EFFECT OF BIRTH ORDER AND SPACING ON THE NUTRITIONAL STATUS OF MOTHER AND CHILD

By

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THESIS

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DECLARATION

I hereby declare that this thesis entitled "Effect of birth order and spacing on the nutritional status of mother and child" 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 or other similar title, of any other University or Society.

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INTRODUCTION

INTRODUCTION

In India, morethan a third of the population consists of women in the reproductive age and children under five years of age. Large section of this community is vulnerable to diseases, disability and death as a result of a number of interacting biological, environmental, social and genetic characteristics. These characteristics acting singly or in varying combinations place them at a greater risk. Among these factors mother's age, number of children in the family and interval between births are three important elements which directly affect woman's health status and that of her children.

Bhaskaran and Rao (1987) had reported that about 1-2 per cent of pre-school children belonging to poor communities suffer from severe forms of Protein Energy Malnutrition. According to UNICEF (1984) in addition to family size and poor socio-economic condition, interval between births is also responsible for child malnutrition. Number of episodes of illness suffered by each child in a family is reported to increase with the increase in the family size resulting in an over crowding and less sanitation at home (Sebastian 1974).

Maternal mortality is also reported to rise with the number of pregnancies, prolonged breast feeding inadequate spacing, and pregnancies occuring at the extrems of reproductive age Chaurasia (1984). Repeated pregnancies followed by prolonged breast feeding results in protein depletion and short intervals between pregnancies will provide too little time for recovery especially to women who are on diets which are only marginally adequate.

In Kerala as per 1981 census families depending on agriculture, form a vast section of the population. The limited income from their work resulted in poverty and they often subsisted on less nutritious foods with increased number of deliveries and number of children. Without proper spacing between children and lack of nutritious food, mothers as well as children's health in these families is reported to be deteriorating. However sufficient data on these lines are not available at present. Hence the present study on the effect of birth order and spacing on the nutritional status of mother and child of agricultural families was taken up with the following objectives:

a) To assess the effect of birth order of children below the age of five on their nutritional status and mortality

b) To assess the effect of spacing of under fives on their nutritional status and mortality

c) To study the effect of number of deliveries and spacing of children on mother's health and her nutritional status

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Nutritional status refers to both the types and amounts of nutrients available in the body and the body's utilisation of nutrients. Nutritional status is influenced by factors such as psychological, socio-cultural and physiological influences and also by thoughts and beliefs and emotions (Suitor and Hunter (1980)). The nutritional status of children depends largely on the feeding practices of the community which are influenced by social customs, beliefs, superstitions, religion, cultural values and the socio-economic status (Banik 1977). Aguillon et al (1963) pointed out that the nutritional status of pre-school children had a relationship with the age of weaning, education of the parents, number of children under six or under fifteen years, number of household members and birth order of the child. Large number of pregnancies, short birth intervals and pregnancies occuring at the extreme of the reproductive age affect the nutritional status of the mother and also carry an increased risk of unfavourable outcome for the mothers (Chaurasia (1984)).

Effect of birth spacing on the nutritional status of the child

Inter pregnancy intervals was accepted as the interval between termination of one pregnancy and

Onset of a successive one (Das et al. (1981)). The health and survival of a child as well as the health status of the mother are much influenced by this birth interval (Koppert 1977). A shorter interval between successive pregnancies is associated with a high infant mortality rate (Bhargava (1983)). Kumar (1985) conducted a survey of 6,000 women in India and found that infant mortality rate of 80 per 1000 where the interval between births was 3 to 4 years. The author has also stated that the rate was risen to 200 per thousand when interval between births became less than one year. UNICEF (1986) has also reported that among poor communities, infant mortality is typically twice as high, when the interval between births in less than two years. Studies in India have shown that infant mortality rates among babies born within one year of a previous birth, are between two to four times, as high as for babies born after an interval of two years or more (UNICEF 1984). Gosh (1987) reported that spacing between births not only affect mother's health but also has profund effect on child mortality. UNICEF (1982) reported that children born close together face a greater risk of not surviving their first five years of life than those whose births were spaced further

apart, and also reported that infant and child mortality rates for those born less than two years after the preceeding sibling are twice as high as those born four or more years after. Morley and Margarat (1979) reported that children born after a short birth interval have higher mortality rates during childhood and there is a positive correlation between length of birth interval and physical health and school ability of the children.

Devadas et al (1976) reported that with the increase of spacing, birth weight also increased. The mean birth weight is the highest in the case of children, whose mothers had spacing periods of six years and above. Spacing of children with a three year birth interval and the delay in the marriage of females are effective to control prematurity and low birth weight (Kumar(1986)). Doyal (1972) had also found that with the increase of spacing between children, birth weight increased. Das et al. (1981) in his study pointed out that mean birth weight was lowest for the shortest interpregnancy interval and highest for the interval of five years. Birth weight was highest with spacing of four years or more.

Gosh (1977) had pointed out that the main cause of death of under fives is malnutrition and the main factors responsible for malnutrition are poor socio-economic conditions, large families, closely spaced children and ignorance of parents about the nutritional requirements of children and prejudices against certain foods. Ahmad et al. (1982) conducted a study on the morbidity pattern in relation to birth interval and birth order of children and pointed out an inverse relationship between birth interval and prevalence of malnutrition, anaemia, worm infection, respiratory infection and gastroenterits and he also observed that when the birth interval was morethan four years, the risk of malnutrition tended to be reduced by about seven times. Geetha and Devadas (1986) pointed out a positive correlation between large number of siblings and severity of Protein Energy Malnutrition. Sebastian (1974) showed that incidence of malnutrition among siblings decreases significantly when the interval between the children is three years or more. Two ethnic groups compared in Guinea Bissau, one with a long birth interval and one with a short, by Morley and Lovel (1986) and they had found out that in a

group with a short birth interval there was over-crowding of children, lack of space, prevalence of infection and a higher mortality rate. Murthy et al. (1987) reported that a pregnancy occuring too soon or after a very long time of previous pregnancy is more likely to result in foetal wastage.

Morley and Lovel (1986) showed that children born at a longer birth interval were heavier and taller than those with shorter birth interval.

Chandramani et al. (1975) reported that the number of problem were more when the interval between the siblings were shorter.

Effect of birth spacing on infant feeding habits

Koko (1987) had reported that pregnancies not adequately spaced, act as a drain on the mother's health and also displace the older infant from breast causing malnutrition. He had also reported that malnutrition and infant death are much higher in closely spaced pregnancies when compared with an interval of three to four years. UNICEF (1982) had also pointed out that a closely - spaced birth, affects the attention and care, a mother can give either to the new born or to the elder sibling. According to Ahmad (1988) the

mean duration of breast feeding of mothers, aged 20 to 24 with four to five children, was about five months shorter than that of mothers in the same age group, who had less than four children. He had further stressed that, within each age group, mothers with higher parities tended to have shorter duration of breast feeding. Samul (1984) conducted studies on infant feeding and rearing practices in a rural community of western Orissa and had reported that subsequent pregnancies and natural cessation of lactation were reasons for stoppage of breast feeding. Padmini and Krishnamoorthy (1988) had reported that mothers in extended families continued exclusive breast feeding for a longer duration but discontinued it earlier than the mothers from nuclear families.

In a study by Eckholm and Newland (1977) in Punjab it was revealed that a short interval between births, affects the new born baby as well as the next youngest child because when another baby appears quickly, the nursing child may be preemptively weaned, and there may not be enough high protein food to replace the mother's milk.

The word kwashiorkor literally means "the disease of the deposed baby when the next is born". In the

Ga language of Ghana from which this terminology is drawn, the word carries a connotation of sibling rivalry as well as of sickness (Williams (1963)). Sadre and Donoso (1971) had reported that a history of very sudden, early weaning due to repeated pregnancy is very common due to which the child is bottle fed with a highly contaminated diet of low nutritional value and this results in repeated periods of diarrhoea. UNICEF (1988) had also reported that in the first six months, the risk of morbidity and death from diarrhoea is respectively fifteen and twenty five times higher for children not receiving breast milk compared to those who have the immunological protection of an exclusively breast milk diet. Chakraborthy and Das (1983) pointed out that partially breast fed children suffered the episodes of diarrhoea more than the fully breast fed.

Anderson et al. (1977) reported that non-breast fed children had smaller heads than breast fed children.

West et al. (1986) conducted studies on breast feeding, weaning patterns and the risk of Xerophthalmia in southern malawi and indicated that children with Xerophthalmia, were weaned to porridge earlier after

withdrawing the breast feeding, had a shorter weaning interval and were fully weaned from the breast for a longer duration. The association between earlier cessation of breast feeding and subsequent Xerophthalmia was strongest during the immediate post weaning years. These findings imply a protective role for breast feeding against Xerophthalmia in early childhood.

Khan et al. (1983) conducted studies on the role of breast feeding in preventing acquisition of round worm and hook worm in Dhaka slum children and reported that breast feeding was found to give protection against many gastrointestinal infections in infants and also showed that by the age of 6 and 24 months the presence of ascaris ova was significantly higher in breast fed with supplemented group than the breast fed only group. It appears that exclusive breast feeding may have some role in preventing acquisition of ascaris infection in urban slums with poor sanitation facilities.

Effect of number of deliveries and spacing on the nutritional status of mother

Kumar (1986) pointed out that mothers health is of paramount importance for child health. A healthy mother with good nutritional status will produce a healthy baby. Eckholm and Newland (1977) reported that the ill

effects of numerous births on both mothers and their children are more likely to occur when the intervals between these births are short. Padmaumapathy and Pushpaupadhyaya (1981) reported that having children at short intervals, increase risks among women who needs 2-3 years of interval between the progenies for optimal growth of infants at birth as well as good health of the mother. Rao and Gopalan (1971[b]) reported that the incidence of anaemia in women can be further reduced, if the spacing between pregnancy is increased. Ozorio (1983) reported that severe anaemia in pregnancy has been shown to be associated with an increased risk of maternal mortality. Gosh (1987) had pointed out that maternal mortality is five times in anaemic women. According to Gosh (1987) nutritional anaemia is widespread among women of child bearing age and contributes significantly to maternal morbidity and mortality. Khan et al. (1986) conducted studies on maternal mortality in Rural Bangladesh in the Jamalpur district and reported that maternal mortality was positively related to maternal age and parity, with the mortality risk rising very sharply beyond age of 35 years and beyond parity four among women aged 25-34 years. According to Gupta and Chaudhary (1976) high parity increase risks in poor socio-economic group because of associated under nutrition,

anaemia, infection, poverty and poor sanitation and he had also stated that with the burden of increased pregnancy maternal health deteriorates at an early age and finally may end up in premature aging and early death of the mother, number of abortions, still births, neonatal deaths increased with increased pregnancies leading to more foetal wastage. Verma and Dhar (1976) reported that lower the haemoglobin of the mother, the lesser the birth weight of their neonates and higher the preventable perinatal deaths. Khan et al. (1986) had reported that the women suffer most from anaemia and other incidence of sickness because of poverty resulting in low nutrition, compulsion to over work under family circumstances, early marriage, repeated pregnancies and prolonged breast feeding. Bhargava (1983) had reported that less frequent pregnancies lead to better health of the mother and the children and with more frequent pregnancies, the mother does not have time to recover from the strain caused by pregnancy, child birth and lactation. Roe (1979) pointed out that girls who had more than one pregnancy during adolescence are at high risk and also nutritional anaemia is common in pregnancy due to low intake of iron and he also pointed out that folacin deficiency with anaemia is caused by low intake of folic acid and the high folacin

requirements of the foetus which impose a strain on the maternal supply of the vitamin consistent nutrient deficits of iron and folacin tend to occur in girls under 19 years who have had several pregnancies. Rao and Gopalan (1971 b) pointed out that the incidence of severe anaemia was significantly different among women having three or less pregnancies and those with four or more pregnancies. They had also stated that about 8.5 per cent of all women whose order of pregnancy was four or more had severe anaemia with less than 8 gm per cent haemoglobin while only 3 per cent of women whose order of pregnancy was three or less had severe anaemia. The author further pointed out that more than 65 per cent of severe or moderate anaemia exists among those pregnant women having higher number of pregnancies.

Gosh (1987) had also reported that maternal mortality accounts for the largest proportion of deaths among women of reproductive age in India and in developing countries also had reported that in India maternal mortality is around 500 per 100,000 live births which is about 50 times that of a developed country, the actual risk of women dying in India of maternity related causes is 150-300 times greater. Gosh (1987) emphasised that the

chief causes of maternal deaths are haemorrhage often with anaemia as an underlying cause, sepsis, obstructed labour and toxaemia. Chaurasia (1984) pointed out that the epidemiology of toxaemia which is prevalent not only in the developing countries but also in the developed countries, appears to be frequently associated with maternal depletion and malnutrition in high parity women and with very high young mothers.

Jesudason and Ambujadevi (1978) emphasised that nutritional deficiency was higher among older women than among younger women. They further stressed the fact that in each of the age categories, higher the parity, higher was the nutritional deficiency signs like angular stomatitics, glossitis, paraesthesias and burning feet were significantly higher in pregnant women who had more than three pregnancies than those who had three or less. Gosh (1987) reported that maternal malnutrition has been implicated as a casual factor in pregnancy induced high blood pressure, abortion, premature labour and haemorrhage.

Birth order and nutritional status of the child

Gosh (1977) pointed out that family size has an important correlation with the nutrition of the child, the status being worse after birth order four. Rao and Gopalan (1971 a) reported that the incidence of severe or

mild forms of Protein Caloric Malnutrition and other nutritional deficiency signs were significantly higher in children of higher birth order than those of lower birth orders and also reported that children of lower birth orders of 1-3, are seen to be taller by 4 cm and heavier by 1.5 kg. Gosh (1987) reported that the risks to health of borth mother and infant increases steeply after the third child. Ahmad et al. (1982) reported that the incidence of all the major illness increased with an increase in birth order, the increase is more significant beyond the third birth order.

Luwang and Singh (1981) reported that the prevalence of Protein Energy Malnutrition was lowest amongst the first born children and, there observed an increased prevalence of Protein Energy Malnutrition with the increase of the sibling number of children and they also pointed out that there was an apparent increase of moderate and severe forms of protein energy malnutrition with the increase of birth order. Mamarbachi et al. (1980) had performed a study in the paediatric hospital. Tripoli, Libya, where the familial background of fifty marasmic infants were compared with those of a group of fifty essentially healthy infants of similar age and the author had reported that families with marasmic

infants had more children and lived in smaller home than the families with which they were compared. In the first to third born category there were less from the marasmic group than from the comparison group whereas in the fourth born and above ranks there were less from the comparison group. Rank distribution differed significantly between marasmic and comparison children with the marasmic infants tending to be later in birth order. Gupta et al. (1976) pointed out that there was significant direct relationship between family size and Protein Caloric Malnutrition, vitamin deficiencies and common infection and he also reported that the frequency of morbidities was significantly high after second child.

Das et al. (1981) reported that with increasing birth order and inter pregnancy interval, the birth weight of neonates also increased and the proportion of low birth weight babies decreased. Nanda et al. (1977) showed a significant increase of mean birth weight after the first birth order and a consistent, though small, increase in males except in the third birth order and the author also had reported that the birth length also appears to increase after the first birth order upto third order in males and second birth order in females.

UNICEF (1984) reported that a research in China has shown that the chances of survival for the first and second child are slightly higher than for the third child and very significantly higher than for the fourth and fifth child in the family.

Birth order and nutritional status of mother

According to Murthy et al. (1987) there is a significant tendency for foetal wastage to increase with birth order (order of live births). Potler (1965) reported that the risk of still births is relatively high for first births, decreases at second and third births but increases slightly for fourth births and then increase very sharply for later birth order.

Effect of parity on the nutritional status of child

Yamada (1986) showed that a reduction in fertility will decrease infant mortality below its normal level, while a fall in infant mortality will increase fertility above its normal level. Ghai (1980) observed that primipara mothers had smaller babies. The incidence of low birth infants increased in grandmultipara particularly beyond fourth parity. Devadas et al. (1976) in her study revealed that upto fourth para there is a steady rise in weight of the infants and mothers in sixth para had given birth

to low birth weight babies. Banik (1978) also reported that the incidence of low birth weight babies increases after third parity.

Annprentice et al. (1987) conducted a study on impaired growth in infants born to mothers of very high parity and reported that maternal parity was shown to exert a marked influence on growth with low body weignts, midupperarm circumference and triceps skin folds.

Arora (1980) in a survey conducted in Bombay reported that the infant mortality rates for the first and second parity were 130.9 and 74.4 and these were highest for the first and fourth parity.

Grover (1982) reported that the birth weight of the infant was found to increase upto sixth parity after which there was a decline in the birth weight of the infant. Primiparous mothers found to have lightest babies.

Reddiar and Nath (1978) pointed out that the mortality risk was high in first parity births and lowest in births of fifth para above. Malnutrition, prematurity, respiratory infections, tetanus neonatram and diarrhoea constituted the main causes of death and he also reported that in the first parity group, prematurity and respiratory infections constituted morethan 70 per cent of

deaths and in the second to fourth parity groups, prematurity, respiratory infections, malnutrition, tetanus neonatrum and diarrhoea constituted main causes but for the fifth parity and above respiratory infections and malnutrition were most common. Bhandari and Mandowara (1983) reported that perinatal mortality was ten times higher in low birth weight babies.

Arora et al. (1971) conducted studies on the weaning habits of infants in low socio-economic groups of population in Bombay City and reported that 49 per cent of children had breast milk for first nine months and also observed a reduced adequacy of breast milk with the parity of the mother and also a relation between the parity of the mother and the age at the complete weaning of the child has also been observed.

Effect of family size on nutritional status of children

Pigott and Kolasa (1979) pointed out that the age at which first supplementary food was given, the number of children in the family, intergestational period before subjects birth and the weaning age statistically helped to predict nutritional status of children. According to

Kumar et al. (1976) family size and interpregnancy period have been known to favourably influence the prevalence of morbidity due to malnutrition and infections among children of poor socio-economic status and also reported that in a study conducted in rural families around the village of Hyderabad city showed that a limitation of families to three or less children and increase in inter-pregnancy period to thirty six months or more exerted a beneficial impact on health and nutritional status of young children in poor communities. The prevalence of diarrhoea, malnutrition and possibly death could be attributed to a number of factors, which include the large number of children in the family, the unhygenic environment, early introduction of supplementary food in unsanitary conditions etc. (Kazmani and Kazmani (1979)). Smedman et al. (1987) conducted a study on anthropometry and subsequent mortality in groups of children aged six to fifty nine months in Guinea - Bissu and reported that mortality was as twice as nigh in the periurban as in the rural areas due to an outbreak of measles. The number of children in the household was a better discriminator for death from measles than was nutritional status. Muntz and Leitzman (1982) indicated that a negative influence

on the nutritional status could be shown for families with a large number of children as well as for early weaning and he also reported that even for a good socio-economic situation a negative influence on the nutritional status was indicated, which is explained by the increased number of children and a short nursing period in these families.

Geetha and Devadas (1986) conducted studies on the prevalence of malnutrition, morbidity pattern and nutritional status of 0-6 year old children in Coimbatore and reported that the total percentage of children exhibiting grade I and grade III malnutrition were thirty three out of which 20.5 were from family size of five and above. The correlation analysis indicated a striking direct relationship between large family size and severity of grades. Mamarbachi et al. (1980) compared the familial backgrounds of fifty marasmic infants with those of a group of fifty essentially healthy infants of similar age and reported that large families were significantly more common in the marasmic group. Devadas et al. (1974) reported that the malnutrition and infection are important contributing factors to high rates of morbidity and of mortality in developing countries among infants. The causes such as infection

and malnutrition were found more in families with five to seven members than smaller families and also reported that prematurity alone was found to be higher in large families (5 members or more).

Kabirullah et al. (1985) reported that small sized family showed highest infant mortality compared to medium sized family and with the increase of family size infant mortality increased and also reported that infant mortality was highest in the farm families.

Family size and food intake

Kumar et al. (1976) reported that family size has been shown to influence the nutrient intake of families of low socio-economic group. Families with three or less children were observed to have better intake of calories and proteins than families with four or more children as a result the prevalence of Protein Caloric Malnutrition among children were found to be considerably high in larger families having four or more children. Rao and Gopalan (1971 c) pointed out that there was a striking inverse relationship between family size and nutrient intake and they had also pointed out that families with three or less children were observed to have better intake of calories and proteins than families with four or more children.

Aujla et al (1983) conducted a comparative study on the nutrient intake among different income, occupation and family size in rural areas of Punjab and reported that the calories were consumed below the body requirement in low income, large families categorised as labour class. Thimmayamma (1983) reported that large family size results in improper food distribution among family members mainly due to low purchasing power, faulty food habits and taboos and he had also reported that early marriages, repeated pregnancies and short interval (spacing) between deliveries and low weight gain during pregnancy also contribute a lot to the poor nutritional status of vulnerable segments or population. Ahmad et al. (1982) reported that an increase in the incidence of various diseases in children of higher birth order could probably due to the fact that the nutrition of children in large sized families suffer not only as a result of food shortage but also due to maldistribution of food among all the numbers of family. Kusin et al. (1984) pointed out that there is a close relationship between energy and nutrients intake of mothers and children, indicating that low food availability is one of the casual factors of low consumption.

