

**THE IMPORTANCE OF ORAL REHYDRATION THERAPY
IN THE CONTROL OF DIARRHOEA
IN THE COASTAL AREAS OF TRIVANDRUM DISTRICT**

BY
GINCY GEORGE



THESIS
SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT
FOR THE DEGREE OF
MASTER OF SCIENCE
IN FOOD SCIENCE AND NUTRITION
FACULTY OF AGRICULTURE
KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF RURAL HOME SCIENCE
VELLAYANI, TRIVANDRUM

1987



DECLARATION

I hereby declare that this thesis, entitled "The importance of oral rehydration therapy in the control of diarrhoea in the coastal areas of Trivandrum district" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title of any other University or Society.

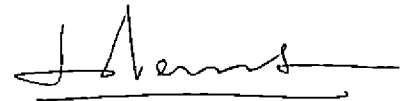
Gincy George

GINCY GEORGE

Vellayani,
12-8-87

CERTIFICATE

Certified that this thesis entitled "The importance of oral rehydration therapy in the control of diarrhoea in the coastal areas of Trivandrum district" is a record of research work done independently by Smt. Gincy George under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.



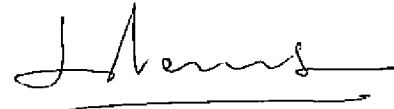
Dr. L. Prema,
Chairman,
Advisory Committee,
Professor and Head,
College of Rural
Home Science.

Vellayani,
12-8-'87

APPROVED BY

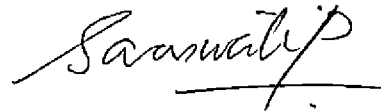
CHAIRMAN

Dr. L. Prema


9.10.87

MEMBERS

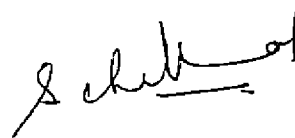
1. Dr. P. Saraswathy



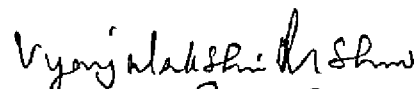
2. Smt. Mary Ukkuru, P.



3. Smt. S. Chellammal



External Examiner


9.10.87

ACKNOWLEDGEMENT

It is my pleasant duty to express my deep sense of gratitude to the Chairman of my Advisory Committee Dr. (Mrs.) L. Prema, Professor and Head, College of Rural Home Science for providing me with proper guidance, excellent suggestions and sincere help during the course of present investigation and preparation of thesis.

I express my heartfelt thanks to Smt. Mary Ukkuru, Assistant Professor, College of Rural Home Science for her expert supervision, timely advice and unfailing inspiration throughout the period this thesis work.

I extend my sincere gratitude to Dr. P. Saraswathy, Associate Professor, Department of Agricultural Statistics for the valuable advice and timely help in the statistical analysis of the data and in the finalisation of thesis.

I am grateful to Smt. N.K. Vimalakumari, Associate Professor, College of Rural Home Science who had served as my adviser and for her help and suggestions, rendered during the conduct of this study.

I am thankful to Smt. S. Chellammal, Assistant

Professor, College of Rural Home Science for serving
in the Advisory Committee.

I extend my sincere thanks to the members of the
staff and students of College of Rural Home Science for
their whole-hearted co-operation.

Grateful acknowledgement is rendered to Dean,
College of Agriculture for providing the necessary
facilities and the Kerala Agricultural University for
awarding the fellowship during the course of investiga-
tion.

GINCY GEORGE

CONTENTS

Chapter No.		Page No.
I	INTRODUCTION	1 - 4
II	REVIEW OF LITERATURE	5 - 21
III	MATERIALS AND METHODS	22 - 42
IV	RESULTS AND DISCUSSION	43 - 139
V	SUMMARY	140 - 144
VI	REFERENCES	i - x
VII	APPENDICES	I - XI
VIII	ABSTRACT	

LIST OF TABLES

Table No.		Page No.
1.	Details of family size.	50
2.	Agewise distribution of family members.	51
3.	Educational status of family members.	52
4.	Physiological condition of family members.	53
5.	Occupational status of family members.	54
6.	Economic status of families.	55
7.	Exposure to media.	56
8.	Monthly expenditure pattern of families.	58
9.	Comparison of family income and total expenditure pattern.	59
10.	Effect of family size on food expenditure pattern.	60
11.	Effect of family size on expenditure for health.	61
12.	Food expenditure pattern with reference to different food items.	62
13.	Frequency of different items of food use by families.	64

