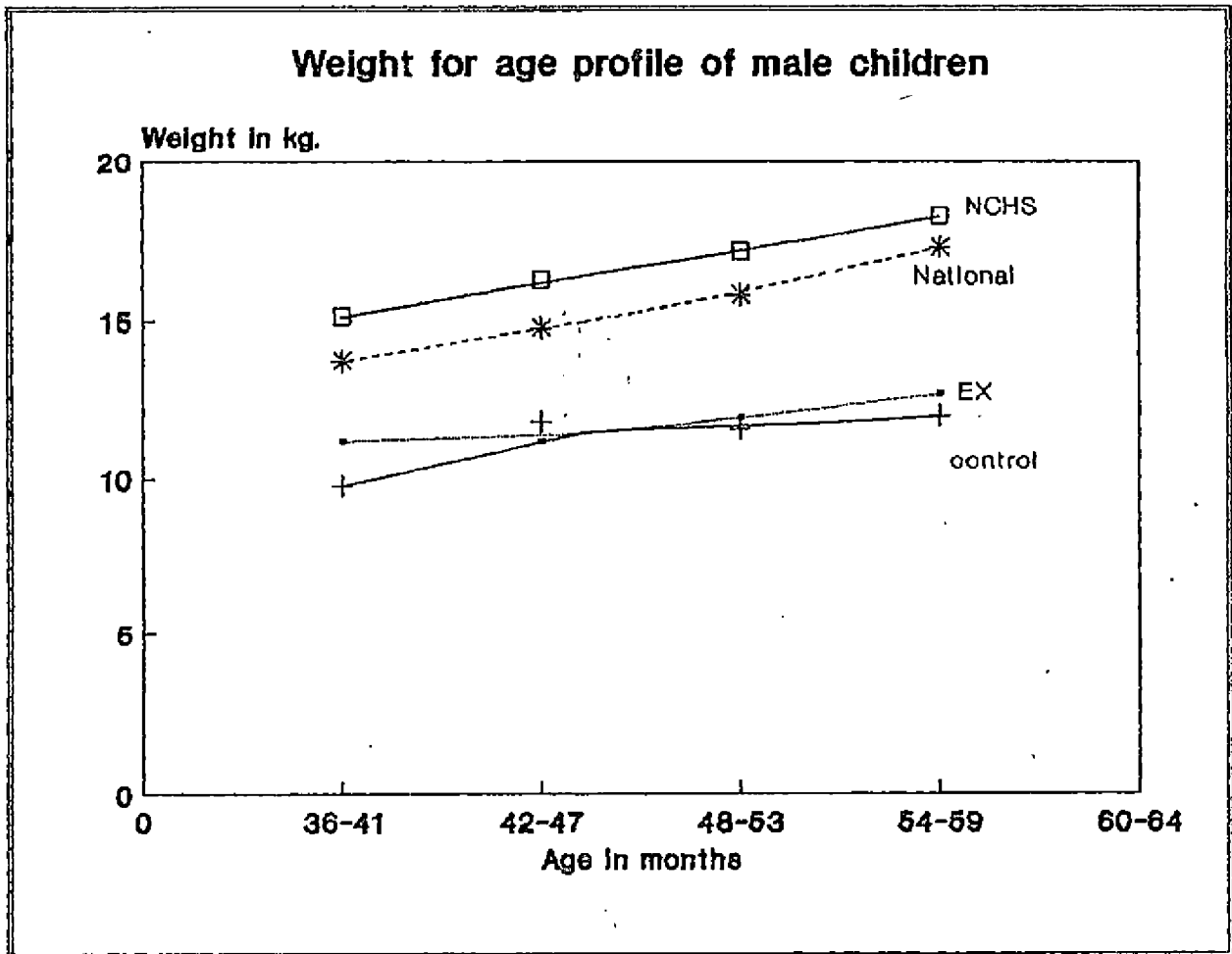
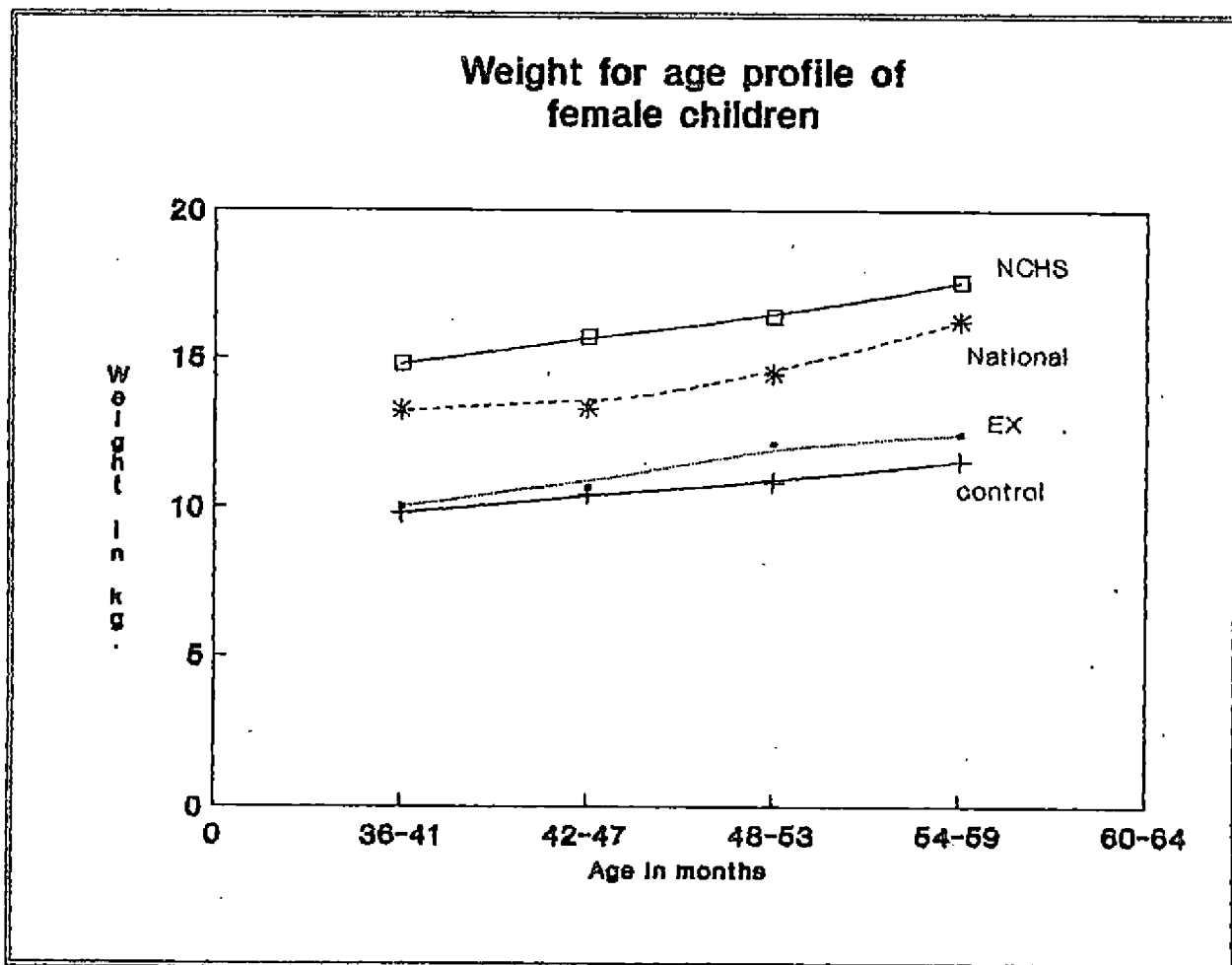


Figure 3.



significantly lower than the Indian standards except in the case of female children belonging to the age class of 48-53 months. The mean 'weight for age' of the children of both experimental and control groups were found to significantly lower than the international standards in majority of the age classes.

Data on body weight of the children was further examined. The factors age, sex and treatments were taken together through analysis of variance technique, given in Appendix XIII.

The mean body weight of the four age groups are given in the table 54.

Table 54 Mean body weight of the preschool children according to the age groups

Age in months	Mean weight
36 - 41	10.53
42 - 47	10.99
48 - 53	11.88
54 - 59	12.48

C.D values

	A ₂	A ₃	A ₄
A ₁	0.8469	0.7885	0.8464
A ₂		0.6529	0.7218
A ₃			0.6529

It is revealed that there was a significant difference ($F_{3,124}=8.93^{**}$ significant at 1 per cent level) in four age groups as far as the body weight is concerned. The maximum weight was obtained for the fourth age group (54 to 59 months, 12.48 kg) which was significantly different from the weight of both first and second age groups.

The mean weight of the respondents in the age groups of 36-41 and 42-47 months did not differ significantly. But the mean weight was high in the age range of 48 to 53 and 54 to 59 months, and in these age groups also weight did not differ significantly. Hence it is concluded that the mean weight of respondents in the age groups 36 to 47 and 48 to 59 months differ significantly, a significant increase being observed in the higher age groups. This observation was consistent in the control group also as evidenced by the interaction between age and treatments.

It was also clear from the anova table that experimental group had significant weight difference ($F_{1,124}=7.35^{**}$ significant at 1 per cent level) when compared to the control group. The mean weight of the experimental group was 11.8 kg and that of control group was 10.92 kg.

However the weight of the male children was not found to be significantly different from that of the female children. None of the interaction effects was found to be significant.

4.4.3.1.2 Malnourished children identified in the experimental and control groups

Indian Academy of pediatrics classified malnourished children into different grades based on the body weight deficit. This classification would enable to detect the most needy children in many field oriented intervention programmes.

Table 55. Percentage distribution of the children according to the grades of malnutrition

Classification as suggested by Indian Academy of pediatrics	Experimental Group			Control Group		
	M	F	Total	M	F	Total
Normal (> 80% 'weight for age')	25.00 (15)	54.00 (27)	38.2 (42)	13.33 (2)	20.0 (3)	16.8 (5)
Grade I. Malnutrition (71 - 80% 'weight for age')	46.67 (28)	24.00 (12)	36.4 (40)	53.3 (8)	60.0 (9)	56.6 (17)
Grade II. Malnutrition (61 - 70% 'weight for age')	26.67 (16)	14.00 (7)	20.9 (23)	33.3 (5)	20.0 (3)	26.7 (8)
Grade III. Malnutrition (51 - 60% 'weight for age')	1.66 (1)	8.00 (4)	4.5 (5)	0.00 (0)	0.00 (0)	0.00 (0)
Total	(60)	(50)	(110)	(15)	(15)	(30)

Figures in parenthesis denote number of children

In the present study distribution of children according to the gradation of growth retardation is made and Table 55 (Figure 4) depicts the percentage distribution of the children according to the degree of malnutrition as suggested by Indian Academy of pediatrics.

As evidenced from the table, 38 percent of the children belonging to the experimental group and 16 per cent of the children belonging to the control group were found to be normal. The percentage of children belonging to the experimental group identified under Grade I and Grade II malnutrition was found to be less (36.4 per cent and 20.9 per cent respectively) in comparison with the control group. None of the children in both the groups were identified under Grade IV malnutrition. Compared to the male children, female children were found to be normal in the both the groups.

Impact of any supplementary feeding programme can be assessed by determining the shift of the children from lower grades of malnutrition to the better grades. Distribution of children according to the grades of malnutrition at their admission to the intervention programme is presented in Table 56 (Figure 5). As indicated in Table, the percentage of children coming under normal group was 37.3 per cent at the time of admission

Figure 4.

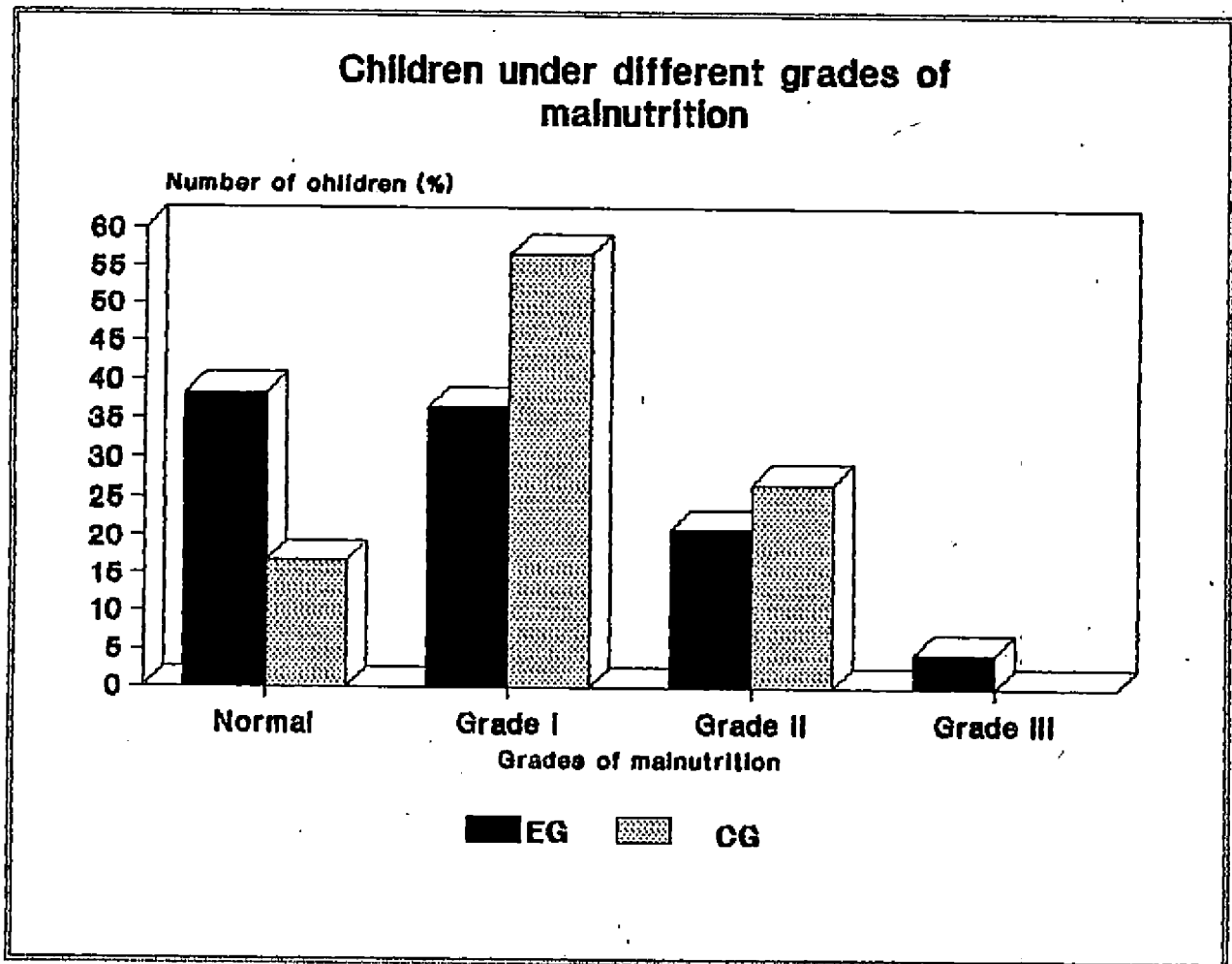
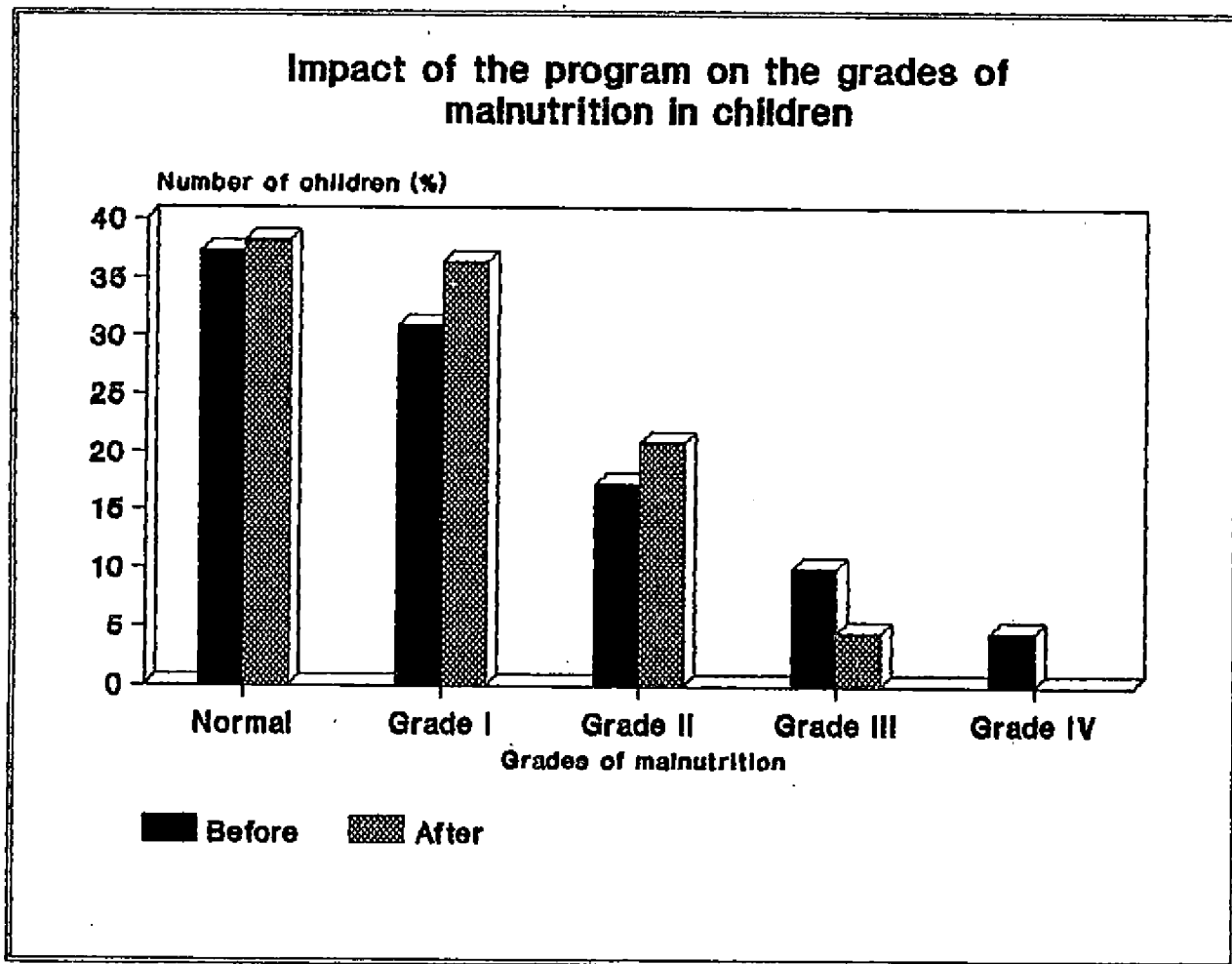


Figure 5.



which was increased to 38.2 per cent after intervention. It was also observed that the per cent of children identified under Grade I and Grade II, was 30.9 and 17.3 before intervention has also increased to 36.4 and 20.9 per cent respectively. Children indentified under Grade III, and Grade IV malnutrition was reduced from 10 per cent to 4.5 per cent and 4.5 to nil after intervention.

Table 56 Impact of the intervention programme on the grade of malnutrition

Grade of malnutrition	Percentage of children identified under different grade	
	Before the intervention	After the intervention
Normal	37.30 (41)	38.20 (42)
Grade I. Malnutrition	30.90 (34)	36.40 (40)
Grade II. Malnutrition	17.30 (19)	20.90 (23)
Grade III. Malnutrition	10.00 (11)	4.50 (5)
Grade IV. Malnutrition	4.50 (5)	0.00 (0)
Total	(110)	(110)

Figures in parenthesis denote number of children

4.4.3.1.3 Height for age profile of the children

Height for age profile shows the state of chronic malnutrition or stunting in children (Gopaldas and Seshadri, 1987). The extent of height deficit in relation to age, as compared to standards, can be regarded as a measure of the past nutritional history of a subject.

Mean 'height for age' of the children belonging to the experimental and control groups in comparison with the national and international standards are presented in Table 57.

Mean height for age of male and female children of the experimental group ranged between 91.70 to 98.78 cms and 85.33 to 98.09 cms respectively whereas mean 'height for age' of male and female children of the control group ranged between 90.50 to 97.60 cms and 88 to 96.50 cms (Figures 6 and 7).

The experimental and control groups maintained the national standard for height for age in all groups, whatever be the sex. But male children in the 48 to 53 months and female children in the age groups 54 to 59 months maintained a low profile in comparison with the international standards in the experimental group. In the control group female children in the age group 48 to 53 months and 54 to 59 months also maintained a low profile.

Figure 6.

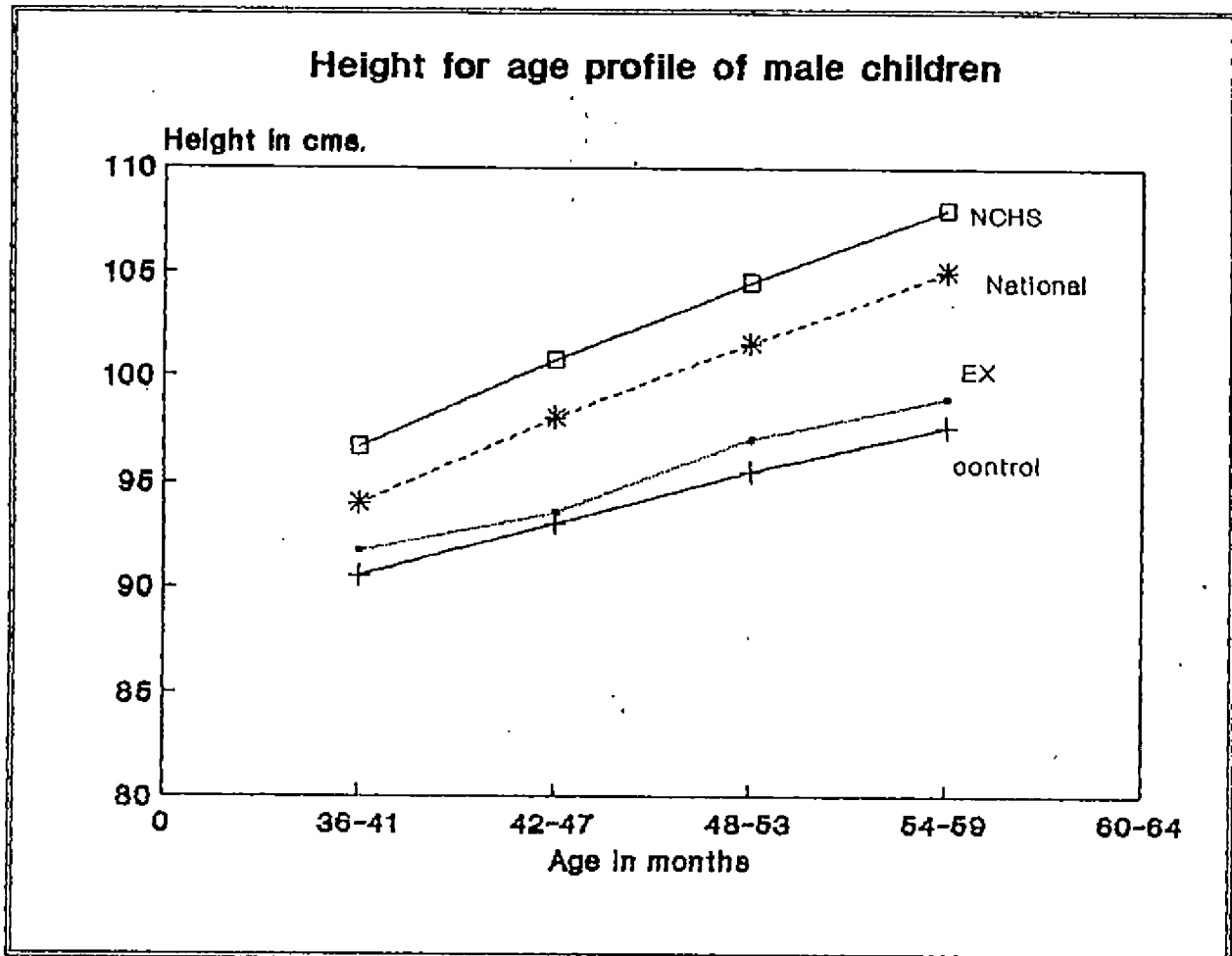


Figure 7.

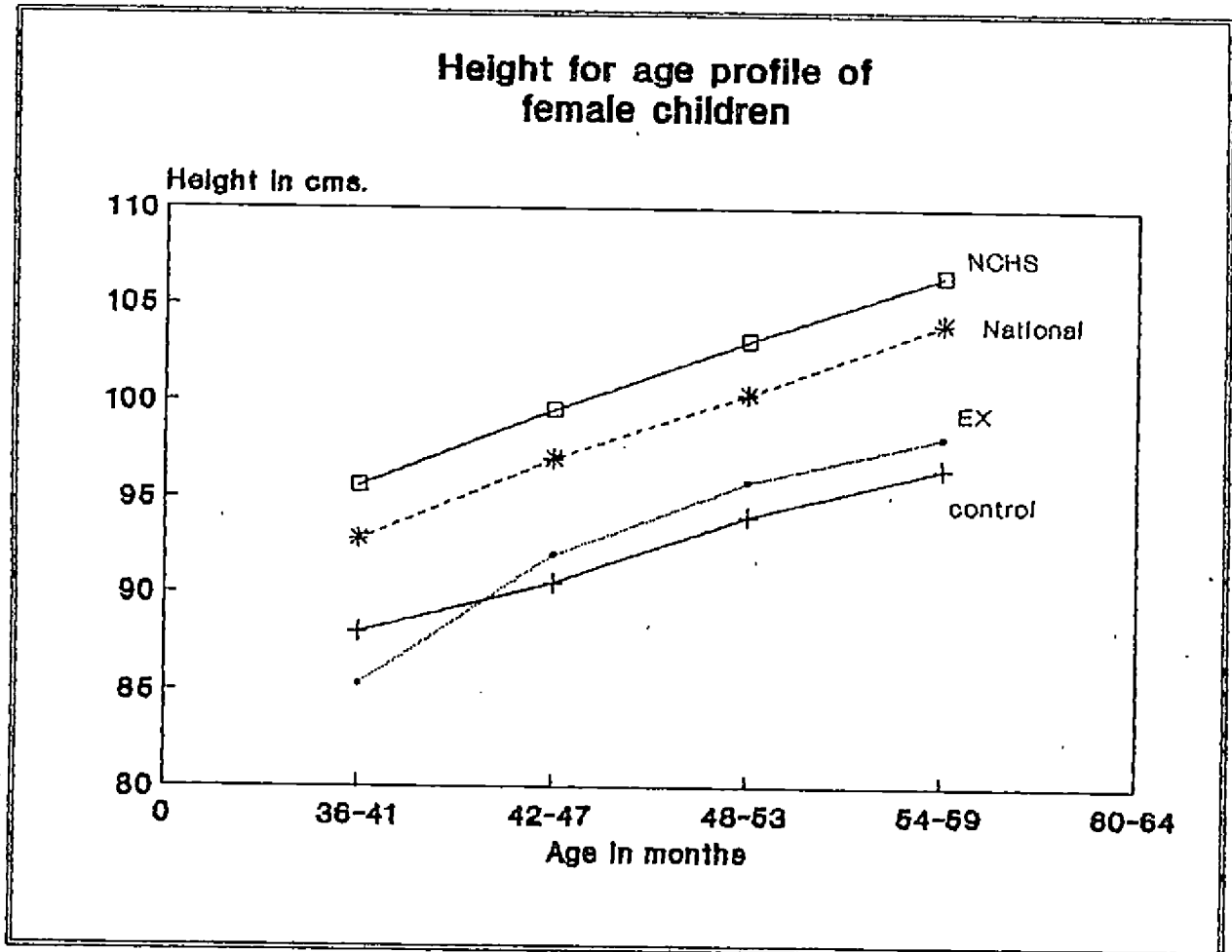


Table 57. Height for age profile of children in comparison with National and International standards

Age (in months)	Sex	Mean height for age (cm)		National standard (Shanti Ghosh 1986)	t value		Iner- national standard NCHS (1987)	t value	
		EG	CG		EG	CG		EG	CG
36-41	M	91.70(10)	90.50(4)	94.0	0.473(9)	2.020(3)	96.65	1.017	3.551*
	F	85.33(3)	88.0(3)	92.8	1.793(2)	1.101(2)	95.60	2.466	1.744
42-47	M	93.58(17)	93.00(3)	98.0	0.872(16)	1.387(2)	100.70	1.406	2.136
	F	91.95(11)	90.50(4)	97.0	0.924(10)	1.547(3)	99.48	1.378	2.136
48-53	M	97.04(19)	95.50(5)	101.5	1.480(18)	1.170(4)	104.48	2.470*	1.868
	F	95.81(25)	94.0(6)	100.3	0.815(24)	1.850(5)	103.08	1.248	2.666*
54-59	M	98.89(14)	97.6(3)	105.0	1.383(13)	2.400(2)	107.98	2.057	3.376
	F	98.09(14)	96.50(2)	104.0	1.627(13)	10.607(1)	106.45	2.301*	0.714*

Figures in paranthesis of column 3 and 4 denote number of children and that of 6 and 7 denote degrees of freedom

* Significant at 5 per cent level

Height for age of the preschool children, was further examined through analysis of variance technique taking together the factors viz. age, sex and treatments. Anova table is given in Appendix XIV.