Family size and immunisation status

Dabi et al. (1983) conducted studies on family size and immunisation status of the under five children and pointed out that an inverse relationship was seen between the family size and immunisation status of the under five children. The immunisation status was unsatisfactory in under fives of large families as compared to that of small families. Reduction in family size may improve the immunisation status of the under fives by improving the socio-economic status of the community. Singh and Gulati (1976) pointed out that the percentage of the vaccinated children decreased as the order of birth of the child increased. The percentage of vaccinated children was highest for first born child and then it generally declined as the birth order of the child increased. Mooja et al.(1976) conducted a study on immunisation status in an urban community and indicated that B.C.G. was the least and primary small pox the most accepted vaccination. Overall immunisation status was unsatisfactory. Better economic and educational status of the mother led to increased acceptance of all the immunisations. Also children born at institutions had a higher immunisation rate than those born at home.

Income, expenditure and nutritional status

Sreenath et al. (1978) indicated that with an increase in the family size the percapita income decreased, reducing thereby the money spent on food, clothing, education and recreation. Lalitha and Sarada (1988) conducted a study on socio-economic and living conditions of farm labourers and reported that the major source of income was from agricultural wages other sources of income include dairy and also indicated that the expenditure on food was more than the total income. The deficit between income and expenditure was met by taking debts. Omidiyi (1988) conducted studies on family size and productivity of rural households in Nigeria and reported that low farm productivity combined with large family size has resulted in the lowering of household income and savings and to greater poverty. Nutrition Foundation of India (1988) conducted a survey on maternal nutrition, lactation and infant growth in urban slums (Bombay, Madras and Calcutta) and reported that with low family incomes and more mouths to feed in each household the incidence of under nutrition may be expected to be specially high in Calcutta slums. Devadas et al (1980) conducted studies on the influence of family income and parent's education on the nutritional status of

Pre-school children and reported that the lower the socio-economic status and educational status of the parents the higher was the number of children who were malnourished. Srivastava and Sakeena (1988) pointed out that education of both the husband and wife was found to exercise a promoting influence on immunisation coverage. The mother's education had a more pronounced effect which is seen with the acquisition of a simple literacy status unlike the fathers education. Among the different occupational categories children of manual labourers and petty traders had the lowest protection level and require greater attention. Devas et al (1980) had reported that the haemoglobin levels of pre-school children of low income groups were lower than that of children high income groups. Geetha and Devadas (1986) pointed out that as the monthly income of the family increased there was an increase in the percentage of well nourished children. Agarwal and Agarwal (1987) conducted a survey on early childhood mortality in Bihar and U.P. and reported that the mortality was higher in children of young and illiterate mothers with low percapita income. According to Miglani (1978) the average annual expenditure per family increased with the increase in family size. Chandramani et al (1975) pointed out that the incidence of problem behaviour was the highest in the low income group and also in children from nuclear families.

MATERIALS AND METHODS

MATERIALS AND METHODS

The study on the effect of birth order and spacing on the nutritional status of mother and pre-school children was undertaken to

(a) asses the effect of birth order of children below the age of five years on their nutritional status and mortality

(b) assess the effect of birth spacing of under fives on their nutritional status and mortality

(c) study the effect of number of deliveries and spacing of children on mother's health and her nutritional status

Area of study

The Instructional Farm situated at the Agricultural College, Vellayani and the area around Vellayani were selected for the present study.

Plan of action

Plan of action of the present study comprises:

(1) A pilot survey to locate families with three children and above

(2) A baseline survey to monitor the socio-economic, cultural and personal characteristics of the families

(3) A dietary survey of the families to assess the food consumption pattern of the family members particularly the mother and child

(4) The nutritional status of mother and child was assessed by conducting

(i) A weighment survey to determine the actual food intake of the pre-school children and mothers

(ii) An anthropometric survey among the children and mothers whereby height, weight, arm circumference, head and chest measurements of the former and body heights and weights of the latter were monitored

(iii) Clinical studies among selected samples with the help of a qualified physician

(iv) Biochemical studies

Selection of samples

A total of 150 families having three or more children with atleast one child below the age of five years were selected for the study based on a pilot survey among the labourers to locate the families with three children and above. Among the 150 families selected for the study 75 families only belonged to the labourers employed in the Instructional Farm because only 75 families had three or morethan three children and having one child in the pre-school age group out of 500 labour families and other 75 families selected were from the families residing around the Vellayani Campus having the same socio-economic background as that of the labourers in the Instructional Farm, whose main occupation is agricultural labour. This 75 families were selected at random.

Method selected for the study

Data were collected by interview method through house visits. Under village survey and socio-economic and dietary survey interview method was adopted because this method consist of face to face verbal interchange in which the interviewer attempt to elicit information or expression of opinion or belief from another person (Lindzey 1954). Moreover, this is a systematic method by which a person enters more or less imaginatively into the inner life of a comparative ranger (Devadas and Kulandaivel 1975).

Development of tools

To elicit information regarding the socio-economic and dietary pattern of the farm families oral questionnaire method was used. Schedules required for the survey were formulated in Malayalam keeping in mind the fact that this will be more easy for the interviewer as well as for the respondents. The schedule developed to elicit information on socio-economic and personal characteristics of the families, were framed in such a way to collect details regarding the social status of the family, size of the family, number of children in the family, birth spacing of the children, mortality of children, income, occupation and educational level of parents, expenditure pattern and details about the family planning measures adopted etc.

The questionnaire was pre-tested and is presented in Appendix I.

The questionnaire used in the dietary survey were also developed in such away to collect information regarding the dietary habits of the families, expenditure pattern on various food stuffs, frequency of usage of the various food stuffs, methods of cooking preparation and storing, feeding practices of the children, details of breast feeding habits, age of weaning, types of supplementary foods introduced, diets given during special conditions like pregnancy and lactation and pre-school children, diets given during illness, epidemics that had affected the children during the past five years and details about the participation in supplementary feeding programmes etc. The pre-tested questionnaire structure for the survey is presented in Appendix II.

Suitably structured questionnaires were developed for food weighment survey. The questionnaires are presented in Appendix III A and III B.

Suitably structured questionnaires were also developed for Anthropometric and clinical survey. The questionnaires are presented in Appendix IV.

Conduct of the study

A pilot survey among the labourers to locate the families having three or morethan three children was conducted by the investigator through house visits and also by personal enquiry.

To elicit information regarding the socio-economic and dietary pattern of the farm families oral questionnaire method was used.

Inorder to study the actual food intake of the mothers and pre-school child within the family, a food weighment survey was conducted with suitably structured questionnaires as given in Appendix III A and III B.

According to Visweswara Rao (1975) any single day or 2 day weighment method would be as efficient a tool as that of 7 days. In the present study, a three day food weighment survey was conducted in fifteen families (10 per cent of the sample size) to get accurate records of actual food intake of the mothers and pre-school children in the family.

During the food weighment survey the investigator was with the families throughout the period of weighment. All the raw foods taken out for cooking

PLATE - I Food Weighment Survey

(a) Weighing raw food

(b) Weighing cooked food

PLATE I(a)

PLATE I(b)

were weighed and the total cooked weight of each preparation was recorded. The food consumed by the mothers and child each time and items remaining after eating were also weighed to find out the exact amounts of foods consumed by them. Raw equivalents for the food items consumed were then computed. The nutrients available from the food intake was computed using food composition tables ICMR (1987).

Anthropometric Measurements

Anthropometry has been accepted as an important tool for assessment of nutritional status, particularly of children. Vijayaraghavan (1987). According to Chen et al (1978) anthropometric measurements are internationally accepted system for classifying protein energy malnutrition and it will accurately protray the nature, severity and prevalence of the problem. In this study, anthropometric measurements viz., height, weight, head circumference, mid arm circumference and chest circumference of pre-school children and height and weights of mothers were recorded.

Height of both mothers and children was taken by using a fiber glass tape. The fiber glass tape was fixed on the wall with cellophane tape. The subject

was asked to stand erect without shoes, with the heels, buttocks, shoulders and occipit against the wall. The height was read off from the scale on the wall.

Weight of both mothers and children were recorded using a bath room balance which was checked by caliberation with standard weight.

Vandnasen et al (1980) pointed out that weight/height^2 gives a fair estimate of the magnitude of the PCM.

Head circumference of the children were measured using a soft fiber glass tape passing round the supercilliary ridges in front and occipital protrusion behind (Mayers, 1972).

Midarm circumference of the children were measured with an insertion tape at the level mid way between the acromial and olecranon process with the arm hanging freely relaxed, with the tape applied at right angles to the long axis of the humerous (Malina, 1972, Mayer 1972). Zerfas (1975) reported about insertion tape as a new circumference tape for use in nutritional assessment.

Chest circumference of the pre-school children were also taken with the fiber glass tape. The measurement is taken at the level of xiphisternum and in a

PLATE - II Anthropometric measurements of pre-school children

(a) Weight

PLATE II(a)

PLATE II (b) Chest circumference

PLATE II (c) Mid arm circumference

PLATE II(b)

PLATE II(c)

PLATE II (d) Head circumference

PLATE II(d)

PLATE III Anthropometric measurements of mothers

(a) Height

PLATE III(a)

PLATE III (b) Weight

PLATE III(b)

place at right angles to the vertebral column below the inferior angle of the scapula. Sufficient tension was applied to enable the tape to rest against the perimeter of the thorax without slipping.

Chen et al (1980) pointed out that weight/age and arm circumference/age were the strongest indices used to determine protein energy malnutrition.

Clinical Examination

According to Swaminathan (1986) clinical examination is the most important part of nutritional assessment, as we get direct information of signs and symptoms of dietary deficiencies prevalent among people. The investigator with the help of a qualified Physician assessed the clinical symptoms of malnutrition among pre-school children and mothers. The proforma prepared and used for clinical assessment is presented in Appendix IV.

Biochemical Examination

Under biochemical examination haemoglobin estimation of pre-school children and mothers were conducted

PLATE IV Clinical Examination

(a) Mother

(b) Pre-school children

PLATE IV(a)

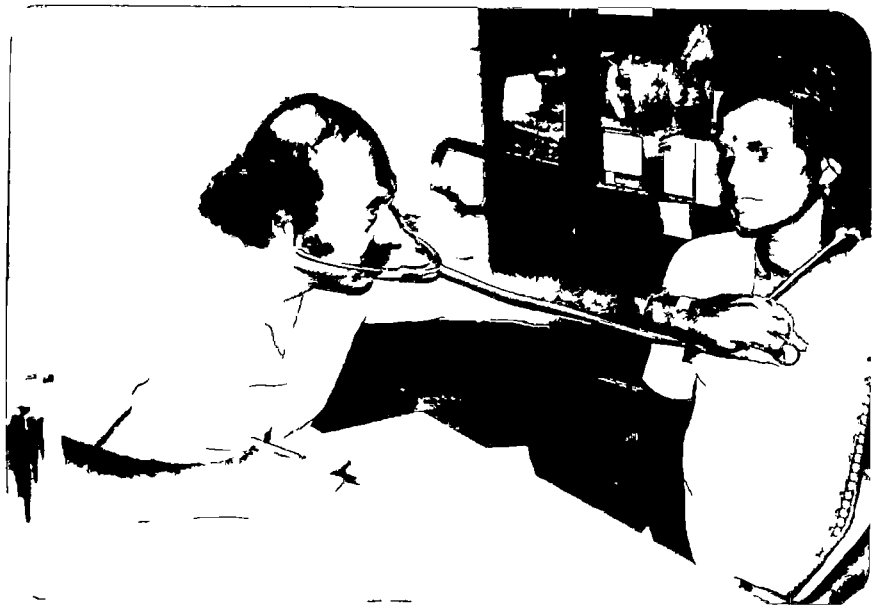


PLATE IV(b)

PLATE - V Haemoglobin Estimation

(a) Mother

(b) Pre school children

PLATE V(a)

PLATE V(b)

by Cyanomethaemoglobin method NIN (1971). 0.02 ml of the blood was collected by the finger prick on a filter paper and used for haemoglobin estimation. The procedure is given in Appendix V.

Interpretation of data collected

From the data collected, the nutritional status of pre-school children with special reference to birth order and birth spacing and that of mothers with respect to number of pregnancies and spacing of deliveries and various other factors correlated to this were interpreted and presented in results.

RESULTS

RESULTS

The results pertaining to this study are presented under the following headings.

1. Background information regarding the families especially of the mother and children
2. Food habits and consumption pattern of the families
3. Nutritional status of the selected mothers and pre-school children assessed by
   a) Mean food and nutrient intake of the mothers and pre-school children
   b) Anthropometric measurements of the pre-school children and mothers
   c) Clinical findings and
   d) Biochemical findings

1. Background information regarding the families

Type of family

Of the 150 farm families surveyed 96.67 per cent belonged to nuclear families with husband, wife and their children. The type of families with details of members are presented in Table 1.

Table 1 Type of family

Type of family	Details of families	
	Number	Per cent
Small	17	11.33
Large (5-9 members)	131	87.33
Very large (10 and above)	2	1.34
Total	150	100.00

As indicated in table 1, 11.33 per cent of the families surveyed were small with less than 5 members. Majority of the families (87.33 per cent) studied belonged to large families consisting of 5 to 9 members and only 2 (1.34 per cent) families had very large family size consisting of 10 and more members.

Distribution of adults and children in the families

Since majority of the families (96.67 per cent) belonged to nuclear families family size indicated the number of children in the families besides husband and wife. Distribution of adults and children in the 150 families surveyed are presented in Table 2.

Table 2 Distribution of adults and children in the families

Family size with Adults	+ Children	Number	Percentage
2	2	17	11.33
2	3	113	75.33
2	4	11	7.33
2	5	3	2.00
2	6	1	0.67
2	7	3	2.00
2	8	2	1.34
Total number of adults		300	39.66
Total number of children		466	60.84

As indicated in the table 2,60.84 per cent of the numbers in the 150 families surveyed were in the growing stage and the average size of majority of the families (75.33 per cent) consisted of 5 members in which 2 were adults and three were children.

Occupational status of the family members

In many of the families surveyed women were also employed outside home and details related to the occupational status of the head of the family and housewives and elder male children are presented in Table 3.

Table 3 Occupational status of the family members

Occupation	Head of the family		Women alone employed		Women as additional wage earners		Male children employed	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Agricultural Labour	146	97.33	4	2.67	53	35.33	3	2.00

As revealed in Table 3, the main occupation of the families surveyed were agricultural labour. 35.33 per cent of the housewives and 97.33 per cent of the head of the family (male members) were engaged in agricultural labour. In 2.67 per cent of the families the main earning member was the housewife since they were the head of the family in the absence of their husband. 62 per cent of the women were not engaged in any occupation.

Income of the families

Average income of the families surveyed are presented in Table 4.

Table 4 Average income of the families

Monthly income	Number	Per cent
Rs. 700 - 800	4	2.67
Rs. 801 - 900	38	25.33
Rs. 901 - 1000	50	33.33
Rs. 1001 - 1100	28	18.67
Rs. 1101 - 1200	16	10.67
Rs. Above - 1201	14	9.33
Total	150	100.00

Since all were agricultural labourers with the same wage rate, 58.66 per cent of the families surveyed had their income coming in the range of Rs.801 - 1000. Some families (29.34 per cent) had their income between as 1001 - 1200 and 9.33 per cent of the families had their income above Rs.1200. The main reason being both husband and wife were engaged in agricultural labour in such families.

Income and family size

The economic status of the families with regard to family size is presented in Table 5.

Table 5 Income and family size

Income range (in Rs.)	Family size (Adults + Children)													
	2+2		2+3		2+4		2+5		2+6		2+7		2+8	
	Number	Per cent	Number	Per-cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
700-800	1	0.67	3	2.00	..	..	..	..	..	..	..	..	..	..
801-900	4	2.67	32	21.33	2	1.33	..	..	..	..	..	..	..	..
901-1000	2	1.33	42	28.00	5	3.33	1	0.67	..	..	..	..	..	..
1001-1100	4	2.67	19	12.67	2	1.33	1	0.67	1	0.67	1	0.67	..	..
1101-1200	5	3.33	10	6.67	1	0.66	..	..	..	..	..	..	..	..
Above 1201	1	0.67	7	4.67	1	0.66	1	0.67	..	..	2	1.33	1	1.33

Table 5 reveals that majority of the families (49.33 per cent) in the income range 801 - 1000 were having 5 members ie. 2 adults and 3 children.

Religion of the families

Religion and caste of the families surveyed are presented in Table 6.

Table 6 Religion of the families

Religion	Number	Per cent
Hindu		
Nayar	3	2.00
S.C.	41	27.33
Nadar	32	21.33
Cheramar	16	10.67
O.B.C	14	9.33
Christian		
Cheramar	14	9.34
Nadar	27	18.00
C.S.I	3	2.00
Total	150	100.00

The families surveyed were either belonged to Hindu or Christian community. Among the Hindu families (70.66 per cent) scheduled caste families constituted

the highest percentage (27.33 per cent) followed by Nadar community (21.33 per cent), other minor communities among Hindus were Cheramar (10.67 per cent) and O.B.C. (9.33 per cent). Only 2 per cent of the families belonged to forward community. Among Christian families also (29.34 per cent) majority of them belonged to the under privilaged sections of the religion.

Educational status of the parents

Since most of the families belonged to nuclear families educational status of the mother and father were studied separately and are presented in Table 7.

Table 7 Educational status of the parents

Educational status	Mother		Father	
	Number	Percent	Number	Per cent
Illiterate	24	16.00	15	10.00
L.P.S.	35	23.33	53	35.33
U.P.S.	55	36.67	45	30.00
High School	36	24.00	37	24.67
Total	150	100.00	150	100.00

Sixteen per cent of mothers were found to be illiterate. All others were educated of which 24 per cent had high school education. Among the heads of the families 10 per cent were illiterate and all others were educated. The table further reveals that in many 60.67 per cent of the mothers had Upper Primary School and High School level education while only 54.67 per cent of the male members had same level of education. (vide Table 7).

Educational status of children

Educational status of the children are presented in Table 8.

Table 8 Educational status of children according to birth order

Educational status of children	First child		Second child		Third child		Fourth child		Fifth child		Sixth child		Seventh child		Eigth child		Total	
	Number	per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Nursery	10	2 14	28	6.00	48	10 30	14	30.00	7	1.50	3	0 o4	2	0 43	1	0.21	113	24.24
L.P S	72	15.45	72	15.45	30	6.44	12	2.58	7	1.50	3	0 64	1	0.21	1	0 21	198	42 48
U.P.S.	33	7 08	15	3.22	4	0.86	2	0 43	2	0 43	1	0.2.					57	12.28
High School	10	2.14	2	0.43	5	1.07	2	0.43	1	0.21							20	4.28
Not studying below 3	,		14	3.00	46	9.87	5	1.07	.								65	14 16
Above lo	3	0 o4	4	0.86	4	0 86	1	0.21	1	0 21						.	13	2.78
Total	128	27.45	135	28 96	137	29.40	36	7 72	18	3 85	7	1 49	3	0 64	2	0 44	466	100 00

Of the total 466 children in all the families surveyed 24.24 per cent was in the nursery and 42.48 per cent was undergoing lower primary school education 12.23 and 4.29 per cent of the children was undergoing lower primary and high school education respectively. 16.94 per cent of the children was not attending the school because out of which 14.16 per cent were below the age of 3 and the rest above 16 years of age.

Living conditions of the family

Regarding the living conditions of the families studied majority of the families surveyed lived in thatched houses (63.33 per cent) built with bricks (56 per cent) 98 per cent of the families had their own houses with 3 to 5 rooms (60 per cent) and separate kitchen (86.67 per cent) water supply for the houses were mainly from their own wells (49.33 per cent) or wells from nearby houses (33.34 per cent). Most of the families studied lacked sanitary facilities, only 39.33 per cent of the families had their own latrines and others resorted to open fields. No families studied had drainage facilities in their houses. 22.67 per cent of the families had electric connection. The main

recreational facilities for the families were radio (38.00 per cent) whereas 4 per cent of the families possessed T.V. 12.67 per cent of the families owned their own bicycle for their personal transportation.

Influence of family size on living conditions

Living conditions of the families as influenced by family size is presented in Table 9.

9 Influence of family size on living conditions (in per cent)

Number of families	Own house	Rented house	No of rooms				Separate kitchen	No separate kitchen	Drinking facilities				Near-by house	Own latrine	Open field	Structure of the house					
			One	two	3-6	6-8			Own well	Own pipe	Public pipe	Public well				Roof			Wall		
																Thatched	Tiled	Concrete	Mud-built	Brick built	Thatched
17.00	11.33		0.67	0.67	8.67	1.33	9.33	2.00	5.33	0.67		1.33	4.00	5.33	6 00	6.00	5 33		6 00	4.67	0.67
113.00	73.33	2.00	7 33	12.00	46.00	10.00	65.33	10.00	40.67		8.67	4.00	22.00	30.00	45.33	46 67	26.00	2.67	28.67	44 67	2 00
11 00	7 33		1.33	0.67	3 33	2.00	6.00	1.30	2 67		1.33		3 33	3.33	4 00	6 00	1.33		2.67	3.33	1.33
3 00	2 00			1 33	0.67		2.00					.	2 00		2 00	2 00			1 32	0 67	
1 00	0 67					0 67	0.67		0 67		.				0.67		0.67			0 67	
3 00	0 20		0.67			1 33	2 00				0 67		1 33	0 67	1 33	2 00			0 67	1 33	
2 00	1 34				1.33		1 33			.	0.67		0.67	.	1.33	0.67	0 67		0 67	0.67	.
150	98.00	2 00	10 00	14 67	60 00	15 33	86 66	13 34	49 33	0 67	11 34	5 33	33 33	39 33	60 67	63 33	34 00	2 67	40 00	56 00	4 00

As revealed in table 9 the living conditions of the families with less members were far better when compared to large families.