Table No.		Page No.
14.	Menu for the survey period.	66
15.	Methods employed for cooking and preparation.	71
16.	Average quantity of foods consumed by women in normal and special conditions.	73
17.	Average nutrient consumption of normal women.	75
18.	Average nutrient consumption of pregnant women.	76
19.	Average nutrient consumption of lactating women.	76
20.	Average quantity of foods consumed by children.	79
21.	Average nutrient consumption of children 1 to 3 years.	81
22.	Average nutrient consumption of children 3 to 5 years.	82
23.	Average quantity of foods consumed by women in normal and special conditions.	84
24.	Average nutrient consumption of normal women.	85
25.	Average nutrient consumption of pregnant women.	86

Table No.		Page No.
26.	Average nutrient consumption of lactating women.	86
27.	Average quantity of foods consumed by children.	88
28.	Average nutrient consumption of children 1 to 3 years.	89
29.	Average nutrient consumption of children 3 to 5 years.	89
30.	Occurrence of diarrhoea.	93
31.	Duration of diarrhoea.	93
32.	Mean score obtained for statements on diarrhoea.	98
33.	Mean score obtained for the statements pertaining to the prevalence of diarrhoea.	99
34.	Mean score obtained for statements pertaining to the seriousness of diarrhoea.	100
35.	Mean score obtained for statements pertaining to the treatment of diarrhoea.	101
36.	Mean score obtained for the statements on environmental sanitation.	102
37.	Mean score obtained for statements pertaining to scientific infant feeding and childcare practices.	103

Table No.		Page No.
38.	Knowledge of mothers related to various aspects of diarrhoea.	105
39.	Level of knowledge of mothers.	108
40.	Impact of age on level of knowledge of mothers.	108
41.	Statistical analysis of age on level of knowledge of mothers.	109
42.	Impact of number of children on the knowledge level of mothers.	110
43.	Statistical analysis of number of children on the knowledge level of mothers.	111
44.	Economic status and level of knowledge of mothers.	112
45.	Statistical analysis of economic status on knowledge level of mothers.	112
46.	Weight for age profile.	114
47.	Percentage distribution of preschool children surveyed according to their weights in each age group.	117
48.	Height for age profile.	118
49.	Profile of arm circumference for different age groups.	119

Table No.		Page No.
50.	Profile of chest circumference for different age groups.	120
51.	Profile of head circumference for different age groups.	121
52.	Weight for height profile of preschool children.	122
53.	Chest/head ratio of preschool children.	125
54.	Prevalence of clinical signs of malnutrition among preschool children.	126
55.	Morbidity profile of preschool children.	127
56.	Grouping of children based on haemoglobin content.	128
57.	Nutrition/health problems identified and remedial measures suggested.	129
58.	Gain in knowledge after education programme.	135
59.	Rate of retention of knowledge.	135
60.	Evaluation after one month.	136
61.	Evaluation after two months.	137
62.	Evaluation after three months.	137
63.	Frequency of occurrence of diarrhoea.	138
64.	Foods given during diarrhoea.	139

LIST OF FIGURES

	Page No.
1. Measurement of height.	30
2. Measurement of weight.	31
3. Measurement of Head circumference.	33
Measurement of chest circumference.	33
Measurement of arm circumference.	33
4. Clinical examination.	34
5. People viewing exhibition.	38-39
6. Demonstration on oral rehydration therapy.	41
7. Percentage distribution of children surveyed according to their weights in each age group.	116
8. Difference in physical stature between standard and study sample.	124

APPENDICES

- I. Questionnaire for village survey.
- II. Questionnaire for socio-economic and food consumption survey.
- III. Statements to assess the knowledge of mothers on diarrhoea.
- IV. Questionnaire for clinical examination.
- V. Estimation of haemoglobin - cyanmethaemoglobin method.
- VI. Folders distributed.
- VII. Teaching aids used in education programme.
- VIII. Statistical analysis - analysis of variance tables.
- IX. Average anthropometric measurements and the deviation of each age group from the standard.
- X. Height for weight and the deviation of study group from the standard.
- XI. Analysis of variance table - evaluation of education programme.