The mean height for age of the four age groups are presented in Table 58.

Table 58. Height for age of the preschool children according to the age groups

Age in months	Mean height for age
36 - 41	88.88
42 - 47	92.23
48 - 53	95.58
54 - 59	97.77

C.D values

	A ₂	A ₃	A ₄
A ₁	2.6219	2.4424	2.6219
A ₂		2.0225	2.2360
A ₃			2.0225

Among preschool children an increasing trend in height with age was observed as per our expectation, evidenced from the 'F' value $F_{3, 124}=15.68^{**}$ (significant at 1 per cent level). Maximum height was obtained for the fourth age group 97.77 cms which was significantly different from all the other age groups.

From the Anova table, it was also found that height of the children of the experimental group did not differ significantly from that of control group. ($F_{1,124}=3.31$). Similarly height of the female children also not differ significantly from the female children. $F_{1,124}=3.18$.

Based on the height for age deficit, McLaren classified the stature of the children as dwarf, short and normal. This classification will give an insight about the nature of malnutrition. Percentage distribution of children according to their 'height for age' with the type of height deficit as specified by McLaren is presented in Table 59.

Table 59. Percentage distribution of the children according to the height for age with the degree of growth retardation

McLaren's classification	Experimental Group			Control Group		
	M	F	Total	M	F	Total
Normal 93 - 105%	58.30 (35)	70.00 (35)	63.60 (70)	60.00 (9)	53.00 (8)	56.60 (17)
Short 80 - <93	41.70 (25)	24.00 (12)	33.70 (37)	40.00 (6)	46.60 (7)	43.30 (13)
Dwarf <80	0.00 (0)	6.00 (3)	2.7 (3)	0.00 (0)	0.00 (0)	0.00 (0)
Total	(60)	(50)	(110)	(15)	(15)	(30)

Figures in parenthesis denote number of children

According to the classification suggested, 63.6 per cent of the children of the experimental group was found to have normal 'height for age' as against 56 per cent in the control group. Thirty three per cent children in the experimental group were identified as short as against 43 per cent in control group. Two per cent children in the experimental group were found to be dwarf whereas in the control group none were identified as dwarf. (Figure B).

4.4.3.1.4 Weight/height² profile of the children

Weight/height² is another index used to classify the children into different grades of malnutrition.

Table 60. Percentage distribution of the children according to the weight/height² profile

Weight/height ²	Experimental Group			Control Group		
	M	F	Total	M	F	Total
Normal >0.0015	5.00 (3)	6.00 (3)	5.45 (6)	0.00 (0)	0.00 (0)	0.00 (0)
Moderate malnutrition 0.0013 to 0.0015	65.00 (39)	56.00 (28)	60.90 (67)	6.66 (1)	33.33 (5)	20.00 (6)
Under nourished <0.0013	30.00 (18)	38.00 (19)	33.63 (37)	93.33 (14)	66.66 (10)	80.00 (24)
Total	(60)	(50)	(110)	(15)	(15)	(30)

Figures in parenthesis denote number of children

Figure 8.

**Stature of children as per height
for age**

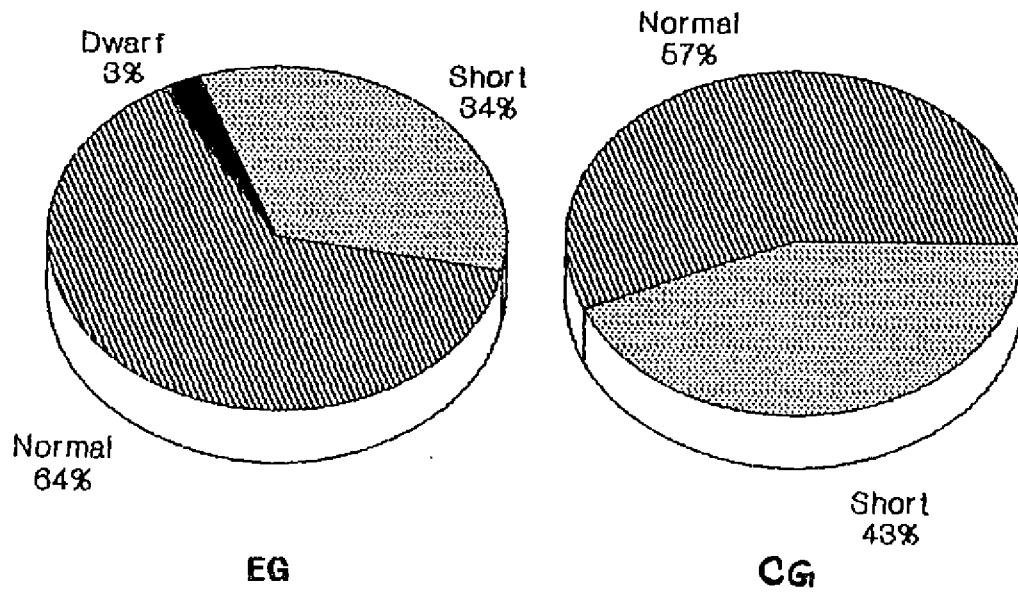
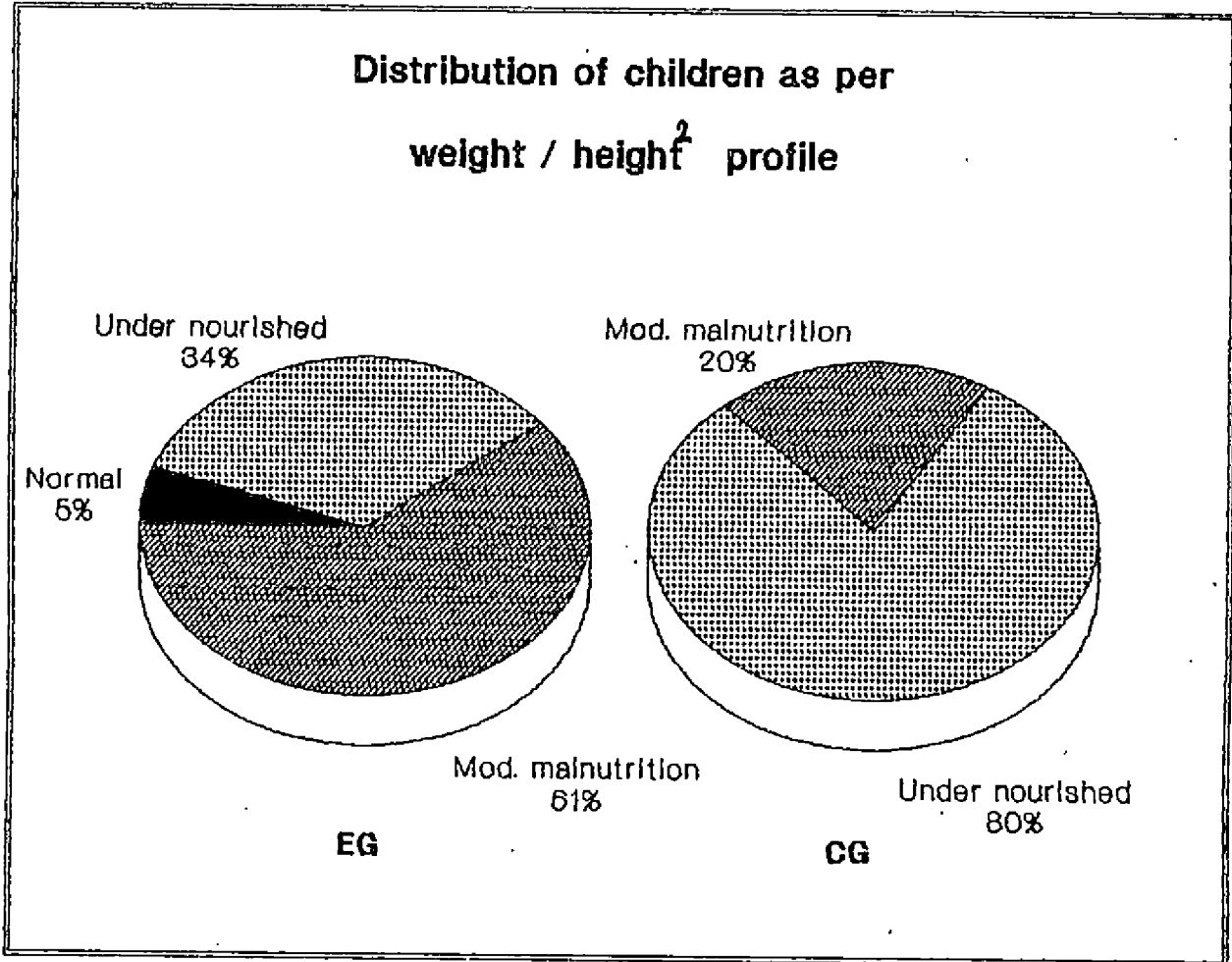


Figure 9.



Weight/height² profile was worked out for the two groups of the children and were classified accordingly, the details of which are presented in the above Table.

As revealed in the table (Figure 9), 5 per cent children in the experimental group and none in the control group were found to be normal. Sixty one per cent children in the experimental group, and 20 per cent in the control group were found to suffer from moderate malnutrition. The percentage of children having under nutrition were found to be 33 per cent in the experimental group and 80 per cent in the control group.

4.4.3.1.5 Mid-Upper Arm Circumference of the children

Mid upper arm circumference is used as an indicator for screening the severely malnourished children.

Mean mid upper arm circumference of the children of both groups are presented in Table 61.

Mean mid upper arm circumference of male and female children ranged between 15.2 to 15.8 cm and 14.5 to 15.5 cm respectively in the experimental group as against 14.4 to 15.6 cm and 14.5 to 15.5 cm in the control group (Figures 10 and 11).

Figure 10.

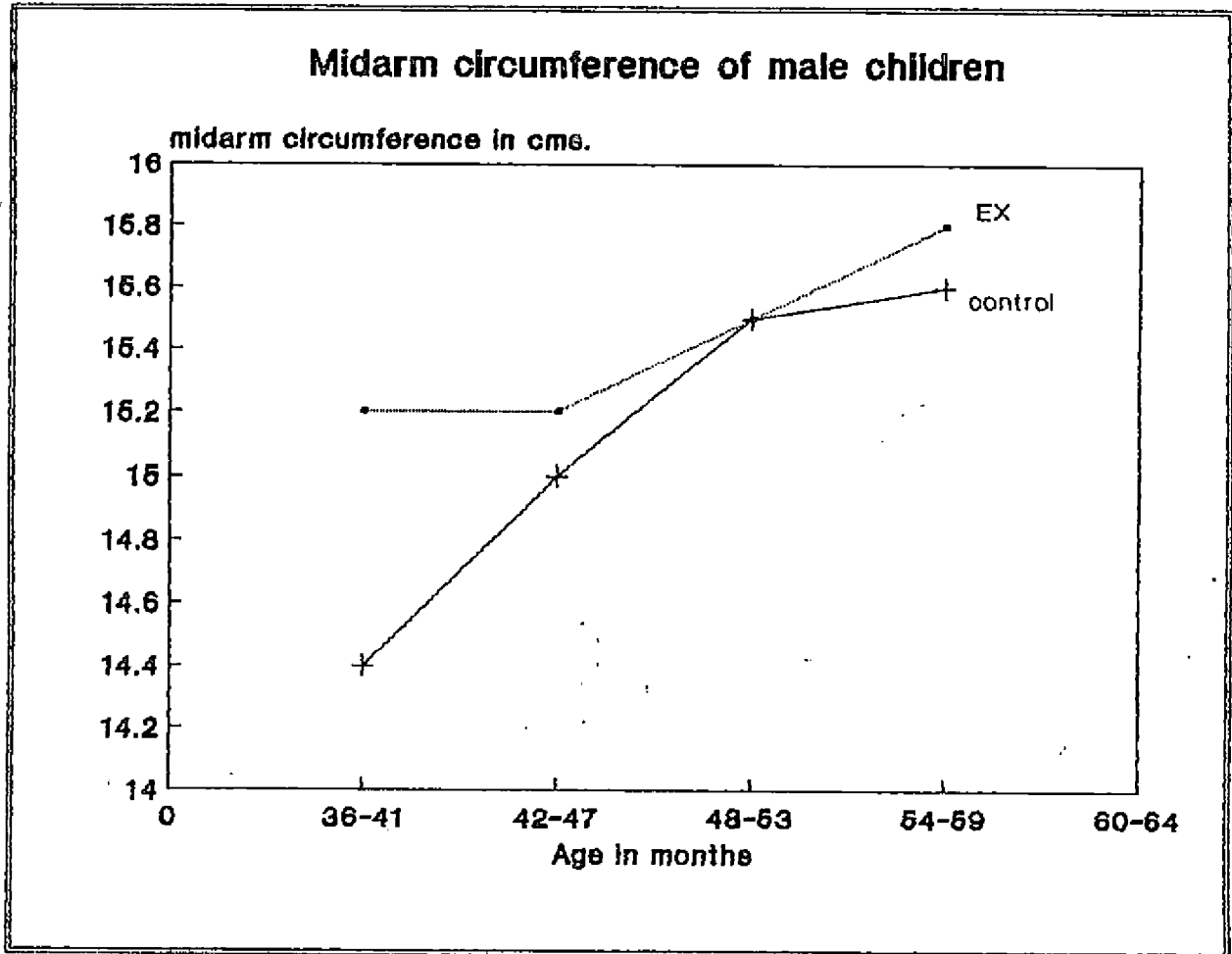


Figure 11.

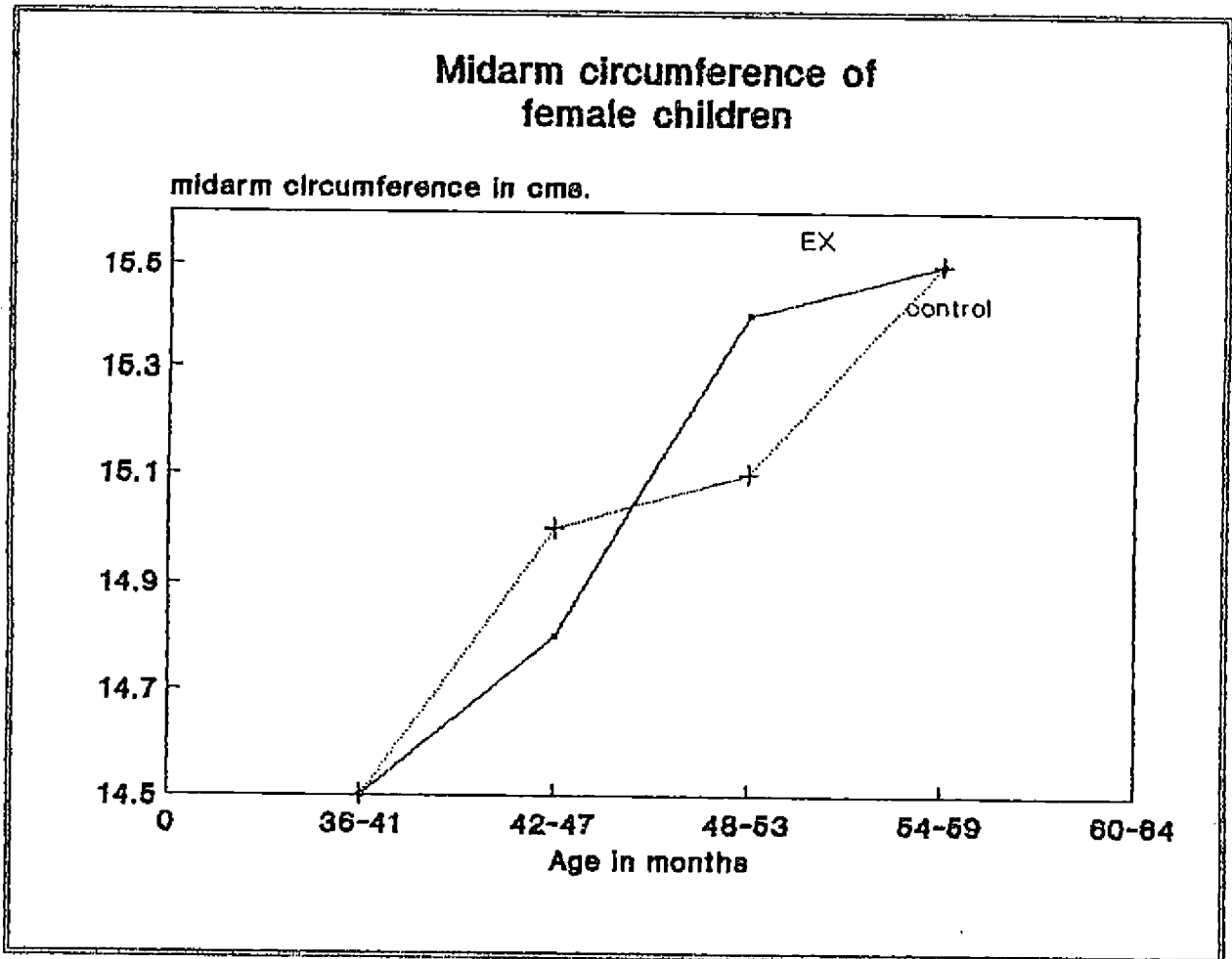


Table 61. Mean mid upper arm circumference of the preschool children

Age in months	Experimental Group		Control Group		Standard*	
	M	F	M	F	M	F
36 - 41	15.20 (10)	14.50 (3)	14.40 (4)	14.50 (3)	15.10	15.00
42 - 47	15.20 (17)	14.80 (11)	15.00 (3)	15.00 (4)	15.20	15.20
48 - 53	15.50 (19)	15.40 (25)	15.50 (5)	15.10 (6)	15.50	15.40
54 - 59	15.80 (14)	15.50 (11)	15.60 (3)	15.50 (2)	-	-

Figures in parenthesis denote number of children
*Eswaran (1981).

Percentage distribution of malnourished children based on the mid upper arm circumference is depicted in Table 62.

Majority of the children in both experimental and control groups (98 and 90 per cent respectively) were found to have mid arm circumference above 13.5 cm which is considered as normal. Moderate to severe malnutrition was observed in negligible per cent children in the experimental group (5 per cent) and almost double in the control group.

Table 62. Percentage distribution of malnourished children according to the mid upper arm circumference

Mid arm circumference cm	Respon- dents	Age in months								Total	
		36-41		42-47		48-53		54-59		M	F
		M	F	M	F	M	F	M	F	M	F
Severe malnutrition <12.5	EG	0.00 (0)	2.00 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	2.00 (1)
	CG	0.00 (0)	0.00 (0)	6.67 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	6.67 (1)
Moderate malnutrition 12.5-13.5	EG	1.66 (1)	0.00 (0)	0.00 (0)	2.00 (1)	1.66 (1)	4.00 (2)	0.00 (0)	0.00 (0)	3.83 (2)	6.00 (3)
	CG	13.33 (2)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	13.33 (2)	0.00 (0)
Normal >13.5	EG	15.00 (9)	4.00 (2)	28.33 (17)	20.00 (10)	30.00 (18)	46.00 (23)	23.33 (14)	22.00 (11)	96.67 (56)	92.00 (46)
	CG	13.33 (2)	20.00 (3)	13.33 (2)	26.67 (4)	33.33 (5)	40.00 (6)	20.00 (3)	13.33 (2)	80.00 (12)	100.00 (15)

Figures in parenthesis denotes number of children

Mid arm circumference of the children were further statistically analysed (Anova table appended XV), and the mean arm circumference of the children of the four age groups are presented in Table 63.

It is clear from the table that there is significant difference $F_{3,124}=2.81$ (significant at 5 per cent level) between the four age groups as far as the MUAC is concerned. The maximum value was recorded for the fourth age group (15.65 cm) which was significantly different, only from the first age group (36 to 41 months).

Table 63 Mean mid arm circumference of the children as per age group

Age group	Mean mid arm circumference (cm)
36 - 41	14.63
42 - 47	15.15
48 - 53	15.35
54 - 59	15.65

C.D values

	A ₂	A ₃	A ₄
A ₁	0.6799	0.6336	0.6799
A ₂		0.5245	0.5798
A ₃			0.5245

MUAC of the experimental group was not significantly different from the control group ($F_{1,124}=0.18$) similarly no significant difference was noted in the arm circumference between the sexes ($F_{1,124}=0.99$). None of the interaction effect was found to be significant.

4.4.3.1.6 Head chest circumference ratio of the children

Head/chest circumference ratio was also applied for identifying the normal and malnourished children in the study group.

Percentage distribution of children according to head/chest circumference ratio is presented in Table 64.

Table 64 Percentage distribution of the children according to Head/chest circumference ratio

Head/chest circumference	Experimental Group		Control Group	
	M	F	M	F
Normal <1	90.00 (54)	86.00 (43)	80.00 (12)	66.67 (10)
Malnourished >=1	10.00 (6)	14.00 (7)	20.00 (3)	33.33 (5)

Figures in paranthesis denote number of children

From the above table, it is obvious that 88 per cent of the children in the experimental group and 73 per cent in the control group were found to be normal. According to the head/chest circumference ratio malnourished children identified was 12 per cent in the experimental group and 26.5 per cent in the control group.

4.4.3.2 Anthropometric measurements of pregnant and lactating mothers

Anthropometric measurements viz. weight, height, and body mass index, are valuable tools for assessing the state of malnutrition among pregnant and lactating mothers. Body weight of the pregnant mother influences the outcome of pregnancy. Similarly good nutritional status is essential for successful lactation.

4.4.3.2.1 Weight profile of pregnant and lactating mothers

In the present study weight and height of the pregnant and lactating mothers were assessed.

Weight profile of pregnant and lactating mothers are depicted in Table 65.

Table 65. Weight profile of pregnant and lactating mothers

Type of Beneficiary	Mean weight (in kg)	
	EB	CB
Pregnant mothers		
Stage of pregnancy	39.00	40.00
First trimester	(3)	(3)
Second trimester	45.00	40.00
	(21)	(13)
Third trimester	46.00	44.00
	(6)	(4)
Lactating mothers	47.00	43.00
	(30)	(20)

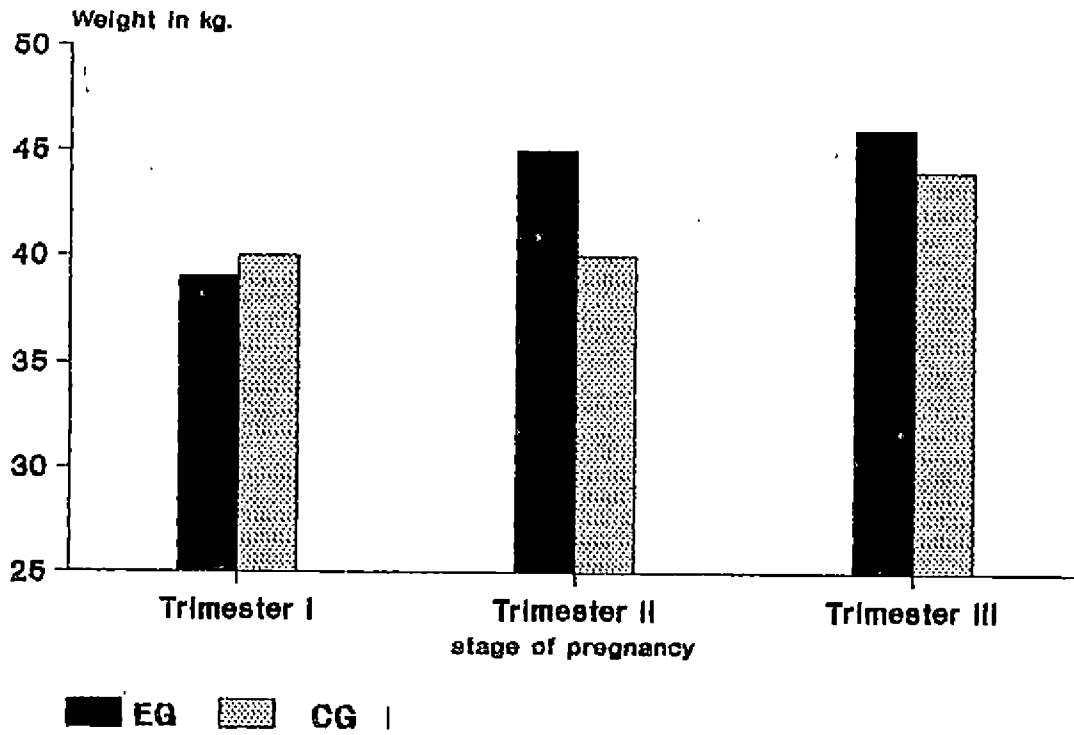
Figures in parenthesis denote number of mother beneficiaries.

Weight profile of the pregnant mothers at different stages of pregnancy indicated Table 7 (Figure 12) that mean weight of the pregnant mothers in the 1st trimester was 39 kg for the experimental group as against 40 kg for the control group. Mean weight of pregnant mothers during the second trimester was 45 kg in the

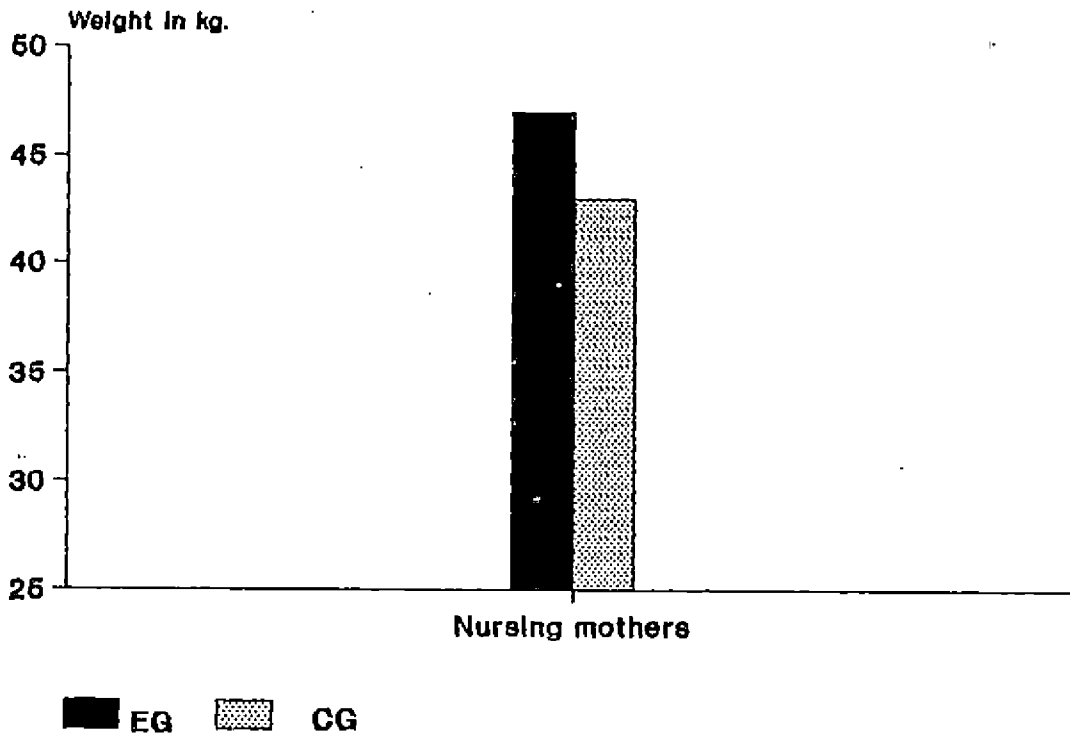


Figure 12.

Weight profile of pregnant mothers



Weight profile of Nursing mothers



experimental group and 44 kg in the control group. Mean weight of the pregnant mothers during the third trimester was 46 kg in the experimental group while for control group, mean weight was 44 kg.