Monthly expenditure pattern of the families

Monthly expenditure pattern of the families studied are presented in Table 10.

ble 10 Montly expenditure pattern of the families

ıge of ıthly ɔendi- re (ın r cent)	Food		Clothing		Housing		Rent		Travel		Education		Health		Savings		Receration		Expenses		Other	
	Num- ner	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
10	.		150	100.00	147	98.00	3	2.00	150	100.00	122	81.33	150	100.00	67	44.67	26	17.33	10	67 33	72	48.00
-20	.	..	.	..	..	.	..		..	.	2	1.33	..	..	57	38.00	.		..	.	27	18.00
-30	.	..	..	..	..	..	.	..	.	.	.	..	..	..	3	2.00	..	.	..	..	9	6.00
-40	..	..	..	.	..	..	.	.	..	..	..	..	.	..	..	.		.		..	1	0.67
-50	4	2 00	.	..	..	..	..	..			..	..	.		..	..	.	.	..	..		..
-60	46	30.67	.		..	..	..	..	..	..	..	..	..	.				.	.	..	.	..
-70	80	53.33		.	..	..	..	..	.		..	..	..	.				.	.	.	..	..
-80	9	12.67	.	..	..	..	..	..	..	.	..	..	..	.	.		.	..	.		..	..
-90	2	1.33	..	..	..	..	..	..	..	..	..	..	..	..	.			.	.		..	..

It is clear from the table that majority of the families (84 per cent) spent 51-70 per cent of their monthly income on food. Expenditure on clothing, housing, travel, education, health and recreation were below 10 per cent while 1.33 per cent of the families spent upto 20 per cent of their income on education. Regarding savings, 82.67 per cent of the families saved upto 20 per cent of their income. Expenditure under others mainly included the amount spent on alcohol, cigaratte smoking etc. 66 per cent of the families spent upto 20 per cent and 6.67 per cent of the families spent 20-40 per cent of their monthly income on these unhealthy habits.

Expenditure pattern of the families who spent their income for unhealthy habits

The expenditure pattern of the families who spent their income for unhealthy habits on other items such as food, education, savings etc. are presented in Table 11.

Table 11 Expenditure patternof the (72.67 percent) of the families who spent their income for unhealthy habits.

Range of income on other expenses	Expenditure on food				Education	Savings
	41-50	51-60	61-70	71-80		
0-10	..	32.67	4.67	1.33	51.33	56.00
11-20	0.67	23.10	..	..	..	..
21-30	0.67	5.33	..	..	..	..
31-40	0.67	..	..	..	..	..

It was found from the table 11 that as the income spent for unhealthy habits increased, the percentage of income spent for food and others such as education, saving etc. decreased. Among those 6.67 per cent of those families who spent 20-40 per cent of their monthly income on unhealthy habits spent only 40-60 per cent of their income for food. Similarly for education 21.33 per cent of these families among 66 per cent were not spending any of their income for their children's education and also 16.67 per cent of these families among 66 per cent were not saving their income.

Influence of family size on expenditure pattern

Expenditure pattern of the families as influenced by family size is presented in Table 12.

le 12 Family size and expenditure pattern (in per cent)

ily e	Food					Clo- thing	Hou- sing	Rent	Tra- vel	Education		Heal- th	Saving			Recre ation	Own- exp- enses	Others			
	40-50	50-60	60-70	70-80	80-90					0-10	10-20		0-10	11-20	21-30			0-10	11-20	21-30	31-40
2		4 00	5.33	1.33	0 67	11.33	11 33		11.33	11.33	6 00	11.33	6.67	2 67		2 67	7.33	5 33	1 33	2.67	.
3	1.33	22 00	41.33	10.67		75.33	75 33	2 0	75.33	64.00	1 33	75.33	28 67	32 67	2 00	12 67	51 33	37 33	14 67	3 33	0.67
4		1 33	4 67	0 67	0 67	7 33	7.33		7.33	6 00		4 00	2 67	0 67		0 67	4 67		0 67		
5		2 00				2 00	2 00		2 00	2 00		1 33	1 00			1 33	2 00				
6			0 67			0 67	0 67		0.67	0 67		0 67	0 67								
7	0 67	1 33				2 00	2 00		2 00	2 00		2 00	2 00				1 33		0 67		
8			1 33			1 33	1 33		1 33	0 67		1 33	1 33				0 67				

As revealed from the table 12 it was clear that as the family size increased the expenditure pattern decreased ie. 14.01 per cent of the families having 4 to 6 members spent 70-90 per cent of their income on food. Similarly small families spent 10-20 per cent of their income for the education of their children while large families spent only 0.1 per cent.

Expenditure pattern of the employed family members on foods outside the home

It was observed among agricultural labourers, that majority of them both male and female members employed outside, daily spend money for buying tea, coffee, breakfast, snacks and also lunch from nearby teashops or small hotels or canteen. Details regarding this type of expenditure pattern among the families surveyed was studied and is presented in Table 13.

Table 13 Expenditure pattern of the employed family members on foods outside the home

Monthly expenditure	Family members			
	Male		Female	
	Number	Percent	Number	Percent
0-10	9.00	6.00	2.00	1.33
11-20	37.00	24.67	10.00	6.67
21-30	10.00	6.67	4.00	2.67
31-40	1.00	0.67	..	..
Total	57.00	38.01	16.00	10.67

As indicated in the table male members spent more money for eating outside while at work when compared to the female members. The maximum range of expenditure was found to be 11-20 per cent of their monthly income.

Information regarding the mothers and children

Age at menarche

Since severe early childhood malnutrition can delay age at menarche in girls, it was assessed in the mothers and the details are presented in Table 14.

Table 14 Age at menarche of the mothers

Age (in years)	Number	Percent
10-12	28	18.67
12-14	98	65.33
14-16	18	12.00
16-18	6	4.00
Total	150	100.00

Majority of the mothers (65.33 per cent) surveyed were found to have reached puberty at the age between 12 to 14 years while 18.67 per cent of the mothers reached puberty at the age between 10-12. About 16 per cent of the mothers came to age only after 14 years which is comparatively a delayed onset (vide table 14).

Age at marriage

Age at marriage of the mothers were assessed and presented in Table 15.

Table 15 Age at marriage of the mothers

Age (in years)	Number	Percentage
13-15	8	5.33
15-17	26	17.33
17-19	72	48.00
19-21	29	19.34
21-23	12	8.00
23-25	3	2.00
>25	0	0
Total	150	100.00

From the table it was revealed that early marriage were very common among the families studied. About 70.66 per cent of the women got married before the age of 19.

Delivery pattern of the mothers

The delivery pattern of the mothers was enquired and the details are presented in Table 16.

Table 16 Delivery of children after marriage

Delivery Pattern	First child		Second child		Third child		Fourth child		Fifth child		Sixth child		Seventh child		Eighth child	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Within one year	121	80.67	.	.	.	.		.	.	.			.	.	..	.
1-2	21	14.00	48	32 00	.				.				.	.		
2-3	7	4 67	58	38.o7	16	10.67	.	.	.	..			.	.		
3-4			15	36.00	24	3.00	2		.							
4-5			20	13 33	34	22.67	7	4.66	2	1.33						.
5-6	1	0.67	5	3 33	28	18 67	10	6.67								
6-7			3	2 00	16	10.67		2.67		0 67						
7-8					8	5 33	5	3 33	3	3 00						
8-9					6	4 00	8	5 33	1	0 o7						
0-10					1	0 67	6	4 00	2	1 33						
10-11					1	0 o6			3	2 00	2	1 33				
11-12					3	2 00	1	0 67	2	1 33						
12-13					1	0 66			2	1 33	2	1 33				
13-14									2	1 33						
14-15											2	1 33	2	1 33		
15-16						.	.									
16-17											2	1 33	1	0.67	1	0.67
17-18	.		.	.	.	..	..	.		.	2	1 33	1	0 67	1	0.67
18-19		.			..	.		.	..	..	..		.			0 67

Majority of the mothers studied (80.67 per cent) had their first child born within one year after marriage. 14 per cent of the mothers under study had their first child within 1-2 years whereas 4.67 per cent of the mothers had an interval of 2-3 years to have their first child after marriage. Regarding spacing between subsequent children it was revealed from the table that 32 per cent of the mothers had their second child within 1-2 years interval and 38.67 per cent of the mothers gave birth to their 2nd child with a spacing of 2-3 years. Regarding the 3rd child 24 per cent of the mothers delivered their 3rd child within 3-4 years and 22.67 per cent within 4-5 years. The same pattern was seen with the 4th child also where 4.66 per cent of the mothers had their 4th child within 4-5 years.

4.67 per cent of the mothers had their first child only after 2-3 years of marriage. About 18.66 per cent of the mothers had their 2nd child only within 4-7 years. 20 per cent of the mothers delivered their 3rd child only within 6 to 9 years. Regarding the 4th child 9.33 per cent of mothers delivered only between 8-10 years after marriage.

Education of the mother and number of deliveries

Education of the mother and the number of deliveries of the mother was assessed and is presented in Table 17.

Table 17 Education of the mother and number of deliveries

Educational status	Number of deliveries											
	3		4		5		6		7		8	
	Number	Per cent	Number	Per cent	Number	Per-cent	Number	Per cent	Number	Per-cent	Number	Per cent
Illiterate	10	6.67	6	4.00	2	1.33	1	0.67	3	2.00	1	0.67
L.P.S.	21	14.00	8	5.33	5	3.33	1	0.67	..	..	..	..
U.P.S.	46	30.67	5	3.33	2	1.33	2	1.33	..	..	..	..
High School	31	20.67	5	3.33	..	..	1	0.67	..	..	..	..
Total	108	72.01	24	15.99	9	5.99	5	3.34	3	2.00	1	0.67

63

It was found from the table that mothers with more education had less number of deliveries. Only 6.67 per cent of the illiterate mothers had 3 children. Illiterate mothers were found to have more number of deliveries.

Correlations between education of the mother and number of deliveries was found to be 0.3978** which was highly significant.

Spacing between children

Spacing between children in the families were assessed and is presented in Table 18.

Table 18 Spacing between children

Years	After marriage		First and second		Second and third		Third and fourth		Fourth and fifth		Fifth and sixth		Sixth and seventh		Seventh and eighth	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
1	121	80.67	54	36.00	41	27.33	11	7.33	4	2.67	1	0.67	1	0.67	1	0.67
1-2	21	12.00	65	43.33	60	40.00	17	11.33	6	4.00	1	0.67	1	0.67	1	0.67
2-3	7	4.67	19	12.67	35	23.33	5	3.33	4	2.67	2	1.33	1	0.67	1	0.67
3-4	1	0.67	10	6.67	10	6.67	9	6.00	3	2.00	3	2.00	..	..	..	..
4-5	..	..	1	0.67	5	2.00	2	1.33	1	0.67	..	..	..	..	..	..
5-6	..	..	1	0.67	1	0.67	..	..	..	..	..	..	..	..	..	..

It was revealed that 80.67 per cent of the families had their first child within 1 year after marriage. Majority of the families (43.33 per cent) had only a spacing of 1-2 years between the 1st and 2nd child. 36 per cent of the families had a spacing of below 1 year between the 1st and 2nd child. There was only a spacing of 1-2 years for majority of the families (40 per cent) between 2nd and 3rd child. Generally it was observed that the spacing pattern was only from 1-2 years and even below 1 year between subsequent children in majority of the families.

Family planning measures adopted

Details regarding the family planning measures adopted were enquired and is presented in Table 19.

Table 19 Family planning measures adopted

Family planning measures	Housewife		Head of the family	
	Number	Percentage	Number	Percentage
Adopted	131	87.33	4	2.67
Not adopted	15	10.00	..	..
Total	146	97.33	4	2.67

As depicted in table 19 majority of the women (87.33 per cent) adopted family planning measures while only 2.67 per cent of the men adopted these measures.

Educational status of the parents and the use of family measures

Influence of education for the adoption of family planning measures were assessed and is presented in Table 20.

Table 20 Educational status of the parents and the use of family planning measures (in per cent)

Educational status of the parents	Family planning measures	
	Adopted	
	Wife	Husband
Illiterate	12.00	1.33
L.P.S.	20.67	0.67
U.P.S.	32.33	..
High School	22.33	0.67
Total	75.33	2.67

The table indicated that with increasing educational status of parents the rate of adoption of family planning measures also increased and the adoption was more among female members. About 75.33 per cent of educated mothers had adopted family planning measures.

Infant and neonatal mortality, abortions and still births

Details regarding infant and neonatal mortality, number of abortions and still births were collected from the mothers and it was found that out of the 150 mothers studied 19 infant and 20 neonatal deaths, 17 abortions and 3 still births were reported to have occured and the details of which with regard to birth spacing, birth order and number of parities are presented in Table 21 (a), 21 (b) and 21 (c) respectively.

Table 21 (a) Infant/neonatal mortality, abortions and still birth with respect to birth spacing

Birth spacing	Infant mortality	Neonatal mortality	Number of abortion	Still birth
Below 1 year	14	13	16	2
1-2	4	4	1	..
2-3	1	2	..	1
3-4	..	..	..	..
4-5	..	1	..	..
Total	19	20	17	3

As revealed from the table, of the 19 infant mortality reported 14 were found to occur to infants whose birth spacing was below 1 year. The same trend was seen with regard to abortions, still births and neonatal deaths, almost all these incidents occured when the mothers conceived with a birth interval below 1 year.

Table 21 (b) Infant/neonatal mortality, abortion still births with respect to birth order

Birth order	Infant mortality	Number of abortions	Still birth	Neonatal deaths
1	8	6	2	6
2	6	4	1	4
3	4	4	..	5
4	1	3	..	4
5	..	..	..	1
Total	19	20	17	3

As revealed from the table it was clear that infant and neonatal mortality, still birth and abortions were maximum in the first order births. This might be due to the fact that majority of the women married between the age of 18-19 and also they delivered their first baby within 1 year after their marriage due to this the risk of occurrence of infant and neonatal mortality, abortions and still births was more in the first order births.

MORTALITY RATE AMONG CHILDREN WITH RESPECT TO BIRTH SPACING AND BIRTH ORDER

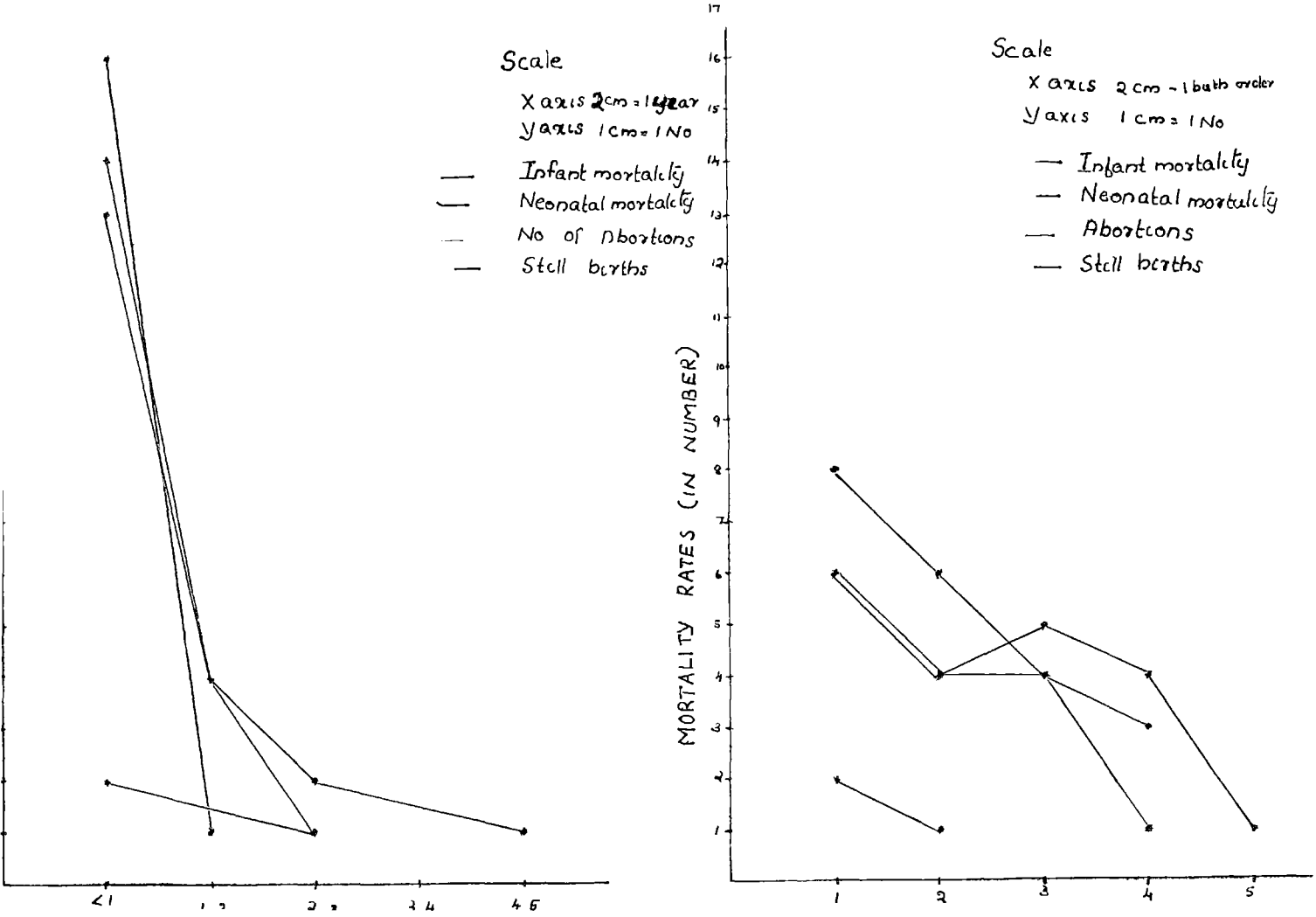


Table 21 (c) Infant/neonatal mortality, abortions and still births with respect to number of parities

Number of parities	Infant mortality	Neonatal mortality	Number of abosrtions	Still birth
3	4	6	4	2
4	9	13	6	1
5	5	11	4	..
6	1	..	3	..
7	..	..	..	..
8	..	..	..	..
Total	19	20	17	3

As revealed from the table infant and neonatal mortalities and abortions occured more to mothers with increasing number of parities ie. more than 3. Out of the 3 still births reported, 2 of them occured to mothers with 3 parities.

Illness occured to mothers during pregnancy

The diseases that had occured to the mother during pregnancy were assessed and presented in Table 22.

Table 22 Diseases occured to the mothers during pregnancy

Diseases occured	First pregnancy		Second pregnancy		Third pregnancy		Fourth pregnancy		Fifth pregnancy		Sixth pregnancy		Seventh pregnancy		Eigth pregnancy	
	Number	Per cent	Number	Per-cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per-cent	Number	Per cent
Vomiting	31	20.67	48	32.00	48	32.00	12	8.00	1	0.67	4	2.67	2	1.33	1	0.67
Fever	31	20.67	27	18.00	21	14.00	8	5.33	2	1.33	1	0.67	..	..	..	..
Hypertension	2	1.33	2	1.33	2	1.33	..	..	..	..	..	..	..	..	..	..
Oedema	5	3.33	6	4.00	4	2.67	1	..	..	..	..	..	..	..	..	..
Respiratory disease	4	2.67	7	4.67	7	4.67	3	2.00	2	1.33	2	1.33	1	0.67	..	..
Jaundice	..	..	2	1.33	1	0.67	1	0.67	..	..	..	..	..	..	..	..
Others	23	15.33	16	10.67	15	10.00	6	4.00	3	2.00	..	..	..	..	..	..
Not having any disease	71	47.33	78	52.00	77	51.33	22	14.67	16	10.67	3	2.00	2	1.33	1	0.67

Common diseases that had occured to the mother during pregnancy were vomiting, fever, oedema, respiratory diseases, jaundice and others included rheumatism, diabetis, fits, diarrhoea, dysentry, chickenpox etc.

As revealed from the table discomforts like vomiting and respiratory diseases were reported to have occured more during the second and third pregnancies of mothers (32 and 4.67 per cent respectively). Most of the mothers were reported of not having any types of diseases or discomforts during their course of pregnancies.

Place of delivery of the mothers

Place of delivery of the mother were assessed and is presented in Table 23.

Table 23 Place of delivery of the mothers for each child

Place of delivery	First child		Second child		Third child		Fourth child		Fifth child		Sixth child		Seventh child		Eigth child	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
At hospital	109	72.67	104	69.33	104	69.33	24	16.00	12	8.00	4	2.67	1	0.67	1	0.67
At home with the help of midwife	30	20.00	37	24.67	35	23.33	16	10.67	7	4-67	3	2.00	3	2.00	1	0.67
At home with the help of older persons	5	3.33	5	5.33	7	4.65	1	..	..	..	..	..	..	..	..	..

Irrespective of the birth order majority of the mothers went to hospitals for their delivery. Others delivered at home with the help of a trained midwife. Only a few mothers (12 per cent) delivered at home with the help of older women.

Type of delivery and diseases or discomforts after delivery

Almost all the mothers had normal delivery and only 6.67 per cent of the mothers had caessarian when enquired about the diseases and discomforts that had occured after delivery majority of the mothers reported of not having any discomforts or diseases after delivery. Among others some pointed out that they experienced easy fatigue while others mentioned about diarrhoea, fever, jaundice, diabetis etc.

Diseases occured to children after birth

Diseases that had occured to children after birth were enquired and the details are presented with respect to their birth order and birth spacing in Table 24 (a) and 24 (b).