INTRODUCTION

Women and children constitute nearly 70 percent of the population in India. The need for improving the health standards and quality of life of these vulnerable population has been emphasized during the last three decades, through various developmental programmes. Although these developmental programmes have decreased the maternal and child mortality rates, many health problems still remain. These problems are the result of complex interaction between malnutrition and infection. The two ailments which greatly increase infant mortality in the third world are malnutrition and diarrhoea with negative reciprocal effect on each other (Guerrin 1985). Acute diarrhoeal disease is one of the major cause of mortality and morbidity among children of under fives in developing countries especially in slum and coastal areas.

Basic health care is the right of every Indian. But children who die every year of diarrhoea (about 1.5 million) is a tragic symbol of the inefficiency of

our health care system, passive apathy and injustice. Concrete actions along with other interventions contribute integral part of a comprehensive approach to the control of diarrhoeal diseases in children. It is clear that nutrition intervention alone will not have any impact on the problem unless efforts are made simultaneously to improve the environment which is the chief determinant of morbidity rates in the community (Chen et al 1981).

Oral rehydration therapy is considered as the biggest medical revolution for the control of diarrhoeal diseases of the century. This technological breakthrough offers important and new possibilities for reducing the number of deaths in children because it can be used throughout the health care system and can even be administered in the home by family members. Effective communication and sharing of this 'know how' with people will ensure its acceptance as a preferred mode of treatment.

Successful treatment with oral rehydration solution not merely demystifies diarrhoea care but gives the people a sense of control over their own

lives and lives of their children. Repeated attacks of diarrhoeal diseases deteriorates the nutritional status of the children and the survivors tend to become progressively malnourished if their nutritional needs during and after bouts of illness are not met adequately. Hence preventing death from diarrhoeal dehydration by means of oral rehydration therapy is not enough to ensure long term health benefit and significant reduction in child mortality. Integrating dietary actions with oral rehydration solution in diarrhoeal diseases is fundamental for an effective prevention and control of both diarrhoea and malnutrition. With innovative and cost effective actions it is possible for the world to take steps to heal some of the tragic wounds of diarrhoeal diseases and malnutrition. Diarrhoeal diseases are found to be common in coastal areas of the developing countries and the reason for the prevalence of diarrhoea and factors responsible for the occurrence of such diseases are to be assessed. The present study on the importance of oral rehydration therapy in the control of diarrhoea in the coastal areas of Trivandrum district is conducted with the following objectives.

1. To assess the prevalence of diarrhoea among infants

and children.

2. to find out the causative factors responsible for the incidence of diarrhoea.
3. to popularise oral rehydration solution as a preventive measure to reduce diarrhoea through various educational methods.
4. to evaluate the education programmes conducted.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

According to the reports of WHO and UNICEF (1983) five million children under five years of age died as a consequence of diarrhoeal disease in developing countries in 1980. Mathur (1985) reported that about 6 million children died every year all over the world due to diarrhoea and of this 1.5 million was from India alone. The author further reported that diarrhoea and malnutrition together contribute to 50 percent of childhood mortality. A survey conducted by Datta (1985) also pointed out that acute diarrhoeal diseases are the important cause of childhood mortality and morbidity in developing countries. The results further revealed that 750 million children below 5 years suffers from diarrhoeal diseases annually in Asia, Africa and America. Donoso (1979) in his review on infant diarrhoea indicated that between one and three million children under 3 years of age can be expected to die in India due to diarrhoea every year.

Nazir et al. (1985) reported that diarrhoeal disease incidence varies from area to area, depending

upon topography, climate and quality of environment. According to him the incidence also varies from time to time along with season and fluctuate from year to year. A one year study conducted among children with diarrhoea by Mandal et al. (1983) and Faisal et al. (1984) indicated that diarrhoea is low during summer.

Barrell et al. (1979) reported that diarrhoeal disease is a significant problem among young children in the tropics, because of the microbial contamination of food and unhygienic water supply. Their results clearly indicated that a very high proportion of infant food is overgrown with bacteria to an unsafe degree and they also recommended that foods should be consumed as soon as possible after preparation. Bhatia et al. (1980) studied various environmental factors and microbial agents influencing diarrhoea. According to Zoysa and Feachem (1985) rotavirus may be responsible for about 6 percent of all diarrhoeal episodes in developing countries. They reported that rotavirus immunisation may reduce overall diarrhoea morbidity rate by 6 to 10 percent among children under five years of age.