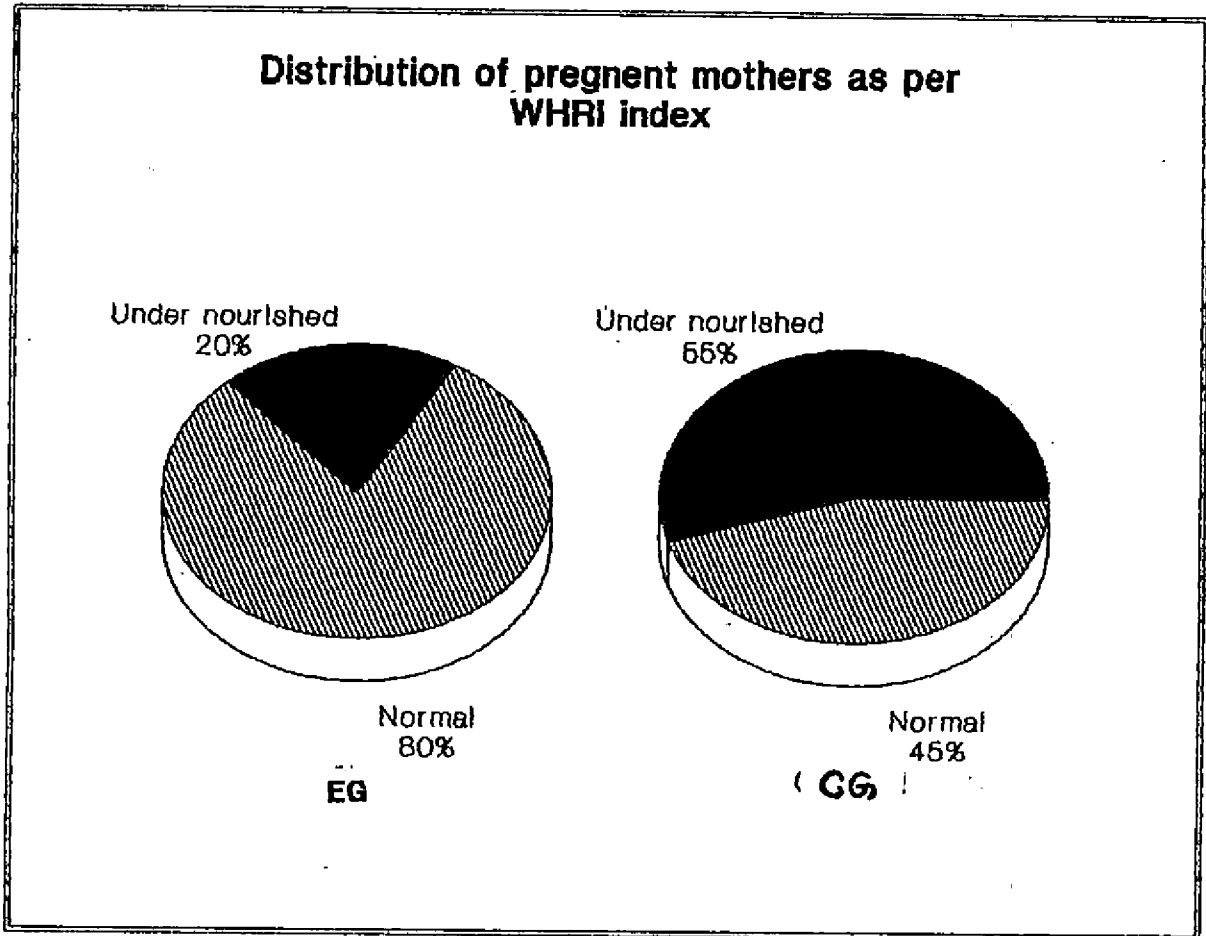
With regard to the weight profile of the lactating mothers, mean weight of the experimental group was 47 kg as against 43 kg in the control group. Observed weight profile of the lactating mothers of both experimental and control group were below the Indian standard.

4.4.3.2.2 Maternal Weight for Height Ratio Index (WHRI)

Maternal weight for height ratio index has been used as a nutritional indicator during pregnancy and also has been related to the birth weight of the off springs (Beal, 1971 a and b; Reddy, 1977; Gueri, 1982 and Bhatia, 1983). Increase in WHRI is also associated with decreased incidence of low birth weight babies (Bhatia, 1989).

Hence maternal weight for height, ratio index of the pregnant mothers of the experimental and control groups were computed. The mean value obtained for maternal weight for height ratio index of the pregnant mothers of the experimental group was 0.190 while that of control group was 0.180. Reddy *et al.* (1977) used WHRI value below 0.180 to classify mothers as undernourished during pregnancy.

Figure 13.



Distribution of pregnant mothers according to the maternal weight for height ratio index is presented in Table 66.

Table 66 Percentage distribution of the pregnant mothers according WHRI index

WHRI	Pregnant Mothers	
	EG	CG
Under nourished <0.180	20.00 (6)	55.00 (11)
Normal >=0.180	80.00 (24)	45.00 (9)

Figures in parenthesis denote number of pregnant mothers.

As indicated in Table 66 (Figure 13) twenty per cent pregnant mothers of the experimental group was considered as under nourished as against 55 per cent in the control group. The percentage of normal pregnant mothers were found to be 80 per cent in the experimental group and 45 per cent in the control group.

4.4.3.2.3 Height profile of the pregnant and lactating mothers

Height profile of the pregnant and lactating mothers are presented in Table 67.

As revealed from the table, mean height of the pregnant mothers of the experimental group was 152 cm while that of control group was 153 cm.

Table 67 Height profile of the pregnant and lactating mothers

Type of Beneficiary	Mean height (cm)		Standard NNNB (cm)
	EG	CG	
Pregnant mothers	152.00 (30)	153.00 (2)	150.8
Lactating mothers	153.00 (30)	151.00 (20)	

(Figures in paranthesis denote number of mothers)

In the case of lactating mothers the mean height was 153 cm for the experimental group and 151 cm for the control group.

In the two categories of beneficiaries, the observed height profile of both the experimental and control groups was found to be below the standard height for the Indian women.

4.4.3.2.4 Body mass index of pregnant and lactating mothers

Body Mass Index (BMI) can be used as a good parameter to grade Chronic Energy Deficiency (CED), and the nutritional status in adults (Nutrition News, 1991). It was also found that normal BMI of pregnant women is associated with better outcome of pregnancy and helps to overcome the risk of low birth weight of infants.

Body mass index of the pregnant and lactating mothers is presented in Table 68.

Table 68. Percentage distribution of the mothers based on body mass index

*Classes of malnutrition	PM		LM	
	EG	CG	EG	CG
(Chronic energy deficiency-CED (II) severe <16.0	3.33 (1)	10.00 (2)	0.00 (0)	0.00 (0)
(CED II, Moderate) 16.0 - 17	6.67 (2)	25.00 (5)	6.67 (2)	20.00 (4)
(CED I, Mild) 17.0 -18.5	6.67 (2)	20.00 (4)	13.33 (4)	40.00 (8)
(Low weight) 18.5 - 20.0	56.67 (17)	20.00 (4)	30.00 (9)	25.00 (5)
Normal >20	26.67 (8)	25.00 (5)	60.00 (15)	15.00 (3)
Total	30	20	30	20

Figures in parenthesis denote number of mother beneficiaries.
* Source Nutrition News (1991)

As indicated in Table 68 (Figures 14 and 15) beneficiaries with chronic energy deficiency was observed to be 3 per cent in pregnant mothers of the experimental group as against 10 per cent in the control group. None of the lactating mothers (experimental and control groups) was found in the chronic energy deficient group. Mild to

Figure 14.

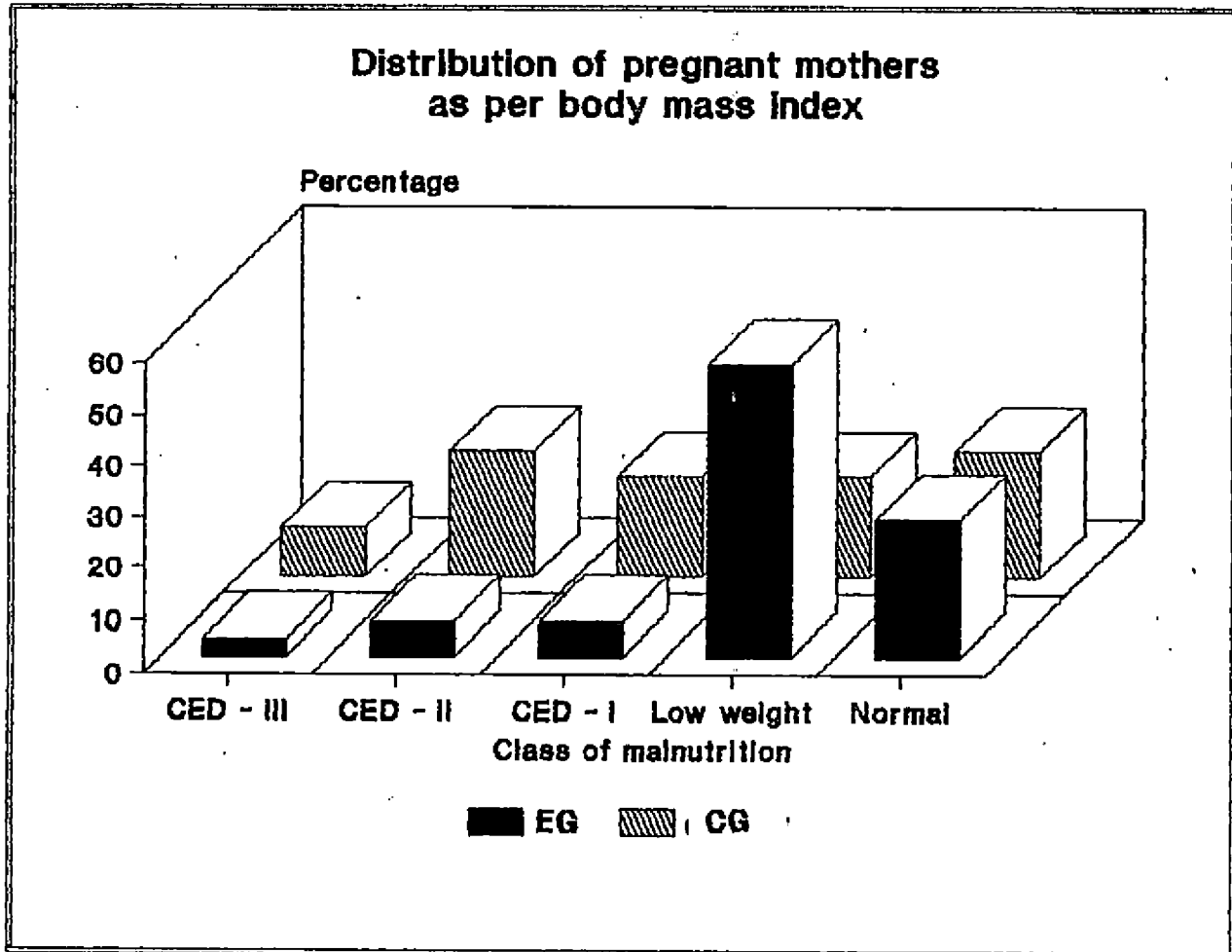
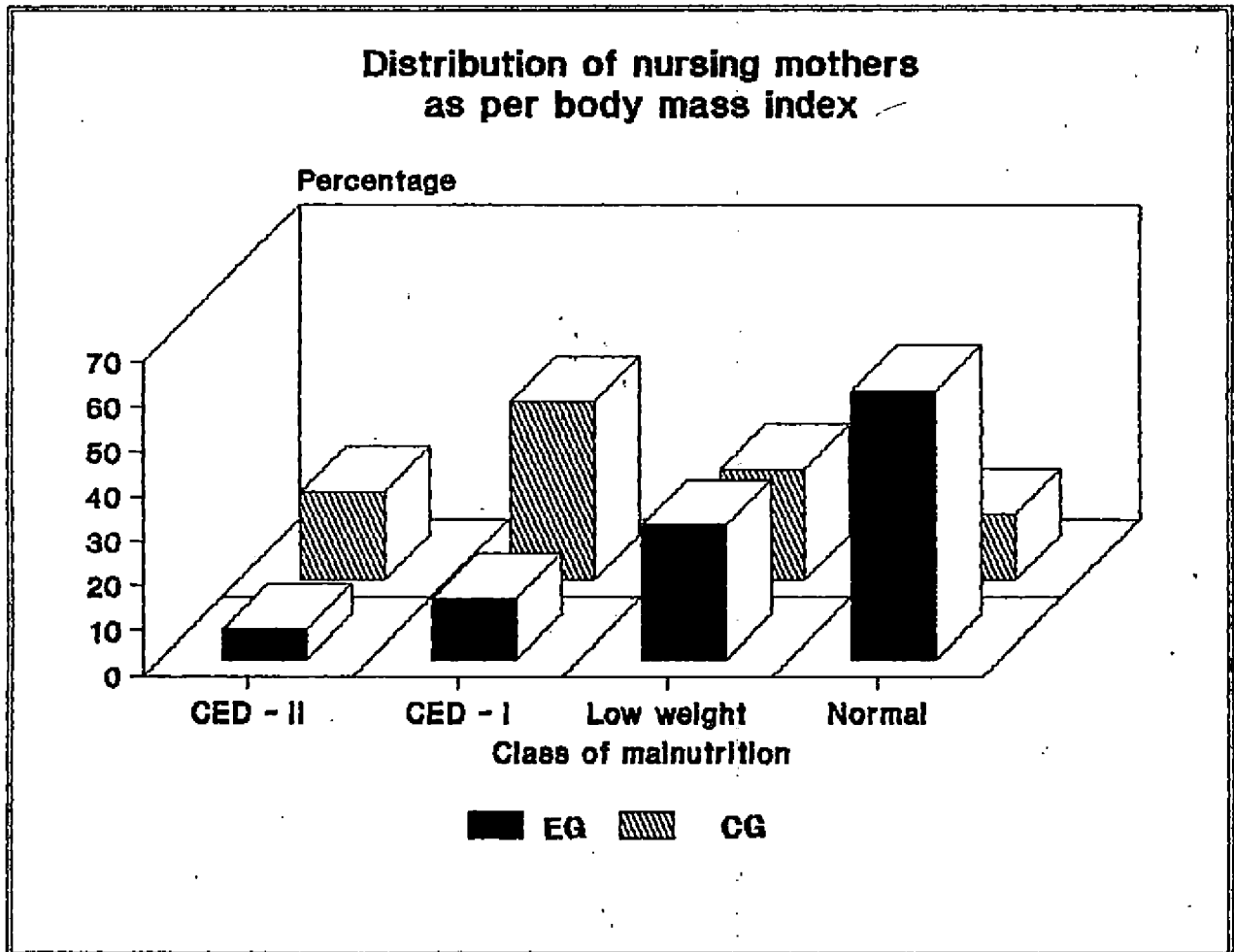


Figure 15.



moderate energy deficiency was observed in 13 per cent pregnant mothers of the experimental group while it was 45 per cent in the control group. In lactating mothers, mild to moderate energy deficiency, observed in the experimental and control groups were 20 and 60 per cent respectively. The percentage of mothers coming in the group of 'low weight' was 56 per cent in pregnant mothers of experimental group, 20 per cent in the control group and 30 per cent in the lactating mothers of the experimental group as against 25 per cent in the control group. Percentage of mothers in the normal range of BMI was 26 and 25 per cent respectively in pregnant mothers of the experimental and control groups and 60 per cent and 15 per cent respectively in the lactating mothers of the experimental and control groups.

4.4.4 Clinical assessment of the respondents

Clinical examination of the study group for changes related to inadequate nutrition is useful for revealing information on their current nutritional status.

Clinical symptoms observed in the experimental and control groups were scored based on the manifestation for each deficiency and thus the total score obtained by each individual in the study group was assessed. A comparison of the percentage scores obtained by the two groups are presented in Table(69).

Table 69. Percentage distribution of the respondents based on the clinical assessment

Percentage score	Experimental Group				Control Group			
	P	PM	LM	Total	P	PM	LM	Total
100	36.3 (29)	20.00 (6)	23.33 (7)	24.71 (42)	23.33 (7)	15.00 (3)	20.00 (4)	20.00 (14)
97 - 99	43.64 (48)	50.00 (15)	46.66 (14)	45.29 (77)	33.33 (10)	25.00 (5)	40.00 (8)	32.86 (23)
96 - 94	15.45 (17)	16.67 (5)	16.67 (5)	15.88 (27)	20.00 (6)	15.00 (3)	25.00 (5)	20.00 (14)
<94	14.55 (16)	13.33 (4)	13.33 (4)	14.12 (24)	3.33 (7)	45.00 (9)	15.00 (3)	27.14 (19)
Total	(110)	(30)	(30)	(170)	(30)	(20)	(20)	(70)

Figures in parenthesis denote number of respondents.

As indicated in (Table 69) maximum score was obtained by 26 and 23 per cent pre-school children respectively in the experimental and control group. Maximum score obtained by the pregnant and lactating mothers of the experimental group was 20 and 23 per cent respectively as against 15 and 20 per cent in the control group. A percentage of 97 to 99 was secured by 43 per cent children of the experimental group where as it was only 33 per cent in the control group. The above score was obtained by 50 and 46 per cent respectively by the pregnant and lactating mothers of the experimental group as against 25 and 40 per cent in the control group.

Ninety six to 94 per cent of score was secured by 15 per cent preschool children of the experimental group whereas 20 per cent children of the control group were found to be in the above percentage score. The percentage of pregnant and lactating mothers in the percentage score range of 96 to 94 was found to be 16 per cent each in the experimental group and 15 and 25 per cent respectively in the control group. The percentage score below 94 was obtained by 14 per cent of preschool children and 13 per cent each by the pregnant and lactating mothers of the experimental group as against 23, 45 and 15 per cent respectively in the control group.

Table 70. Comparison of the clinical scores of the respondents

Type of beneficiary	Mean value for clinical score		't _n ' value
	EG	CG	
Preschool			
M	65.70	64.70	t ₇₃ 1.39
F	66.00	65.50	t ₆₃ 0.80
Pregnant mothers	66.00	64.30	t ₄₈ 2.53*
Lactating mothers	66.10	65.70	t ₄₈ 0.67

* Significant at 5 per cent level

Clinical score obtained by the respondents of the experimental and control groups when tested statistically

(Table 70), significant difference was observed in the pregnant mothers however the mean values obtained by all the other categories of the beneficiaries were higher than the control group.

Table 71. Percentage distribution of the respondents based on the clinical manifestations

Deficiency diseases	Experimental Group				Control Group			
	P	PM	LM	Total	P	PM	LM	Total
Vitamin A deficiency								
Xerosis of conjunctive dry and wrinkled skin	9.09	10.00	6.67	8.82	23.33	30.00	20.00	27.14
Folliculosis	(10)	(3)	(2)	(15)	(7)	(6)	(4)	(19)
Vitamin B complex deficiency	8.18	16.67	10.00	10.00	16.67	50.00	15.00	25.71
Angular stomatitis	(9)	(5)	(3)	(17)	(5)	(10)	(3)	(18)
Vitamin C deficiency								
Spongy and bleeding gums	3.64	0.00	0.00	2.35	6.67	15.00	5.00	8.57
	(4)	(0)	(0)	(4)	(2)	(3)	(1)	(6)
Anaemia	7.27	23.33	30.00	14.12	23.33	50.00	50.00	38.57
	(8)	(7)	(9)	(24)	(7)	(10)	(10)	(27)
Non Nutritional diseases								
Dental caries and tooth decay	48.18	23.33	40.00	38.82	53.33	45.00	40.00	47.14
	(53)	(1)	(12)	(66)	(10)	(9)	(8)	(33)
Fluorosis	10.00	0.00	6.67	7.65	13.33	10.00	10.00	11.43
	(11)	(0)	(2)	(13)	(4)	(2)	(2)	(8)
Scabies	4.55	0.00	0.00	2.94	10.00	0.00	0.00	4.29
	(5)	(0)	(0)	(5)	(3)	(0)	(0)	(3)

Figures in parenthesis denote number of respondents.

Various signs and symptoms of deficiency diseases observed in the study group are presented in Table 71 (Figures 16 to 18). Symptoms of vitamin A deficiency such as xerosis of conjunctiva, dry and wrinkled skin, folliculosis were observed in 9 per cent preschool children of the experimental group as against 23 per cent in the control group. Ten and 6 per cent respectively of pregnant, and lactating mothers, exhibit vitamin A deficiency symptoms as against 30 and 20 per cent respectively in the control group. Angular stomatitis was found to be 8 per cent in the preschool children of the experimental group whereas it was 16 per cent in the control group. Similarly the occurrence of angular stomatitis in pregnant and lactating mothers was 16 and 10 per cent respectively in the experimental group, and 30 and 15 per cent respectively in the control group.

Spongy and bleeding gums, a symptom of vitamin C deficiency was observed 3 per cent in the pre-school children of the experimental group as against 6 per cent in the control group. The above deficiency was absent in pregnant and lactating mothers of the experimental group whereas it was 15 and 5 per cent respectively in the pregnant and lactating mothers of the control group.

Symptoms of anaemia was exhibited in 7 per cent children of the experimental group against 23 per cent in

Figure 16.

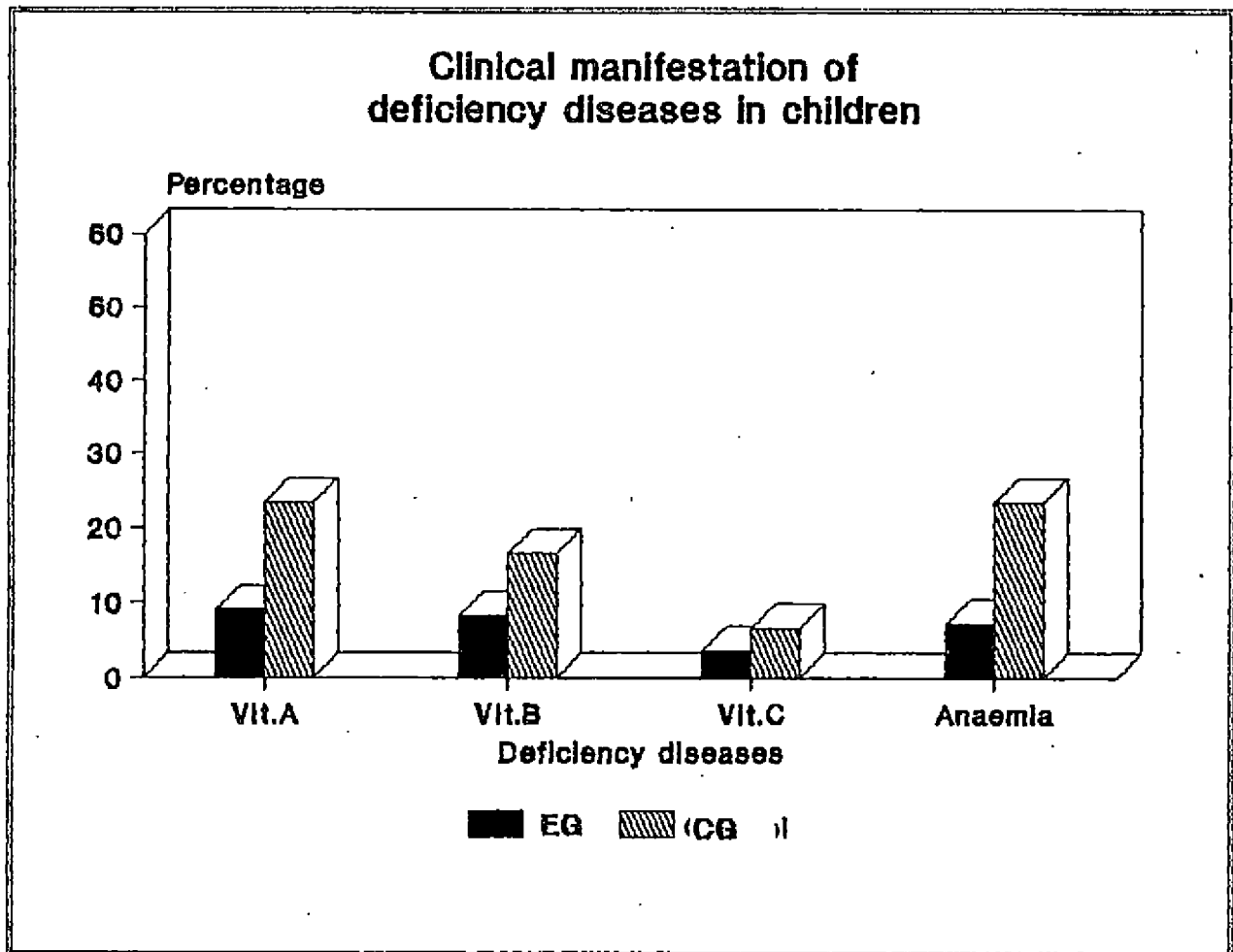


Figure 17.

Clinical manifestation of deficiency diseases in pregnant mothers

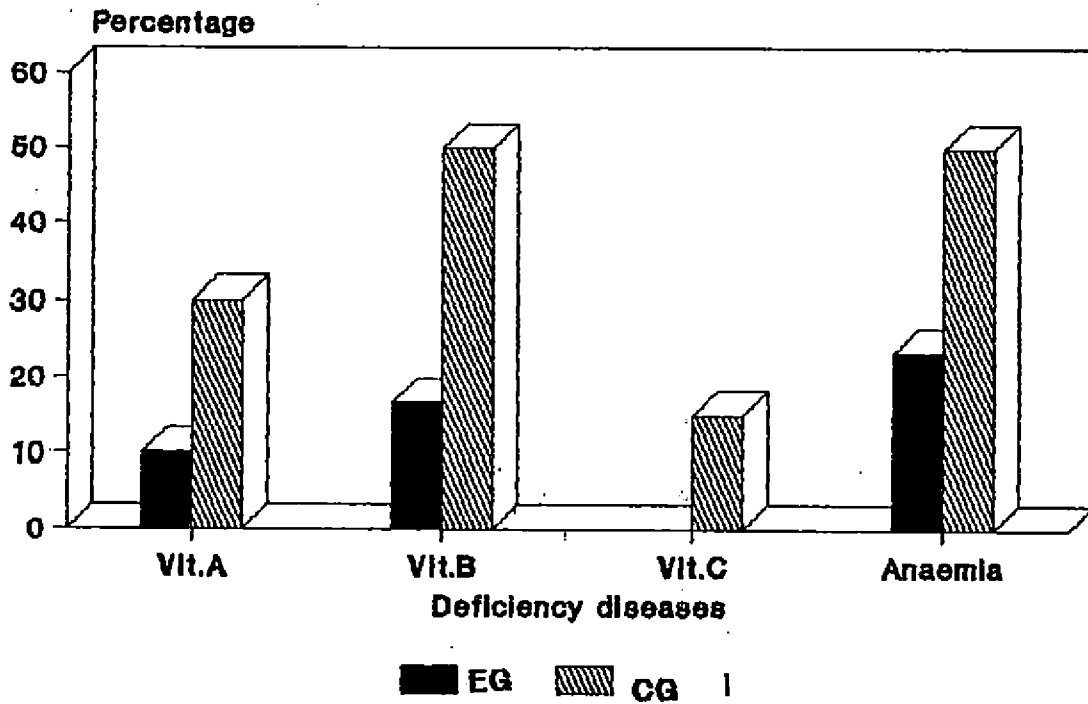
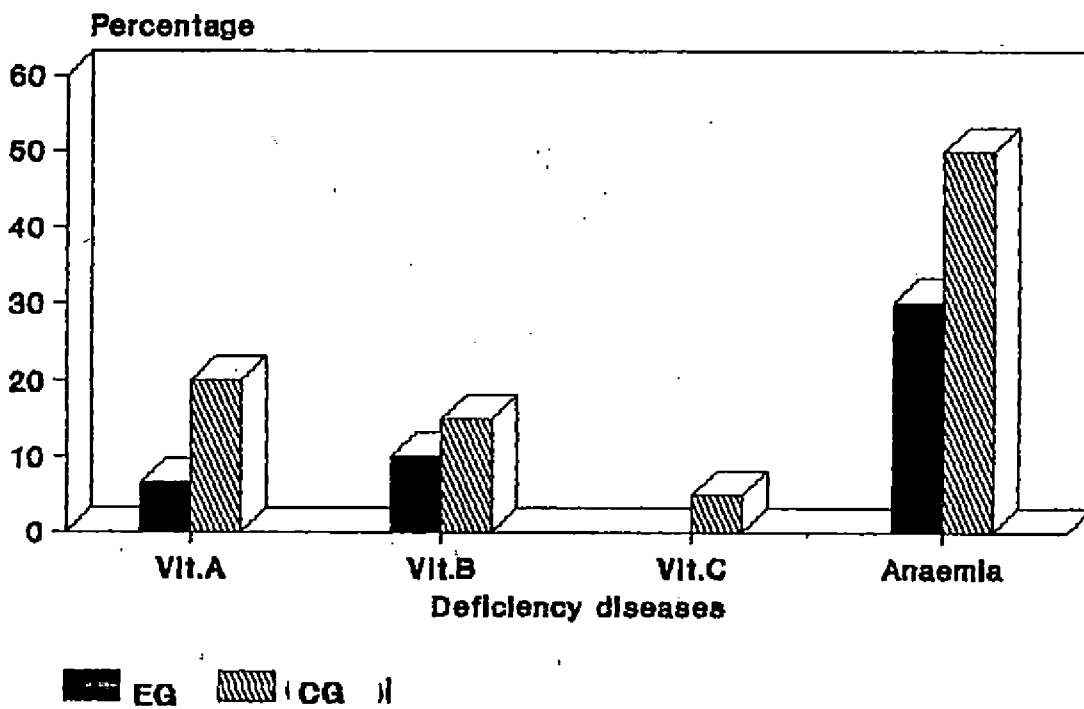


Figure 18.