Table 24 (a) Diseases occured to children with respect to birth order

Diseases	First child		Second child		Third child		Fourth child		Fifth child		Sixth child		Seventh child		Eigth child	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Measles	56	12.01	56	12.01	45	9.65	20	4.29	4	0.85	3	0.64	1	0.21	1	0.21
Respiratory disease	60	12.87	56	12.01	56	12.01	22	4.72	10	2.14	4	0.85	3	0.64	1	0.21
Diarrhoea	37	7.93	20	4.29	34	7.29	11	2.36	5	1.07	3	0.64	3	0.64	2	0.42
Dysentry	6	1.28	2	0.42	3	0.64	2	0.42	1	0.21	..	..	..	..	..	..
Cough	28	6.00	33	7.08	33	7.08	8	1.71	2	0.42	4	0.85	..	..	..	..
Chickenpox	8	1.71	2	0.42	1	0.21	..	..	..	..	..	..	..	..	1	0.21
Jaundice	8	1.71	5	1.07	6	1.28	4	0.85	1	0.21	1	0.21	..	..	..	..
Fever	85	18.24	73	15.66	40	8.58	19	6.00	6	4.08	3	0.64	3	0.64	2	0.42
Not having any disease	8	1.71	14	3.00	11	2.36	1	0.21	..	..	..	..	..	..	..	..

As revealed from the table it was clear that irrespective of the birth order majority of the children had diseases like measles, respiratory diseases, gastrointestinal diseases, chickenpox, jaundice and cough and fever.

Table 24 (b) Diseases occured to children with respect to birth spacing

Diseases	Birth spacing (in years)											
	Less than 1 year		1-2		2-3		3-4		4-5		5-6	
	Number	Per-cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Measles	86	18.45	66	14.16	19	4.07	11	2.36	1	0.21	3	0.64
Respiratory disease	92	19.74	73	15.66	31	6.65	12	2.57	3	0.64	1	0.21
Diarrhoea	59	12.66	33	7.08	14	3.00	4	0.85	3	0.64	2	0.42
Dysentry	5	1.07	5	1.07	2	0.42	..	..	2	0.42	..	..
Cough	47	10.08	45	9.65	14	3.00	1	0.21	..	..	1	0.21
Chickenpox	6	1.28	3	0.64	3	0.64	..	..	..	..	..	..
Jaundice	12	2.50	9	1.93	2	0.42	1	0.21	..	..	..	..
Fever	121	25.96	9	1.93	2	0.42	1	0.21	..	..	..	..
Not having any diseases	9	1.93	9	1.93	8	1.72	3	0.64	1	0.21	3	0.64

As revealed from the table it was clear that the occurence of infectious diseases like measles, respiratory diseases, diarrhoea, dysentry, cough, chicken-pox, jaundice etc. increased as the birth spacing decreased.

2. Food habits and consumption pattern of the families

Dietary habits

All the families surveyed were non-vegetarian, fish being the important non-vegetarian food in their daily diets.

Purchasing pattern of different food items by the Families

The frequency of purchasing of different food items by the families were studied and is presented in Table 25.

Table 25 Frequency of purchasing food items

Items	Daily		Weekly		Monthly		Occasionally		Never	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Percent	Number	Percent
Cereals										
Rice	102	68.00	42	28.00	6	4.00	..	..	..	..
Wheat	83	55.30	59	39.33	8	5.33	..	..	..	..
Other cereals	..	..	47	31.33	9	6.00	41	27.33	53	35.33
Pulses	..	..	59	39.33	31	20.67	25	16.67	35	23.33
Green leafy vegetables	57	38.00	10	6.70	6	4.00	42	28.00	35	23.33
Roots and tubers										
Tapioca	126	84.00	11	7.33	8	5.33	3	2.00	2	1.34
Other vegetables	88	58.67	62	41.33	..	..	..	..	..	..
Milk and milk products	52	34.67	12	8.00	2	1.33	11	7.33	73	48.67
Meat	..	..	11	7.33	36	24.00	86	51.33	17	11.34
Fish	149	99.33	1	67.00	..	..	..	..	..	..
Egg	5	3.33	8	5.33	9	6.00	18	12.00	110	73.34
Nuts and oil seeds	36	24.00	54	36.00	26	17.33	5	3.33	29	19.34
Fats and oils	30	20.00	15	10.00	94	62.67	1	67.00	10	6.66
Sugar	40	26.67	16	10.67	94	62.66	..	..	..	..
Jaggery	..	..	2	1.33	42	28.00	52	34.67	54	36.00
Others	65	43.33	38	25.33	47	31.34	..	..	..	..

Among cereals rice and wheat were purchased daily by majority of the families. 35.33 per cent of the families never purchased cereals other than rice and wheat. 39.33 per cent of the families purchased pulses on a weekly basis whereas 23.33 per cent never purchased pulses. Daily purchase of green leafy vegetables were seen in 38 per cent of the families. Regarding roots and tubers, tapioca was purchased daily by most of the families (84 per cent). Most of them purchased vegetables daily (5867 per cent). 48.67 per cent of the families never purchased milk or milk products whereas some families (34.67 per cent) milk was purchased daily. Purchase of meat was very occasional for most of the families (57.33 per cent) but fish was purchased daily by almost all the families (99.33 per cent) Egg were not purchased by majority of the families (73.34 per cent). Cooking oil and sugar was purchased on a monthly basis for most of the families (62.67 and 62.67 per cent) respectively.

Expenditure pattern of families on different food items

The expenditure pattern of the families on different food items were enquired and the details are presented in Table 26.

Table 26 Expenditure pattern on different food items (in per cent)

Percentage of food expenditure	Cereals	Pulses	Roots and tubers	Green leafy vegetables	Milk	Other vegetables	Meat	Fish	Egg	Nuts and oil seeds	Fats and oils	Sugar	Bakery items	Othe
<1	..	..	..	76.67	..	..	..	..	19.33	..	..	..	..	..
1-4	..	31.33	16.00	21.33	14.00	54.67	80.00	..	6.00	12.00	40.67	38.00	41.33	17.3
4-7	..	42.67	19.33	..	28.00	44.00	8.67	3.34	1.33	14.67	50.00	18.00	1.33	54.6
7-10	..	22.00	28.67	..	20.67	1.33	..	25.33	..	13.33	9.33	3.33	..	26.0
10-13	..	4.0	30.00	..	..	..	..	55.33	..	24.67	..	0.67	..	2.0
13-16	..	..	4.67	..	12.00	..	..	16.00	..	10.67	..	..	..	..
16-19	0.67	..	0.67	..	0.67	..	..	..	..	5.33	..	..	..	..
19-22	0.67	..	0.67	..	0.67	..	..	..	..	..	..	..	..	..
22-25	0.67	..	..	..	..	..	..	..	..	..	..	...	..	..
25-28	4.00	..	..	..	..	..	..	..	..	..	..	..	..	..
28-32	14.00	..	..	...	..	..	..	..	..	..	...	..	..	..
31-34	25.30	..	..	..	..	..	..	..	..	..	..	..	..	..
34-37	20.00	..	..	..	..	..	..	..	..	..	..	..	..	..
37-40	23.30	..	..	..	..	..	..	..	..	..	..	..	..	..
40-44	6.70	..	..	..	..	..	..	..	..	..	..	..	..	..
44-47	2.70	..	..	..	..	..	..	..	..	..	..	..	..	..
47 and above	2.00	..	..	..	..	..	..	..	..	..	..	..	..	..

From table 9 it was clear that most of the families spent 51-70 per cent of their monthly income for food. Table 26 reveals the percentage expenditure on different food items. As indicated, for most of the families (68.66 per cent) 30-40 per cent of food expenditure was for cereals especially rice, which is the staple food of Kerala. Besides rice, the other major food expenditure were for roots and tubers (1-13 per cent), nuts and oils seeds (1-19 per cent), and fish (7-13 per cent) reveals a typical rural Kerala dietary pattern mainly based on rice, fish, tapioca and coconut. For majority of the families (98.67 per cent) expenditure on green leafy vegetables and eggs were negligible (<1 per cent). The expenditure for other vegetables, fats and oils and sugar was 7 per cent of the food expenditure. 62.67 per cent of the families spent upto 10 per cent on milk and milk products. Majority of the families (96 per cent) spent upto 10 per cent for pulses, whereas the expenditure on meat was only between 1-4 per cent. Expenditure for bakery goods was also between 0-4 per cent.

Frequency of using different food items by the families

The data collected to assess the frequency of use of different food items in their daily diet is presented in Table 27.

Table 27 Frequency of using different food items

Foods	Daily		Once		Weekly				Four times		Occasionally		Never	
					Twice		Thrice							
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Cereals														
Rice	150	100.00	..	..	..	..	..	..	..	..	..	..	..	..
Wheat	..	..	31	20.67	76	50.67	27	18.00	13	8.66	3	2.00	..	..
Other cereals	..	..	8	5.33	14	9.33	18	12.00	18	12.00	39	26.00	53	35.34
Pulses	..	..	38	25.33	36	24.00	18	12.00	7	4.67	20	13.33	31	20.67
Green leafy vegetables														
Others	..	..	..	..	7	4.67	..	..	..	..	82	54.67	61	40.66
Roots and tubers														
Tapioca	124	82.67	7	4.67	5	3.33	8	5.33	5	3.33	1	0.67	..	..
Other vegetables	67	44.67	..	..	8	5.33	39	26.00	30	20.00	6	0.40	..	..
Milk and milk products	111	74.00	..	..	8	5.33	..	..	3	2.00	5	3.33	23	15.34
Meat	..	..	8	5.33	..	..	..	..	..	..	135	90.00	7	4.67
Fish	150	100.00	..	..	..	..	..	..	..	..	..	..	..	..
Egg	6	4.00	30	20.00	23.	15.33	9	6.00	5	3.33	12	8.00	65	43.34
Nuts and oil seeds														
Coconut	150	100.00	..	..	..	..	..	..	..	..	..	..	..	..
Fats and oils	150	100.00	..	..	..	..	..	..	..	..	..	..	..	..
Sugar	150	100.00	..	..	..	..	..	..	..	..	..	..	..	..
Bakery items	1	0.67	45	30.00	19	12.67	28	18.67	..	..	35	23.33	22	14.66

It was revealed from the table that all of the families surveyed used rice as staple, fish, coconut, fats and oils and sugar in their daily diet. Other food items included daily were roots and tubers (82.67 per cent) and milk and milk products (74 per cent) by majority of the families. Fats and oils were used in little quantity daily for seasoning tapioca or fish. The source of including sugar was mainly from the coffee or tea either they buy from the tea shop or prepare at home. Coconut was also added in the tapioca or fish preparations. The source of milk in the daily diet for majority of the families was also from tea or coffee.

Whenever fish was unavailable the families (44.67 per cent) bought vegetables daily. Majority of the families used pulses only once or twice in a week. Green leafy vegetables, meat and other bakery items were used only occasionally.

Meal pattern of the families

Daily meal pattern of the families were collected and are presented in Table 28.

Table 28 Daily meal pattern of the families

One day meal combination	Breakfast		Lunch		Supper			Tiffin	
	Number	Per cent	Number	Per cent	Number	Per cent		Number	Per cent
Cereal pulse	31	20.67	..	..	..	..	Coffee	30	20.00
Cereals and fruits	68	45.33	..	..	..	..	Tea	72	48.00
Cereals and root tubers	12	8 .00	..	..	..	..	Nil	48	32 00
Cereals and coconut	39	26.00	..	..	..	..			
Cereals, vegetables and fish	..	..	13	8.67	10	6.67			
Cereals, Root and tubers fish	..	..	63	42.00	74	49.33			
Cereals, vegetables, fish and roots and tubers	..	..	37	24.67	24	16.00			
Cereals and pulses	..	..	..	..	2	1.33			
Cereal, pulse and fish	..	..	5	3.33	9	6.00			
Cereals, root and tubers fish and milk products	..	..	5	3.33	3	2.00			
Cereals, root and tubers fish and coconut	..	..	1	0.67	..	..			
Cereals and fish	..	..	8	5.33	9	6.00			
Cereals, pulses, roots and tubers and fish	..	..	10	6.67	13	8.67			
Cereals, pulses, roots and tubers, fish and vegetables	..	..	8	5.33	6	4.00			

As depicted in the table, three meals a day namely, breakfast, lunch and supper was found to be common pattern of the families surveyed. Rice and wheat was found to be the staple food in the breakfast. 45.33 per cent of the families surveyed had cereal fruit combination for breakfast mainly in the form of puttu and plantain. 20.67 per cent had cereal pulse combination for breakfast like Idli, dosa etc. Rice was found to be the main item for lunch and supper. Roots and tubers mainly tapioca, and fish also had a major role in the daily dietaries of majority of the families. Rice, tapioca and fish form the important items for lunch and dinner for majority of the families studied. About 24.67 per cent of the families also included vegetables along with the above items in their daily diet. The same pattern was observed with supper also. The inclusion of pulse during lunch or supper was found to be very rare. About 68 per cent of the families took tea/coffee in the evening.

Cooking methods adopted by the families

Methods used for cooking, preparation of food before cooking etc. were same for all the families surveyed. Cereals and roots and tubers (tapioca) were cooked by boiling and then strained. Boiling was the cooking method mainly employed for cooking various food articles, since it is the least expensive method.

Other methods like frying and steaming was used for cooking fish and vegetables by very few families. Most of the women surveyed washed vegetables after cutting and they used to wash cereals and vegetables for several times.

Since majority of the families purchased food articles daily, they were not using any storage methods for preservation of food articles.

Meal pattern during special occasions

Two types of meals were prepared during special occasion - one vegetarian type meals and the other non-vegetarian type meals. Majority of the families surveyed prepared non-vegetarian meals. Only a few families (20 per cent) prepared sweet dishes during birth days.

Foods given during special occasions

Infancy, pre-school period, pregnancy and lactation were the three important special conditions when adequate care in food consumption was to be made. Data collected on these lines depicted that for a child in the age group of 0 to 7 months breast milk was the major source of sustenance. About 5.59 per cent of the mothers fed breast milk to their children until they were 3 years old.

Majority of the mothers supplemented breast milk by small amounts of biscuits (15.33 per cent), porridges made of ragi (75.33 per cent) and banana (20.67 per cent). Pre-school children were given the family diet. No special foods were prepared at home for this children. Similarly special foods were not given to adolescents, pregnant and nursing mothers.

Preference in giving food in families

Preference in giving food to family members are given in table 29.

Table 29 Preference in serving food

Members	Number	Per cent
Father	138	92
Male children	12	8
Total	150	100.00

Majority of the families (92 per cent) surveyed gave preference to the head of the family that is, father, in giving food. The reason being he is the main earning member of the family. Only in 8 per cent of the families preference was given to children especially to male children.

Changing dietary habits during pregnancy and lactation

Percentage of women who had changed their dietary habits during pregnancy and lactation were given in Table 30.

Table 30 Dietary habits in pregnancy and lactation

	Number	Per cent
Those who changed their dietary habits	46	30.67
Not changed their dietary habits	104	69.33
Total	150	100.00

It was revealed from the table that majority of the women (69.33 per cent) did not change their dietary habits during special conditions like pregnancy and lactation. Only 30.67 per cent of the women changed their dietary habits. Among this majority of the women excluded roots and tubers and fish from their daily diet and included more milk and vegetables.

Breast feeding practices of women

Breast feeding practices of women with respect to birth order of their children was enquired and the results collected are given in Table 31.

Table 31 Breast feeding practices of women with birth order

Details of women	First child		Second child		Third child		Fourth child		Fifth child		Sixth child		Seventh child		Eighth child	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Who responded positively	125	85.33	131	87.33	135	90.00	35	23.33	18	12.00	7	4.67	3	2.00	2	1.33
Who responded negatively	3	2.00	4	2.67	2	1.33	1	0.67	..	..	..	..	..	..	..	..

From the table it was clear that majority of the women breast fed their infants but only a small percentage of the mothers did not breast feed. Regarding the breast feeding pattern with respect to birth order of the child, it was seen that upto the third child majority of the mothers breast fed and from the fourth child onwards the percentage of mothers who breast fed their babies was found to be declining.

Duration of breast feeding with respect to birth order

Duraction of breast feeding with respect to birth order was enquired and the results are presented in Table 32.

Table 32 Duration of breast feeding with respect to birth order

Period of breast feeding in years	First child		Second child		Third child		Fourth child		Fifth child		Sixth child		Seventh child		Eighth child	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
0-1	41	27.33	42	28.00	35	23.33	5	3.33	2	1.33	2	1.33	1	0.67	1	0.67
1-2	75	50.00	70	46.67	71	47.33	21	14.00	6	4.00	4	2.67	1	0.67	..	..
2-3	9	6.00	18	12.00	28	18.67	6	4.00	11	2.67	1	0.67	1	0.67	1	0.67
3-4	..	..	1	0.67	1	0.67	3	2.00	5	3.33	..	..	..	..	..	..
4-5	..	..	..	..	..	..	..	..	1	0.67	..	..	..	..	..	..
	125	83.33	131	87.34	135	90.00	35	23.33	25	12.00	7	4.67	3	2.00	2	1.33

27.33 per cent of the children of the first birth order was breast fed for a period of less than one year and 50 per cent of the children belonging to the same birth order were breast fed for a period of 1-2 years. Regarding the children of second and third birth order majority of the children (46.67 and 47.33 per cent respectively) received breast milk for a period of 1-2 years. Majority of the families surveyed had 3 children with 1-2 year birth spacing. The data consisted of children who were lost by infant/neonatal deaths and who were not breast fed at all.

Duration of breast feeding with respect to birth spacing

Duration of breast feeding with respect to birth spacing was enquired and the results are presented in Table 33.

Table 33 Duration of breast feeding with respect to birth spacing

Birth spacing	Period of breast feeding (in years)									
	1		1-2		2-3		3-4		4-5	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	76	10.31	91	19.50	21	4.51	..	..	..	..
1-2	30	6.44	104	32.32	23	4.94	2	0.43	..	..
2-3	17	3.65	33	7.08	18	3.86	3	0.64	..	..
3-4	4	0.86	16	3.43	8	1.72	4	0.86	..	..
4-5	..	..	3	0.64	..	..	..	..	..	..
5-6	1	0.21	1	0.21	..	..	1	0.21	1	0.21
Total	128	27.47	248	62.80	90	15.03	10	2.14	1	0.21

As the birth spacing increased duration of breast feeding was also increased. Among the 466 children, 16.31 per cent with a spacing of 1 year was breast fed for a period of less than 1 year but as the birth spacing increased to 1-2 years the percentage of children who received breast milk for a period of less than one year decreased to 6.44 per cent. Majority of the mothers breast fed their babies for a period of 1 to 2 years because majority of the mothers had a spacing of 1 to 2 years.

Age of weaning

Age at which supplementary foods were given to children was assessed and is presented in Table 34.

Table 34 Age of weaning (in months)

Age of weaning (months)	First child		Second child		Third child		Fourth child		Fifth child		Sixth child		Seventh child		Eighth child	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
0-3	93	62.00	97	64.66	101	67.33	32	21.33	8	5.33	7	4.67	3	2.00	1	0.67
3-6	33	22.00	37	24.67	31	20.67	5	2.67	8	5.33	..	..	..	..	1	0.67
6-9	2	1.33	1	0.67	4	2.67	1	0.67	2	1.33	..	..	..	..	..	..

It was revealed from the table that majority of the mothers had introduced supplementing foods from 0-3 months of age itself while only 6.67 per cent of the children received supplementary foods from the 6-9 months of age. Cow's milk or goat's milk was found to be the first supplementary food given to the majority of the children. Among the families surveyed it was found that most of the mothers introduced weaning foods between the first and third month.

Weaning foods given to the child

Type of weaning foods given to the children are presented in Table 35.

Table 35 Weaning foods given to the children

Weaning foods	Details of women	
	Number	Per cent
Ragi porridge	113	75.33
Cow's milk	150	100.00
Fruit juice	69	46.00
Banana porridge	31	20.67
Rice	60	40.00
Biscuit	23	15.33
Milk powder	6	2,00

As shown in the table 35, all the mothers gave cow's milk whereas 75.33 per cent of the mothers introduced ragi porridge. 46 per cent of the mothers introduced fruit juice. Other foods introduced were found to be rice (40 per cent) banana porridge (20.67 per cent) and milk powder (2 per cent).

Reasons for stopping breast feeding

The reasons for stopping breast feeding was enquired and is presented in Table 36.

Table 36 Reasons for stopping breast feeding

Reasons	First child		Second child		Third child		Fourth child		Fifth child		Sixth child		Seventh child		Eighth child	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Diseases	2	1.33	35	3.33	4	2.67	2	1.33	2	1.33	..	..	..	..	..	..
Employment outside the home	3	2.00	7	4.67	15	10.00	8	5.33	5	3.33	1	0.67	..	..	..	..
Traditional habits	13	8.67	6	4.00	61	40.66	13	8.67	4	2.67	5	3.33	1	0.67	1	0.67
Subsequent pregnancy	110	73.33	117	78.00	32	21.33	13	8.67	7	4.67	1	2.67	2	1.33	..	..
Continuint	..	..	..	..	25	16.67	..	..	..	..	..	..	..	..	1	0.67

It was revealed from the table that the major reasons for stopping breast feeding as reported by the mothers were diseases of the mothers, employment outside the home, traditional habits and subsequent pregnancy of which subsequent pregnancy of which subsequent pregnancy was the major reason.

Feeding schedule

Details of feeding schedule followed by the mothers surveyed are presented in Table 37.

Table 37 Details of feeding schedule

Details of feeding schedule	Details of women	
	Number	Percentage
1. Wherever the child cried	114	76.00
2. When the mother feels that the child is hungry	30	20.00
3. Once in every 2 hours	5	3.33
4. Once in every 3 hours	1	0.67
Total	150	100.00

It was found that 76 per cent of the mothers gave food to her child when the child cried, while 20 per cent gave food when the mother felt that her child was hundry. Only 3.33 and 0.67 per cent of the women gave food with a time schedule ie. once in every 2 to 3 hours.