Clinical manifestation of deficiency diseases in nursing mothers



the control group. The occurrence was more in pregnant and lactating mothers belonging to both the experimental and control groups (23 and 50 per cent respectively in pregnant mothers of the experimental and control groups and 30 and 50 per cent respectively in the lactating mothers of the experimental and control groups).

Apart from the above vitamin deficiencies, dental caries and tooth decay was noticed considerably high in both the experimental and control groups (48, 23 and 40 per cent respectively in the preschool, pregnant and lactating mothers of the experimental group as against 53, 45 and 40 per cent respectively in the control group).

Fluorosis was another non nutritional disease observed in the pre-schoolers (10 and 13 per cent respectively in the experimental and control groups) lactating mothers (6 and 10 per cent respectively) and pregnant mothers (10 per cent in the control group and absent in the experimental group). Scabies was also found in 4.5 per cent preschool children of the experimental group whereas it was 10 per cent in the control group.

4.4.5 Assessment of biochemical parameters of the respondents

Biochemical indicators represent the most objective assessment of the nutritional status of an

individual, providing pre or sub clinical informations. Nutrient intakes are reflected in their levels present in blood, serum and urine and these biochemical changes often precede the clinical symptoms. Hence they may be used as early indicators of malnutrition.

Results of the assessment of haemoglobin levels of the preschool children belonging to the experimental and control groups as furnished in Table 72.

Table 72. Percentage distribution of the preschool children based on haemoglobin levels

Haemoglobin levels	Experimental Group			Control Group		
	M	F	Total	M	F	Total
>11 g/dl (Normal)	53.33 (32)	64.00 (32)	58.18 (64)	26.67 (4)	20.00 (3)	23.33 (7)
10 to 10.9 g/dl (Low)	21.67 (13)	18.00 (9)	20.00 (22)	40.00 (6)	33.33 (5)	36.67 (11)
<10 g/dl (Deficient)	25.00 (15)	18.00 (9)	21.82 (24)	33.33 (5)	46.67 (7)	40.00 (12)
Total	(60)	(50)	(110)	(15)	(15)	(13)

Figures in parenthesis denote number of children.

As it is evident from Table 72, 58.1 per cent of the preschool children in the experimental group and 23.3 per cent in the control group were found to have normal levels of haemoglobin, 20 per cent and 36 per cent children respectively in the experimental and control groups had

haemoglobin levels between 10 to 10.91 g/100 ml of blood, which is indicative of slightly low levels, while 21 per cent of the preschool children in the experimental group and almost double in the control group had deficient levels of haemoglobin (less than 10 g/100 ml).

Haemoglobin levels of the pregnant mothers having normal value (>11 g/100 ml) were found to be 66.7 per cent in the experimental group whereas it was 40 per cent in the control group (Table 73). Similarly 70 per cent of the lactating mothers had haemoglobin levels above 12 g/100 ml which is indicative of normal level as against 45 per cent in the control group.

Table 73. Percentage distribution of the pregnant and lactating mothers based on haemoglobin levels

Haemoglobin levels	EG	CG
Pregnant mothers	66.67	40.00
>11 g/dl	(20)	(8)
<11 g/dl	33.33 (10)	60.00 (12)
Lactating mothers	70.00	45.00
>12 g/dl	(21)	(9)
<12 g/dl	30.00 (9)	55.00 (11)

Figures in parenthesis denote number of beneficiary.

Haemoglobin levels of the three categories of the beneficiaries were analysed statistically (Table 74).

Results indicated that, haemoglobin levels of the female preschool children and that of pregnant mothers of the experimental group were significantly higher than their counter parts in the control group. Mean values obtained for all the three groups of beneficiaries in the experimental group were found to be higher than the control group.

Table 74. Comparison of the haemoglobin levels of the respondents

Type of beneficiary	Mean haemoglobin values		't _n ' value
	EG	CB	
Preschool			
M	10.80	10.30	t ₇₃ 1.59
F	11.00	9.90	t ₆₃ 2.95*
Pregnant mothers	12.00	10.90	t ₄₈ 2.56*
Lactating mothers	12.10	11.50	t ₄₈ 1.97

* Significant at 5 per cent level

No single biochemical indicator can satisfactorily evaluate protein calorie malnutrition in early or sub clinical states. Serum total protein and serum albumin levels are considered as a good index for estimating protein energy malnutrition, and also to determine the severity of the disease.

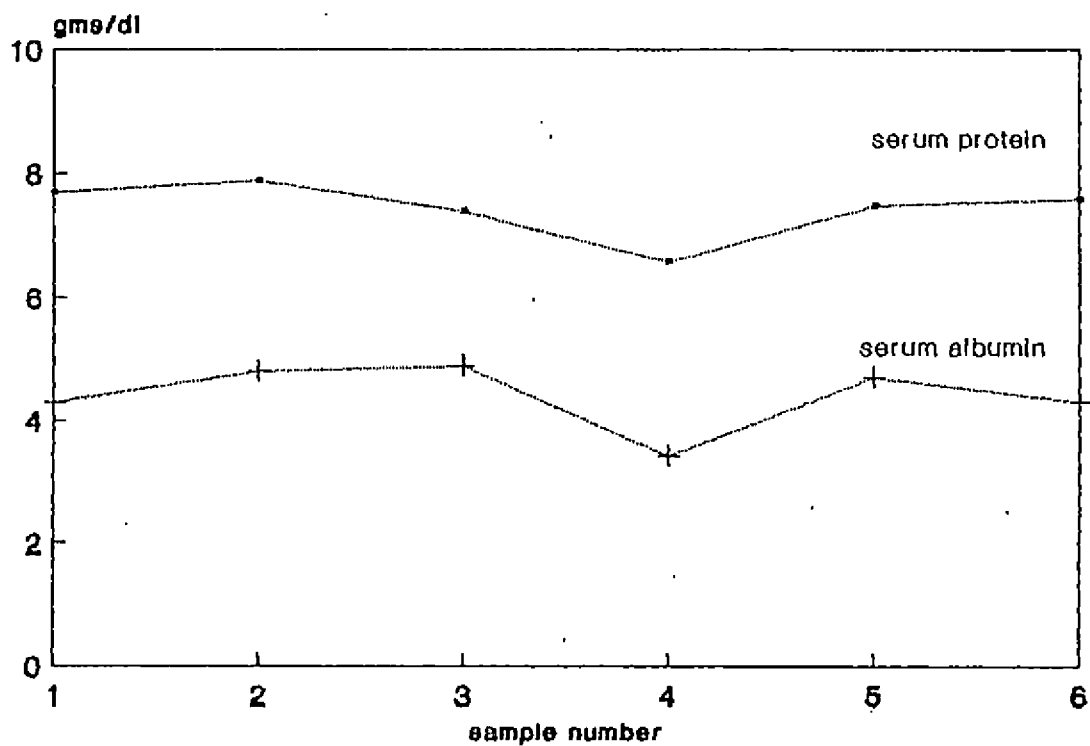
Detailed biochemical investigations viz. estimation of total serum protein and serum albumin were carried out in venous blood, drawing a sub sample of 6 respondents each from male and female preschool children, and 5 each from pregnant and lactating mother beneficiaries of the experimental group, the individual values of which are presented graphically (Figures 19 a, b, 20 and 21).

Table 75. Biochemical parameters of the respondents

Biochemical parameters	Observed value in ranges g/100ml	*Acceptable low risk limits g/100ml
<u>Serum protein</u>		
Preschool children		
M	6.60 - 7.90	>5.00
F	6.10 - 7.60	
Pregnant mothers	8.00 - 8.50	>6.00
Lactating mothers	8.00 - 9.80	>6.50
<u>Serum Albumin</u>		
Preschool children		
M	3.40 - 4.90	>3.00
F	3.20 - 4.70	
Pregnant mothers	3.90 - 4.90	>3.50
Lactating mothers	3.50 - 6.00	>3.50

* Source Tara Gopaldas (1987)

Figures 19a&b.

Serum protein and albumin levels
in pre school children
MALE (a)

D

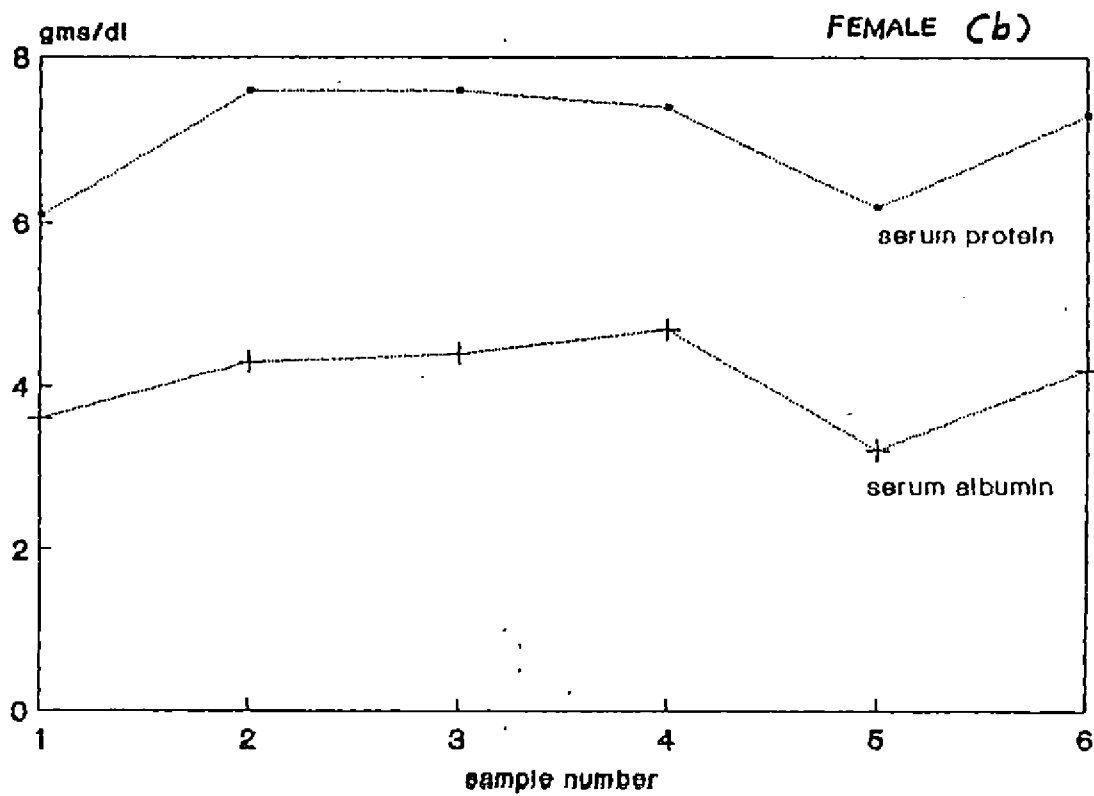


Figure 20. Serum protein and albumin levels in pregnant mothers

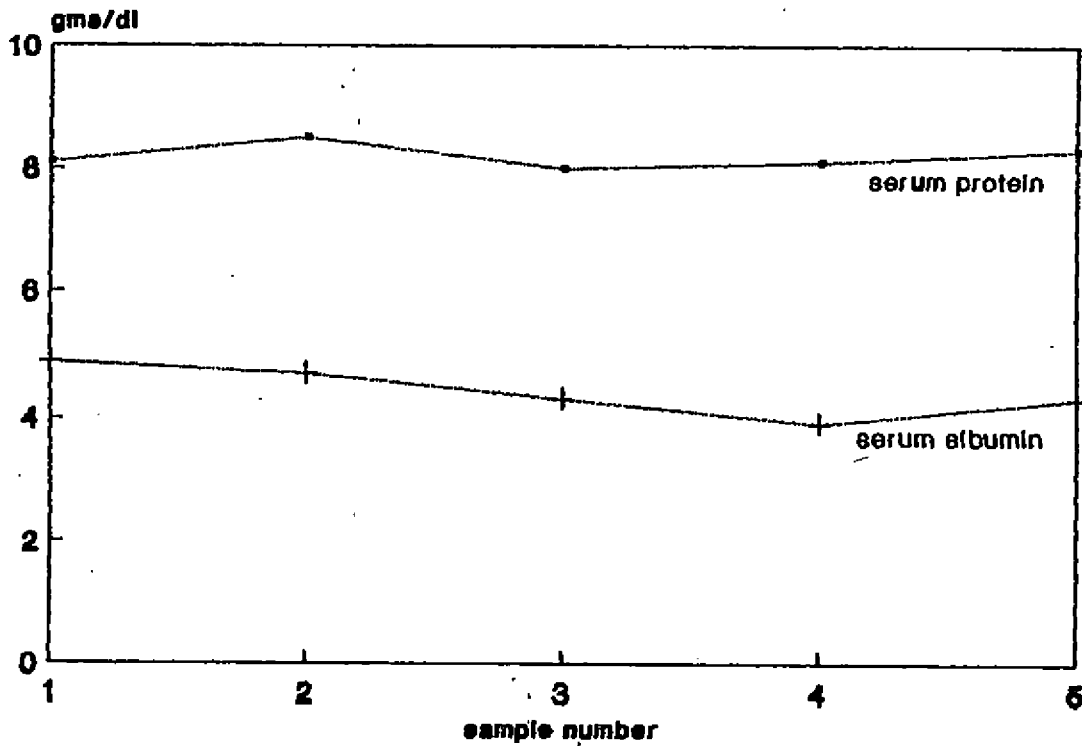
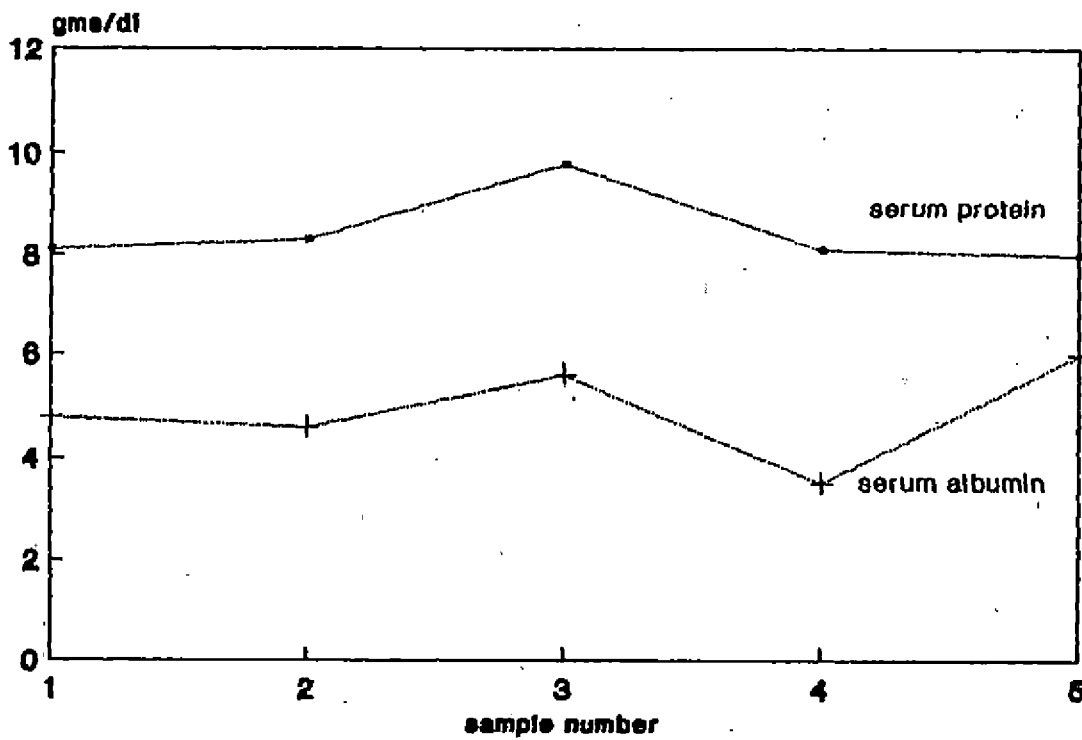


Figure 21. Serum protein and albumin levels in lactating mothers



As evident from the Table 75 serum protein levels of the preschool children, pregnant and lactating mothers were found to be in the acceptable low risk limits of 5 g to 6.5 g/dl. Similarly serum albumin levels of the respondents were also in the prescribed levels of 3 to 3.5 g/dl which further reassure the absence of protein calorie malnutrition in the experimental group.

4.4.6 Assessment of growth monitoring in selected preschool children for a period of 6 months

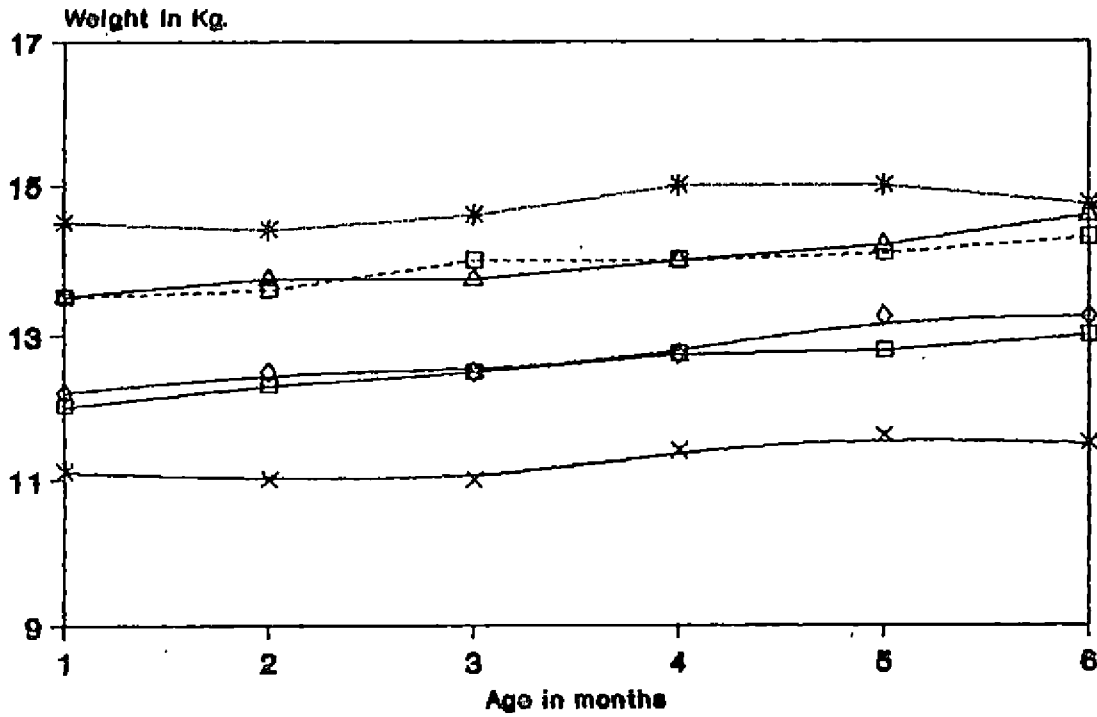
Growth monitoring is an essential tool for the early detection of growth flatterings in children. Hence continuous growth monitoring was carried out in a sub sample of 12 children - 6 each in male and female, and the results are presented graphically (Figures 22 a and b).

Table 76. Weight increments of the preschool children for a period of six months

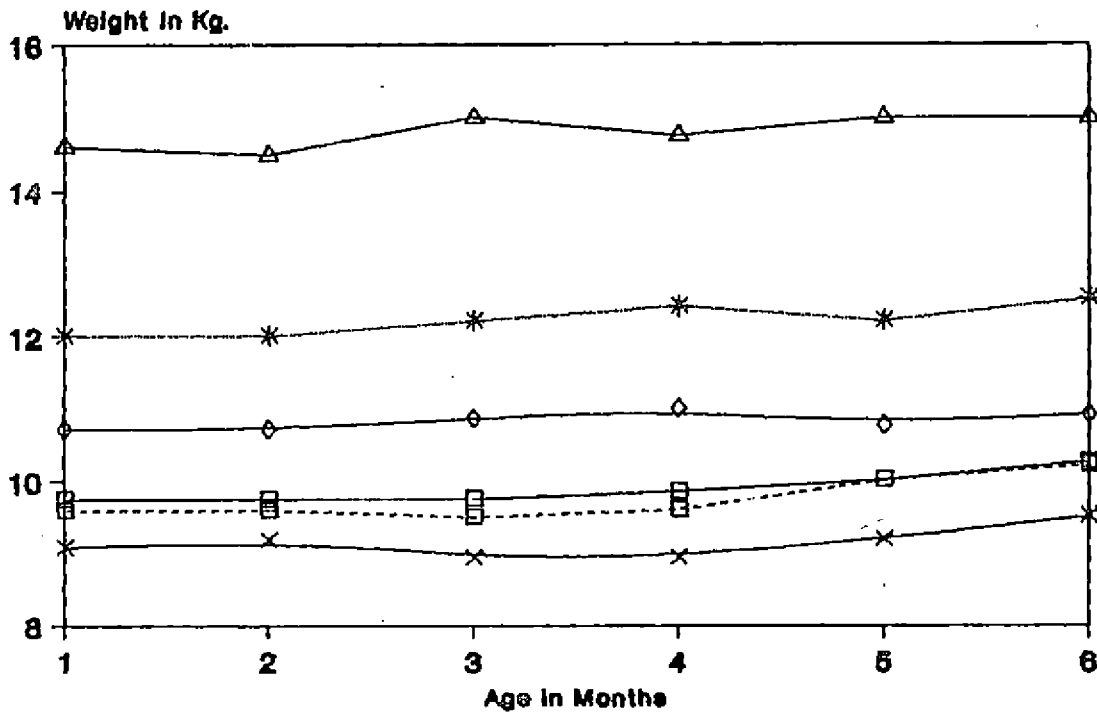
No: of children	Initial weight Kg	Final weight Kg	Weight increment Kg	Initial weight Kg	Final weight Kg	Weight increment Kg
	<u>Male</u>			<u>Female</u>		
1	13.50	14.30	0.80	9.60	10.20	0.60
2	14.50	14.75	0.25	12.00	12.20	0.50
3	13.50	14.60	1.10	14.60	15.00	0.40
4	12.00	13.00	1.00	9.75	10.25	0.50
5	11.10	11.50	0.40	9.10	9.50	0.40
6	12.20	13.25	1.05	10.70	10.90	0.20
		Mean	0.76		Mean	0.43

Figure 22.

Growth curves of the pre school children
(Male)



(Female)



Weight increments of the individual children for a period of 6 months are presented in Table 76.

As indicated in the table, all the assessed children had, increase in the body weights, and the mean weight increments of the male children was 0.76 Kg and that of the female children was 0.43 Kg.

4.5 Factors influencing participation and the participation index of the respondents

4.5.1 Factors influencing Participation

Socio economic factors such as religion, economic status, employment and educational status, and the familial characters viz type of family, marital status, age of the beneficiary, and number of children in the family are some of the factors assumed to influence the participation of the beneficiaries in a programme. In the present study, the influence of the above factors on the participation of the respondents was determined.

Table 77. Influence of religion on participation

Religion	P		PM		LM	
	EG	CG	EG	CG	EG	CG
Muslim	30	13	9	15	10	14
Hindu	80	17	21	5	20	6
	$\chi^2_1=2.86$		$\chi^2_1=9.74^{**}$		$\chi^2_1=6.40^*$	

** significant at 1 per cent level

* significant at 5 per cent level

As evidenced from the Chisquare values obtained (Table 77), participation of the respondents in the ICDS programme was not influenced by religion in the preschool category. However religion was associated with participation in pregnant and lactating mothers (χ^2_1 9.74 in pregnant mothers and χ^2_1 6.40 ** in lactating mothers).

Monthly income of the beneficiaries is assumed to influence the participation of the beneficiaries. But in the present study it was found that, participation of the beneficiaries belonging to all the three categories were independent of their monthly income (Table 78).

Table 78. Influence of economic status on participation

Monthly Income level	P		PM		LM	
	EG	CG	EG	CG	EG	CG
Group I	63	16	17	7	14	12
Group II	36	11	11	12	11	8
Group III	11	3	2	1	5	0
	$\chi^2_1=0.01$		$\chi^2_1=2.26$		$\chi^2_1=0.86$	

Group I- Up to Rs 1000
Group III-Above Rs 2000

Group II-Rs 1001 to 2000

Similarly employment status of the respondents was also found to be independent of the participation in all the three categories of beneficiaries Table 79.

Table 79. Influence of employment status of the respondents on participation

Employment Status	P		PM		LM	
	EG	CG	EG	CG	EG	CG
Employed	21	1	2	0	0	1
Housewife	89	29	28	20	20	19
	$\chi^2_1=3.31$		$\chi^2_1=0.20$		$\chi^2_1=0.70$	

Influence of educational status on their participation was analysed and the results are given in Table 80.

Table 80. Influence of educational status of the respondents on participation

Educational level	P		PM		LM	
	EG	CG	EG	CG	EG	CG
Illiterate	13	7	6	6	7	5
L.P.S.	35	3	8	7	7	8
U.P.S.	32	6	6	5	5	4
High school and above	30	14	10	2	11	3
	$\chi^2_1=12.45^{**}$		$\chi^2_1=2.34$		$\chi^2_1=1.85$	

** Significant at 1 per cent level

As evidenced from the Chisquare value $\chi^2_1=12.45^{**}$ mothers education was a determining factor for the participation in the preschool beneficiaries. However the

participation in the pregnant and lactating mother beneficiaries were not influenced by their educational level.

Participation was not found to be associated with 'type of family' in preschool and lactating mother beneficiaries (Table 81.). However participation of the pregnant mothers in the ICDS programme was influenced by the type of family ($\chi^2_1=4.08^*$).

Table 81. Influence of type fo family on participation

Types of family	P		PM		LM	
	EG	CG	EG	CG	EG	CG
Joint	59	16	20	19	22	15
Nuclear	51	14	10	1	8	5
	$\chi^2_1=0.001$		$\chi^2_1=4.08^*$		$\chi^2_1=0.17$	

* Significant at 5 per cent level

Marital status of the mothers of the preschool children and of pregnant mothers were not an influencing factor for participation (Table 82). However marital status was found to have profound influence on the participation in lactating mothers ($\chi^2_1=4.88^*$).

Table 82. Influence of marital status on the participation of the respondents

Marital status	P		PM		LM	
	EG	CG	EG	CG	EG	CG
1-4 years	12	3	13	8	17	5
5-10 "	59	18	13	10	7	12
> 10 "	39	9	4	2	6	3
	$\chi^2_1=0.40$		$\chi^2_1=0.06$		$\chi^2_1=4.88^*$	

* Significant at 5 per cent level

Influence of age of the respondents on the participation indicated that, in all the three categories 'age' was not an influencing factor (Table 83).

Table 83. Influence of Age of the respondents on the participation of the beneficiary

Age of the respondent	P		PM		LM	
	EG	CG	EG	CG	EG	CG
Upto 25 years	38	12	21	16	23	11
26-30 years	51	11	7	3	4	7
Above 30 years	21	7	2	1	3	2
	$\chi^2_1=0.91$		$\chi^2_1=0.62$		$\chi^2_1=2.59$	

Number of children in the family is assumed to be a factor influencing participation of the beneficiaries (Table 84). In the present study, participation of the

preschool beneficiaries was influenced by the number of the children in the family ($\chi^2_1=5.58^*$). However in the case of pregnant and lactating mothers, number of children in the family did not influence their participation.