Attitude of mothers regarding breast feeding

Opinion of mothers regarding breast feeding was enquired and all the mothers were of the view that breast milk was the ideal food for the infants.

Participation in supplementary feeding programme

Mothers surveyed were not participating in any feeding programmes but most of the children in the pre-school age were participating in these programmes for obtaining pre-school education as well as for supplementary foods.

Occurrence of diseases in children during the past five years with respect to birth order

Details related to the occurrence of diseases in the children, during the past five years with respect to birth order is presented in Table 38.

Table 38 Occurrence of diseases in children during the past five years with respect to birth order

Epidemics	First child		Second child		Third child		Fourth child		Fifth child		Sixth child		Seventh child		Eighth child	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Measles	70	46.67	71	47.33	57	38.00	14	9.33	5	3.33	3	2.00	2	1.33	1	0.67
Jaundice	20	1.33	14	9.33	14	9.33	4	2.67	1	0.67	1	0.67	1	0.67	1	0.67
Chickenpox	8	5.33	11	7.33	4	2.67	2	1.33	..	..	..	..	1	0.67	..	..
Diarrhoea	26	17.33	19	12.67	19	12.67	5	3.33	..	..	..	..	1	0.67	..	..
Dysentry	2	1.33	2	1.33	2	1.33	1	0.67	1	0.67	..	..	..	..	..	..
No diseases	35	23.33	34	22.67	49	32.67	19	12.67	9	6.00	5	3.33	..	..	..	..

Majority of the rural children were affected by infectious diseases like measles, jaundice, and chickenpox irrespective of their birth order.

Occurrence of diseases in children during the past five years with respect to birth spacing

Occurrence of diseases in children during the past five years with respect to the birth spacing was assessed and the details are presented in Table 39.

Table 39 Occurrence of diseases in children during the past five years with respect to birth spacing

Birth spacing (in years)	Epidemics that had affected									
	Measles		Jaundice		Chicken-pox		Diarrhoea		Dysentry	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
< 1	119	25.54	31	6.65	13	2.79	23	4.94	2	0.43
1- 2	72	15.45	15	3.22	7	1.50	19	4.08	2	0.43
2 -3	18	3.86	5	1.07	6	1.29	7	1.50	2	0.43
3 -4	10	2.15	2	0.43	..	..	5	1.07	1	0.21
4 -5	2	0.43	1	0.21	..	..	4	0.86	1	0.21
5 -6	2	0.43	..	..	..	..	2	0.43	..	..

As the birth spacing decreased the occurence of various diseases in children was also found to increase children with a spacing of less than one year were found to be affected by diseases like measles (25.54 per cent) Jaundice (6.65 per cent) chicken pox (2.79 per cent) Diarrhoea (4.94 per cent) and Dysentry (0.43 per cent) children with a spacing of 5-6 years had attacks of measles and diarrhoea.

3. Nutritional status of selected mothers and pre-school children

a) Mean food and nutrient intake of the mothers and pre-school children

Weighment survey

The actual dietary intake of mothers and pre-school children belonging to 15 families were found out by weighment survey and the nutrients present in their diets were computed using nutritive value table ICMR (1987).

Food and nutrient intake of mothers

Table 40 presents the mean food intake of mothers belonging to small, medium and large families.

Table 40 Average food consumption of mothers with respect to family size

Food	RDA	Family size											
		2+3		2+4		2+5		2+6		2+7		2+8	
	g	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met
Cereals	440	437	99.31	305	69.13	315	71.59	330	75.00	360	81.88	309	70.22
Pulses	45*	15	33.33	12	26.66	6	13.33	..	..	..	..	15	33.33
Roots and tubers	50	35	70.00	90	180.00	25	50.00	..	..	..	..	..	..
Other vegetables	40	6	15.00	..	..	..	..	..	..	30	75.00	..	..
Green leafy vegetables	100	5	5.00	..	..	..	..	62	62.00	..	..	..	..
Milk	150	8	5.33	..	..	25	16.66	40	26.66	25	16.66	25	16.66
Fish	..	43	..	50	..	30	..	30	..	40	..	20	..
Meat	..	3	..	..	..	..	..	..	..	..	..	..	..
Egg	..	375	..	4	..	..	..	..	..	..	..	..	..
Fruits	..	100	..	..	..	..	..	100	..	..	..	..	..
Coconut	..	10	..	20	..	10	..	10	..	10	..	10	..
Sugar	20	2	10.00	2	10.00	4	20.00	2	10.00	3	30.00	2	20.00
Fats and oils	25*	4	16.00	5	20.00	4	16.00	5	20.00	2	8.00	4	16.00

* According to ICMR (1987) recommendations for non-vegetarians diets, 50% of the pulse may be substituted by 1 egg or 30 gm meat or fish with 5 gm fat or oil or 100% pulses may be replaced by 2 eggs or 50 gms of meat or fish or 1 egg + 30 gm meat or fish with additional 10 gm fat or oil.

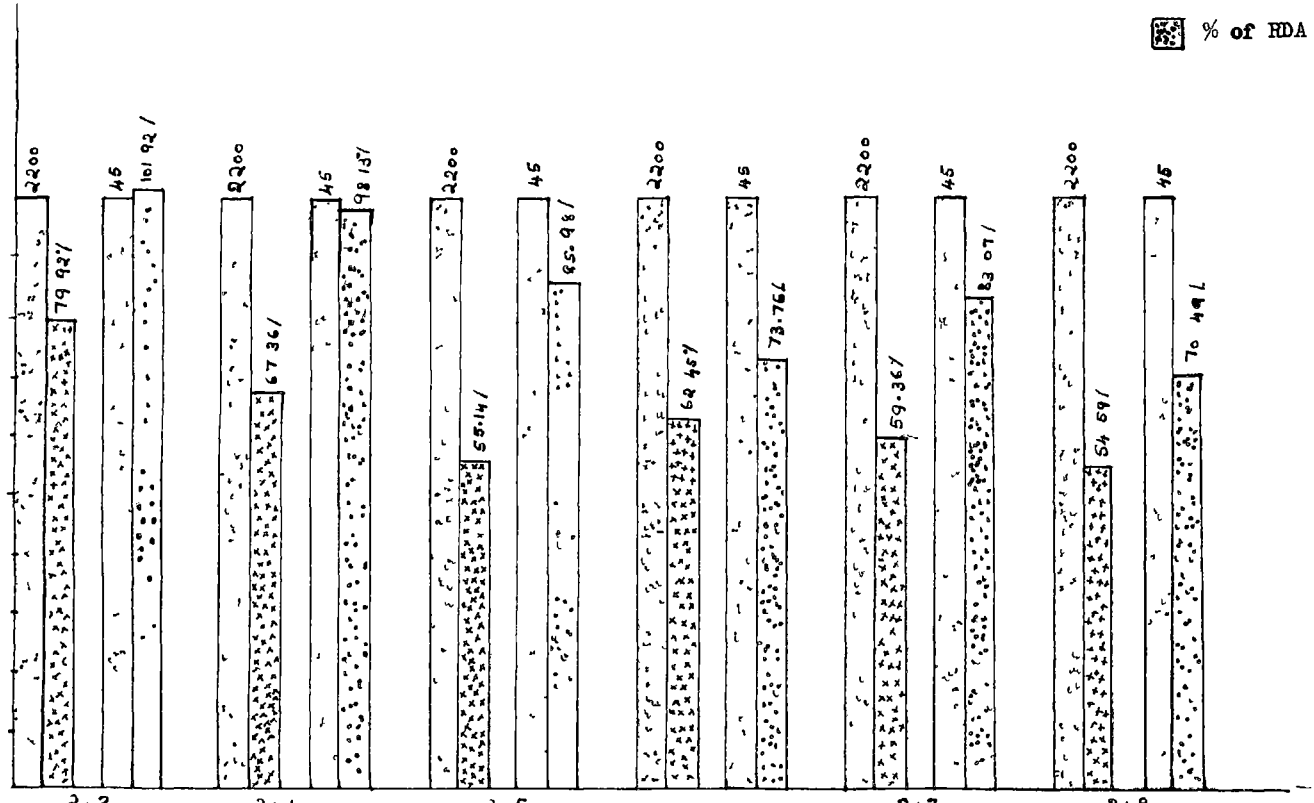
As indicated in the table only in small families all types of food groups were included in the daily diet of the mothers whereas in large families cereals constituted a major part of the diet.

Table 41 presents the mean nutrient intake of the mothers with respect to family size.

Table 41 Average nutrient intake of mothers with respect to the family size

Nutrients	RDA	Family size											
		2+3		2+4		2+5		2+6		2+7		2+8	
		Quantity	Percentage of RDA met	Quantity	Percentage of RDA met	Quantity	Percentage of RDA met	Quantity	Percentage of RDA met	Quantity	Percentage of RDA met	Quantity	Percentage of RDA met
Calories (kcal)	2200	1743	79.92	1482	67 36	1213	55.135	1374	62 454	1306	59 36	1195	54.59
Protein (gm)	45	45.867	101.92	44.16	98.13	38.692	85 982	33 191	73 757	3/ 381	83 068	31.72	70 49
Fat		5 572		12 46		9.04		8.29		7 49		8 03	.
Ca (gm)	0 4-0 5	0 167	41 81	0.284	71.17	0 145	36.31	0.162	40 53	0.163	40 83	0.69	33.05
Iron (mg)	32	29 750	92.99	26 07	81.46	14 69	45.90	19 12	59 75	20 686	64 64	22 42	10.62
Vit A ( )	750	181 040	24 138	209	27 86	155 50	20.73	222 10	29 613	156 73	20 897	57 60	7 00
Th amine (mg)	1 1	1 715	155 900	1 092	92 272	1 04	94.90	0 93	85 545	0 414	85 818	0 910	82 72
V t c (g)	40	48 360	120 900	70	175 00		.	70	1 75	1 0	2 50	0 90	2 25

AVERAGE CALORIE AND PROTEIN INTAKE OF MOTHERS WITH RESPECT TO FAMILY SIZE



Nutrient consumption was also higher in small families when compared to large families. Even in small families only 79.92 per cent of the recommended daily allowance of calories was met where as it decreased upto 54.59 per cent in large families with 10 members. Protein intake was better due to the consumption of fish in the daily diet. The intake of calcium and Vit.A was also found to be very low in all the families. Regarding iron, about 92.99 per cent of the RDA was met in families with 5 members whereas it decreased to 10.06 per cent in families with 10 members.

Food and nutrient intake of children

Table 42 showed the mean food intake of children (1-3 years) with respect to their family size.

Table 42 Average food intake of children (1-3 years) with respect to family size.

Food	RDA	Family size							
		2+3		2+4		2+5		2+8	
	g	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met
Cereals	175	167	95.42	142	81.14	165	94.28	..	..
Pulses	35	1	2.85	15	42.85	15	42.85	..	..
Vegetables	20	15	75.00	..	..	..	..	..	..
Roots and tubers	10	..	..	..	..	..	..	..	..
Fish	..	22	..	30	..	30	..	..	..
Meat	..	..	..	..	..	..	..	..	..
Egg	..	..	..	..	..	..	..	..	..
Milk									
Human milk	300	140	46.66	50	16.66	50	16.66	100	33.33
Fruits									
Coconut	..	10	..	..	..	10	..	550	..
Sugar	30	4	13.33	8	26.67	6	200.00	4	13.33
Fats and oils	15*	5	33.33	2	13.33	2	13.33	..	..

* According to ICMR (1987) recommendation for non-vegetarian diets, 50% of the pulses may be or substituted by 1 egg or 30 gm of meat or fish with 5 gm fat or oil or fish or egg + 30 gm meat or fish with additional 10 gm fat or oil.

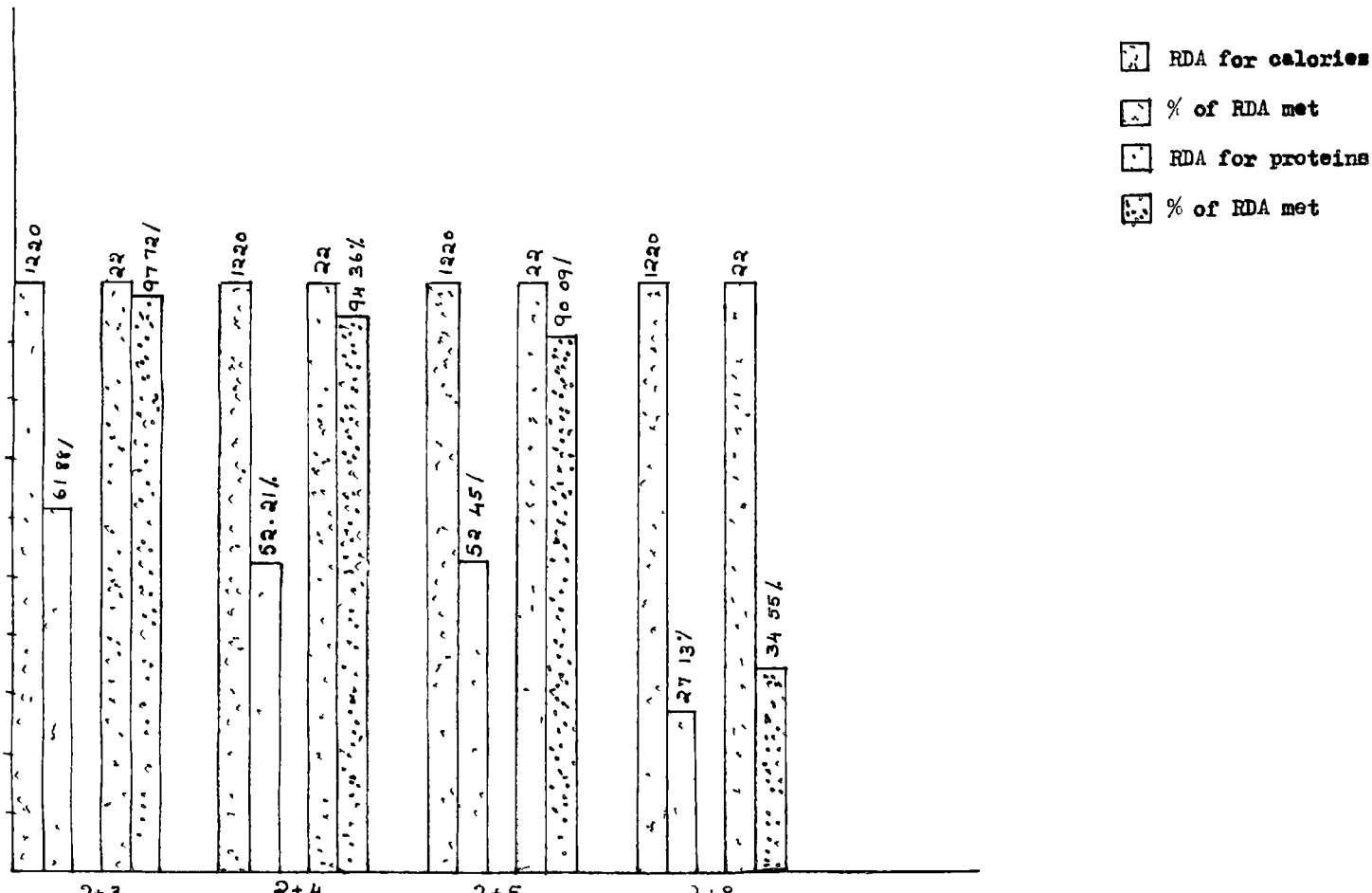
As depicted in the table, the food groups mainly included in the dietaries of the children of 1-3 years constituted cereals, pulses, fish, milk, sugar and fats and oils and in small families with 5 members they included Vegetables also, but irrespective of family size the quantities included were below the recommended levels.

Table 43 revealed the mean nutrient intake of children (1-3 years) with respect to family size.

Table 43 Average nutrient intake of children (1-3 years) with respect to family size

Nutrients	RDA	Family size							
		2+3		2+4		2+5		2+6	
		Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met
Calories(kcal)	1220	755	61.88	637	52.21	640	52.45	331	27.13
Protein (gm)	22	21.50	97.72	20.76	94.36	19.82	90.09	7.602	34.55
Fat (gm)	..	23.68	..	5.42	..	4.26	..	17.70	..
Calcium (gm)	4.5	0.129	32.60	0.119	29.83	0.114	28.50	0.45	0.125
Iron (mg)	20.25	15.66	78.30	5.445	27.225	7.83	38.66	0.20	..
Vit.A (mg)	250	56.30	22.52	101.10	40.44	98.02	39.20	719.50	287.50
Thiamine (mg)	0.6	0.4605	76.75	0.833	138.8	0.523	87.16	0.07	0.66
Vit.C (mg)	40	24.57	61.425	0.50	1.25	12.00	30.00	45.00	112.50

AVERAGE CALORIE AND PROTEIN INTAKE OF CHILDREN (1-3) YEARS
WITH RESPECT TO FAMILY SIZE



The protein intake of the children irrespective of family size was found to be satisfactory, except in the families with 10 members, ranging between 90-97 per cent of the RDA. This was mainly due to the inclusion of fish in the daily diet. Regarding calories only 61.18 per cent of RDA was met even in small families and it decreased upto 27.13 per cent as the family size increased. In large families and it decreased upto 27.13 per cent as the family size increased. In large families with 10 members the only food given to the child was milk. The intake of all other nutrients also was found to be unsatisfactory in all the families, but when compared to children of large families, the intake was higher in children of small families.

Table 44 indicated the mean food intake of children of 4-5 years with respect to family size.

Table 44 Average food intake of children (4-5 years) with respect to family size

Foods	RDA	Family size									
		2+3		2+4		2+6		2+7		2+8	
		Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met
	g										
Cereals	270	250	92.59	195	72.22	185	68.51	175	64.81	170	62.96
Pulses	35*	4	11.42	15	42.85	15	42.85	..	..	4	11.42
Roots and tubers	20	4	20.00	..	..	25	125	..	..	..	..
Green leafy vegetables	50	2	4	..	..	..	..	..	..	..	..
Other vegetables	30	15	30	10	33.33	..	..	..	..	..	..
Milk	250	50	20	25	10	50	20	25	10	..	..
Curd	..	15	..	..	..	..	..	..	..	..	..
Fish	..	24	..	50	..	10	..	20	..	30	..
Egg	42	..	..	..	..	..	..	..	..	..	..
Meat	12.50	..	..	..	..	..	..	..	..	..	..
Fruits	55	..	..	..	..	..	..	..	..	..	..
Coconut	20	..	..	10	..	20	..	10	..	10	..
Sugar and jaggery	40	8	20	4	10	4	10	4	10	6	15
Fats and oils	25*	5	20	5	20	5	25	4	26.66	4	16.66

* According to ICMR (1987) recommendations for non-vegetarian diets, 50% of the pulses may be substituted by 1 egg or 30 gm of meat or fish with 5 gm fat or oil or 100% of pulses may be replaced by 2 egg or 50 gms of meat or fish or 1 egg + 30 gm meat or fish with additional 10 gm fat or oil.

As depicted in the table more food groups were included in the daily diets of children belonging to small families, eventhough the quantity was less when compared to RDA. Food groups like roots and tubers, green leafy vegetables, other vegetables and fruits were not included in the diets of the children belonging to large families.

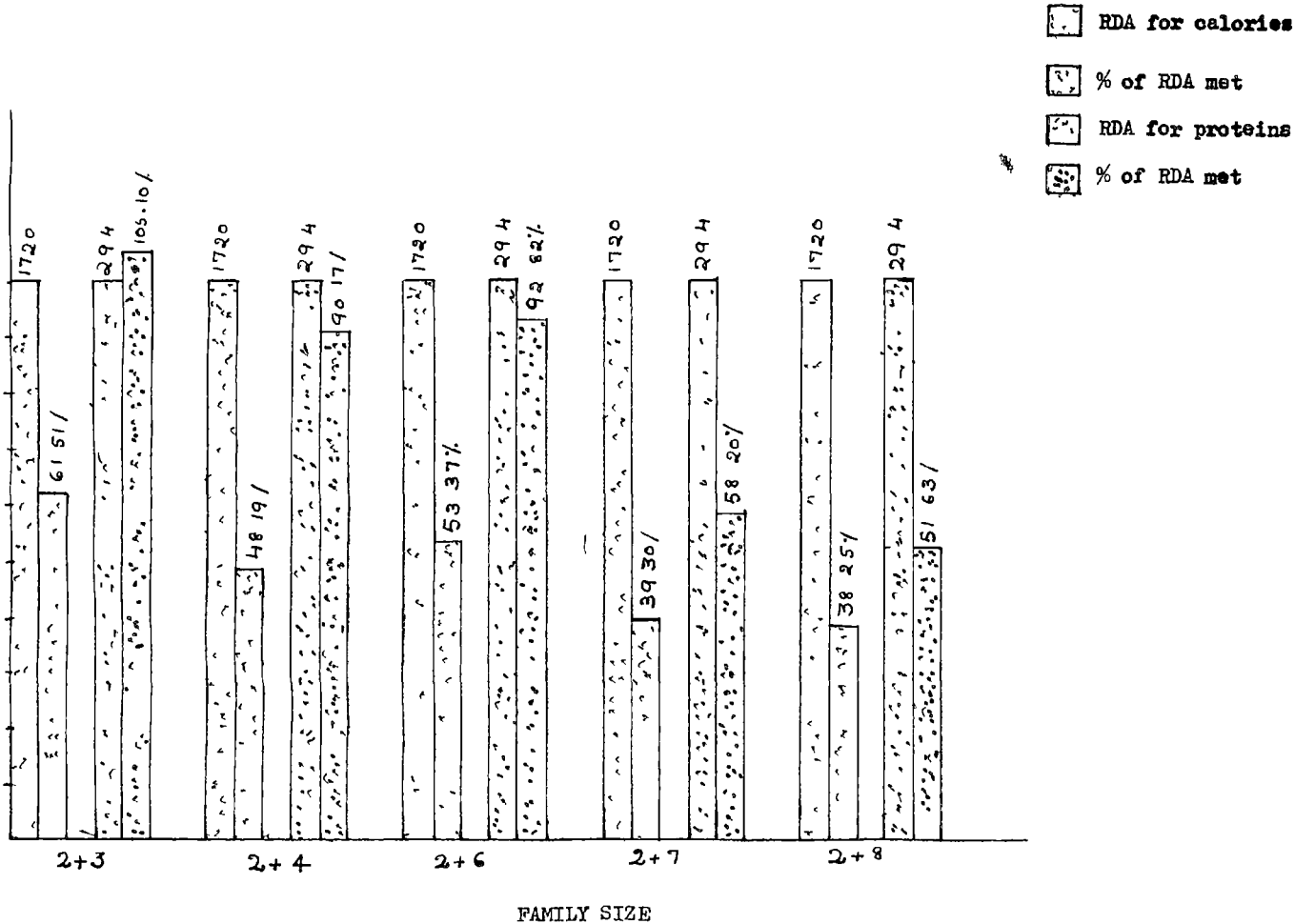
Table 45 depicted the mean nutrient intake of children of 4-5 years with respect to their family size.

Table 45 Average nutrient intake of children (4-5 years) with respect to family size.

Nutrients	RDA	Family size (Adults + children)									
		2+3		2+4		2+6		2+7		2+8	
		Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met	Qty.	Percentage of RDA met
Calories (kcal)	1720	1058	61.51	829	48.19	918	53.37	676	39.30	658	38.25
Protein(gm)	29.4	10.90	105.10	26.51	90.17	27.19	92.82	17.112	58.20	15.18	51.63
Fat	..	15.59	..	8.35	..	10.73	..	6.48	..	6.21	..
Calcium (gm)	0.405	0.185	46.45	0.09	23.15	0.172	43.16	.072	18.08	0.092	23.15
Iron (gm)	20.25	13.76	68.80	18.16	90.83	18.88	90.4	8.94	44.70	9.02	44.54
Vit.A(mg)	300	349.41	116.47	61.30	20.43	238.70	77.90	101.50	33.83	100.2	33.40
Thiamine (mg)	0.9	1.45	161.11	0.607	67.44	.871	96.70	.102	11.33	.325	36.11
Vit.C.	40	25.04	2.60	53.6	134	17.75	44.375	.10	.25	23.08	57.70

AVERAGE CALORIE AND PROTEIN INTAKE OF CHILDREN (4-5) YEARS

WITH RESPECT TO FAMILY SIZE



The protein consumption was found to be satisfactory in small families. Eventhough the pulse consumption was less in the diets of children with family size 2+3 the protein intake was high due to the inclusion of flesh foods like meat, fish and egg. In other families the main source of protein was from pulses. Vit. A and thiamine intake was also high in children of this family size (2+3). The intake of all other nutrients were found to be low when compared to the recommended daily allowances irrespective of family size.

b) Anthropometric measurements of the pre-school children and mothers

Anthropometric measurements of both pre-school children and mothers were carried out and the results are interpreted in the following tables.

Heights and weights of mothers with respect to birth spacing

Mean heights and weights of the mothers with respect to birth spacing of the children are given in Table 46.

Table 46 Mean heights and weights of the mothers with respect to birth spacing

Birth spacing (years)	Weights (kg)	Height (cm)
1	41.27	151.49
1- 2	44.59	151.50
2- 3	44.90	151.50
3- 4	46.23	151.15
4- 5	47.66	151.00
5- 6	46.33	151.33

There was no much variation in the heights of mothers but it was seen that body weight was high in mothers with increased birth spacing of children. When statistically analysed it was found from the correlation table that increase in the body weights of mothers with more birth spacing was highly significant (0.2198**).

Heights and weights of mothers with respect to number of deliveries

Mean heights and weights of mothers with respect to the number of deliveries are presented in Table 47.

Table 47 Mean heights and weights of mothers with respect to number of deliveries

Number of deliveries	Height (cm)	Weight (kg)
3	151.46	43.35
4	152.305	44.81
5	151.06	39.36
6	151.00	42.00
7	150.33	41.00
8	149.00	40.82

With regard to the number of deliveries there was not much variation in the mean heights of mothers and it was seen that mothers who had less number of deliveries had more mean body weights.

No correlation was found between the body weights of mothers and number of deliveries.

Anthropometric measurements of children (0-3 years) with respect to birth spacing

Mean anthropometric measurements of children of 0-3 years age group with respect to birth spacing was measured and is presented in Table 48.

Table 48 Mean anthropometric measurements of children (0-3 years) with respect to birth spacing

Birth spacing (in years)	Mean Anthropometric measurements				
	Height (cms)	Weight (kg)	Mid-arm circum-ference (cms)	Chest circum-ference (cms)	Head circum-ference (cms)
< 1	67.14	8.16	13.94	45.87	46.00
1 -2	67.25	10.52	14.85	48.69	47.98
2 -3	68.50	8.37	15.00	47.35	46.50
3 -4	70.00	8.59	14.14	48.50	47.65
4 -5	75.00	11.50	14.39	48.00	47.50
5 -6	76.00	11.70	14.28	48.20	47.80

As depicted in the table all anthropometric measurements were found to be less in children having a spacing of less than 1 year. Mean height and weight was found to be more (76 cms and 11.7 kgs) in children with a spacing of 4-5 years. Mid arm circumference was maximum in children with a spacing of 1-2 years (48.69 and 47.98 cms) respectively.

Anthropometric measurements of children 3-5 years) with respect to birth spacing

Mean anthropometric measurements of children of 3-5 years age group with respect to birth spacing was measured and is presented in Table 49.

Table 49 Mean anthropometric measurements of children (3-5 years) with respect to birth spacing

Birth spacing (in years)	Mean Anthropometric measurements				
	Height (cms)	Weight (kg)	Mid-arm circum-ference (cms)	Chest circum-ference (cms)	Head circum-ference (cms)
< 1	99.09	14.43	14.95	47.91	47.89
1 - 2	100.35	15.01	15.30	48.00	46.67
2 - 3	104.20	15.09	15.47	48.75	49.40
3 - 4	105.54	17.06	15.53	49.33	49.04
4 - 5	106.33	17.84	15.55	49.35	47.53
5 - 6	110.33	18.00	15.66	49.89	48.50

There was an increase in all the anthropometric measurements in children of 3-5 age group with increased birth spacing except head circumference. Head circumference was highest (49.40 cms) among children with a spacing of 2-3 years.

Anthropometric measurements of children (0-3 years) with respect to birth order

Mean anthropometric measurements of children (0-3 years) with respect to birth order is presented in Table 50.

Table 50 Mean anthropometric measurements of children (0-3 years) with respect to birth order

Birth order	Mean Anthropometric measurements				
	Height (cms)	Weight (kg)	Mid-arm circum-ference (cms)	Chest circum-ference (cms)	Head circum-ference (cms)
1	75.00	10.82	14.73	48.78	48.30
2	75.13	10.66	14.64	48.73	48.20
3	69.56	8.394	14.44	48.95	48.02
4	64.00	8.00	12.66	46.00	45.83
5	63.50	7.66	12.40	46.00	46.50
6	63.00	7.48	12.32	46.00	46.80
7	62.80	6.50	12.12	45.00	46.50
8	62.00	6.00	12.00	40.00	44.00

Anthropometric measurements were found to be higher in children upto the third birth order. Children of higher birth order were found to have lower values.

Anthropometric measurements of children (3-5 years) with respect to birth order

Mean anthropometric measurements of children (3-5 years) with respect to birth order are presented in Table 51.

Table 51 Mean anthropometric measurements of children (3-5 years) with respect to birth order

Birth order	Mean Anthropometric measurements				
	Height (cms)	Weight (kg)	Mid-arm-circum-ference (cms)	Chest circum-ference (cms)	Head circum-ference (cms)
1	102.99	14.66	15.22	50.11	49.00
2	91.93	15.56	15.26	49.80	49.44
3	101.00	16.30	15.88	50.29	49.21
4	103.40	14.61	15.13	49.65	48.54
5	99.22	13.88	14.88	46.44	46.22
6	95.60	14.80	15.08	47.70	46.80
7	98.00	12.16	15.60	49.00	48.75
8	97.00	13.50	14.50	48.50	46.00

Mean anthropometric measurements of were found to be higher in children upto third bith order. Children of higher birth order had lower values.

Weight/height^2 profile of children with respect to birth order

Wt/Ht^2 profile of children with respect to their birth order is presented in Table 52.

Table 52 Wt/Ht^2 profile of children (in per cent) with respect to birth order

Wt/Ht^2 ratio	Birth order							
	1	2	3	4	5	6	7	8
>0.0015	52	57.89	60.17	32.07	31.81	20	..	..
0.0023-0.0015	52	42.11	33.33	67.03	68.19	60	50	50
<0.0013	16	..	6.50	6.50	..	20	50	50

>0.0015 - Normal, 0.0013 - 0.0015 - Moderate malnutrition
<0.0013 - under nourished

It was found from the table that the percentage of malnourished children increased with an increase in the birth order of the children. Percentage of the normal children was found to be maximum in the third birth order.

Wt/Ht^2 profile of children with respect to birth spacing (in per cent)

Wt/Ht^2 profile of children with respect to birth spacing is presented in Table 53.

Table 53 Wt/Ht^2 profile children (in per cent) with respect to birth spacing

Wt/Ht^2 ratio	Birth spacing					
	1	1-2	2-3	3-4	4-5	5-6
>0.0015	17.47	63.74	82.35	91.67	100	100
0.0013-0.0015	69.88	32.97	17.65	8.33	..	..
< 0.0013	12.65	3.29	..	..	..	..

>.0015 - Normal, 0.0013 - 0.0015 - Moderate malnutrition

< 0.0013 under nourished

As revealed from the table the percentage of malnourished children increased as the birth spacing decreased. 69.88 per cent of the children with less than one year was found to be moderately malnourished and 12.65 per cent was undernourished. Prevalence of moderate malnutrition decreased to 8.33 when the birth spacing was 3-4 years.

Head/chest circumference ratio of children (in per cent) with respect to birth order

Head/chest circumference ratio of children with respect to birth order is presented in Table 54.

Table 54 Head/chest circumference ratio of children (in per cent) with respect to birth order

Head/chest circumference	Birth order							
	1	2	3	4	5	6	7	8
< 1	52	57.89	60	31.81	31.81	20	..	..
≥ 1	48	42.11	40	68.15	68.19	80	100	100

< 1 Normal

≥ 1 Malnourished

The percentage of malnourished children increased as the birth order of the children increased. Percentage of normal children was found to be maximum in the third birth order.

Head/chest circumference ratio (in per cent) of children with respect to birth spacing

Head/chest circumference ratio of children with respect to birth spacing is presented in Table 55.

Table 55 Head/chest circumference ratio of children (in per cent) with respect to birth spacing

Head/chest circumference ratio	Birth spacing (in years)					
	1	1-2	2-3	3-4	4-5	5-6
< 1	17.47	63.74	82.14	91.67	100	100
≥ 1	82.53	36.26	17.86	8.33	..	..

< 1 Normal ≥ 1 Malnourished

The percentage of the malnourished children increased as the birth spacing decreased 82.53 per cent of the children with less than one year spacing were found to be malnourished while only 8.33 per cent of the children with a spacing of 3-4 years was found to be malnourished.

Mid arm circumference/head circumference ratio of children (in per cent) with respect to birth order

Mid arm/head circumference ratio of children with respect to birth order is presented in Table 56.

Table 56 Mid arm/Head circumference ratio of children (in per cent) with respect to birth order

Mid arm/ Head circumference	Birth order							
	1	2	3	4	5	6	7	8
> 0.35	..	..	..	..	..	..	..	..
0.31-0.34	52	57.89	60.17	32.07	31.81	20	..	..
0.28-0.30	52	28.95	33.33	52.83	31.81	60	33.33	50
0.25-0.28	8	13.16	6.50	15.10	36.38	10	33.33	..
< 0.25	8	..	..	..	..	10	33,34	50

> 0.35 - Obese, 0.31 - 0.34, Normal, 0.28-0. 30 Mild malnutrition, 0.25 - 0.28 Moderate malnutrition 0.25 - severe malnutrition.

The percentage of malnourished children increased as the birth order of the children increased. Percentage of normal children was found to be maximum in the third birth order.

Mid arm circumference/head circumference ratio of children with respect to birth spacing .

Mid arm/Head circumference ratio of children with respect to birth spacing is presented in Table 57.

Table 57 Mid arm/Head circumference ratio of children (in per cent) with respect to birth spacing

Mid arm/ Head circumference ratio	Birth spacing (in years)					
	1	1-2	2-3	3-4	4-5	5-6
> 0.35						
0.31 - 0.34	17.47	63.74	82.35	91.67	100	100
0.28 - 0.30	53.01	32.97	17.65	8.33	..	..
0.25 - 0.28	24.09	3.29	..	..	..	..
< 0.25	5.43	...	..	..	..	..

> 0.35 - Obese, 0.31 - 0.34 - Normal, 0.28 - 0.30 Mild Malnutrition 0.25 - 0.28 Moderate malnutrition

< 0.25 - Severe malnutrition

The table that the percentage of the malnourished children increased as the birth spacing decreased 53.01 per cent of the children with less than one year spacing had mild malnutrition while the percentage decreased to 8.33 when the spacing was 3-4 years.

Nutritional status of children in relation to birth order and bulk spacing

Nutritional status of the children was assessed from the anthropometric measurements. when statistically

analysed it was found that there is a positive correlation between birth spacing and nutritional status. There was a significant increase in the nutritional status of children with an increased birth spacing. Regarding the birth order of children there existed a negative correlation between nutritional status and birth order. As the birth order of the child increased there was a significant decrease in the nutritional status. In general, it was found that nutritional status was significantly better with regard to birth spacing than birth order.

c) Clinical findings

Clinical examination was carried out in both pre-school children and in mothers to locate nutritional deficiency signs and the results are interpreted in the following tables.

Table 58 shows the prevalence of nutritional deficiency signs in children with respect to birth order.

Table 58 Nutritional deficiency signs in children with respect to birth order (in per cent)

Deficiency signs	Birth order							
	1	2	3	4	5	6	7	8
Anaemia	50	60	60	50	100	100	100	100
Phrynoderma	..	..	..	50	50	..	..	..
Gums spongy & bleeding	..	..	..	..	50	50	100	..
Teeth caries	50	20	12.5	50	..	100	100	..
Thyroid enlargement	50	..	..	50	..	50	..	..
Protruded stomach	..	..	..	..	50	..	..	..

The clinical signs of anaemia was more among children as birth order increased. Among fourth and fifth birth order children studied 50 per cent manifested phrynoderma which indicated the deficiency of essential fatty acids. Similarly, majority of the children of high birth orders also exhibited spongy bleeding gums a sign of vitamin C deficiency. Majority of children irrespective of their birth order had dental caries which indicated their improper oral hygiene. Majority of the children in the first, fourth and sixth birth order had thyroid enlargement and 50 per cent of the children of fifth birth order were having protruded stomach.

Table 59 reveals the prevalence of nutritional deficiency signs among children with respect to their birth spacing.

Table 59 Nutritional deficiency signs in children with respect to birth spacing (in per cent)

Nutritional deficiency	Birth spacing (in years)		
	1	1-2	2-3
Anaemia	88.88	41.66	..
Phrynoderma	33.33	..	..
Gums spongy and bleeding	22.22	16.66	..
Teeth caries	66.66	25.00	100
Thyroid enlargement	11.11	..	..
Protruded stomach	11.11	..	..

Clinical signs of malnutrition was found to be more among children with less than 1 year birth spacing percentage prevalence of nutritional deficiency signs were less in children. But the prevalence of dental caries was seen in almost all children irrespective of their birth spacing.

Table 60 reveals the prevalence of nutritional deficiency signs among mothers with respect to their number of deliveries.

Table 60 Nutritional deficiency signs among mothers with respect to number of deliveries (in per cent)

Nutritional deficiency signs	Number of deliveries					
	3	4	5	6	7	8
Anaemia	50	62.50	100	100	100	100
Emaciation	..	..	50	100	100	100
Corneal Xerosis	..	..	..	..	..	100
Phrynoderma	..	12.50	..	100	..	..
Gums spongy and bleeding	12.50	..	..	..	100	..
Teeth caries	37.50	..	100	100	100	..
Mottled enamel	12.50	50	50	..	..	100
Thyroid enlargement	..	50	..	..	..	100

All the mothers studied who had more than 4 deliveries exhibited signs of anaemia and Vit.A deficiency as exhibited by Corneal Xerosis. Dental caries was prevalent among almost all the mothers studied and majority had mottled enamel.

Table 61 reveals the percentage prevalence of nutritional deficiency signs among mothers with respect to their birth spacing.

Table 61 Nutritional deficiency signs among mother with respect to birth spacing (in per cent)

Nutritional deficiency signs	Spacing (in years)		
	1	1-2	2-3
Anaemia	80	75	50
Emaciation	29	..	..
Corneal Xerosis	20	..	..
Phrynoderma	40	..	..
Gums spongy and bleeding	40	12.50	..
Teeth caries	20	50.00	50
Mottled enamel	60	25	..
Thyroid enlargement	20	..	..

Almost all types of nutritional deficiency signs were exhibited by the mothers who had delivered their children with less than 1 year birth spacing. The most severe form was anaemia which was exhibited by 80 per cent of the mothers. As the birth spacing increased upto 2-3 years the prevalence of anaemia decreased to 50 per cent. Tooth caries was seen in majority of the women studied.

d) Biochemical findings

Biochemical investigation mainly haemoglobin estimation was carried out in both pre-school children and in mothers and the results are presented in the following tables:

Tables 62 shows the prevalence of anaemia among children with respect to their birth spacing.

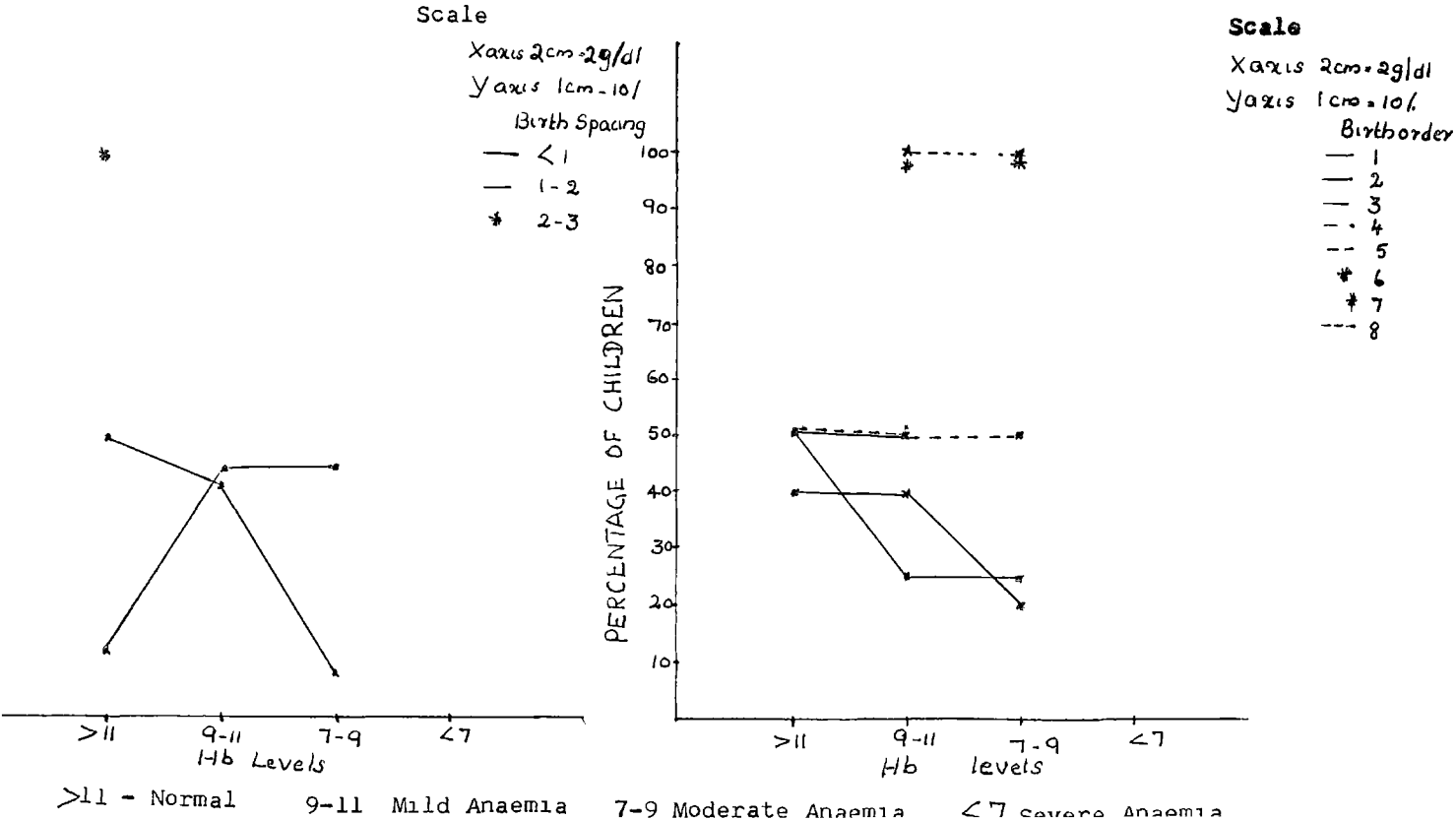
Table 62 Anaemia in children with respect to birth spacing (in per cent)

Details	Birth spacing (in years)		
	1	1-2	2-3
Hb levels			
11 g/dl	11.12	50	100
Prevalence of anaemia			
9-11 g/dl	44.44	41.66	..
7-9 g/dl	44.44	8.34	..
Severe anaemia			
7 g/dl	..	..	..