Table 84. Influence of number of children in the family on the participation

Number of children	P		PM		LM	
	EG	CG	EG	CG	EG	CG
1 - 3	80	15	24	13	22	14
4 & above	30	15	6	7	8	6
	$\chi^2_1=5.58^*$		$\chi^2_1=1.40$		$\chi^2_1=0.07$	

* Significant at 5 per cent level

4.5.2 Participation Index of the beneficiaries

Participation index of the three categories of the beneficiaries was determined by assessing their involvement in each of the component of ICDS in which they are involved.

Participation index of the respondents are depicted in Table 85.

As evidenced from the table, mean participation indices of the male and female preschool children were 85.69 and 86.11 respectively, and that of pregnant and lactating mothers were 80.96 and 75.16 respectively.

Table 85. Participation Index of the respondents

Type of beneficiary		Participation Index in ranges	Mean participation Index
Preschool	M	65.00 - 100	85.69
	F	40.00 - 100	86.11
Pregnant mothers		16.60 - 100	80.96
Lactating mothers		33.30 - 100	75.16

Based on the participation index obtained by the beneficiaries, they were classified into high and low level participating group. Mean participation index was taken as the basis for grouping the beneficiaries. Beneficiaries with participation index equal and above mean were considered as the high participating group, whereas those with below mean index were regarded as low participating group.

Participation levels of the three categories of the beneficiaries are give in Table 86.

Table 86. Percentage distribution of the beneficiaries according to the levels of participation

Participation levels	Experimental Group			Total
	P	P.M	L.M	
High	49.09 (54)	60.00 (18)	56.67 (17)	52.35 (89)
Low	50.90 (56)	40.00 (12)	43.33 (13)	47.65 (81)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis denote number of beneficiary

As evidenced from the table, among the three categories of the beneficiaries participation level was highest among the pregnant mothers (60 per cent) followed by lactating mothers (56.7 per cent). Approximately equal percentage of the preschool beneficiaries were in the two levels of participation groups (49.1 and 50.9 per cent respectively in high and low groups).

4.5.3 Influence of the socio economic factors on participation levels of the respondents

Influence of religion on the participation levels, indicated that, level of participation was not influenced by religion in all the three categories of the beneficiaries (Table B7).

Table B7. Influence of religion on the participation levels

Participa- tion level	Experimental Group					
	P		P.M		L.M	
	M	H	M	H	M	H
Low	18	38	3	9	4	9
High	12	42	6	12	6	11
	$\chi^2_1=1.36$		$\chi^2_1=0.01$		$\chi^2_1=0.02$	
	M - Muslim		H - Hindu			

Similarly, economic level, employment status and educational status, type of the family, marital status, age of the beneficiary, and number of children in the family

were not found to influence levels of participation, in all the three categories of beneficiaries. (Table 88 to 94).

Table 88. Influence of economic status on the participation levels

Participa- tion levels	Experimental Group								
	P			P.M.			L.M.		
	Group I	II	III	I	II	III	I	II	III
Low	29	20	7	4	7	1	6	4	3
High	34	16	4	13	4	1	8	7	2
	$\chi^2_1=0.98$			$\chi^2_1=2.99$			$\chi^2_1=0.00$		

Group I - Monthly income upto Rs.1000 Group II - Rs.1001 - 2000 monthly

Group III - Rs. 2000 monthly

Table 89. Influence of employment status on the participation levels

Participa- tion level	Experimental Group					
	P		P.M		L.M	
	E	H	E	H	E	H
Low	11	45	2	10	0	13
High	10	44	0	18	0	17
	$\chi^2_1=0.02$		$\chi^2_1=1.09$		---	

E - Employed H - Housewife

Table 90. Influence of educational status on participation levels

Participation level	Educational level				
	Illiterate	L.P.S.	U.P.S.	High School	
P					
Low	7	22	15	12	$\chi^2_3=3.51$
High	6	13	17	18	
P.M					
Low	1	3	4	4	$\chi^2_1=0.16$
High	5	5	2	6	
L.M					
Low	5	2	1	5	$\chi^2_1=0.03$
High	2	5	4	6	

L.P.S. - Lower Primary School U.P.S. - Upper Primary School

Table 91. Influence of type of family on the participation levels

Participation level	Experimental Group					
	P		P.M		L.M	
	N	J	N	J	N	J
Low	27	29	3	9	2	11
High	24	30	7	11	6	11
	$\chi^2_1=0.02$		$\chi^2_1=0.16$		$\chi^2_1=0.65$	

N - Nuclear family J - Joint family

Table 92. Influence of marital status on the participation levels

Participa- tion levels	Experimental Group								
	P			P.M.			L.M.		
	1-4 Yrs	5-10 Yrs	>10 Yrs	1-4 Yrs	5-10 Yrs	>10 Yrs	1-4 Yrs	5-10 Yrs	>10 Yrs
Low	7	28	21	6	5	1	8	3	2
High	5	31	18	7	8	3	9	4	4
	$\chi^2_1=0.91$			$\chi^2_1=0.36$			$\chi^2_1=0.00$		

Table 93. Influence of age of the beneficiary on the participation levels

Participa- tion levels	Experimental Group								
	P			P.M.			L.M.		
	Upto 25 Yrs	26-30 Yrs	>30 Yrs	Upto 25 Yrs	26-30 Yrs	>30 Yrs	Upto 25 Yrs	26-30 Yrs	>30 Yrs
Low	16	27	13	11	0	1	9	1	0
High	22	24	8	10	7	1	14	3	3
	$\chi^2_1=1.55$			$\chi^2_1=6.09^*$			$\chi^2_1=1.97$		

* Significant at 5 per cent level

Table 94. Influence of number of children in the family on the participation levels

Participa- tion levels	Experimental Group					
	P		P.M.		L.M.	
	1-3 chil- dren	4 and above	1-3 chil- dren	4 and above	1-3 chil- dren	4 and above
Low	40	16	9	3	9	1
High	40	14	15	3	13	7
	$\chi^2_1=0.88$		$\chi^2_1=0.01$		$\chi^2_1=1.04$	

Age of the beneficiary was found to have an influence on the participation level, in the case of pregnant mothers ($\chi^2_1=6.09^*$, Table 93). However, in the other two categories viz. preschool beneficiary and lactating mothers, participation levels were independent of their 'age'.

4.5.4 Nutritional cognition of the beneficiaries with participation levels

Nutritional cognition among the three categories of the beneficiaries was tested. Based on the mean score obtained by the beneficiaries, they were divided into two groups viz., high and low knowledge groups. Those above the mean score was regarded as the high knowledge group while those below mean score was considered as the low knowledge group. Knowledge level of the three categories of the beneficiaries are presented in Table 95.

Table 95. Percentage distribution of the beneficiaries based on the knowledge levels

Knowledge levels	Experimental Group			Total
	P	P.M	L.M	
Low	35.45 (39)	40.00 (12)	40.00 (12)	37.05 (63)
High	64.55 (71)	60.00 (18)	60.00 (18)	62.94 (107)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis are number of beneficiary

It is evident from the table, that majority of the beneficiaries in the three groups, fall in the high knowledge group, with mothers of the preschool beneficiaries attaining the highest (64.5 per cent). The percentage of beneficiaries with low knowledge group was 35.5 per cent among the preschool beneficiaries and 40 per cent each among the pregnant and lactating mothers.

Knowledge levels of the three groups of the beneficiaries were associated with their participation levels. From the Chi-square value obtained (Table 96), it was found that knowledge levels were independent of the participation levels in all the three categories.

Table 96. Association of knowledge levels of the beneficiaries with participation levels

Participation levels	Knowledge levels					
	P		P.M		L.M	
	Low	High	Low	High	Low	High
Low	23	33	7	5	6	5
High	16	38	5	13	6	11
	$\chi^2_1=1.57$		$\chi^2_1=2.80$		$\chi^2_1=0.36$	

Attitude of the beneficiaries towards the ICDS programme was assessed. Based on the mean score obtained by the beneficiaries, they were classified into two groups. Beneficiaries who had secured above, the mean values were

considered, as highly favourable attitude group, and those who had secured below mean values as less favourable attitude group.

Attitude levels of the beneficiaries are depicted in Table 97.

Table 97. Percentage distribution of the beneficiaries with attitude levels

Attitude levels	Type of Beneficiaries			Total
	P	P.M	L.M	
Low	51.82 (57)	56.67 (17)	23.33 (7)	47.65 (81)
High	48.18 (53)	43.33 (13)	76.67 (23)	52.35 (89)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis are number of beneficiaries

Among the three groups of the beneficiaries, majority of the lactating mothers (76 per cent) had highly favourable attitude towards the programme. The percentage of the beneficiaries who fall in the highly favourable group was 48 per cent in the preschool group and 43 per cent in the pregnant mothers. The percentage of beneficiaries with less favourable attitude was 51, 56 and 23 per cent respectively among preschool, pregnant and lactating mothers.

Attitude levels of the beneficiaries were associated with participation levels and the results are given in Table 98.

Table 98. Association of attitude levels of the beneficiaries with participation levels

Participa- tion level	Attitude levels					
	P		P.M		L.M	
	Low	High	Low	High	Low	High
Low	29	27	7	5	3	10
High	28	26	9	9	4	13
	$\chi^2_1=0.00$		$\chi^2_1=0.20$		$\chi^2_1=0.17$	

It is obvious from the Chisquare values, that the attitude levels of the beneficiaries were not associated with participation levels in all the three categories of the beneficiaries.

Adoption of various nutrition messages disseminated was assessed among the three groups of the beneficiaries. Based on the mean score obtained, the beneficiaries were classified into two groups. Beneficiaries who had secured above mean score values were grouped as high, adoption group while those secured below the mean scores as low adoption group.

Adoption levels of the beneficiaries are presented in Table 99.

Table 99. Percentage of distribution of the beneficiaries based on the adoption levels

Adoption levels	Experimental Group			Total
	P	P.M	L.M	
Low	39.09 (43)	46.67 (14)	36.67 (11)	40.00 (68)
High	60.91 (67)	53.33 (16)	63.33 (19)	60.00 (102)
Total	(110)	(30)	(30)	(170)

Figures in parenthesis denote number of beneficiaries

From the table it is clear that adoption of nutrition messages was high in the lactating mothers (63.3 per cent) followed by preschool beneficiaries (60.9 per cent) and pregnant mothers (53.3 per cent). Forty per cent of the total beneficiaries were identified under the low adoption group.

Adoption of nutrition messages among the beneficiaries were associated with their participation levels (Table 100).

It was found that, adoption levels of the beneficiaries were also independent of the participation levels in all the three categories of the beneficiaries.

Table 100. Association of adoption levels of the beneficiaries with participation levels

Participa- tion level	Adoption levels					
	P		P.M		L.M	
	Low	High	Low	High	Low	High
Low	19	37	8	4	5	8
High	24	30	6	12	6	11
	$\chi^2_1=1.28$		$\chi^2_1=2.01$		$\chi^2_1=0.03$	

4.6 Nutritional status index of the respondents and their interrelationship with different characters

4.6.1 Nutritional status index of the respondents.

Nutritional status index of the respondents belonging to the experimental and control groups were computed and the results are furnished in Table 101.

Table 101. Nutritional status index of the respondents

Type of respondents	Nutritional status index	
	EG	CG
Preschool children		
M	74.20 to 86.50	75.30 to 84.30
F	63.80 to 77.10	75.20 to 83.90
Pregnant mothers	43.00 to 48.10	28.80 to 33.90
Lactating mothers	43.30 to 48.60	39.90 to 44.80

Nutritional status index computed for male and female children of the experimental group ranged between 74.2 to 86.5 and 63.8 to 77.1 respectively as against 75.3 to 84.3, and 75.2 to 83.9 for the same category in the control group. The nutritional status index obtained for the pregnant mothers was between 43 to 48.1 and 28.8 to 33.9 respectively in the experimental and control groups. In the lactating mothers, nutritional status index ranged between 43.3 to 48.6 in the experimental group as against 39.9 to 44.8 in the control group.

Table 102. Comparison of the nutritional status index of the respondents

Respondents		Mean values for nutritional status index		't _n ' values
		EG	CG	
Preschool children	M	81.00	79.86	t ₇₃ 1.25
	F	71.12	78.36	t ₆₃ 8.05**
Pregnant mothers		46.02	31.35	t ₄₈ 32.06**
Lactating mothers		46.65	42.46	t ₄₈ 10.19**

** Significant at 1 per cent level

* Significant at 5 per cent level

Significant difference was observed in the nutritional status index of the pregnant and lactating mothers of experimental and control groups (t₄₈ 32.06 **, ,

$t_{48} 10.19^{**}$ Table 102). Even though the nutritional status index for the male childrens in the experimental group was higher, it was not significantly different between the groups it was not ($t_{63} 1.25$) while in the case of female children, nutritional status index of the control group was observed to be significantly higher than the control group ($t_{63} 8.05^{**}$).

4.6.2 Interrelationship of different factors contribution to the nutritional status index

Interrelationship of different characters contributing to the nutritional status index of the respondents, in the present study was analysed. The results of the interrelationship of different characters including participation index of the three categories of beneficiaries are furnished in Table 103 to 106.

The variable body weight, showed a positive significant correlation in male and female preschool children with height (0.5998^{**} , 0.6823^{**}), head circumference (0.4042^{**} , 0.4721^{**}), arm circumference (0.3476^{**} , 0.4418^{**}), clinical score (0.7207^{**} , 0.6754^{**}), body mass index (0.5502^{**} , 0.6360^{**}), and with nutritional status index (0.8904^{**}). Similarly body weight of lactating mothers showed positive significant relationship with body mass index (0.8274^{**}), haemoglobin

(0.6081^{**}), and nutritional status index (0.7473^{**}) while in the case of pregnant mothers only clinical score showed significant correlation with body weight (0.5241^{**}).

Table 103. Intercorrelation matrix contributing to the nutritional status of male children in the experimental group

X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}
X_1	0.5998 ^{**}	0.4042 ^{**}	0.0706	0.3476 ^{**}	0.7207 ^{**}	0.7307 ^{**}	0.4857 ^{**}	0.5502 ^{**}	0.8008 ^{**}
X_2		0.1264	0.1204	0.1070	0.2155	0.2321	0.1515	-0.0007	0.3434 ^{**}
X_3			0.0316	-0.1153	0.1591	0.2735 [*]	-0.1067	0.1274	0.1271
X_4				0.1214	0.1214	0.0358	-0.0276	-0.2245	-0.0529
X_5					0.1825	0.2531	0.1634	0.2151	0.3146 [*]
X_6						0.5673 ^{**}	0.2687 [*]	0.4108 ^{**}	0.5530 ^{**}
X_7							0.3236 ^{**}	0.3852 ^{**}	0.5909 ^{**}
X_8								0.2842 [*]	0.3725 ^{**}
X_9									0.8209 ^{**}
X_1	Weight		X_6	Clinical score					* Significant at 5 per cent level
X_2	Height		X_7	Participation index					** Significant at 1 per cent level
X_3	Head circumference		X_8	Haemoglobin					
X_4	Chest circumference		X_9	Body Mass Index					
X_5	Arm circumference		X_{10}	Nutritional Status Index					

Table 104. Intercorrelation matrix contributing to the nutritional status of female children in the experimental group

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀
X ₁		0.6823**	0.6606**	0.4721**	0.4418**	0.6754**	0.8349**	0.6399**	0.6360**	0.8904**
X ₂			0.5755**	0.2039	0.0414	0.1901	0.4889**	0.2354	0.0655	0.5664**
X ₃				0.2430	0.1725	0.1457	0.3997**	0.3215*	0.1856	0.4497**
X ₄					0.1433	0.4390**	0.4272**	0.3331*	0.4559**	0.4794**
X ₅						0.3828**	0.2995*	0.1293	0.3876**	0.3311*
X ₆							0.6237**	0.3404*	0.5526**	0.5642**
X ₇								0.5849**	0.5508**	0.7620*
X ₈									0.6080**	0.6423**
X ₉										0.8249**

X ₁	Weight	X ₆	Clinical score	* Significant at 5 per cent level
X ₂	Height	X ₇	Participation index	** Significant at 1 per cent level
X ₃	Head circumference	X ₈	Haemoglobin	
X ₄	Chest circumference	X ₉	Body Mass Index	
X ₅	Arm circumference	X ₁₀	Nutritional Status Index	

In male children height was found to be positively and significantly correlated with nutritional status index (0.3434**) and in female children with head circumference (0.5755**), participation rate (0.4889**), and nutritional status index (0.3434**). However in pregnant and lactating mothers height was not correlated with any of the variables tested.

Table 105. Intercorrelation matrix contributing to the nutritional status of pregnant mothers in the experimental group

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇
X ₁		-0.0817	-0.1051	0.5241**	0.0036	0.1751	-0.0941
X ₂			0.0891	-0.1314	-0.1076	-0.2886	0.2612
X ₃				0.3694*	0.4304*	-0.1637	0.3583
X ₄					0.2592	-0.2109	0.1462
X ₅						-0.2536	0.8420**
X ₆							0.3065
X ₁	Weight				X ₆	Participation index	
X ₂	Height				X ₇	Nutritional Status Index	
X ₃	Body Mass Index				*	Significant at 5 per cent level	
X ₄	Clinical score				**	Significant at 1 per cent level	
X ₅	Haemoglobin						

Head circumference of the male and female children was significantly correlated with participation rate (0.2735*, 0.3992** respectively) and that with haemoglobin (0.3215*) and nutritional status index (0.4497*) in female children. In female children, chest circumference also showed significant correlation with clinical score (0.4390**), participation rate (0.4272**), haemoglobin (0.3331*), body mass index (0.4559**), and nutritional status index (0.4794**).

Table 106. Intercorrelation matrix contributing to the nutritional status of lactating mothers in the experimental group

X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇
X ₁	0.0300	0.8274**	0.2880	0.6081**	0.2516	0.7473**
X ₂		0.1526	0.0038	-0.1342	0.0511	-0.1142
X ₃			-0.0168	0.3606*	0.1707	0.4707**
X ₄				-0.2086	0.0440	-0.1658
X ₅					-0.2349	0.8127**
X ₆						0.3691*

X ₁	Weight	X ₆	Participation index
X ₂	Height	X ₇	Nutritional Status Index
X ₃	Body Mass Index	*	Significant at 5 per cent level
X ₄	Clinical score	**	Significant at 1 per cent level
X ₅	Haemoglobin		

Arm circumference was significantly correlated with nutritional status index (0.3146^{*}) in male children while in the case of female children, this was significantly correlated with clinical score (0.3828^{**}), participation rate (0.1995^{*}) body mass index (0.3876^{**}) and nutritional status index (0.3311^{*}).

The character clinical score of the children was found to be correlated with participation rate (0.5673^{**} , 0.6237^{**}), haemoglobin (0.2687^{*} , 0.3404^{*}), body mass index (0.4108^{**} , 0.5526^{**}), and nutritional status index

(0.5530^{**} , 0.5642^{**}) in male and female children respectively. However in mother beneficiaries clinical score was not correlated with any of the characters tested.

The character participation index was observed to be significantly correlated with haemoglobin (0.3236^{**} , 0.5849^{**} , body mass index (0.3852^{**} , 0.5508^{**} , and nutritional status index (0.5909^{**} , 0.7620^{**}) in male and female preschool children respectively and that with nutritional status index in lactating mothers (0.3691^{*}). However participation rate was not significantly correlated with nutritional status index in pregnant mothers.

The character haemoglobin level of male and female children were found to be significantly correlated with body mass index (0.2842^{*} , 0.6080^{**} respectively in male and female children) and with nutritional status index in pregnant and lactating mothers (0.8127^{**} , 0.8420^{**}).

Similarly Body mass index was significantly correlated with nutritional status index in both male and female preschool children (0.8209^{**} , and 0.8249^{**}). In pregnant mothers, body mass index was correlated with clinical score (0.3694^{*}) and haemoglobin (0.4304^{**}) and in lactating mothers, it was significantly correlated with haemoglobin (0.3606^{*}) and nutritional status index (0.4707^{*}).

DISCUSSION

5.DISCUSSION

5.1 Socio-economic and personal characteristics of the study group

'Integrated child development services' (ICDS) as its name indicates is a children's programme (Sohoni, 1988). Hence in the present study more emphasis was given to child beneficiaries, than to mother beneficiaries by including more respondents from the child category.

According to the census report (1981), 65.5 percent of population in Malappuram district belonged to Muslim community, while 32.1 percent belonged to Hindu community. Thus eventhough Malappuram district is predominated with muslim population, in the present study majority of the beneficiaries were from Hindu community (71.18 percent). However in the control group majority were from muslim community. This might be attributed to the fact that various religious and cultural restrictions imposed on muslim community might have restrained them from being the beneficiaries of this intervention programme.

The developmental programmes like ICDS are implemented for the benefit of under privileged sections of

the community. A study conducted in Thiruvananthapuram by Beegum (1990) had revealed that majority of ICDS beneficiaries were from the under privileged sections of the community. In the present study also out of 240 women respondents surveyed, 92 percent were from the backward and under privileged sections of the community.

Joint family system was prevailing in majority of the families surveyed and it clearly indicated that impact of modern concept of nuclear family has not yet gained much momentum in these remote rural areas, and the families still live in a close net work of 'kinship'.

Majority of the families in the experimental and control groups were found to be small sized with one to 3 children. However 'small family norm' was found to be adopted more among the experimental group, than the control group, probably because of their religious status. 'Small family norm' advocated through the health education programme of ICDS might also have influenced, the experimental group in reducing the family size, which is a benefit derived by the experimental group as a beneficiary in the programme. Vasundhara *et al.* (1985) in their study had also observed better acceptance of family planning measures among the ICDS beneficiaries.

Size of the family is influenced by the system, a family observes. Joint family system is a very common phenomenon observed in these areas, and hence in the present study the total number of family members were found to be large in the both groups. Many of the respondents were observed to have a marital life of 5-10 years. Compared to younger couples, older ones were found to be less conscious about the benefits derived from the ICDS programme, which is implicated through their lesser participation in the programme.

This finding is in tune with 1981 census where 40 percentage of illiterates had been reported from Malappuram district. High literacy rate prevalent in Kerala is reflected in many of the respondents selected for the study. However number of illiterates under control group were more.

In the present study, majority of beneficiaries were housewives and were economically dependant. Beneficiaries of any nutrition intervention programme are identified from the families under poverty line, and in the present study, majority of the beneficiaries were from the families below poverty line even though more than one member is employed outside in majority of families in both groups. Due to socio cultural inhibitions and the lack of awareness, majority of the families in both groups were not found to

take up subsidiary occupation for augmenting their total income.

The monthly expenditure pattern of the families revealed that a major share of the income was spent on food items by both the groups. This finding is in tune with the studies conducted earlier by Aguilon *et al.* (1982) and Thomas (1989) which early indicated economically poorer families spent major share of their income for food. Priority in expenditure, next to food was for 'health needs' in both groups. Sreenath *et al.* (1978) indicated that with an increase in family size, the expenditure incurred on clothing, education, and recreation decreases. So also in the study group, owing to the bigger families, the expenses on clothing, education, recreation was found to be comparatively less.

It was encouraging to note that almost all the families surveyed possessed a house of their own, even though they were below the poverty line. However all the basic amenities such as drinking water, electricity and toilet facility were enjoyed by only very few families in both groups. Bharadwaj (1990) expressed that, among the above basic amenities drinking water is most essential, since 80 percent of all diseases in developing countries are directly related to poor drinking water and insanitary

conditions. In the present study most of the families possessed a well which remained as the age-old source of drinking water. These findings are in line with the observations of Sen (1990) who has opined that lower income groups in the community does not have access to individual household taps, but enjoyed the benefits of public facility. Another remarkable point was that toilet facility was found in majority of the families in both the groups which would otherwise would have created immense health problems. Families in the experimental group were found to attain all these basic amenities, in a better way than the control group, may be due to the influence of nutrition messages disseminated through health education classes.

Possession of land by an individual generally indicates his social status and security. In the present study, majority of the families in both groups possessed land of their own ranging from 5 cents to 200 cents but majority of them did not pay much attention to utilise the available land for proper cultivation. However data pertaining to the home production of different crops among the study group indicated that crops such as paddy and vegetables produced were fully utilized at the household level, and excess coconuts were sold out. These observations stresses the need for maintaining vegetable gardens in the available land, which would result in better

food consumption and thereby better health. Besides, the excess produced can be utilized for improving their economic level.

Production of animal foods through animal husbandry was popular more among the experimental group than the control group. A favourable trend was observed in the utilization of the animal produce at the household level among the experimental group. It can be inferred that experimental group were fully aware of the wholesomeness of the foods like egg, milk in the daily diet. This may probably be due to their exposure to various services offered through the ICDS programme and because of their association with the field level functionaries responsible for the implementation of ICDS programme.

In Indian culture, the male member is the supreme authority and the key decision maker in the family, and the female members of the family are still voiceless. Similar trend was observed in majority of the families surveyed in both groups. It was observed in the families surveyed that this responsibility was entrusted to an elder member in a joint family or on the male member in a nuclear family. Only in very few families, all the members were given an opportunity to offer their views before making decisions. This may be mainly due to the fact that women and children

in general are economically dependent on the wage earner of the family. It was also observed that this system was not much appreciated by the women in majority of the families surveyed.

Majority of the respondents in both the groups had the freedom to go out of houses, but only with prior approval from the male members or elder members of the family for various religious or social commitments. However this freedom was not extended to their participation in various socio-cultural organizations locally available.

Familiarity to various sources of communication will result in better understanding of the various worldly matters. Rao (1990) has remarked that newspaper is an excellent source of communication, among the literate sections of the population. However, findings of the present study indicated that this media was not properly utilized by the moderately educated respondents. Lack of interest, illiteracy, unavailability of time and money were the major reasons. Among the various sources available under the printed media, light reading magazines were found to be comparatively popular among the respondents of both groups. Radio which is less expensive and sound method of communication was also found to be popular among the respondents of both groups. Due to non availability,

television viewing was not common among the respondents. Rao (1970) has pointed out that as far as the lower income groups are concerned, televisions cannot be a widely used media because of its prohibitive cost. Among the various sources of communication radio was found to be the most accessible and popular media among the study group.

Majority of the respondents in both the groups were found to be very much enthusiastic in knowing the health related subjects. Chandekar and Thomas. (1990) has opined that social workers and voluntary agency staff were identified as the main motivating agents in health related subjects. So also in the present study among the experimental group anganwadi workers, other health workers and media were found to act as a major source of communication for health related subjects where as in the control group media alone serves as the source of communication. However information thus gained on health related subjects were not practised by the respondents of both the groups due to economic difficulties.

5.2. An Appraisal of the programme implemented in the study area

ICDS is India's multidimensional programme meant for improving the health status of children from birth to six years, pregnant women and lactating mothers and caters

to the needs of the under served segments of rural tribal and urban population. Monitoring and evaluation are regarded as crucial processes and integral part of any developmental programmes as they provide the needed feedback, to assess the impact of the services provided and the efficiency with which they are implemented. This will also be of immense help for suggesting measures for further improvement.

5.2.1. General evaluation of ICDS

General evaluation of ICDS included, the assessment of duration of participation of the respondents, their perception about ICDS, purpose of approach, their preference and opinion about the utility value of various components envisaged in the programme.

Kennedy and Knudsen (1988) has the opinion that the length of time an individual needs to be in a nutrition intervention programme in order to improve his/her nutritional status will vary, upon the type of the programme and also on the initial nutritional status. They had also made it clear that the impact of the programme on its beneficiaries will depend upon the nature of the intervention programme. In a 'take home' or 'onsite feeding' programme positive effects will appear only after one or two years. However Edozien *et al.* (1979) and

Anderson *et al.* (1981), viewed that the major effect of the intervention programme on the growth of the preschool children appear within the first six months. They had also pointed out that in addition to minimum length of participation, there is also a maximum length of participation beyond which no effect was observed.

In the ICDS programme, the preschool children are generally enrolled when they are 3 years and will be a beneficiary for at least 2 years until they leave for school years. While the other two categories of the beneficiaries will be able to enjoy the benefits only for a shorter duration. In the present study, all the preschool beneficiaries were observed to be the beneficiaries for more than one year, whereas only 69 percent mother beneficiaries were participants of the programme of same duration. Compared to the pregnant mothers, lactating mothers were beneficiaries in the programme for longer period the reason being the switch over from the 'pregnant mother beneficiary' to 'lactating mother beneficiary'.