It was revealed from the table as the birth spacing increased prevalence of anaemia decreased. Only 11.12 per cent of the children with a spacing of less than one year were found to have normal haemoglobin levels ie., more than 11g/dl while 100 per cent of the children with a birth spacing of 2-3 years were found to have normal haemoglobin levels ie. more than 11g/dl. None of the children studied had severe anaemia with Hb level less than 7g/dl.

Table 63 shows the prevalence of anaemia among children, with respect to their birth order.

PREVALENCE OF ANAEMIA AMONG CHILDREN WITH RESPECT TO BIRTH SPACING AND BIRTH ORDER



>11 - Normal 9-11 Mild Anaemia 7-9 Moderate Anaemia <7 Severe Anaemia

Table 63 Anaemia in children with respect to birth order (in per cent)

Details (Unit)	Birth order							
	1	2	3	4	5	6	7	8
Hb levels								
11 g/dl	50	40	50	50	..	..	..	..
Prevalence of Anaemia								
9-11 g/dl	50	40	25	50	50	100	..	100
7-9 g/dl	..	20	25	..	50	..	100	100
Severe anaemia	..	..	..	..	..	..	..	..

Among the first birth order children 50 per cent were having normal haemoglobin levels and the remaining 50 per cent had Hb levels between 9-11 g/dl. Among second birth order children only 40 per cent belonged to the normal group and 20 per cent of the children were having Hb levels between 7-9 g/dl. Regarding the third birth order children only 50 per cent belonged to the normal range and 50 per cent were anaemia with Hb levels 7-9 g/dl. Similarly it was found that as the birth order increased no children had normal Hb levels.

Table 64 reveals the prevalence of anaemia among mothers with respect to their number of deliveries.

Table 64 Anaemia among mothers (in per cent) with respect to number of deliveries

Details	Number of deliveries					
	3	4	5	6	7	8
Hb levels 12 g/dl	50	37.50	..	..	..	..
Prevalence of Anaemia						
10-12 g/dl	37.50	12.50	50	..	..	..
8-10 g/dl	12.50	50	50	100	100	..
Severe anaemia <8 g/dl	..	..	..	..	..	..

As the number of deliveries increased prevalence of anaemia also increased. 50 per cent of the mothers who had delivered thrice had normal Hb levels (12 g/dl) where as only 37.5 per cent of the mothers who had 4 deliveries belonged to the normal group. No women who had more than 4 deliveries had the normal Hb levels. 50 per cent of the mothers who had 5 deliveries were anaemia with Hb level between 10-12 g/dl and the remaining had still lower Hb levels between 8-10 g/dl. All the mothers with 6 to 7 deliveries were anaemic with Hb level between 8-10g/dl

and 100 per cent of the mothers with more than 7 deliveries were found to be severely anaemic with Hb level less than 8g/dl. All the mothers with eight deliveries studied were having severe anaemia with Hb levels less than 8g/dl.

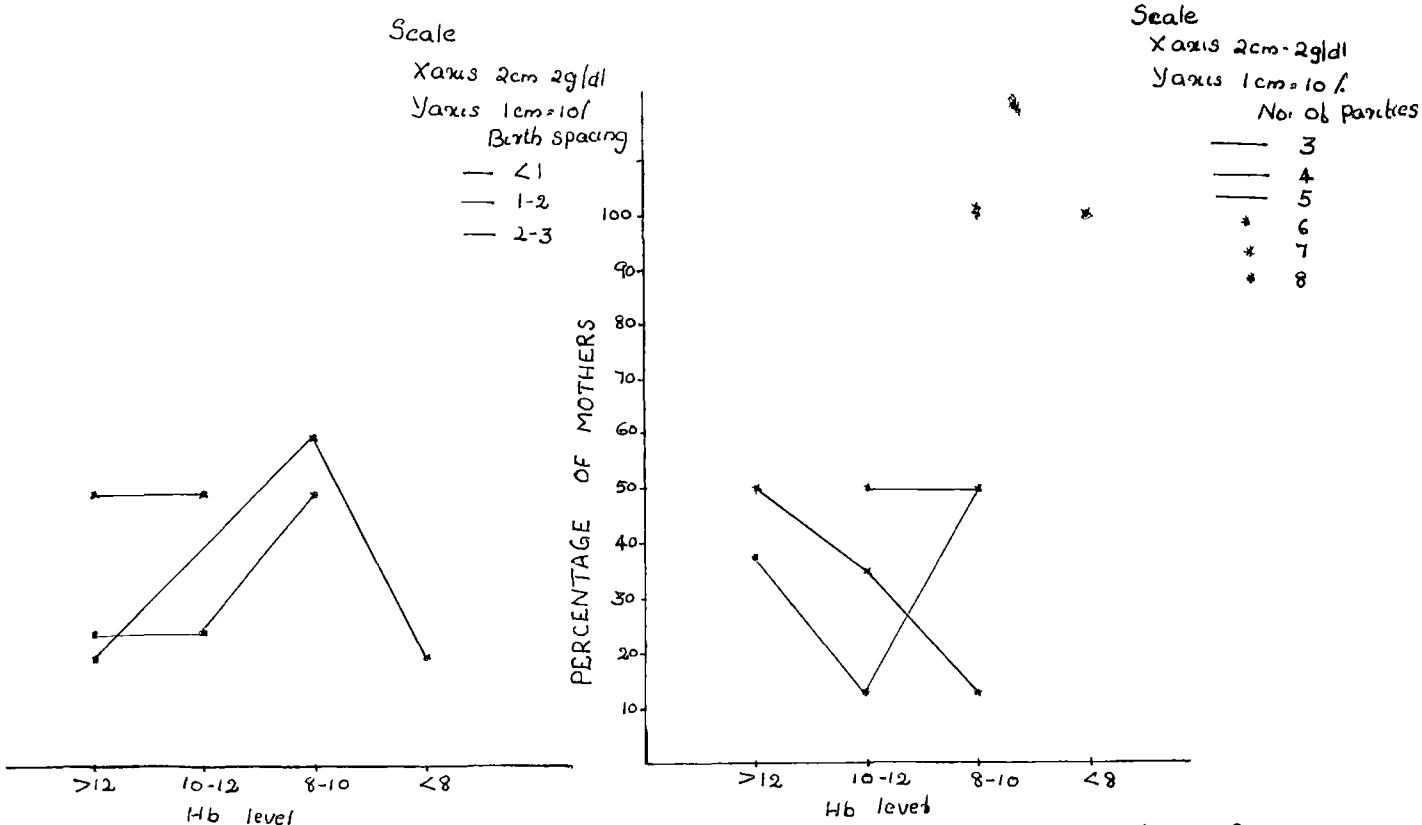
Table 65 reveals the prevalence of anaemia among mothers with respect to their birth spacing.

Table 65 Anaemia among mothers (in per cent) with respect to birth spacing

Details	Spacing (in years)		
	1	1-2	2-3
Hb levels			
12 g/dl	20	25	50
Prevalence of anaemia			
10-12 g/dl	..	25	50
8-10 g/dl	60	50	..
Severe anaemia			
<8 g/dl	20	..	..

As the birth spacing increased prevalence of anaemia decreased. Only 20 per cent of the mother with a spacing of less than one year were found to have normal haemoglobin levels ie. more than 12 g/dl. While 50 per cent of the mothers with a spacing of 2-3 years were found to

PREVALENCE OF ANAEMIA AMONG MOTHERS WITH RESPECT TO BIRTH SPACING AND NUMBER OF PARITIES



have normal Hb levels ie. more than 12 g/dl. 20 per cent of the mothers with a spacing of less than one year were found to be severely anaemic with Hb levels 8g/dl. 60 per cent of the mothers with a less than one year spacing had Hb levels between 8-10 g/dl.

DISCUSSION

DISCUSSION

The study was conducted among the agricultural labourers working in the Instructional Farm, Vellayani and also from other agricultural labourers working near the Vellayani Campus.

Socio-economic conditions of the families

Majority of the families (96.67 per cent) surveyed were of nuclear type. The membership of the 150 sample families added upto 766, the average size of majority of the families being 5 (2 adults + 3 children) of the total, 146 were males and 150 females. 60.84 per cent of the total population surveyed were in the growing stage.

Agricultural labourers consisted primarily of low caste Hindus like Scheduled Castes, Nadars, Cheramars and Christian converts. Among the sample households, 70.66 per cent were Hindus and the rest Christians.

The educational status of the parents showed that only 16 per cent of the mothers and 10 per cent of the fathers were illiterates. Of the total 466 children in all the families surveyed 14.16 per cent were not attending school since they were below the school going age.

Agriculture was their main, if not the only source of livelihood. As per the occupational distribution of the family members 35.33 per cent of the housewives and 97.33 per cent of the head of the families were engaged in agricultural labour.

All of the families surveyed were above the poverty line, this was because all of the families were engaged in agricultural labour with almost same wage rate. The wage rates of agricultural labour in Kerala are admittedly high, higher than in most other states. 58.66 per cent of the families surveyed had a monthly income ranging between 800-1000 and about 49.33 per cent of the families were in the income range of 800-1000 where having 5 members ie. 2 adults and 3 children.

Majority of the people surveyed lives in their own thatched houses built with bricks with 3 to 5 rooms and separate kitchen. Water supply was mainly from their own wells. Only 39.33 per cent of the families had their own latrines and others resorted to open fields. The houses lacked sanitary facilities and environmental hygiene were far from satisfactory. The living conditions of the small sized families were better when compared to the families

with more members. This is because in large families eventhough they had income it was utilised for feeding the family members instead of maintaining better living conditions.

Majority of the income in all the families was spent for food. Next to this come expenditure on alcohol and cigarette. 4.66 per cent of the families spent upto 20 per cent and 6.67 per cent of the families spent 20 to 40 per cent of their monthly income on these unhealthy habits. In these families, expenditure for food, education, savings etc. were found to be very low, compared with other families who were not spending any money for unhealthy habits. Similarly, as the family size increased the expenditure on education of children, clothing, health and savings decreased.

Among these labourers, it was observed that since they leave for work early in the morning, they used to spend money for buying tea, coffee, breakfast, snacks or even lunch from nearby teashops or small hotels. Compared to female labourers male labourers spent more money for this purpose, as large as 11 to 20 per cent of their total monthly income.

Details regarding mothers and children

The age of menarche of the mothers showed that about 16 per cent of the mothers came to age only after 24 years which indicated their severe early childhood malnutrition. Early marriage was very common among the farm families studied. About 70.66 per cent of the women got married before the age of 19 and majority of the women had their first child born within one year after marriage.

Regarding the spacing between children it was observed that the spacing pattern was only from 1 to 2 years and even below 1 year between subsequent children in majority of the families. The number of children in most of the families studied was found to be 3 since about 87.33 per cent of the female labourers studied had adopted family planning measures to restrict their family size. High female literacy was found to be a major factor in limiting the family size in most of the families.

Details related to infant and neonatal mortality, number of abortions and still births in this farm community showed that out of 19 infant deaths 14 were found to occur to infants whose birth spacing was below 1 year. The same trend was seen with regard to abortions, still births and neonatal deaths. Eventhough majority of the women studied

had adopted family planning measures to limit their family size, they lacked the knowledge about the importance of spacing between children which was also explained by Kabirullah (1985).

Another factor to be noted was that these mortality rates, still births and abortions were found to be high in first birth order. Since early marriage was very common majority of the women got married between the age of 18 to 19 years and had their first pregnancy within 1 year after marriage. This was found to be the reason for the high infant/neonatal mortality, still birth and abortions among the first order infant by Murthy et al. (1987) who conducted a similar study.

As suggested by Chaudhary et al. (1978) number of parities of the mother is also an important factor contributing to high infant/neonatal mortality, still births and abortions. The same result was observed in this study also. With increasing number of pregnancies, mothers health deteriorates which will further affect to health of children resulting in high infant/neonatal mortality and abortions.

Majority of the mothers irrespective of birth order went to hospitals for delivery and almost all the mothers (93.33 per cent) had normal delivery.

Irrespective of the birth order majority of the children had diseases like measles, respiratory and gastrointestinal diseases, chickenpox, jaundice, cough and fever but the incidence rate was more among children having a birth spacing less than one year and decreased with increased spacing.

Food habits and consumption pattern of the families

All the families surveyed were habitual non-vegetarians with fish being important non-vegetarian food in their daily diet. Foods like rice (68 per cent) wheat (55 per cent), tapioca (84 per cent), other vegetables (58.67 per cent) and fish (99.33 per cent) were purchased daily, since they were daily wage earners, purchase of food articles like pulses was mainly weekly basis (39.33 per cent) whereas 23.33 per cent of the families never purchased such food articles. 48.67 per cent of the families never purchased milk. Purchase of meat was occasional (57.33 per cent) whereas egg was not at all purchased (73.34 per cent) cooking oil and sugar were purchased on a monthly basis.

The food expenditure pattern depicted that majority of these families spent 30 to 40 per cent of total food expenditure on rice which was the staple food. Expenditure

on rice was followed by the expenditure on fish (7 to 13 per cent of total food expenditure). Tapioca (1 to 13 per cent) and coconnut (1 to 19 per cent). For most of the families (98.67 per cent) expenditure on greenleafy vegetables and eggs were negligible.

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

A three meal pattern was observed consisting of a breakfast, lunch and supper. Breakfast was mainly cereal based supplemented with fruits (45.33 per cent) or with coconut (26 per cent). Rice, tapioca and fish formed the important items for lunch and supper.

Methods used for cooking were more or less same for all the families. Boiling method was widely used, since it is the least inexpensive method. The culinary practices followed by women indicated that they were

unaware of the nutrient loss from foods due to faulty cooking methods. No storage methods were used for storing food articles since they purchased food articles daily.

As all the families were non-vegetarians they preferred non-vegetarian meals during special occasions like marriages, festivals etc. During infancy, most of the mothers breast fed their infants upto 7 months and then supplemented with ragi porridge (75.33 per cent) or banana (20.67 per cent). No special foods were given to pre-school children.

Bhat and Dahiya (1985) had indicated that majority of the Indian children received only ordinary home diets and these diets were deficient in many nutrients like Vitamin A, C and Iron. Similarly no special foods were given to adolescents, pregnant women and nursing mothers. In almost all the families (92 per cent) preference was given to the head of the family in serving the food, since he was the main earning member.

Dietary habits in pregnancy and lactation indicated that most of the women (69.33 per cent) did not change their dietary habits. Few women (30.67 per cent) excluded roots and fish from their daily diet due to taboos and cultural beliefs.

Breast feeding pattern followed by women indicated that majority of the mothers breast fed their infants and the percentage of mothers breast feeding their babies was found to be declining from the fourth child onwards. The main reason for this was the health problems generally faced by the mothers due to repeated pregnancies. In rural areas, the duration of breast feeding is mainly dependant on subsequent pregnancy of the mother. Majority of the children upto the third birth order received breast milk for a period of 1-2 years. This was because most of the families had 3 children with a spacing ranging from 1-2 years but the duration of breast feeding was found to be more among third birth order children when compared to the first and second birth order children because majority of the families had 3 children, so the third child was breast fed for a prolonged period. It was revealed that as the birth spacing increased period of breast feeding was also increased.

Supplementary foods were introduced at a very early age of 0 to 3 months. In general cow's or goat's milk and cereal products like hime made ragi or rice porriage or banana poiridge formed the staple meal fed regularly to the children. Availability in the house as well as adherence to tradition and customs were found

to determine the choice of these foods as supplements. There was no regular schedule for giving supplementary foods. Most of them (76 per cent) fed the child when he or she cried.

All the mothers were of the view that breast milk was the ideal food for the infants. Pregnancy of the mother was found to be the main reason for stopping breast feeding. Epidemis such as measles, jaundice, chicken pox, diarrhoea and dysentry were frequent among the rural children irrespective of their birth orders. This might be due to the unhygenic environment in and around the house, lack of proper water supply and also improper care of children due to increased family size. But the occurrence of epidemics was found to be less in children with increased birth spacing. When the birth spacing increased, the child gots ample time for breast feeding for a period of 1 to 2 years and due to the immunological properties of the breast milk the child was less susceptible to infectious diseases.

Most of the pre-school children were found to be attending the anganwadi centre and were participating in the Supplementary Nutrition Programme.

Actual food and nutrient intake of mothers and pre-school children

The actual food intake of mothers found out by food weighment method revealed that only in families with three children, all types of food groups were included in the daily diet of mothers and in large families mainly cereals constituted a major part of the diet. Similarly mothers in small families were observed to have better intake of calories even then it was less than the recommended allowance (79.92 per cent of RDA). But as the family size increased upto 10 members, the calorie intake of mothers decreased 54.59 per cent of RDA. The same trend was seen with other nutrients also. But irrespective of the family size, the dietaries of all the mothers were deficient in calcium, iron and Vitamin A.

The same pattern was observed with the food and nutrient intake of pre-school children with family size. In small families, the daily diet of the children included all types of food groups, eventhough the quantity was less, when compared to the recommended allowances. Their nutrient intake was also found to be better when compared to large families. But in general the calorie intake of all the pre-school children were not satisfactory.

These data clearly showed that contrary to earlier belief, the primary bottleneck in the current dietaries of our pre-school children is their calorie content and not the protein content. The findings of this study also indicated that limitations of the family size to a smaller number of children especially among poor socio-economic groups will increase the quantum of disposable income and volume of food available to each member of the family.

Anthropometric measurements of mothers and pre-school children

The mean heights of mothers with respect to birth spacing showed no much variation but an increase in the mean body weights with more birth spacing was observed and this increase in body weight of mothers with respect to more spacing was found to be highly significant. Similarly mothers with more number of deliveries had less body weight but this difference was not statistically significant because in the present study most of the mothers had only three children.

Wt/ht^2 profile of pre-school children with respect to birth order indicated that normal children was more

among the third birth order (60.17 per cent) when compared to first birth order (52 per cent) and second birth order (57.89 percent). The percentage of normal children decreased from fourth birth order onwards. Similarly all children with a spacing of 4-6 years were normal. Prevalence of moderate malnutrition (69.88 per cent) and under nutrition (12.65 per cent) was more in children with less than one year spacing.

Head/chest circumference ratio also indicated that 60 per cent of the third birth order children were normal whereas only 52 per cent of the first birth order children came under normal. The percentage of malnourished children increased after the third birth order. All children with 4 to 6 year spacing were found to be normal whereas malnourished children was more (82.53 per cent) among children with less than one year spacing.

Mid arm circumference/head circumference ratio of pre-school children with birth order indicated maximum normal children (60.17 per cent) among third birth order children. Severely malnourished children were observed among sixth (10 per cent) seventh (33.34 per cent) and eighth (50 per cent) birth order children. All children with a spacing of 4 to 6 years were found to be normal. Severe

malnutrition was observed among children (5.43 per cent) with less than one year spacing, statistical analysis indicated a high positive correlation between birth spacing and nutritional status of children and a negative correlation between nutritional status and birth order of children.

Clinical examination to locate nutritional deficiency symptoms in pre-school children indicated that deficiency symptoms like anaemia, phrynoderma, bleeding gums, protruded stomach etc. were manifested more in high birth order children. 88.88 per cent of children with less than one year spacing manifested symptoms of anaemia. But irrespective of birth order and birth spacing majority of the children having dental caries, indicating their improper oral hygiene. Nutritional deficiency signs among mothers revealed that majority of the mothers exhibited anaemic symptoms. Almost all the mothers who had more than 4 deliveries were emaciated due to their poor nutritional status. Mottled enamel and dental caries was also very common among mothers. With regard to birth spacing of mothers and deficiency symptoms exhibited, it was observed that 80 per cent of the mothers who were anaemic had a birth spacing of less than one year. Nutritional deficiency signs in mothers were found to be decreasing as their birth

spacing increased, indicating the better nutritional status of mothers with increased birth spacing. Bhargava (1983) had also reported that less frequent pregnancies lead to better health of the mother and the children and with more frequent pregnancies, the mother does not have time to recover from the strain caused by pregnancy, child birth and lactation.

Haemoglobin levels also depicted that mild to moderate anaemia was more among children of high birth orders and also in children with less birth spacing. No children had severe anaemia with a Hb level less than 7g/dl. Among mothers the percentage prevalence of anaemia was more who had more than three deliveries. 20 per cent of the mothers had severe anaemia who had a birth interval of less than one year.

The high nutritional status of third birth order children as observed in this study can be attributed to the improper spacing between previous pregnancies and most of the mothers by adopting family planning measures had limited their number of children to three. So the third child got ample time for breast feeding and proper care and attention of the mother. Spacing between previous children ranged from 1 to 2 years, which resulted in early weaning and lack of sufficient maternal care. This may be

the reason for the high rate of malnutrition among the first and second birth order children. As the birth order increased nutritional status was found to be decreasing due to the relationship between family size and nutritional status especially among the low socio-economic groups.

A definite inverse relationship was observed between the birth interval of children and the prevalence of moderate or severe malnutrition and infant mortality. When malnutrition among the under fives is rampant, and mortality high as in India, it is important to focus attention on the reduction of the mortality rate and the improvement of the nutritional status of the young children as well as mothers. For that purpose emphasis should be placed on the spacing of births in addition to that on the number of children a women should have. Therefore in programmes aimed at improving the nutritional status of the pre-schoolers and mothers priority should be given to increased birth spacing.