5.2.2 ICDS as perceived by the beneficiaries

The beneficiaries surveyed were observed to have a clear cut perception about the ICDS programme. Major reasons reported by the respondents for their participation in the programme were improving the health conditions,

including good food habits, and enriching their knowledge apart from obtaining nutritious food. The implementation of ICDS for the past 16 years in the study area, and literacy level of the beneficiaries might have profoundly influenced the respondents, to have a correct perception about the programme. However, this observation is not in tune with the earlier findings of Paranjpe *et al.* (1989), Sharma *et al.* (1989) and Venugopal (1989), on the basis of the surveys conducted in different parts of the country. Lesser awareness about the services of ICDS was reported in their studies. One third of the respondents were found to expect multiple benefits from the programme. Only negligible percent of the respondents were found to participate in the programme, merely for getting food. This may be a notable feature in Kerala, unlike the other states, where participants sole interest was found to be for the food supplement.

Location of the anganwadi, according to the convenience of the respondents, might play a major role in their participation in the programme. Chakkladar *et al.* (1989) had experienced the disadvantage of long distance of anganwadies for the restricted participation of the beneficiaries. In the present study, it was observed that majority of the respondents were staying near the anganwadi centre and were found to be satisfied with the location of the centre.

'Food, medicine and immunization provided in the ICDS, package was found to be the major attraction for the participation in majority of the respondents surveyed. Apart from the above services, mothers of preschool children were found to approach the anganwadies, for education purposes too.

An analysis of the preference of the beneficiaries for various components revealed that, irrespective of the category, their first preference was for supplementary nutrition. This finding is on par with the earlier survey conducted in different district of Kerala by Prema et al. (1990) and also by the study conducted by PED (1982).

Compared to other States, Keralites are reported to have greater affinity for literacy programmes. In this study also, preschool education component of the programme, was recorded as the first choice, next to supplementary nutrition by the respondents including all the three categories. Compared to pregnant mothers, mothers of preschool children, and lactating mothers, had recorded their first preference for preschool education probably due to the participation of their children in the education component. 'Health education' and health 'check-up' components were scored less as the respondents first choice. It was also noted that, none of the respondents recorded

immunization or referral services as their first preference. This may be due to the fact that above said facilities can be availed from other local agencies also.

Among the second preference of the respondents, for various components of ICDS, 'health check-up' scored the highest. No difference was observed between the groups, for this component. It can be inferred that all categories of the respondents might have utilized this facility from the ICDS centre, which might have influenced their preference. Preschool education and 'health check-up' components were ranked equally as their third preference by many of the respondents. Whereas referral service component was found to be the least preferred component among the respondents irrespective of their categories. Similar trends were reported by Prema *et al.* (1990).

With reference to the utility value of the services, respondents felt supplementary untrition as the most useful followed by preschool education, immunization health check-up and health education. Above findings confirmed that supplementary nutrition and preschool education components were found to be the most preferred and useful service among the various components of ICDS for the respondents. Widge (1980) in his study conducted among the ICDS beneficiaries also found that supplementary nutrition

component was ranked high in terms of awareness and coverage.

Even though immunization was not recorded as their highly preferred component, from the utility point of view, the respondents regarded this component as equally important. Apart from the above services, health 'check-up' and 'health education' components were also reported to be useful to the respondents. However referral service component was found to be recorded least, with regard to the utility point of view.

5.2.3 Assessment of supplementary nutrition component of ICDS

Supplementation programmes are reported to perform preventive function in nutrition intervention programmes (Kennedy and Knudsen, 1988). So also in the ICDS programme, supplementary nutrition component, provide additional food for its beneficiaries which will be helpful in reducing the severity of malnutrition.

As revealed in the present study, all the respondents irrespective of their categories viewed that supplementary food served is nutritious and suitable to bring desirable changes in their health. But majority of the respondents were found to participate in the programme not for the free food but for the around benefits they

derived from the programme. This finding is unlike the observations made by Widge (1988) where the sole attraction for enrolment in the anganwadi centres was the provision of supplementary food. High literacy level of the Keralites are reflected in this finding and shows their confidence in the programme for the betterment of their life.

All most all the respondents relished the food served in the anganwadi and were found to be contented with the quantity of the food served. Only negligible respondents expressed about the inadequacy or excess of the food served.

The maximum benefit of the food supplement will be obtained only if it is utilized fully by the beneficiary. With regard to the utilization of the food supplement, it was found that full utilization of the food supplement was only 67 percent among the respondents. However utilization rate was found to be better than those reported by Meetakumar *et al.* (1988). They observed only 25 percent utilization of the food supplement among the ICDS beneficiaries. Comparison of the consumption pattern among the three categories of the beneficiaries revealed that, lactating mothers were found to consume it better than the other two groups. The family members of the beneficiaries were found to share the left over food. This observation is in line with the results reported by Mittal and Gupta

(1980). They had reported about the large scale sharing of the supplement by the sibilings which negatively influenced the health status of the ICDS beneficiaries. Desai (1989) in his survey had also noted that only half or negligible amount of the food supplement was actually consumed by the beneficiary. Gopaldas *et al.* (1975) in their study found that sharing of the food supplement by the family members had decreased 50 percent of the ration available to the child beneficiaries Kennedy and Knudsen (1988) had suggested an alternative, to minimize sharing of the supplement by introducing special foods that are less likely to be shared, which was exemplified by the distribution of 'Nutripak' as a child's food in Philippines. Few respondents had reported to consume the left over food after some time. However it was beyond verification. Hence it can be concluded that sharing of the food supplement by the family members should be curbed for better outcome of the programme.

Nutrition planners regarded that the type of nutrition delivery system followed in an intervention programme may influence the pilferage of the supplement. On assessing the food delivery system followed in the study area, it was observed that majority of the respondents followed 'take home' system. Only very few respondents followed the 'onthe spot' feeding pattern. This can be presumed to be one of the reason for the sharing of the food

supplement by the family members. Anderson (1981) in an evaluation of supplementary feeding programmes in five countries had pointed out that 'on site feeding' can reduce the leakages due to sharing and selling of food. Similar findings were also reported by Gopaldas et al. (1975) from her experience in the project Poshak, where the preschool children participating in the 'onsite' feeding had a significantly greater increase in weight for age than those partaking in the 'take home' programme.

The respondents of the present study were found to be fully satisfied with food distribution system followed in the centres. This may be due to the fact that they had the freedom to opt whichever type of food delivery system and the functionaries were not very strict about the system followed.

It is encouraging to note that religious or cultural setbacks do not prevent the beneficiaries, from their participation in the supplementary feeding component of ICDS.

Majority of the respondents in the present study were found to be satisfied with the space adequacy in the centres and regarding the time of serving of the food supplement.

Montony of the food supplement and low quality of the food are some of the short comings of the component as pointed out by the respondents.

5.2.4. Assessment of Immunization Component of ICDS

Millions of young children are dying every year due to vaccine preventable diseases, viz, measles, tetanus, whooping cough, diphtheria tuberculosis and polio, and many more are becoming disabled because of the same reason (UNICEF, 1989). The age old saying "prevention is better than cure" applies so aptly to the need for immunization of the young children and the expectant mothers, so also ICDS is trying to achieve this goal through its strongly built in component of immunization.

Immunization status of the respondents revealed that almost all the child beneficiaries were found to be immunized against tuberculosis, diphtheria, tetanus, polio, and whooping cough. However immunization coverage for measles was only 42 per cent. This may probably due to the fact that need for this vaccination was not stressed properly and partly due to non-availability of this vaccine.

Devadas *et al.* (1989) reported 78-90 percent immunization coverage among the child beneficiaries in ICDS block of Mattanchery (Kerala). Total immunization coverage

was reported to be 60 percent or above for BCG, DPT and Polio in the ICDS blocks (ICDS,1987). Significant improvement in the immunization status was reported by various authors from different parts of the country. Studies conducted by Widge (1980); Mandowara (1989); Subramaniam (1985); Thakar *et al.* (1989) and Prasad *et al.* (1989) are a few important such studies.

Compared to child beneficiaries, vaccination against tetanus for mother beneficiaries were found to be less (77 per cent). The coverage was noticed still less among the lactating mother beneficiaries. This may attributed to the fact that many of them were not beneficiaries of ICDS when they were pregnant, and hence were not motivated by the functionaries.

Out of the total respondents only 11 per cent were not found to receive any type of immunization due to their own indifference and ignorance about its significance. Khanna *et al.* (1985) had found that the main reasons for the incomplete coverage of immunization were non availability of vaccines, lack of awareness regarding the schedule, inconvenient timings and fear of side effects.

With regard to the course of completion of immunization schedule, the coverage becomes lower to 60 percent in the present study. UNICEF (1989) also reported

similar results among the beneficiaries of ICDS. Kanthimathi (1989) reported 50 percent coverage among the beneficiaries with regard to course of completion of immunization schedule. The purpose of immunization will not be served unless the beneficiaries complete the course of immunization and hence functionaries of ICDS should insist the beneficiaries for the completion of the course of immunization.

Anganwadies were found to play a major role in achieving better immunization status among the beneficiaries since in this study anganwadi worker were found to be the sole motivators for the beneficiaries for immunization. Facilities available in the local government hospitals were also found to be explored for immunization purpose. In a way this component of ICDS might have functioned as a persuasive factor to inculcate health habits among the underprivileged sections of the population and to create an awareness about the necessity of taking immunization.

The morbidity pattern of the ICDS beneficiaries in the study revealed that the major child killers like diphtheria and polio were not located in any of the child beneficiaries. Findings of Kothari and Nataraj (1989) supported the above finding. They reported that ICDS programme had a positive impact on morbidity pattern of the

children. However a few cases of tuberculosis, petrusis and measles were reported among the child beneficiaries even after the immunization.

Majority of the beneficiaries were found to receive vitamin supplements viz. vitamin A drops, iron and folic acid tablets. Such positive response was reported by Widge (1986) also. However in the present study some beneficiaries expressed the difficulty in getting the medicines. Prinja *et al.* (1989) stressed the need for ensuring the supply of essential medicines for the ICDS beneficiaries.

Distribution of other medicines such as B complex tablets, tablets for fever and deworming were found to be less. Irregular supply of medicines to the centre and non distribution of the supplied medicines were observed a regular feature, in some of the centres surveyed. This may be due to lack of supervision by the senior field functionaries.

However, medicines distributed were regularly consumed by majority of the respondents even though only 30 percent mothers of child beneficiaries, and 50 percent of mother beneficiaries had correctly perceived the reason for the distribution of the medicines. Compared to the mothers of child beneficiaries, mother beneficiaries were found to

be more aware of the purpose. This may be due to their direct involvement in the programme or due to their frequent exposure to various experience to various ICDS components and contacts with the field functionaries.

Few respondents were not found to consider the medicines, beneficial to their health. Earlier findings which indicated the non-awareness of the purpose of taking medicines, presumed to be the reason for their negative response.

5.2.5 Assessment of health check-up component of ICDS

Majority of the respondents were found to be the regular participants of the health check-ups, conducted in the centre. Comparison between the three categories indicated that, compared to the pregnant mother beneficiaries, preschool and lactating mother beneficiary was found to be more regular in attending the 'health check-ups' organized. The physiological difficulties during the pregnancy period may be one of the reason for their lesser participation. Besides they were found to approach the primary health centres for regular check-ups.

Major reasons reported for the non participation by the respondents were the conduct of health check-ups without prior notice and indifference of the respondents

which in a way reflects the need for further motivation of the respondents by the ICDS functionaries.

Majority of the respondents viewed this component is beneficial and at the same time essential to them. The respondents also pointed out that in the absence of such health check-up facility in the centre, they may face burden of seeking assistance from other doctors which would cause additional expenses to them. Hence the respondents strongly supported to maintain this component in the ICDS centres.

Majority of the mothers of the child beneficiaries were well aware of the significance of the growth monitoring activity in the centres. Saxena and Bagchi (1986) pointed out from their studies that, growth monitoring was done most unsatisfactorily in many of the ICDS centres. However, mothers surveyed in the present study had the correct perception about growth monitoring. According to these mothers growth monitoring is an indispensable component of ICDS.

5.2.6 Assessment of referral service component of ICDS

Among all the component of ICDS, referral service system was found to be the least utilized facility by the respondents, as 90 percent respondents did not avail this facility. Prema *et al.* (1990) also reported similar results.

The reasons being ignorance and unawareness of the beneficiaries, non availability of doctors and the existence of private hospitals in the rural areas. Krishnamoorthy and Nadkarni (1983) in their studies among ICDS beneficiaries also supported the same view. Tandon (1980) and Mandowara *et al.* (1989) had also reported about the existence of unsatisfactory referral system in the ICDS centres.

5.2.7 Assessment of health education component of ICDS

No health intervention programme would be successful, unless the health and nutrition education component is tailored along with other inputs. Assessing the health education component of ICDS in the study area indicated that, only 63 percent of the total respondents were found to be regular in the health education classes.

Drawing a comparison among the three categories of respondents, it was noted that, pregnant mother beneficiaries were found to have a better participation, followed by mothers of preschool beneficiaries, and lactating mothers. Lack of time, lack of interest, and household burdens, job responsibilities, and distance were the reasons given by other respondents for their non-participation.

Rohd *et al.* (1975) remarked that unless that health and nutrition knowledge of the mothers were not

improved, better nutrition cannot be achieved. Gopaldas (1981) was of the opinion that educating the mothers on the special needs of children and utilizing mothers for child's growth surveillance found to be very effective in preventing malnutrition. Therefore nutrition education component of ICDS should be stressed more by conducting more education classes, making it more attractive and effective, besides motivation of the respondents for their better participation. Khanolkar and Vasudeva (1989) and Vasudeva and Sunderlal (1979) had stressed the need for strengthening health education component of ICDS. Neglect in nutrition health education component was reported by Tandon (1980) also.

Health workers were found to be the most important personnel responsible for the conduct of education classes apart from anganwadi workers. However unlike the salient findings of Gopaldas (1982) and Saxena and Bagchi (1986), in the present study, the respondents were found to grasp various nutrition messages, disseminated through education classes especially in the areas of hygiene and sanitation, infant feeding and child rearing practices, and health care of the children. On enquiring about the adoption of such messages in the day to day life, it was noted that 64 percent of the respondents reported to adopt the messages disseminated. Among the three categories, comparatively

less adoption was reported among the lactating mother beneficiaries, eventhough majority were of the opinion that health education classes are essential.

Regular house visits by the anganwadi workers may improve the personal contacts which would definitely influence in gaining the confidence in them. Participation of the respondents in the programme and their co-operation can be achieved only through such direct contacts. Apart from the above personal contact, house visits would also act as a powerful channel for communicating important nutrition messages. In the present study, it was found that only 34 percent respondents reported about the dissemination of nutrition messages by the functionaries through such house visits. Many respondents were of the view that, field functionaries visited their houses, mainly for discharging their duties related to survey work.

However all the respondents irrespective of their categories appreciated their visists, which clearly reflect that, house visits are helpful in maintaining good relationship between the functionaries and beneficiaries.

5.2.8 Assessment of preschool education component of ICDS

Preschool education plays an important role in moulding a child into useful and good citizen of a nation.

Good habits inculcated in the early years of childhood help him to bring out his potentialities to its fuller extent. Preschool education envisaged in the ICDS services was found to gain interest among the surveyed respondents next to supplementary nutrition, since all the mothers expressed that sending the child to the anganwadi is good to the child and, they were found to be satisfied with the education imparted.

On assessing the various amenities available in the surveyed anganwadies, it was revealed that many of the anganwadies were adequately provided with safe drinking water and playing materials. Majority of the anganwadies were also found to be kept neat and tidy. However adequate kitchen facility was observed only in 52 percent anganwadies. Lack of proper building, lack of toilets and lack of sleeping facilities were some of the inadequacies in some anganwadies. Nair and Bansal (1989) in their studies, observed similar lacunae.

Hence the investigator felt that, basic amenities in the centre should be increased which would be helpful in bringing up the children in a healthy surrounding.

5.3 Assessing the knowledge, Attitude and Practice of the respondents

Assessment of the nutritional cognition among the experimental and control groups indicated that majority of

the respondents in the experimental group had secured a score above 80 percent. Similarly lower scores obtained by the beneficiaries in the experimental group were negligible when compared to the control group. In general, experimental group had significantly better nutritional cognition than the control group in all the three categories of the beneficiaries. These findings are in line with Beegum and Malathi (1989), who had found a significant difference in the nutrition knowledge among the beneficiaries and non-beneficiaries of ICDS. Punhani and Mahajan (1989) also reported similar results.

Nutritional knowledge pertaining to important areas of nutrition viz. infant feeding, supplementary feeding, health care during childhood, pregnancy and lactation, immunization, diarrhoeal disease sources of various nutrients and their deficiencies, personal and food hygiene were tested among the two groups. Except in the area of sources of various nutrients and their deficiencies the experimental group had fairly good knowledge. Hence information related to the source of various nutrients and their deficiencies needs to be emphasized more in the education classes offered through ICDS. The mean score obtained by a control group in all the different areas tested was below that of the experimental group, from which we can conclude that, nutrition education component

envisaged in the ICDS programme was able to bring desirable changes in the nutritional cognition of the beneficiaries.

Adoption of various nutrition messages disseminated among the beneficiaries indicated that majority of the respondents practice many of the messages disseminated in their daily life, as 87 percent beneficiaries secured a score above 70 percent. This finding is in line with the observation of Kothari and Nataraj (1989), Punhani and Mahajan (1989) and Beegum and Malathi (1989). They found that nutrition practices of the beneficiaries of ICDS were better than those of the non-beneficiaries. Their practices in the different areas of nutrition such as infant feeding, health care during childhood, pregnancy and lactation, hygiene and food habits were tested. Results revealed that all the three groups of beneficiaries had better adoption of scientific practices products in the area of infant feeding, health care, and hygiene, since overall mean score was 0.88. Not much difference was noticed among the three groups with regard to the adoption of nutrition messages. However, messages related to food habits were found to be least adopted among the three groups of beneficiaries. This may possibly be due to the fact that food habits are deeply rooted and difficult to change within a short period. Moreover economic difficulties are also reflected in changing the food pattern.

Results of the assessment of the attitude of beneficiaries towards, ICDS in general and, to that of various components revealed that majority of the beneficiaries belonging to all the three groups showed favourable attitude towards the ICDS programme. Among the various components, attitude towards supplementary nutrition was found to be most favourable followed by preschool education, immunization and health check-up. Less favourable attitude was shown by the beneficiaries towards and health education and referral services. Hence special efforts are needed by the functionaries to make these components more meaningful and attractive to the beneficiaries.

5.4 Food consumption and dietary habits of the families

Food is the major vehicles for affecting improved nutrition of people and hence assessment of food consumption and dietary habits of the people should form an integral part of the evaluation of any nutrition intervention programme. (Chavez, 1984).

5.4.1 Food purchasing habits of the families

An assessment of purchasing habits of the families with regard to various food articles will reflect on the frequency of inclusion of these food items in the daily

diet. In Kerala, through an effective public distribution system, staple food articles like rice and wheat are distributed weekly to the people at subsidised rates. This has found to influence the purchasing pattern of the families under study. Staple food articles like rice and wheat are purchased by majority of the families of both experimental and control groups 'once in a week' at subsidised rates. Compared to rice, wheat was found to be less popular and less acceptable among the families of the present study, even though Keralites are familiar to this grain for the last so many years. Compared to the control group wheat was more popular among the experimental group, mainly because of their awareness regarding the advantage of wheat along with rice in their daily diet, through the education classes of ICDS programme. However cereal products such as maida and semolina were found to be purchased less frequently by many of the families in the two groups. These findings are in line with the number of studies conducted earlier in the State (Thomas 1989., Beegum, 1989 and Sujatha 1990). Unlike other residents in the country, Keralites are still found to prefer one cereal meal ie, rice based and they are less familiar and do not relish a mixed cereal diet.

Next to cereals, pulses are another dry food article having a place in the Indian diet. They are considered to be poor man's meat since they are relatively

inexpensive protein in concentrated form (Ramdasmoorthy, 1984). Among the study group redgram was the most frequently purchased pulse followed by greengram and bengalgram. Findings of the present study are also in line with the results of the NNMB surveys (1981). Frequency of consumption of pulses by the families belonging to the control group was found to be less than the experimental group. However more than half the families in the two groups were not in the habit of purchasing pulses at all.

Not much difference was noticed among the two groups with regard to the purchasing habits of perishable food articles viz. vegetables, green leaves, roots and tubers, milk and egg.

Purchase of vegetables was not very frequent among the two groups and their purchase was influenced by the home production of the same. Half of the families in both groups were not in the habit of purchasing green leaves. The main reason being they are available, and were accessible to them even without purchasing the same. Tapioca was found to be the most frequently purchased tuber followed by potato, yam and colios among the two groups. However control group were found to purchase roots and tubers more frequently than the experimental group.

Among the perishable foods, fish was found to be the only item purchased daily by both the groups mainly because of its availability, preference and cost. Purchase of meat and egg were found to be more in the control group than the experimental group. Religious and cultural habits and the traditional meal pattern of the control group might have influenced their purchase.

Purchase of sugar and jaggery was found to be 'weekly' among the experimental group as against the 'daily' purchase in the control group. Similarly monthly purchase was observed in the experimental group with regard to cooking oil, whereas control group followed a weekly purchase pattern. Bakery items being costlier had not found a place in the dietaries of these rural families. Purchasing habits of the families threw light on the following salient features which are applicable to the families of similar socio-economic background.

1. Availability of food at subsidised rates influenced the purchasing habits of the families.
2. Dry food articles were purchased once in a week.
3. Food items expensive and available only in seasons were purchased less frequently.
4. Home production of foods negatively influenced the purchasing habit.

5. Families below poverty line purchase food articles daily.
6. Perishable food articles were purchased as and when they were required.

5.4.2 Frequency of use of various foods in the dietaries of the families

Indian diets are predominantly rich in energy supplying foods, since the staple foods included in the daily meals were of this category. Surveys conducted by NNMB (1981) in selected districts in Kerala had also revealed similar results. In the present study also, the frequency of use of foods by the families threw light on the fact that the diets were predominated by rice and roots & tubers which are concentrated source of energy. Rice was found to be an essential item in the daily menu while roots and tubers found a place in the side dishes. Thimmayamma *et al.* (1988) observed that the major dietary source of energy is cereals in rural families in Hyderabad. According to Sosamma (1983) predominant cereal based diet was supplied to preschool children residing in the rural areas of Udaipur city so also in Kerala (Beegum 1989., Thomas 1989).

Next to rice, fish was found to be an essential item in the diets of the two groups. Frequency of consumption of green leafy vegetables, and other vegetables

which are designated as protective foods were found to be less frequently included in the diets of the two groups. However inclusion of greens and other vegetables were found to be more in the experimental group. Probably, they were aware of the nutritional significance of protective foods. A general trend noticed in the consumption pattern was that, protective foods were included in the dietaries only when the fish was not available.

With regard to the consumption of pulses which is a source of protein in the dietaries of the families was found to be poor in the families of both the groups. This finding is in line with Devadas *et al.* (1977) who had reported about the poor consumption of pulses among the beneficiaries of supplementary nutrition programme. NNMB (1981), Beegum (1989) and Thomas (1989) also supported that among the families of rural areas, consumption of pulses was poor. However it is encouraging to note that the experimental group included pulses more frequently, than the control group. Non-users of pulses were also found to be more in the control group. Among the pulses, redgram was found to be the most preferred pulse. This finding is on par with NNMB (1981) and Lina and Reddy (1984).

Animal products such as milk, egg and meat are the traditional foods consumed by man and they have immense

value in supplementing the vegetable proteins. Inclusion of these products in the dietaries were observed to be less in both the groups. Kondiah (1984) observed that expensive food items such as milk, meat and eggs were used less frequently in the dietaries of rural people. Assessing the daily consumption pattern of milk and milk products indicated that only 38 percent families in the experimental group and 47 percent in the control group used milk in the dietaries in negligible quantities mainly for making coffee or tea. A positive trend was observed in the case of control group unlike the experimental group with regard to the consumption of milk and milk products. Similarly frequency of consumption of meat was also more among the control group, possibly due to the cultural practices. Egg was found to be an occasionally used food item among the two groups.

Coconut, cooking oil and sugars were included sparingly in the daily dietaries of both the groups. However these food articles did not play an important role in elevating the nutritional adequacy of the meals except calories.

Food use frequency measured indicated that cereals, fats and oils, sugar and jaggery, nuts and oil seeds and fish were the most frequently used food articles

in the daily diets by both the groups. In the experimental group, roots and tubers, vegetables and pulses were the medium frequently foods where as in the control group, apart from roots and tubers, milk and meat were the medium frequently used food items. This may again be attributed to the religious and cultural practice of the group. Less frequently used foods among the experimental group were milk, greens, meat and egg as against greens, vegetables, egg and pulses among the control group. Bakery items did not find a place in the dietaries of both the groups.

5.4.3 Food combination followed in the dietaries of the families

An assessment of food combinations followed in the daily meal pattern will indicate the preference of the family members for various food articles and also the frequency with which every food item is repeatedly used. This will also help to ascertain their food habits.

Various food combinations followed by the families for breakfast indicated that 'cereal, pulse and coconut' combination was followed by many families in both the groups. Food items in the above combination will complement each other with regard to calories and protein. Another notable feature observed was that cereal tuber combination was not very much popular among the majority of the families

in the experimental group, where as it was found to be a favourite combination for the control group. Cereals and tubers mainly provide calories, and do not complement each other. Hence the control group will have the disadvantage of using this combination.

Habit of taking midmorning snacks were not very much popular among the study group. However when compared to the experimental group, control group were in the habit of taking gruel with pickle/chamanthi/fish during midmorning. It was observed that the main meal of the day (lunch) was taken by the families of control group very late in the afternoon unlike the experimental group and that may be the reason for taking an additional meal in the midmorning.

Rice and fish combination was a popular form in which lunch was prepared by the families of both the groups. Rice, vegetable combinations and rice, pulse and vegetable combinations were prepared by only a few families in both the groups. However rice with non vegetarian preparation mainly meat was found to be a favourite combination for a few families in the control group for lunch.

'Rice with fish' was found to be the most commonly used combination for dinner by majority of the families of both the groups. Similar findings were also reported by Thomas (1989) and Sujatha (1990).

An analysis of the different combination tried by these families threw light on the fact that cereals, roots and tubers and fish was the most commonly used, items in their daily dietaries. Food groups such as pulses green leafy vegetables, other vegetables, milk and milk products were included in the dietaries only occasionally. This finding is on par with Sosamma *et al.* (1983). She has pointed out that the amount of vegetables, fruits, milk and milk products were absent or negligible in the diets of preschool children residing in rural and urban areas of Udaipur.

5.4.4 Cooking methods followed in the families

The way in which food is handled influence the retention of nutrients in foods, its safety and the organoleptic qualities.

Among the different cooking methods, boiling was the most commonly practised method of cooking for cereals, pulses, vegetables, roots and tubers, fish, milk and egg in both the groups. Shallow frying was generally practised for green leafy vegetables and for meat, while deep fat frying was also observed for fish and meat. From the above findings it can be concluded that families of both were not found to follow scientific methods to conserve nutrients or any sophisticated cooking procedures in their dietaries.

Lack of time, interest, and economic difficulties are reflected in their choice of cooking methods.

5.4.5 Preservation methods followed in the families

Preservation practices followed by the study group indicated that majority of the families in both the groups were in the habit of preserving food. But the most simple method of pickling was the only preservation technique followed by the study group. When compared to the control group experimental group showed a positive trend towards preservation of food. The knowledge rendered through health education classes might have influenced their preservation practices. Foods like mango, amla, lemon, bittergourd and papaya were the foods that were commonly preserved items used in their dietaries, apart from dried fish. However dried fish was not found to be preserved in their homes. This dried food article was found to be readily available at low cost in the local markets in plenty and hence the families had not felt the need for preserving this food. Negligible use of vegetable in the daily dietaries, as evidenced in the earlier findings may be another reason for the less popularity of preservation techniques among the families.

5.4.6 Delicacies prepared during special occasions in the families

Majority of the families in both the groups were found to prepare delicacies during special occasions such as birth days, marriages, and festivals, mainly in the form of calorie rich sweet dishes. However such special foods were not found to be prepared during religious functions and death ceremonies in majority of the families in both the groups.

5.4.7 Dietary care observed in the families at different stages of life cycle

Nutrient needs vary at different stages of life cycle. Early years of childhood is a phase of rapid growth and development and deprivation of various nutrients at this stage would result in malnutrition and poor development in a child (UNICEF, 1991). Similarly physiological stress in pregnancy and lactation impose additional nutrient demands on the mother. Thimmayamma *et al.* (1983).