SUMMARY

SUMMARY

The present study to assess the effect of birth order and spacing on the nutritional status of the mother and child was conducted among the agricultural labourers working in the Instructional Farm of the Agricultural College and among those residing near the College Campus. Since such data is not available at present, information regarding the socio-economic bagkground and dietary habits of the families with special reference to the nutritional status of mother and child were collected through weighment, anthropometric, clinical and biochemical studies.

The results of the study showed that majority of the families surveyed were of nuclear type belonging to the under privileged section of the community. The main occupation was agriculture. In most families the only earning member was the head of the family.

In majority of the families, parents (both father and mother) were moderately educated and local facilities available for educating the children were well utilised by all the families.

Among the farm labourers, the monthly expenditure pattern indicated that the major expenditure was for food. Male members were in the habit of spending a significant amount of their income for taking meals. In some families (6.67 per cent) major part of their income was spent on alcohol, cigarettes, betel nuts etc. In these families expenditure for food and education of children were found to be less as well as for savings.

Early marriage was common among these families and most of them (80.67 per cent) had their first child born within one year. In most families spacing between subsequent children was found to be 1-2 years or less than one year. Infant mortality, neonatal mortality aborted children and still birth were more in the families where children were born with less spacing. These problems were found to be high among the first birth order children and in mothers with increased number of parities. There was a significant decrease in the number of deliveries as the educational level of the mothers increased, probably due to the adoption of family planning measures.

Irrespective of the birth order, majority of the children had infectious diseases like measles, respiratory disease, gastrointestinal diseases, chicken pox,

jaundice, cough and fever but the frequency of occurrence of such diseases was more among closely spaced children.

All the family members were non-vegetarians and majority of them preferred non-vegetarian meals even during special occasions. Since the agricultural labourers were on daily wage, they had a daily purchasing pattern. Rice, roots and tubers (mainly tapioca) and fish were the food articles daily purchased. Rice, tapioca, fish and coconut were found to be the major ingredients in the daily meal pattern of this community. No food items were preserved and stored.

During physiological conditions such as infancy, pre-school age, adolescence, pregnancy and lactation no special foods were prepared and given to that vulnerable member of the family. Child feeding practices showed that most of the mothers breast fed their babies for a period of 1-2 years since their subsequent pregnancy was within 1-2 years prolonged breast feeding was seen with increased birth spacing.

In general cow's milk, and cereal products like ragi or rice porridge or biscuits formed the main weaning food given to the children between 0-3 months of age.

Subsequent pregnancy of the mother was found to be the main reason for early weaning. They did not spend money for purchasing commercial baby foods.

Results of the food weighment survey indicated that the diets of both mothers and children were inadequate and unbalanced. The intake of many protective foods were too low in large families. In small families, all the food groups were included but in inadequate quantities. The average intake of calories was far short of the requirement in the diets of mothers and pre-school children.

The anthropometric measurements of pre-school children with more birth spacing was found to be better when compared to closely spaced children. Statistical analysis showed a highly significant correlation between the nutritional status of children and birth spacing and with increased birth order of children there was a decrease in the anthropometric measurements. Similarly more body weight was observed in mothers with more spaced deliveries and this was also found to be statistically significant.

Anaemia as assessed by haemoglobin estimation and other nutritional deficiency symptoms like chrysoderma,

protruded stomach, gums spongy and bleeding, teeth caries, thyroid enlargement etc. was found to be more among closely spaced children as well as among children of high birth orders. Similarly, severely anaemic women with other deficiency symptoms were found to be the mothers who had closely spaced repeated pregnancies and who had more than three children.

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* Original not seen

APPENDICES

APPENDIX-I

KERALA AGRICULTURAL UNIVERSITY

DEPARTMENT OF HOME SCIENCE

INTERVIEW SCHEDULE TO ELICIT INFORMATION REGARDING THE SOCIO-ECONOMIC CONDITIONS OF THE FAMILIES

Name of the head of the family :

Address :

Place of survey

Block

Village/Town/City

Community

Distance to the nearby city.....kms.

Relationship with the head of the family	Sex M/F	Age Yrs	Age Months	Marital status	Educational level: Illiterate	L.P.S.	U.P.S	High School	College	Source of income: Occupation: Major	Subsize	Other sources: Agriculture	Cattle wealth	Poultry	House Rent	Total income Rs/month	Physical status: Light work	Moderate	Heavy	Physiological status: Healthy	Unhealthy

Details of housing conditions

1 a) Type of house : One room/2 room/3-5/ 6-8/8 and more

b) Type of roof : Thatched/Tiled/Concrete

c) Structure of the house : Mud-built/brick built/ Thatched

2 Details of ownership

a) Staying in own house : Yes
No

b) Staying in rented house : Yes
No

c) If a portion is let out, rent received : Rs...../month

3. Other characteristics

a) Separate kitchen : Yes
No

b) Usage of different rooms in the house

1. Drawing room
2. Study room
3. Bed room
4. Store room

c) Source of drinking water:

Own well or own tap	Public well or Public tap	Tank/ river	Nearby House

d) Source of water for other activities

Own well or own tap	Public well or public tap	Tank/ river	Nearby House

e) Lavatory facilities : Yes
No

If yes· Own latrine/Public latrine/Open field

f) Drainage facilities : Yes
No

If yes, specify

g) Facilities for disposal of water : Yes
No

h) Electricity facilities: Yes
No

i) Recreational facilities: Owns a Radio, T.V., Transister

j) Transport facilities : Bicycle, Motor-bike, Bus

Monthly expenditure pattern

No	Items	Expenditure	Spenting money	
		Monthly	Cash	Kind
1	Food			
2	Clothing			
3	Shelter			
4	Transport			
5	Rent			
6	Education			
7	Entertainment			
8	Health			
9	Savings			
10	Own expenses			
11	Others			

Details of the expenditure pattern of the family members who work outside

Individuals	Details of food that is eaten outside				Expenditure/day
	Breakfast	Lunch	Tiffin	Dinner	

Details about the house wife

1. Age at menarche
2. Age at marriage
3. How long have you been married
4. Number of children

    1.

    2.

    3.

    4.

5. How many times you became pregnant

    1.

    2.

    3.

6. Do you have menstrual periods regularly : Yes/No

   If no, did you take any remedy

7. Give reasons for the stoppage of menstrual cycle

Which year after marriage	Age of the child	Class of study	Ailments during pregnancy	Place of delivery				Type of delivery		Care after delivery		Care during lactation	
				Hospital	At home with the help of mid-wife	At home with the help of elderly women	With the help of unskilled persons	Normal	Ceasarian	Yes If yes, how long	No	Yes How long	If yes No

1. Did any baby die

   Yes
   No

   If yes, which baby

   First
   Second
   Third
   Fourth
   Fifth

   Reason

   1. Diseases
   2. Abortion — How many time / Which month
   3. Accident
   4. Just after delivery
   5. Still birth

2. After the death of the baby when did you have the next baby
3. Spacing between the death child and the previous child
4. Spacing between first and second child

   One year
   Two year
   Three year

5. Spacing between second and third child

   One year
   Two year
   Three year

6. Spacing between third and fourth child

One year
Two year
Three year

7. Rest periods after each delivery

Children	Months			
	I	II	III	IV
1st child				
2nd child				

8. Have you got any illness after each delivery

Yes
No

If yes,

Anaemia
Fatigue
Diarrhoea
Others

9. Does your child get any illness after birth

Yes
No

If yes, which child (specify the illness)

1.
2.
3.

10. During illness do you visit any of the following health centres

Yes
No

If yes,

1. Hospitals
2. Dispensary
3. Maternal and child Health Centre
4. Others

11. Do you visit any of the following Health Centres when your child is sick

Yes
No

If yes,

1. Hospital
2. Dispensary
3. Maternal and child Health Centre
4. Others

12. Do you used to go for work during pregnancy

Yes
No

If yes, upto which month do you work

6th month
7th month
8th month
9th upto delivery

13. Who will look after the baby at home

1. Mother
2. Sister
3. Elder children
4. Others

Details about family planning

1. From where did you get information about this

1. Books
2. Friends
3. Radio
4. Health Workers
5. T.V
6. Health programmes

2. What is your opinion about family planning

3. Have you adopted family planning measures

Yes
No

If yes, husband/you

If no, why didn't you adopt

APPENDIX-II

COLLEGE OF AGRICULTURE

DEPARTMENT OF HOME SCIENCE
VELLAYANI

Interview schedule to elicit information on food consumption and dietary pattern of the families

1. Serial No :
2. Name of the house wife:
3. Place of residence :
4. Age :
5. Type of family :

a) Nuclear b) Joint

Small (1-4 members)

Large (5-10 members)

Very large (10 and more)

6. Religion

Hindu

Muslim

Christian

Others

7. Food habit of house wife

Vegetarian

Non-vegetarian

8. Expenditure of food

Items	Frequency of purchase				Price	Percentage of food expenditure
	Daily	Weekly	Monthly	Occasionally		
Cereals						
Pulses						
Leafy vegetables						
Roots and tubers						
Other vegetables						
Fruits						
Milk and milk products						
Fleshy foods						
Nuts and oil seeds						
Spices and condiments						
Others						

9. Frequency of use of different food materials

Foods	Frequency of use of food stuffs					Occasionally	Never
	Daily	WEEKLY					
		Once	Twice	Thrice	4 times		
1. Cereals							
2. Pulses and legumes							
3. Roots and tubers							
4. Other vegetables							
5. Green leafy vegetables							
6. Fruits							
7. Milk and milk products							
8. Meat							
9. Fish							
10. Egg							
11. Fat and oil							
12. Sugar and jaggery							
13. Bakery items							

10. Daily meal pattern of the family

Items	Preparations	Time	Quantity
1. Cereals			
2. Pulses			
3. Roots and tubers			
4. Leafy vegetables			
5. Other vegetables			
6. Fruits			
7. Milk and milk products			
8. Meat			
9. Fish			
10. Egg			
11. Fats and oils			
12. Sugar and jaggery			
13. Bakery items			

Do you produce any food items in your home

Yes

No

If yes, give the following details of use of food items

Items	Quantity produced	Quantity used in home	Quantity sold	Profit obtained
1. Cereals				
2. Pulses				
3. Green leafy vegetables				
4. Fruits				
5. Milk and milk products				
6. Meat				
7. Fish				
8. Egg				
9. Nuts and oil seeds				
10. Sugar and Jaggery				
11. Bakery items				

11. Method of preparation for cooking

Stage	Vegetables	Roots and tubers	Leafy vegetables	Fish	Meat	Reasons
1. Washing before cutting						
2. After cutting						
3. Cutting size						
Large						
Small						
4. Straining excess water						

12. Methods employed for cooking

Foods	Boiling		Frying	Steaming	Baking	Reasons
	Absorption	Straining				
1. Cereals						
2. Pulses and legumes						
3. Roots and tubers						
4. Other vegetables						
5. Fruits						
6. Flesh foods						
7. Egg						
8. Milk and milk products						
9. Others						

13. Different methods of preservation of foods

Items	Different methods	Reasons
1. Cereals		
2. Pulses		
3. Leafy vegetables		
4. Other vegetables		
5. Milk		
6. Meat		
7. Egg		
8. Fish		
9. Others		

14. Foods given during special condition

Condition	Breakfast	Lunch	Dinner
Infancy			
Pre-school period			
School going children			
Adolescent			
Pregnancy			
Lactation			

15. Preparations in special occasions

Occasion	Foods prepared	Importance
Birth day		
Marriage		
Death		
Festivals		
Feasts		
Others		

16. In feeding whom do you consider the most important person in the family

Preference	Individual	Reason
1.		
2.		
3.		

17. Do you change your dietary habits during pregnancy and lactation : Yes
No

If yes, which of them

Items	During pregnancy			During Lactation		
	Foods included	Foods avoided	Reason	Foods included	Foods avoided	Reason
1. Cereals						
2. Pulses						
3. Green leafy vegetables						
4. Roots and tubers						
5. Other vegetables						
6. Milk and milk products						
7. Fish						
8. Nuts and oil seeds						
9. Sugar and Jaggery						
10. Fats and oils						
11. Others						

18. Do you breast feed your baby

Yes

No

19. Period of giving breast milk and other supplementary foods

Children	Period of giving breast milk	Time at which supplementary foods started	Reasons for discontinuing breast milk				Other reasons	Reasons for delay of giving weaning foods
			Disease	Occupation	Traditional habits	Next child		

20. Do you take your child to work place

Yes

No

21. If yes, do you breast feed your baby at the working place

Yes

No

If yes, How many times?

22. If no, will any other family members feed your baby

Yes
No

If yes,

Mother
Sister
Elder children

23. Before going for work do you cook food for your baby

Yes
No

If no,

Mother
Sister
Elder children

24. Are you satisfied with your baby's health

Yes
No

25. When do you start breast feeding the new born baby

Children	1st day			2nd day			3rd day			Reasons
	12 hour after birth	18 hour after birth	Other time	12 hour after birth	18 hour after birth	Other time	12 hour after birth	18 hour after birth	Other time	

26. During the period of breast feeding did your child get any disease

Yes

No

27. Details of epidemics that had affected your child before the age of five years.

Children	Small pox	Cholera	Jaundice	Chicken pox	Measles
1.					
2.					
3.					

28. Do you change the dietary pattern of your child during this condition

Yes

No

If yes,

Children	Diseases						Food items included	Reasons	Food items avoided	Reasons
	Cholera	Diarrhoea	Chicken pox	Jaundice	Measles	Dysentry				
1.										
2.										
3.										
4.										

29. Do you use medicines to cure these conditions

Yes

No

30. Do you give foods other than breast milk

Yes

No

If yes specify:

1. Ragi
2. Rice
3. Milk powders
4. Arrow root
5. Banana

31. What is your opinion about breast feeding

1. Good
2. Good only to unemployed mothers
3. Not good

32. What is the time interval of giving foods to a child

1. When the child cries
2. When the mother feels that the baby is hungry
3. After every 2 hours
4. After every 4 hours

33. When did you start giving other foods along with breast milk

Foods	Age of giving supplementary foods	Amounts given at one serving	How many times	Reasons
1.				
2.				
3.				

34. Do all the family members go out for work

Yes
No

35. 1. Do any supplementary feeding programme present in your locality

Yes
No
Not known

2. Do you participate in that

Yes
No

3. If yes, from where did you get information about this

4. Do you get any benefits from this programme

Yes
No

5. If yes, what are the benefits you get from this programme

    1. Food
    2. Medicine
    3. Immunization
    4. Education

6. Does your child participate in this

    Yes

    No

7. If yes, what are the benefits they get

    1. Food

    2. Medicine

    3. Immunization

    4. Education

8. Are you satisfied with these programmes

    Yes

    No

9. What is your opinion about this programme

APPENDIX-III.A

FAMILY AND INDIVIDUAL FOOD CONSUMPTION SURVEY WEIGHMENT METHOD

Name of the investigator :
Name of the head of the family:
Name of the subject :
Age of the subject :

Serial No :
Address :
Date :

FOOD CONSUMPTION

Name of the meal	Menu	Weight of total raw ingredients used by the family (g)	Weight of total cooked food consumed by the family (g)	Amount of cooked food consumed by the family (g)	Raw equivalents used by the individuals (g)
1	2	3	4	5	6
Breakfast					
Lunch					
Tea					
Dinner					
Others					

APPENDIX-III.B

FAMILY DIET SURVEY - ONE DAY WEIGHMENT

Family No	:	Name of the Head of the family	:	Date	:
Village	:	District	:	State	:

Age and sex composition of those who have parttaker the meal

Age	Adult	12-21	9-12	7-9	5-7	3-5	1-3	Below 1	Guest (ages)
M									
F									

Cereals

1. Rice
2. Wheatflour
3. Ragi
4. Maida
5. Ravai
6. Others

Pulses

7. Bengal gram
8. Black gram
9. Red gram
10. Soyabean
11. Green gram
12. Others
13. Leafy vegetables
14. Other vegetables

Roots and tubers

15. Carrot
16. Onion big
17. Beet root
18. Tapioca
19. Potato
20. Sweet potato
21. Yam
22. Others

Nuts and oil seeds

23. Cashewnut
24. Coconut,dry
25. Coconut fresh
26. Ground nut
27. Others
28. Spices and condiments

Fruits

29. Amla
30. Apple
31. Banana,ripe
32. Lime and orange
33. Mango,ripe
34. Melon water
35. Papaya,ripe
36. Tomato,ripe
37. Others

Fish

38. Fish,fresh
39. Fish,dry

Other flesh foods

40. Meat
41. Chicken
42. Liver,goat
43. Egg, hen

Milk and milk products

44. Milk
    Curds
    Butter milk
45. Skimmed milk, liquid
46. Cheese

Fats and oils

47. Butter
48. Ghee
49. Hydrogenated oil
50. Cooking oil

Other food stuff

51. Biscuit, sweet
52. Biscuit, salt
53. Bread, white
54. Sugar
55. Jaggery
56. Pappad
57. Sago
58. Toddy
59. Farex
60. Amul

APPENDIX-IV

KERALA AGRICULTURAL UNIVERSITY

DEPARTMENT OF HOME SCIENCE
VELLAYANI, TRIVANDRUM

Nutritional assessment schedule

State : District : Taluk : Village:

Serial No: Family : Block :

Name of the child : Sex :

Name of the guardian/parent :

Occupation of parent :

Annual income :

Date of birth of child : Years Months

Source - Parent/Record :

ANTHROPOMETRY

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

Clinical Examination:

Hair sparse	01	Tongue papillae atrophie	20
Discoloured	02	Papillae hypertrophic	21
Easily plucked	03	Pellagra	22
Moon face	04	Crazy pavement dermatosis	23
Parotid enlargement	05	Pigmentation at knuckles/ fingers/toes	24
Oedema	06	Phrynoderma	25
Emaciation	07	Koilonyehia	26
Marasmus	08	Gums-spongy bleeding	27
Conjunctival xerosis	09	Craneotapes	28
Bitot's spot	10	Ephiphyseal Enlargement	29
Corneal xerosis/Kerotomalacia	11	Beading of ribs	30
Corneal opacity	12	Knockknee/howlegs	31
Night blindness	13	Fronto-parietal boosing	32
Photophobia	14	Teeth caries	
Anaemia	15	Teeth Mottled enamel	33
Nasolabial dyssebacia	16	Enlargement of spleen	34
Angular stomatitis	17	Enlargement of liver	35
Cheilosis	18	soft-	
Red & raw	19	firm-	
		hard	
		Thyroid enlargement	37
		Others	38

APPENDIX V

Haemoglobin cyanmethaemoglobin method

Principle

Haemoglobin is converted into cyanmethaemoglobin by the addition of potassium cyanide and ferricyanide. The colour of cyanmethoaemoglobin is read in a photo-electric calorimeter at 540 against a standard solution since cyanide has the maximum affinity for haemoglobin, this method estimates the total haemoglobin.

Reagent

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

Procedure

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

Construction of standard curve

If the blood drawn from subject contain haemoglobin 15g/d/after estimation then prepared them reference standards as follows:

1. Reference standard A

   4 ml blood in 1000 ml Drabkin's reagent contain haemoglobin 15g/dl.

2. Reference standard B

   300 ml of reference standard A + 200 ml of Drabkin's reagent contain haemoglobin concentration of 10g/dl.

3. Reference standard C

   200 ml of reference standard A and 300 ml of Drabkin's reagent contain a haemoglobin concentration of 7.5g/dl.

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

EFFECT OF BIRTH ORDER AND SPACING ON THE NUTRITIONAL STATUS OF MOTHER AND CHILD

By

SUJA P. THOMAS

ABSTRACT OF A THESIS
submitted in partial fulfilment of the requirement
for the Degree
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ABSTRACT

A study on the effect of birth order and spacing on the nutritional status of mother and child was conducted among the agricultural labourers working in the Instructional farm, Vellayani and also among other agricultural labourers working near the Vellayani Campus.

Living conditions of the families with less members were far better when compared to large families. As the family size increased the expenditure on various items decreased.

There was an inverse relationship between education of the mother and number of deliveries. With increased educational status of parents the rate of adoption of family planning measures was also found to be increased.

Regarding the mortality rates of children with respect to birth order and birth spacing the results showed that infant and neonatal mortality, still births and abortions were more in children with a birth interval below one year and these were more in first birth order children. Incidence of infectious diseases like measles, respiratory disease, diarrhoea, dysentry, cough

chicken pox, jaundice etc. were found to be more among closely spaced children.

Rice, fish, tapioca and coconut were the main items in their daily diet and they purchased these food articles daily since they were daily wage earners. No special foods were given to physiologically vulnerable groups.

Majority of the mothers breast fed for a period of 1 to 2 years and early weaning was observed due to subsequent pregnancy. Prolonged breast feeding was observed in children with more birth spacing.

All types of food groups were included in the daily diets of mothers and children of small families but only in insufficient quantities. Nutrient consumption was also higher in the members of small families when compared to large sized families.

There was a positive correlation between birth spacing and nutritional status of children, and a negative correlation between nutritional status and birth order. In the case of mothers, as the birth spacing increased body weight was also found to increase significantly.

The body weight was found to be decreasing in mothers with more number of deliveries. Deficiency symptoms were found to be more in mothers with closely spaced children and with more number of deliveries. Similarly the manifestation of deficiency symptoms were more among closely spaced children and also among high birth order children.

Prevalence of anaemia in mothers and children was also high when birth interval decreased and also when the number of deliveries of the mothers and birth order of the children increased.