In the present study, dietary care provided to the vulnerables in the families were investigated. Majority of the families in both groups were found to take much care during infancy. Experimental group was observed to introduce more wholesome and variety foods to infants compared to the control group. Plantain flour, Ragi, boiled banana, and tubers were some of the items included in the

infant's diet. It can be assumed that, the knowledge, the mothers gained through the anganwadi centres might have influenced their practice. However the physiological condition such as pregnancy and lactation was regarded as the normal condition, by majority of the families in both groups, since no alteration was found to be introduced in the diets of pregnant and lactating mothers, so as to meet the additional nutrient needs.

5.4.8 Intrafamily food distribution pattern in the families

Intrafamily distribution of food within the family indicated that children were given first preference for taking meals in many of the families of both the groups. Next to children, preference was given to the male members of the family. Habit of taking meals along with all 'family members' was noticed only in very few families. Traditional customs prevailed in the area might have influenced their habit. No preference was found to be given to adult female or even to pregnant or lactating mothers in taking meals in the studied families of both groups. This finding is in confirmation with UNICEF (1988), who had stated that women in the households of rural families were considered last and the least, with regard to meal serving. Studies have also proved that profile of the under privileged women is one of the poor physical growth, manifesting nutritional stunting, and poor dietary and nutrient intakes.

5.4.9. Morbidity pattern of children in the families studied

Intestigations on the morbidity pattern of the children of the study group indicated that, diarrhoea was the most commonly occurring disease among the children of the two groups. Kannan *et al.* (1992) reported that diarrhoea and fever are the commonest diseases in children. A notable feature was that occurrence was less in the experimental group. This is one of the benefit obtained from the package of services rendered through ICDS. Communicable diseases account for 68 percent of morbidity in Kerala. (Kannan *et al.*, 1992). Measles and whooping cough were the other diseases, found to be occuring in the children of the studied group, and the children of the experimental were found to be less attacked than the control group, which is again due to the impact of the programme.

During the disease conditions certain modifications in the diet are necessary, and the experimental group were found to impose such dietary restrictions more efficiently than the control group.

5.5 Assessment of actual food and nutrient intake of the respondents

Assessment of the actual food intake of the respondents of the experimental and control groups revealed that cereal consumption was appreciably adequate in almost

all the categories of beneficiaries, in the experimental group while it was inadequate in the diets of preschool children of the control group. Pulse consumption was found to be adequate in preschool children of the experimental group whereas it was below the R.D.A. in mother beneficiaries. In control group, consumption of pulses was very poor in all the three groups of respondents. The food supplement provided under ICDS for the preschool children might have contributed for the adequacy of pulses in the diets of the preschool children.

Among the various food groups included in the dietaries, consumption of fish was found to be the highest in all the groups, and consumption was appreciably high in the control group. This may be attributed to the fact that fish was available in plenty and was affordable to them. Studies conducted earlier in the rural areas of Thiruvananthapuram by Thomas (1989), Beegum (1990) and Sujatha (1990) also revealed that fish consumption was high in the dietaries of people. Consumption of all the other food groups were found to be insufficient in the diets of all the categories of the beneficiaries when compared to R.D.A.

Among the various foods, the intake of leafy vegetables was far from satisfactory. NNMB surveys

(1975-81) conducted in Kerala confirm the above finding. Though the vegetable consumption was poor in the experimental group it was better in all the three categories of beneficiaries, when compared to the control group. Low consumption of protective foods was reported in the dietaries of preschool children by Beegum (1990), in her study conducted in the urban ICDS block of Thiruvananthapuram. Consumption of milk and milk products was higher in the child beneficiaries, when compared to the mother beneficiaries. Among the control group the actual consumption of milk and milk products was very low. However, foods like fats and oils and sugar and jaggery were found to be deficient in the diets of all the respondents of the two groups. Apart from these, consumption of coconut was also found to be higher among all the respondents belonging to both the groups, being higher in the control group, which is a speciality of Keralites. Seasonal consumption of fruits were also noticed in the respondents of both the groups.

Assessment of actual food intake of the respondents also helped to understand the trends in the consumption of food supplement served in the anganwadi centres. Discouraging result of large scales sharing of the supplement by other family members, was observed among all the categories of the beneficiaries, being higher in the

mother beneficiaries. This observation is in conformity with the earlier findings of Meetakumar *et al.* (1988), and Desai, (1989). They found that only 25 percent of the supplement was consumed by the beneficiaries themselves.

To conclude we can say that, the diets of the control group were ill balanced since it was composed mainly of cereal, and fish alone. The respondents from the experimental group had tried to improve their food consumption by including pulses, vegetables, roots and tubers and milk in addition to fish and cereals. This change in the dietary habit may be due to the impact of the education and supplementary nutrition component of the ICDS programme. Gupta (1989) observed better food intake among the ICDS beneficiaries of rural ICDS block of Uttarpradesh when compared to the nonbeneficiaries.

Mean nutrient intake of the respondents revealed that, energy intake was sufficient in mother beneficiaries, and was more or less adequate in the child beneficiaries. In contrast, protein intake was adequate and almost met the R.D.A. in children of the experimental group unlike the mother beneficiaries. Much difference was not noticed between the experimental and control groups in the energy and protein intake. The average calorie and protein intake of the pregnant and lactating mothers of both experimental

and control groups were found to be above the average energy and protein intake which was reported to be 1800-2000 kcals/cu/day, and 40-45 g/cu/day respectively for Malappuram district by NNMB during 1975-81. It is also interesting to note that, protein and calorie intake of the pregnant mothers in the present study were found to be above those reported in the pregnant mothers of urban slums of Nagpur city which was only 1400 kcals for energy and 42 g for proteins (Durge *et al.* 1989).

In the child beneficiaries and lactating mothers, iron intake was sufficient in the experimental group whereas it fell short of adequacy in their counterparts in the control group as well as in the pregnant mothers of experimental group. Gross inadequacies were observed in the intake of nutrients viz retino, calcium, riboflavin and vitamin C, in the diets of the respondents of experimental and control groups, being much lower in the control group. Insufficient consumption of milk and milk products, greens and vegetables might have contributed to the inadequacies of these nutrients.

5.6 Assessment of anthropometric measurements of the respondents

Assessment of anthropometric measurements is an important technique for detecting different degrees of

malnutrition among the population. Analysis of the weight for age profile of the preschool children which is an indicator of the nutritional status, indicated that, in both male and female children of the experimental group, mean body weight was significantly better than the control group, though the mean body weight of the majority of the children belonging to both the groups, and at different age classes was found to be lower than the national and international standards. This finding is in confirmity with Gupta (1989). He observed that mean values of all the anthropometric measurements in both and male children belonging to the ICDS block of Uttar Pradesh were found to be lower than the ICMR standards but the values were much lower in the non-beneficiaries of ICDS. Chaturvedi *et al.* (1987) found that mean weight of male and female children of ICDS group was higher than in non ICDS group. However it was encouraging to note that, mean body weight of both male and female children in the first two age classes was 'on par' with the Indian standard, whereas it was significantly lower than the standard in the control group, except in the male children belonging to the age group of 42-47 months. Results of the analysis of anova indicated that, mean body weight of the children, in the studied groups increased with age, as per our expectation. However the weight of the male children was not significantly different from that female children in both the groups.

Malnourished children identified according to the gradation of growth retardation revealed favourable trends in the experimental group. The percentage of children identified in the normal group was found to be more than double in the experimental group when compared to the control group. Similarly, children belonging to Grade I, and Grade II were also found to be less in the experimental group compared to the control group. Vivek *et al.* (1989) observed that children identified in Grade II and III were less in the ICDS beneficiaries of rural ICDS block of Uttar Pradesh when compared to the non-beneficiaries.

Impact of an intervention programme is reflected in the shift of children from the lower grades of malnutrition to better grades, and in the present study, switch over of children from the lower grades of malnutrition to the better grades was noticed, though the shift was found to be slow and gradual. Patel (1984) noticed that the average conversion time taken by the children to improve from PEM (Protein Energy Malnutrition) grade IV to grade V was 142 days and from grade IV to grade III was 127 days. Another noticeable fact was that, the switch over was pronounced in the lowest grades of malnutrition. Above findings clearly indicate that current nutritional status of the children of the experimental group was found to be better than the control group.

Height for age profile of the children which is a measure of past nutritional state of the subject, indicated that in both the experimental and control groups children maintained the national and international standards with respect to height for age profile, in majority of age groups in both sexes, except in the male children belonging to 48-53 months, and female children in the age group 54-59 months in the experimental group. Results of the anova indicated that, as per our expectation, height for age of the children increased with age. However the height of the male children was not significantly different from the female children. Similarly no significant difference was noticed in the height for the age between the experimental and control groups.

Meetakumar *et al.* (1988) found that mean height measurement of the experimental and control group children belonging to the ICDS project of Delhi was not significantly different.

As per the classification suggested by McLaren, for stature of the children, 63 per cent of the children in the experimental group was found to have normal stature as against 56 per cent in the control group. From these findings we can come to a conclusion that past nutritional state of the children belonging to the experimental group

was found to be better than the control group. This may be attributed to the fact that, mothers of these children may be beneficiaries of the ICDS programme earlier, or may be due to the influence of ICDS on other nutritional aspects (viz. food consumption pattern and immunization status).

Weight/height² profile is another index used to detect the malnourished children. According to this index, the percentage of children in the normal as well as in the moderate group of malnutrition was found to be more in the experimental group than in the control group. Majority of the children in the control group was found to be undernourished.

Severely malnourished children can be screened through assessing the Mid Upper Arm Circumference (MUAC). It is encouraging to note that, majority of the children in both the groups were not found to be severely malnourished. However moderate to severe malnutrition was observed in negligible per cent children in the experimental group, whereas it was almost double in the control group.

Head/chest circumference ratio also helps to identify the normal and malnourished children, and in the present study results of the head/chest circumference ratio reassured that the children identified under normal group, was more in the experimental group than in the control group.

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All these findings throw light to the fact that, anthropometric measurements of the children were found to be better in the experimental group compared to the control group, which is assumed to be due to the impact of the programme.

Evaluation conducted on ICDS by various authors in the different parts of the country indicated a positive change in the nutritional status of preschool children. (Bhandari *et al.* 1981; Tandon *et al.* 1981; Sunderlal 1982; Subramanian 1985; Mehta *et al.* 1989; Prasad *et al.* 1989; Thakur *et al.* 1989; Vivek *et al.* 1989).

Results of the assessment of the anthropometric measurements in the pregnant and lactating mothers revealed that, not much difference was noticed in the weight profile of the pregnant mothers of the experimental and control groups at different stages of pregnancy. However the mean body weight of the lactating mothers was found to be much higher than that of the control group. Not much difference was noticed in the height profile of the pregnant and lactating mothers belonging to the experimental and control groups. The observed height profile was found to be above the standard suggested.

Maternal Weight for Height Ratio Index (WHRI) which is used as an indicator of the nutritional status in

the pregnant mothers, (Bhatia *et al.* 1989) found to be favourable towards the pregnant mothers belonging to the experimental group. As per the WHRI index majority of the pregnant mothers in the experimental group, was found to be normal as against only 45 per cent in the control group. The finding is unlike those reported by Durge *et al.* (1989). She found that 25 per cent expectant mothers in the urban slums of Nagapur city under ICDS was found to be healthy, and 75 per cent showed signs of malnutrition. In order to detect chronic energy deficiency among the pregnant and lactating mothers, body mass index measure was used, the results of which indicated that, majority of the pregnant and lactating mothers were identified under the normal group in the experimental group whereas it was comparatively less in the control group. Severe chronic energy deficiencies were found only in negligible pregnant mothers in both the groups and none among the lactating mothers. Another noticeable fact was that, compared to the pregnant mothers, lactating mothers were found to be healthier.

As in the case of preschool children, pregnant and lactating mothers of the experimental group superceded the control groups in many of the anthropometric variables.

5.7 Clinical assessment of the respondents

Changes related to the inadequate nutrition as detected through clinical assessment indicated that

respondents who had secured maximum score was found to be higher in all the three categories of the beneficiaries in the experimental group when compared to the control group. Similarly lower scores for clinical assessment was obtained by more number of respondents in all the categories of the beneficiaries in the control group than the experimental group. Mean values obtained for clinical score was found to be higher in all the three categories of beneficiaries in the experimental group. The above results clearly indicate comparatively lesser clinical manifestations in the experimental group when compared to the control group.

Among the various deficiency diseases observed in the respondents of both the groups, anaemia was accounted to be the highest being much higher in the control group. This observation is in line with Jakher *et al.* (1989) and Kumar *et al.* (1989). The most common deficiency diseases observed among the children were anaemia, protein energy malnutrition and avitaminosis. Compared to the preschool children, anaemia was much higher in pregnant and lactating mothers. Durge *et al.* (1989) reported similar results. This was followed by B complex deficiency and vitamin A deficiency in the experimental group, but to a lesser extent. This observation is unlike those reported by Indirabai *et al.* (1984). She has found high prevalence of vitamin A and riboflavin deficiencies among children in rural Andhra

Pradesh. In the control group next to anaemia, vitamin A deficiency was found to be the highest followed by B complex deficiency. Coverage of vitamin A supplement to the beneficiaries of ICDS might have contributed to the fewer manifestation of vitamin A deficiency in the experimental group. In both the groups prevalence of dental caries and tooth decay was quite common. Negligible number of children in both the groups showed signs of scabies also. This finding is unlike those reported by Prabhakara *et al.* (1989), who found that scabies was major illness present among the child beneficiaries of ICDS, in the slums of Bangalore city.

5.8 Assessment of biochemical parameters

Assessment of haemoglobin levels of the respondents indicated that in all the three categories of the beneficiaries, mean haemoglobin levels of the experimental group were higher than the control group and in female preschool children and in pregnant mothers, significant difference was noted in haemoglobin levels between the two groups, indicating less number of anaemics in the experimental group when compared to the control group which is assumed to be due to the impact of the ICDS programme.

Encouraging results were obtained when indepth investigations on serum protein and albumin were carried out in selected respondents. Serum protein and albumin levels in the assessed respondents were found to be in the normal limits, indicating the absence of protein calorie malnutrition in the subjects.

5.9 Assessment of growth monitoring in children

Assessment of growth monitoring in selected preschool children, for a period of 6 months indicated that, there was a steady and gradual increase in the body weights, in all the male and female children assessed. The results are encouraging and also assures the importance of growth charts in the early detection of growth flatterings in children. In the present study the mean weight increments of male children was found to be higher than that of female children.

5.10 Factors influencing participation and participation index of the respondents

Various socio-economic and family characteristics of the respondents on the participation was assessed. Among the various factors analysed in the present study, religion was found to be associated with the participation in the mother beneficiaries, whereas it was not associated in preschool beneficiaries. Participation was found to be

independent of the economic status in all the three categories of the beneficiaries. This may be attributed to the fact that all of them were from the lower economic strata. Employment status of an individual is to be considered as a factor influencing their participation in developmental programmes. Surveys conducted by Beegum (1990) and Prema et al. (1990), among the ICDS beneficiaries indicated that employment outside home influenced their participation. However in the present study, employment status was not found to be influencing factor for participation in the ICDS programme.

Educational status is a factor influencing participation, however, in the present study, this factor was found to influence the participation in the preschool category alone. Youngsters are generally found to be active in any programme compared to the older people. In the present study, participation was also found to be independent of the age of the beneficiary. Most of the family characteristics, were not found to have influence on participation of the respondents, except marital status in lactating mothers, type of family in pregnant mothers, and number of children in the preschool category. Above results throw light at the fact that, participation of the respondents in the programme was not much influenced by many of the socio-economic and family characteristics.

Participation index obtained for the three categories of the beneficiaries revealed that, female preschool children had higher participation index followed by male preschool children, pregnant mothers and lactating mothers.

The results also proved that, participation of the respondents in the ICDS programme on the whole was not so low, since mean participation index obtained for the respondents was above 75.

On analysing the influence of various socio-economic variables, on the participation levels of the beneficiaries, it was found that, most of the socio-economic factors, viz., religion, economic, employment and educational status, type of family, marital status and number of children in the family were not influencing the participation levels of the beneficiaries. From these results we can conclude that, participation and the participation levels of the respondents in the programme are independent of their socio-economic of family characteristics.

Assessing the nutrition knowledge, attitude and adoption of nutrition messages among the beneficiaries with the participation levels, indicated that nutrition knowledge attitude, and the adoption were not associated with

participation levels, in all the three categories of beneficiaries.

5.11 Nutritional status index and their interrelationship with different characters

Nutritional status index developed, for the respondents clearly denote that, nutritional status index of the pregnant and lactating mothers of the experimental group was superior to their counterparts in the control group. Among the male children, it was slightly better than the control group whereas in female children control group was found to be better in nutritional status index than the experimental group.

Results of the interrelationship of different characters contributing to the nutritional status index revealed that nutritional status index was correlated with body weight, body mass index, arm circumference, clinical score, and participation index in male and female children apart from height in male children and head and arm circumference in female children.

In pregnant mothers nutritional status index was found to be influenced only by body weight and haemoglobin levels whereas in lactating mothers it was correlated with body mass index, haemoglobin levels and participation index.

Participation index was found to have profound influence on nutritional status index, clinical score, haemoglobin levels, body mass index and that of head circumference in male and female preschool children, apart from height, chest, and arm circumference in female children. Similarly, participation index was significantly correlated with the nutritional status index in lactating mothers. However participation index was not significantly correlated with nutritional status index computed for pregnant mothers.

SUMMARY

6. SUMMARY

The present study entitled "Nutritional status of ICDS (integrated child development services) beneficiaries with respect to participation" was carried out, in Malappuram district selecting 170 respondents representing three categories of beneficiaries of ICDS namely preschool children, Pregnant mothers, and lactating mothers. Seventy non beneficiaries from the same socio economic background was also maintained as the control group.

The study enlightened the socio economic and personal characteristics of the respondents, appraisal of the programme implemented in the area, nutritional status of the respondents through food consumption, anthropometric, clinical, and biochemical parameters, participation index of the respondents and the inter-relationship between participation index and nutritional status index.

Informations pertaining to the socio-economic personal characteristics, indicated that in the predominated muslim area, majority of the respondents were represented from under priveleged sections of Hindu community who followed joint family system and 'small family norm'. The

respondents were moderately educated and from the low socio-economic strata.

Major family expenditure is for food followed by health, clothing, education, transportation and recreation with very low percentage of income for non-food items. Houses owned by the respondents in general were lacking in basic amenities such as drinking water, electricity and toilet facilities.

Cultivable land possessed by the respondents were found under utilized. Male dominance in decision making, popularity of the communication media like radio and light reading magazines, positive interest in gathering health related informations and disability in the adoption of new innovations due to economic difficulties are certain notable information gathered on socio-economic characters ascertained.

The critical appraisal of the programme provided valuable informations on its implementation, short comings and popularity among the respondents. Unlike the beneficiaries of the ICDS in other states, the respondents of the study were found to have a clear cut perception about the programme, and they participated for the over all benefits derived from the programme.

Preference and usefulness of the various components of ICDS among the respondents indicated that, supplementary nutrition was the most preferred and useful component followed by preschool educations, health check-up, immunization and health education. Referral service component was the least preferred one.

Specific evaluation on supplementary nutrition component of ICDS indicated that respondents considered the food supplement nutritious, adequate, and relishable. The food delivery system, time of serving and the space adequacy in the centre were much appreciated. Nevertheless, sharing of the food, supplement by the other family members was a major lacunae observed in this component.

With regard to the immunization status 92 percent coverage was noted among the child beneficiaries for B C G and D.P.T., followed by measles with lesser coverage. The pregnant mothers were found to take comparatively less care in availing the advantage of this component. The major defect observed in this context was the partial and incomplete availing of the immunization component, defecting there by to a large extent the purpose of the programme. Morbidity pattern of the experimental group was encouraging since there was no incidence of diphtheria, or polio among them.

Information pertaining to the distribution of medicines indicated that majority of the beneficiaries were in receipt of the Vitamin and Iron tablets, however, difficulty in getting the medicines were also reported.

Majority of the respondents were found to be regular participants of the health 'check-ups' with high opinion about its benefits and essentiality. Growth monitoring activity. ICDS programme was also found to be well accepted and well perceived by majority of the respondents. This activity was also regarded as an indispensable element of ICDS.

Evaluation on health and nutrition education component revealed lesser involvement among the respondents, probably due to lack of time, lack of interest, household burdens, and outside job responsibilities. Nevertheless the participated respondents were found to grasp important nutrition messages disseminated. Compared to all the other components, referral service component of ICDS was least acceptable.

Preschool education component of ICDS was very popular among the respondents since this component enabled to discipline their child, to inculcate good and healthy habits, and to grasp fundamentals of education. However the present infrastructure facilities of the anganwadi centres were not upto the satisfaction of the respondents.

Assessment of nutritional cognition among the respondents denoted significantly superior nutritional cognition among the experimental group compared to the control group. Scientific practices related to infant feeding, health care, and hygiene were found to be well imbibed by the beneficiaries. However the programme has not made profound impact on adopting the practices related to food habits.

Assessment of the attitude of the beneficiaries towards various components of ICDS, depicted that attitudes in favour to supplementary nutrition was very high followed by other component like preschool education, immunization, health check-up, health education and laslly referral services.

Food purchasing and consumption pattern were taken as the criteria to determine their dietary habits. Public food distribution system prevailing in the State was found to influence the purchase of staple food articles namely cereals in the experimental and control groups. Fish was the only item purchased daily by the families of the two groups. Except in the frequency of purchase of pulses and vegetables, not much difference was observed among the two groups in the purchasing habit of other food articles.

Consumption pattern indicated that diets of the two groups were predominated by rice, fish and roots and tubers. Protective food such as vegetables and greens and pulses were more frequently used by the respondents in the experimental group. Consumption of animal products which are of immense value in supplementing the vegetable proteins, was only occasional in both the groups due to economic reasons. Food use frequency measured indicated that cereals fish and fats & oils, sugar and Jaggery and nuts and oil seeds were the most frequently used food articles in the daily dietaries of both the groups. Positive trends were observed in the experimental groups with regard to the consumption of pulses and vegetables. Food combinations followed by these families further assured that inclusion of better food combinations in the meal pattern of the experimental group.

Culinary practices followed in the dietaries of the two groups indicated that sophisticated or elaborate cooking procedure or scientific methods for conserving the nutrients were not followed. Respondents in the experimental group were found to give adequate stress for meeting the nutrient needs of the infants, compared to the control group. However respondents in both the groups were not found to take adequate care for meeting the nutrient requirements during pregnancy and lactation.

Intra-family food distribution pattern of the two groups indicated, top priority for children and male members in taking meals. However lower morbidity status with respect to diarrhoeal and, other infectious diseases, was observed among the respondents of the experimental group.

In depth investigations on selected respondents of the two groups for assessing the actual food intake revealed that, cereal and fish consumption was appreciable in all the categories of beneficiaries and almost adequate in non-beneficiaries consumption of pulses was adequate only in child beneficiaries. Consumption of other food groups though insufficient was much better in the experimental group. However consumption of leafy vegetables was far from satisfactory in both groups. Comparatively better consumption trend was observed among the respondents of the experimental group.

Nutrient intake of the respondents revealed that energy and protein intake was almost sufficient in the respondents of both the groups. Gross inadequacies were located in the intake of retinol, calcium, riboflavin and vitamin C in the dietaries of both the groups being much lower in the control group.

Assessment of the anthropometric measurements indicated that though the mean body weight of the children

were lower than national and international standard, it was significantly superior in the experimental group. Malnourished children identified according to the gradation of growth retardation was also much lower in the experimental group compared to the control group. Impact of the intervention programme as reflected in the shift of children from the lower grades of malnutrition to that of better grades was a significant observation found in the children of the experimental group. Children belonging to both the groups maintained national as well as international standard with respect to height for age profile in majority of the age groups in both the sexes. Stature of the children was also in favour of the experimental group.

As per the various indices used for screening the malnourished children such as body mass index, mid upper arm circumference, and head/chest circumference ratio, number of normal children in the experimental group were more.

Assessment of the anthropometric measurements of the mother beneficiaries, indicated negligible difference in the weight and height profile of the respondents of both the groups. However as per the weight for height ratio index, more healthier mothers were identified in the experimental group. Similarly the index used for screening chronic energy deficiency was also in favour of the mother beneficiaries of the experimental group.

Biochemical investigations carried out indicated that haemoglobin levels of the experimental group were significantly higher than the control group indicating less number of anaemic persons in the experimental group. Serum protein and albumin levels, confirmed the absence of protein calorie malnutrition in the respondents of the experimental group.

Participation rate of the three categories of the beneficiaries in the programme was assessed and the results indicated that participation of all the groups was high. Among the three groups, participation rate of the preschool beneficiary was the highest followed by pregnant and lactating mothers. On analysing the influence of various socio-economic personal characteristics on participation revealed that, participation of the respondents was not associated with religion, economic, employment status and educational status, type of family and marital status. However participation of the preschool beneficiary in the programme was influenced by the educational status of their mothers and the number of children in the families.

Levels of participation of the respondents were neither associated with socio-economic and personal characteristics of the individual nor with their nutritional knowledge, attitude and practice.

Nutritional status index was developed with suitably selected characters viz weight, height, body mass index, head, chest and arm circumferences, clinical score and haemoglobin levels in preschool children, and weight, height body mass index, clinical score and haemoglobin levels in mother beneficiaries. Results revealed that nutritional status index of the pregnant and lactating mothers of the experimental group was significantly better than that of the control group. Nutritional status index of the male children though higher than their counter parts in the control group, the difference was not statistically significant. However nutritional status index of the female children was found to be better in the control group.

Inter relationship of 'participation rate' with that of 'nutritional status index' of the beneficiaries clearly depicted positive and significant correlation in male and female preschool children and in lactating mothers. However it was not correlated in pregnant mothes.

Recommendations

In the light of the findings, following recommendations are made for the further improvement of the ICDS programme.

1. Certain sections of the under privileged communities are to be motivated further for greater involvement in the programme.

2. 'Sharing of the food supplement' by other family members of beneficiary is to be curbed effectively by insisting on 'on the spot feeding'.
3. The beneficiaries are to be convinced about the significance of completing the 'course of immunization'.
4. Regular supply of essential medicines and other vitamin supplements needs to be ensured.
5. Health education component of the programme is to be made more attractive and effective.
6. Infrastructure facilities of the anganwadi centres needs to be improved.
7. Referral service component of the programme needs to be reoriented in order to make it more meaningful and effective.

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APPENDICES

APPENDIX I

Kerala Agricultural University
College of Agriculture
Department of Home Science

Questionnaire to elicit information on Socio-economic and personal characteristics of the selected preschool, pregnant and lactating mother beneficiaries of ICDS and non beneficiaries in the Malappuram District.

No:
Date

- Name of the ICDS project :
- Name and No of anganwadi centre :
- Type of beneficiary : 1. Mother of the preschool Child
2. Pregnant-mother
3. Lactating-mother
1. Name of the respondent
2. Address
3. Age 4. Religion Caste
5. Type of Family : Nuclear/Joint
6. Marital status of the respondent : Married since
: < 5 years
5 to 10 years
> 10 years
7. Details of the family

Sl.No.	Name of the member	Relation to the respondent	Sex	Age	Educational level	Occupation	Monthly income
--------	--------------------	----------------------------	-----	-----	-------------------	------------	----------------

8. Total monthly Income of the family :

9. Monthly expenditure pattern of the family :

Particulars	Monthly Expenditure
-------------	---------------------

1. Food
2. Clothing
3. Housing
4. Rent
5. Transportation
6. Recreation
7. Health
8. Saving
9. Personal expenses
10. Debts

10. Possession of land : Yes/No
If Yes, how much

11. Details of cultivation practice of the family

Type of crop	Production details	Utilization pattern in home	Income obtained (monthly)
--------------	--------------------	-----------------------------	---------------------------

Paddy
Coconut
Tapioca
Spices
Banana
Others

19. a) Are you interested in knowing health related subject Yes/No
- b) From where do you gather such informations?
Magazines Radio Health workers
News papers TV Neighbours
Anganwadi
20. Do you practice such informations gathered in your daily life Yes/No
If No, give reasons.

APPENDIX II

Questionnaire to evaluate the ICDS programme implemented in the study area

1. a) How long you/your child been beneficiary in the ICDS programme?

 <6 months, 6 months to 1 year, >1 year.
- b) The reason for becoming a beneficiary.
 - 1.
 - 2.
 - 3.
2. a) How long the anganwadi from your home?

 <1 km, 1 to 2 km, >2 km.
- b) Is it convenient to you?

 Yes/No
3. a) Do you/your child go to the anganwadi regularly?

 Yes/No
- b) If yes what are the purposes of going?
 - 1.
 - 2.
 - 3.
4. What are the services you received from the centre?

 Rank according to your preference
 - 1.
 - 2.
 - 3.

5. Give your opinion about the services of the centre.

Services	Very useful	useful	Not useful	Not at all useful
----------	-------------	--------	------------	-------------------

1. Supplementary nutrition
 2. Immunization
 3. Health check-up
 4. Health education
 5. Pre-primary education
 6. Referral services
-

6. Give details of the services you availed from the centre for the past 6 months services.

Services	Number of times offered	Your participation
----------	-------------------------	--------------------

1. Supplementary nutrition
 2. Immunization
 3. Health check-up
 4. Health education
 5. Pre-primary education
 6. Referral services
-

Evaluation of supplementary nutrition component of ICDS

1. Do you take the food supplement served in the anganwadi?

Yes/No

2. The reason for taking the food supplement.

- 1.
- 2.
- 3.

3. Opinion about the food supplement.

Good/bad

4. Opinion about the quantity of the food supplement.

Sufficient/insufficient/more than sufficient

5. a) Do you relish the food supplement fully?

Yes/No

b) If No, what do you do with the left over food?

Take home and eat after some time , Throw away ,
Give it to other members in the house.

6. Do you think, the anganwadi food good for your health?

Yes/No

7. Furnish the details regarding the food supplement served in the anganwadi.

Type of food

The day of serving

1.

2.

3.

8. Food distribution system followed in the centre.

Eating the food in the centre
Take home system.

9. Are you satisfied with the food distribution system followed in the centre?

Yes/No

10. If No, give reasons.

1.

2.

3.

11. a) Do you have any objection in eating food along with other beneficiaries in the centre?

Yes/No

b) If No, what change you expect.

12. Do there adequate space in the centre for eating the food?

Yes/No

13. Is the time of serving the food convenient to you?

Yes/No

14. For the past one week how many days you took food from the centre?

- | | |
|-----------|-----------|
| 1. 6 days | 4. 3 days |
| 2. 5 days | 5. 2 days |
| 3. 4 days | |

15. What are the short comings of this component of ICDS?

- 1.
- 2.
- 3.

16. What are the suggestions for improvement?

- 1.
- 2.
- 3.

Evaluation of Immunization component of ICDS

1. Are you immunized?

Yes/No

If Yes, give the details

Type of immunization	The place from where immunized
1. B.C.G	
2. D.P.T	
3. D.T	
4. Polio	
5. BoosterI, D.P.T, Polio	
6. BoosterII, D.P.T, Polio	
7. Measles	
8. Tetanus	

If Not immunized give reasons

- 1.
- 2.
- 3.
4. What is your opinion about the immunization component of ICDS?
5. Are you immunized by yourself?
Yes/No
If No who takes the initiative for getting immunized?
6. After taking immunization, are you/your child attacked by the following diseases?

T.B	Polio
Whooping cough	Measles
Diphtheria	Tetanus
7. List the shortcomings of the component.
 - 1.
 - 2.
 - 3.
8. Suggestions for improvement
 - 1.
 - 2.
 - 3.

Evaluation of distribution of medicines in the centres

1. a) Are you in receipt of any medicines from the centre?

Yes/No

b) If Yes, furnish the details

- | | |
|----------------------------|--------------|
| 1. Vit.A tablets | 3. Any other |
| 2. Iron/Folic acid tablets | |

2. Do you take the medicines distributed regularly?

Yes/No

3. Do you know the purpose of taking these medicines?

Yes/No

4. If Yes, give the reasons?

- 1.
- 2.
- 3.

5. Do you think, these medicine are good to your health?

Yes/No

6. If you are not taking the medicines give reasons?

- 1.
- 2.
- 3.

7. Are the supply of medicines regular?

Yes/No

8. Short comings of the programme?

9. Suggestions for improvement.

Evaluation of health check-up and health care

1. Do you participate in the health check-ups organized in the centre?

Yes/No

2. What is your opinion about the health check-ups?
3. For the past 6 months how many times you participated in the health check-ups organized?
4. Do you think that such health check-ups are essential?
Yes/No
5. If the 'health check-ups' are not organised , whether you will approach other 'doctors/hospitals for health check-ups'.
Yes/No
6. Are your child weighed in the centre?
Yes/No
7. Do you know the reason for weighing the child?
Yes/No
Reasons
 - 1.
 - 2.
 - 3.

Evaluation of Referral service component of ICDS

1. Do you availed referral service facility in the centre?
If Yes, give details.
If No, give reasons.
2. If your child's health is not satisfactory do you approach other doctors/hospitals?
Yes/No
If No, give reasons
If Yes, give details
3. What is your opinion about the referral service component?

Evaluation of health education component

1. Do you participate in the health education classes conducted in the centres?

Yes/No

2. Do you think that such classes are beneficial?

Yes/No

3. For the past 6 months, how many classes you attended.

Classes	Subjects taught	Persons handled	The subjects you grasped
---------	-----------------	-----------------	--------------------------

1.
2.
3.

If not attended give reasons.

4. Do you practice the nutrition messages grasped, in the daily life?

Yes/No

5. Do you think such classes are beneficial?

Yes/No

6. Short comings of such classes conducted.

1.
2.
3.

7. Suggestion for the improvement?

1.
2.
3.

8. Do the anganwadi workers visit your house?

9. If Yes, state the purpose of their visit.

10. Do you satisfied with such house visits?

If Yes, state reasons.

Evaluation of preschool-education component of ICDS

1. Do you think that, going to the anganwadi is beneficial?

Yes/No

2. What is your opinion about the education in the centre?

3. Give your opinion about the facilities in the centre.

Facilities	Yes	No	Partially
1. Drinking water			
2. Hygine			
3. Furniture			
4. Sleeping facility			
5. Playing facility			
6. Building facility			
7. Toilet facility			
8. Cooking facility			

4. Do you think that your child's health is improved after going to the anganwadi?

Yes/No

5. Do you think that anganwasies are beneficial?

Yes/No

6. Are you satisfied with the behaviour of the anganwadi teacher?

Yes/No

7. Short comings of the programme.

- 1.
- 2.
- 3.

8. Suggestions for improvement?

- 1.
- 2.
- 3.

APPENDIX III

Questionnaire to test nutritional cognition among the respondents

- | | Yes | No |
|--|-----|----|
| 1. Breast milk is good to the child. | | |
| 2. Breast milk should not be given to the child from the day of birth onwards. | | |
| 3. Supplementary foods should be introduced to children after 3 months. | | |
| 4. Artificial feeding is good for the child. | | |
| 5. Fruit juices should not be given to infants. | | |
| 6. Feeding should be discontinued during diarrhoeal diseases. | | |
| 7. B.C.G Vaccination should be given to the children. | | |
| 8. Tripple and polio vaccination should not given to the children. | | |
| 9. Supplementary foods can be prepared at home using pulses and cereals. | | |
| 10. Repeated diarrhoeal diseases affect the health of the children. | | |
| 11. Growth charts are useful for assessing the child's health. | | |
| 12. Toilet training should be given to the children. | | |

13. Hands should be washed before and after the intake of food.
14. Poor hygiene is the causative agent for diarrhoeal diseases
15. Vegetables and greens are rich in vitamins and minerals.
16. Tetanus Toxoid injection should not be given the pregnant mothers.
17. Repeated pregnancies will affect the health of the mother.
18. Additional food is not required during pregnancy.
19. Green leaves, milk, egg and fruits should be included in the daily diets of pregnant mothers.
20. Lactating mothers do not require nutrient rich foods.
21. Deworming of the children should be done once in 6 months.
22. Sick children should be isolated.
23. Health check-ups are essential for children.
24. Routine health check-ups are essential for pregnant mothers.
25. Poor nutritional status of mothers affect the health of the babies.
26. Foods kept open are harmful.
27. Night blindness is due to Vitamin A deficiency.
28. Vegetables and greens are rich in vitamins and minerals.
29. Anaemia is caused due to lack of iron.
30. Calorie deficiency causes marasmus in children.

31. Proteins are essential for children, pregnant and lactating mothers.
32. Artificial feeding is good for child.
33. Pulses are good sources of proteins.
34. Foods should be washed thoroughly before cooking.
35. Spoiled foods produced various diseases.

APPENDIX IV

Questionnaire to test the attitude of the beneficiaries towards various components of ICDS

- | | Yes | No |
|--|-----|----|
| 1. Anganwadies are helpful for the development of the nation. | | |
| 2. Anganwadies are not capable of the around development of the children. | | |
| 3. Anganwadi food is good for improving the health of the children. | | |
| 4. Health check-ups organized through anganwadies are not essential. | | |
| 5. Anganwady take initiative for getting the children immunized. | | |
| 6. Distribution of medicines through anganwadies are not beneficial. | | |
| 7. Anganwadies take care of the health of the pregnant and lactating mothers. | | |
| 8. Growth monitoring of the children in the anganwadies is not beneficial. | | |
| 9. Anganwadies train the children for maintaing personal hygiene. | | |
| 10. Distributing of medicines to pregnant mothers through anganwadies are dangerous. | | |
| 11. Regular health check-ups for the pregnant mothers are organised through anganwady. | | |

12. Health education classes organized in the anganwadies are not useful.
13. Anganwadies take initiative for getting the pregnant mothers immunized against tetanus.
14. Referral service system of ICDS are not useful.
15. Good habits are inculcated in children through anganwadies.
16. Preschool education imparted to the children through anganwadies is not good.
17. Anganwadies train its beneficiaries to keep their houses neat and tidy.
18. House visits of the anganwady workers are not beneficial.
19. Anganwadies are helpful for the reducing the burden of mothers.
20. Anganwadies helped in creating an awareness about the health needs of the people.

APPENDIX V

Questionnaire to test the adoption of nutrition messages dissiminated among the beneficiaries of ICDS

- | | Yes | No |
|--|-----|----|
| 1. Giving breast milk to children from first day onwards. | | |
| 2. Introducing supplementary food to the infants after 3 months. | | |
| 3. Preparing home made infant foods. | | |
| 4. Giving more number of feeds to children than adults. | | |
| 5. Immunizing the children. | | |
| 6. Giving tetanus toxoid injection to pregnant mothers. | | |
| 7. Giving ORS to children during diarrhoea. | | |
| 8. Keeping the cooked foods closed. | | |
| 9. Giving toilet training. | | |
| 10. Training the children to washing hands before taking food. | | |
| 11. Keeping the house and premises clean. | | |
| 12. Bathing the children daily. | | |
| 13. Deworming the children. | | |
| 14. Conducting health check-ups for children. | | |
| 15. Isolating the sick children. | | |

16. Providing additional food to pregnant women.
17. Conducting health check-ups for pregnant mothers.
18. Approaching hospitals for deliveries.
19. Providing nutrient rich foods to lactating mothers.
20. Cutting the vegetables into medium size to avoid nutrient loss.
21. Including greens and vegetables in the daily diet.
22. Including locally available fruits in the daily diet.

5. Vegetables
6. Milk & milk products
7. Meat
8. Fish
9. Egg
10. Nuts & oil seeds
11. Fats & oils
12. Condiments & spices
13. Sugar/Jaggery
14. Bakery items

1. Do not buy	2. Daily	3. Weekly thrice	4. Weekly twice
5. Once in a week	6. Fortnightly	7. Once in a month	8. Occasionally

2. Frequency of use of various foods in the dietaries

Foods	Daily	Weekly Once	Weekly twice	Weekly thrice	Once in a fort- night	Once in a month
-------	-------	----------------	-----------------	------------------	-----------------------------	--------------------

1. Cereal
 - Rice
 - Wheat
 - Semolina
 - Maida
 - Others
2. Pulses
 - Green gram
 - Bengal gram
 - Red gram
 - Cow-pea
 - Others

3. Greens
Amaranthus
Drumstick leaves
Chikkurmanis
Others

4. Root & Tubers
Potato
Tapioca
Coleus
Yam
Colocassia
Carrot
Beetroot

5. Other vegetables

6. Milk &
milk products

7. Meat

8. Fish

9. Egg

10. Nuts & oil seeds

11. Fats & oils

13. Sugar/Jaggery

14. Bakery items

3. Frequency of taking meals in a day >3times/3times/2times/Once

4. Meal pattern of your family for the past 3 days.

Day	Early morning	Breakfast	Lunch	Evening	Night	Any other
-----	---------------	-----------	-------	---------	-------	-----------

First day

Second day

Third day

* Mention the ingredients used for each meal

5. Different cooking methods followed in the family.

Foods	Boiling		Steaming	Frying	Baking	Shallow frying	Any other
	Absorption	straining water					

Cereals

Pulses

Vegetables

Root & Tubers

Other vegetables

Meat

Fish

Egg

Milk &

Milk Products

6. Methods followed for preserving the food.

Foods

1. Cereals

2. Pulses

3. Greens

4. Vegetables

5. Milk

6. Meat

7. Egg

8. Fish

9. Others

7. Methods followed to conserve nutrients.

Methods followed	Foods
1. Cutting the vegetables into big pieces	
2. Cutting the vegetables after washing	
3. Straining the water used for cooking	
4. Cutting the vegetables just before cooking	

8. Dietary care taken during different physiological conditions.

Physiological condition	Type of preparation	Ingredient used
1. Infants		
2. Preschool children		
3. Pregnant mothers		
4. Lactating mothers		
5. Diseased person		

9. Delicacies prepared during special occasions.

Occasions	Type of preparation
Birthday	
Wedding	
Death	
Religious festivals	
Others	

10. Intra family food distribution pattern.

Preference given for taking meals.

- 1.
- 2.
- 3.
- 4.
- 5.

11. a) Morbidity status of the children in the family

Diseases	Occurrence
1. Whooping cough	
2. Measles	
3. Cholera	
4. Diarrhoea	
5. Jaundice	
6. Diphtheria	

b) Dietary modification made during the disease condition.

Name of the disease	Alternation made
1.	
2.	
3.	
4.	

APPENDIX VII

NATIONAL NUTRITION MONITORING BUREAU
(Indian Council of Medical Research)

FAMILY DIET SURVEY - ONE DAY WEIGHMENT

Family No..... Name of the head of family Date

Village District State

Age and Sex composition of those who have partaken the meal.

Age	Adult	12-21	9-12	7-9	5-7	3-5	1-3	Below 1	Guests (Ages)
M									
F									

WEIGHT OF RAW FOODS IN GRAMS

FOODSTUFF	FOODSTUFF
CEREALS	17. OTHER VEGETABLES
1. Bajra	
2. Jowar	
3. Maize, dry	
4. Ragi	
5. Rice	
6. Wheat flour	
7. Others	
	ROOTS & TUBERS
	18. Carrot
	19. Onion, big
	20. Potato
	21. Tapioca
	22. Others
PULSES	NUTS & OILSEEDS
8. Bengalgram	23. Cashewnut
9. Blackgram	24. Coconut, dry
10. Greengram	25. Coconut, fresh
11. Khesari dal	26. Groundnut
12. Lentil	27. Others
13. Redgram	
14. Soyabean	
15. Others	

16. LEAFY VEGETABLES

28. CONDIMENTS & SPICES

WEIGHT OF RAW FOODS IN GRAMS

FOODSTUFF	FOODSTUFF
FRUITS	MILK & MILK PRODUCTS
29. Amla	45. Milk
30. Apple	Curds
31. Banana, Ripe	Butter Milk
32. Lime & Orange	46. Skimmed milk, Liquid
33. Mango, Ripe	47. Cheese
34. Melon, Water	FATS & OILS
35. Papaya, Ripe	48. Butter
36. Tomato, Ripe	49. Ghee
37. Others	50. Hydrogenated oil
	51. Cooking oil
FISH	OTHER FOODSTUFFS
38. Fish, Fresh	52. Betel leaves
	53. Biscuit, Salt
39. Fish, Dry	54. Biscuit, Sweet
	55. Bread, White
40. Prawns	56. Sugar
OTHER FLESH FOODS	57. Jaggery
41. Meat	58. Papad
42. Chicken	59. Sago
43. Liver, Goat	60. Toddy
44. Egg, Hen	61. Horlicks
	62. Farex
	63. Amul,
	Amulspray
	Others:

APPENDIX VIII

Procedure followed for taking anthropometric Measurements

1.Weight

The weight was measured using a platform balance, as it is portable and convenient to use in the field. The weighing balance was checked periodically for accuracy. The scale was adjusted to zero before each measurement. The subject was weighed with minimum clothing. The child was made to stand on the centre of the platform without touching anything, and looking straight. Care was taken to use the balance on a firm surface. The weight was recorded to the nearest 0.25 kg. Each reading was taken twice to ensure correctness of the measurement.

2.Height

To measure the height, anthropometric rod designed by National Institution of Nutrition was used. The rod was placed perpendicular to the ground, taking care to see that the floor area was even and not rough. The subject was asked to remove the slippers, and made to stand with the centre of her back touching the scale with her feet parallel

and heels buttocks, shoulders and back of the head touching the rod. The head was held comfortably erect, the arms hanging loosely by the side. The ruler was held on the top of the head in the centre crushing the hair at right angle to the scale and height was read off from the lower edge of the ruler to the nearest 0.5cm. Each reading was taken twice to ensure correctness of the measurement.

3. Mid upper Arm Circumference

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

4. Head Circumference

For taking head circumference, 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.

5. Chest circumference:

The flexible, non-strechable 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 was taken as the chest measurement.

APPENDIX IX

Nutritional assessment schedule (N.A.C.I.C.M.R.)

- | | |
|--|----------------------------------|
| 1. Sex | (E) Teeth |
| 2. Age | 21. Flourosis |
| 3. Height | 0. Absent |
| 4. Weight | 1. Chalky teeth |
| | 2. Pitting of teeth |
| I General | 3. Mottled and discoloured teeth |
| 6. Appearance | 22. Caries |
| 0. Good | 0. Absent |
| 1. Fair | 1. Slight |
| 2. Poor | 2. Marked |
| 3. Very poor | IV Hair |
| II Eyes (A) Conjunctiva | 23. Condition |
| 7. Xerosis | 0. Normal |
| 0. Absent, glistening and moist | 1. Loss of lusture |
| 1. Slightly dry on exposure for a minute, lack of lustre | 2. Discoloured and dry |
| 2. Conjunctiva dry and wrinkled | 3. Sparse and brittle |
| 3. Conjunctiva very dry and Bitot's Spots present | V Skin |
| | (A) General |

8. Pigmentation

- 0. Normal colour
- 1. Slight discolouration
- 2. Moderate browning in patches
- 3. Severe earthy discolouration

9. Discharge

- 0. Absent
- 1. Watery, excessive lachrymation
- 2. Mucopurulent
- 3. Purulent

B, Cornea

10. Xerosis

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

11. Vascularization

- 0. Absent
- 1. Circumcorneal injection

(B) Lids

12. Excoriation

- 0. Absent
- 1. Slight excoriation
- 2. Blepharitis

24. Appearance

- 0. Normal
- 1. Loss of lusture
- 2. Dry and rough or crazy pavements
- 3. Hyperkeratosis, phrynoderma

25. Elasticity

- 0. Normal
- 1. Diminished
- 2. Wrinkled skin

(B) Regional

26. Trunk

- 0. Normal
- 1. Collar-like pigmentation and dermatitis around the neck

27. Face

- 0. Normal
- 1. Nasolabial seborrhoea
- 2. Symmetrical sub-orbit pigmentation
- 3. Moon face

28. Perineum

- 0. Normal
- 1. Scrotal or puddental dermatitis

29. Extremities

- 0. Normal
- 1. Symmetrical dermatitis with pigmentation of glove or stocking type

13. Folliculosis

- 0. Absent
- 1. A few granules
- 2. Lids covered with extensive granules
- 3. Hypertrophy

14. Angular conjunctivitis

- 0. Absent
- 1. Present

(D) Functional

15. Night blindness

- 0. Absent
- 1. Present

N.B. Exclude other eye diseases not associated with nutritional defects.

III Mouth

(A) Lips

16. Condition

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

(B) Tongue

17. Colour

- 0. Normal
- 1. Pale but coated

VI Adipose Tissue (to be judged by examination of the arm over the biceps)

30. Quantity

- 0. Normal
- 1. Deficient

VII Oedema

31. Distribution

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

VIII Bones

32. Condition

- 0. Normal
- 1. Stigmatic of past rickets

IX Heart

33. Size

- 0. Normal
- 1. Apex outside the nipple line
- 2. Enlarged

X Alimentary system

34. Appetite

- 0. Normal
- 1. Anorexia

35. Stools

- 2. Red
- 3. Red and raw
- 18. Surface
 - 0. Normal
 - 1. Fissured
 - 2. Ulcered
 - 3. Glazed and atrophic
- (C) Buccal mucosa
- 19. Condition
 - 0. Normal
 - 1. Bleeding and/or gingi vitis
 - 2. Pyorrhoea
 - 3. Retracted
- (D) Gums
- 20. Condition
 - 0. Normal
- 0. Normal evacuation
- 1. Diarrhoea
- 36. Liver
 - 0. Not palpable
 - 1. Palpable
- 37. Spleen
 - 0. Not palpable
 - 1. Palpable
- XI Nervous system
- 38. Calf tenderness
 - 0. Absent
 - 1. Present
- 39. Paresthesia
 - 0. Absent
 - 1. Present

APPENDIX X

Estimation of Haemoglobin (Cyanmethaemoglobin method)

Principle

Haemoglobin is converted in Cyanmethaemoglobin by the addition of KCN and ferricyanide. The colour of cyanmethaemoglobin is read in a photoelectric colorimeter at 540 nm against a standard solution. Since cyanide has the maximum affinity for haemoglobin, this method estimates the total haemoglobin.

Reagent

Drabkin's solution : Dissolve 0.05g of KCN, 0.02g of potassium ferricyanide and 1.00g of sodium bicarbonate in 1 litre of distilled water.

Procedure:

20 μ l of blood is transferred with the help of 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 5ml of Drabkin's solution taken in a test tube. Wait for 30 minutes and mix

the contents in the tubes, take the readings in a photoelectric colorimeter. The reagent blank (Drabkin's diluent) is adjusted to zero.

Construction of standard curve

If the blood drawn from the subject contains haemoglobin 15g/dl after estimation then prepare three reference standards as follows.

1. Reference standard A.

4ml of blood in 1000ml Drabkin's reagent contains haemoglobin 15g/dl.

2. Reference standard B.

300ml of reference standard A + 200ml Drabkin's reagent contains haemoglobin concentration of 10g/dl.

3. Reference standard C.

200ml reference standard A and 300ml Drabkin's reagent contains a haemoglobin concentration of 7.5g/dl.

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

APPENDIX XI

Procedures for estimating total protein (Biuret method)

Principle

The CONH groups in the protein molecule react with copper sulphate in alkaline medium to give purple colour which is then read at 540nm.

Reagents

1. Biuret reagent : Dissolve 4.25g of potassium sodium tartarate, 1.5g of cupric sulphate and 2.5g potassium iodide in about 500ml of distilled water. Dissolve 4g of NaOH in the solution and makeup the volume to 1 litre.
2. Standard : The standard protein solution may be either a pooled normal human serum or a solution of pure albumin saline.

Procedure

To 0.1ml aliquots of standard test plasma and blank (saline and distilled water) add 5ml of biuret reagent. Mix well and keep for 30 minutes. Read absorbances of test and standard against blank at 540nm.

$$\text{Calculation} = \frac{\text{Reading the test}}{\text{Reading of the standard}} \times \begin{matrix} \text{Concentration} \\ \text{of} \\ \text{Standard} \end{matrix}$$

Albumin

Reagents - As given for total protein and 28% sodium sulphite.

Procedure - Add 4.8ml of 28% sodium sulphite solution to 0.2ml of plasma. Mix by rotating the tube for 2 to 3 minutes. Filter the solution through a whatman No:40 filter paper. Take 2.5ml of the filtrate and proceed the digestion, distillation and filtration as given under total proteins.

APPENDIX XII

$$\text{Percentage of Total Score} = \frac{R_1 S_1 + R_2 S_2 + \dots + R_n S_n}{n}$$

- S_n = Scale of rating
- R_n = Percentage of respondents selecting a rating
- n = Maximum Scale rating

APPENDIX XIII

ANOVA TABLE - WEIGHT FOR AGE OF THE CHILDREN

Source	DF	SS	MSS	F
A - Age	3	62.33399	20.77799	8.93415**
B - Sex	1	1.43555	1.43555	0.61726
C - Treatment	1	17.08984	17.08984	7.34831**
AB	3	6.81836	2.27279	0.97726
AC	3	0.00000	0.00000	0.00000
BC	1	1.64648	1.64648	0.70796
ABC	3	1.69336	0.56445	0.24270
Error	124	228.3848	2.32568	

Treatment means	1* 11.2	2* 9.75	3* 10	4* 9.83333
	5* 11.20588	6* 11.83333	7* 10.63636	8* 10.375
	9* 11.97368	10* 11.6	11* 12.12	12* 10.83333
	13* 12.67857	14* 12	15* 12.45455	16* 11.5.

APPENDIX XIV

ANOVA TABLE - HEIGHT FOR AGE OF THE CHILDREN

Source	DF	SS	MSS	F
A - Age	3	1050.125	350.0417	15.6846**
B - Sex	1	70.875	70.875	3.17575
C - Treatment	1	73.875	73.875	3.31018
AB	3	116.25	38.75	1.73630
AC	3	0.000	0.0000	0.00000
BC	1	2.000	2.0000	8.96156
ABC	3	8.250	2.7500	0.12322
Error	124	2767.375	22.3175	

Treatment means 1* 91.7 2* 90.5 3* 85.33334 4* 88
5* 93.58823 6* 83 7* 91.95454 8* 90.5 9* 87.04311
10* 96.5 11* 85.072 12* 94 13* 98.89286 14* 97.66666
15* 98.09091 16* 96.5

APPENDIX XV

ANOVA TABLE - ARM CIRCUMFERENCE OF THE CHILDREN

Source	DF	SS	MSS	F
A - Age	3	12.64844	4.21615	2.80941*
B - Sex	1	1.48828	1.48828	0.99171
C - Treatment	1	0.26563	0.26563	0.17700
AB	3	2.25391	0.75130	0.50063
AC	3	0.40625	0.13542	0.09023
BC	1	5.85938	5.85938	3.90436
ABC	3	4.90625	1.63542	1.08975
Error	124	186.08990	1.50073	

Treatment means 1* 15.15 2* 14.375 3* 13.83333
 4* 15.16667 5* 15.21765 6* 15.66667 7* 14.7 8* 15
 9* 15.42105 10* 15.5 11* 15.424 12* 15.16667 13* 15.89286
 14* 15.66667 15* 15.54546 16* 15.5

**NUTRITIONAL STATUS OF ICDS (Integrated
Child Development Services) BENEFICIARIES
WITH RESPECT TO PARTICIPATION**

BY

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ABSTRACT OF THE THESIS

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ABSTRACT

A study entitled "Nutritional status of ICDS (Integrated Child Development Services) beneficiaries with respect to participation" was carried out in Malappuram district selecting 170 beneficiaries representing three categories viz preschool children, pregnant mothers and lactating mothers and 70 nonbeneficiaries from similar socio-economic background for comparison.

The study enlightened the socio-economic and personal characteristics of the respondents, appraisal of the programme implemented in the area, nutritional status of the respondents through dietary, food consumption, anthropometric, clinical and biochemical parameters, participation index and nutritional status index of the respondents, and the interrelationship between participation index and nutritional status index.

Major findings

Majority of the respondents were from Hindu community. Joint family system with 'small family norm' prevailed in the area. Major expenditure is for food.

Beneficiaries had the correct perception about the ICDS programme. Their highest preference was for supplementary nutrition and least for referral service. Beneficiaries considered supplementary nutrition most useful

followed by immunization and 'health check-ups'. "Sharing of the food supplement", incomplete utilization of immunization, Irregular supply of vitamin supplements, lack of motivation for health education classes, under utilization of referral services were some of the lacunae identified.

Anthropometric measurements of the preschool children and that of mother beneficiaries were superior to that of their counterparts in the control group. Dietary and food consumption pattern of the experimental group was better than the control group. Nutrient intake was adequate with respect to calories and proteins in both the groups, while other nutrients such as vitamin A, vitamin C, and riboflavin were inadequately met, and were much lower in the control group. Clinical evidence of various deficiency diseases were lower in the experimental group compared to the control group. So also the biochemical parameters.

Various socio-economic personal characteristics were not found to influence either the participation or the participation levels of the respondents. The nutritional status index developed was significantly better in the experimental group. Participation index of the beneficiaries was found to be high and nutritional status index increased significantly with participation index in the beneficiaries except in pregnant mothers.