Gupta (1985) reported that diarrhoea has been

found to be inversely proportional to age and decreases with increasing age. Zoysa and Feachem (1985) reported that 20 percent of diarrhoeal diseases are under five years of age and according to Bhatia et al. (1980) diarrhoea was common below the age of 2 years. They found that feeding habits, storage of drinking water and lack of excreta disposal facilities were the significant variables responsible for the occurrence of diarrhoea. Daral et al. (1985) reported that diarrhoea is a major cause of mortality and morbidity in young infants aged 6 to 12 months. The study further indicated that E.coli was the most prevalent bacteria in children suffering from diarrhoea. According to Daral et al. (1985) weaning, teething, crawling etc. exposes the infants to heavy infection. He also reported that low economic status, poor environmental hygiene coupled with lack of health education in mothers may contribute to a higher incidence of diarrhoea. A survey conducted by Kumar et al. (1985) in rural and urban areas of Northern India revealed that mothers were not aware of the ill-effects of watery stools, restriction of fluids and foods in infant's diet. Parents regarded diarrhoea as a normal part of growing up (The State of Worlds children 1984).

Chakraborty and Das (1983) in their study indicated that educational level of mother and health knowledge of parents influenced the incidence of diarrhoea. The study also revealed that among malnourished and artificially fed infants episodes of diarrhoea were greater. Gupta (1985) observed that poverty, illiteracy, superstition and unhygienic conditions played the major role in the production of diarrhoea.

Black et al. (1984) reported that diarrhoea and malnutrition are common in young children in developing countries and a reciprocal relationship has been postulated with diarrhoea resulting in malnutrition.

Herman et al. (1983) reported that acute and chronic malnutrition in children below 2 years is positively associated with the incidence and duration of gastrointestinal disorders. Based on a longitudinal study Ghai and Jaswal (1970) reported that diarrhoea occurs more frequently in undernourished children than in well nourished children. But Parker (1984) found that incidence of diarrhoea was not high in underweight children but the duration of disease was prolonged. According to Martorell (1975) and Baumslag et al. (1979)

diarrhoeal diseases are first among the health problems of preschool children in developing countries as a cause of mortality and growth retardation and it increases the susceptibility to infection. Martorell (1975) indicated that days ill with diarrhoeal diseases are significantly associated with a reduction of growth both in length and weight. He further reported that 10 percent of growth retardation in children was accounted by diarrhoeal diseases.

Kenneth et al. (1984) pointed out that recent evidences convincingly demonstrated an inverse relationship between the prevalence of diarrhoeal disease and growth of children in less developed countries. Black et al. (1984) stated that children with low weight for height had long durations of diarrhoea than better nourished children. Brown et al. (1979) and Wittman and Hansen (1965) conducted hospital based studies and found that diarrhoea occurs more frequently in children suffering from kwashiorkor and marasmus.

Stomach acidity and intestinal immunity are the two major host defence mechanisms that protect against enteric infections. Gracy and Cullity (1977) revealed

that gastric secretion is reduced in children suffering from kwashiorkor or marasmus. According to the authors, suppression of this mechanism may contribute to bacterial overgrowth and diarrhoeal diseases in malnourished children.

Persistent diarrhoea or diarrhoea lasting more than 14 days is often accompanied by severe growth retardation and malnutrition syndrome is an important cause of death during the second and third years of life (Thomkins 1985). A study in Indonesia showed that children with Xerophthalmia were five times more likely to have diarrhoea (Somer 1984).

Ashworth and Feachem (1985) found strong association between low birth weight and diarrhoeal mortality in developing countries. Adhikari and Hewitt (1985) reported that in an outbreak of diarrhoea, the overall mortality was 22 percent and 62.5 percent deaths occurred in low birthweight infants.

It is important to continue breast feeding during and after diarrhoea because it provides protection against infection and constitute an inexpensive highly nutritious and non contaminated source of food (Guerrin 1985).

Roy et al. (1984) reported that the use of additional

water may not be necessary during hydration of breast fed children.

According to the studies of Feachem and Koblinsky (1984) conducted in 14 countries, it was found that exclusive breast feeding was protective when compared with partial breast feeding. Cushings and Anderson (1982) pointed out that breast fed babies have less diarrhoea than bottle fed babies. Sarker et al. (1983) and Pal (1979) pointed out that breast feeding is to be advocated during acute and early convalescent stages of diarrhoea. It is well known that breast fed children are less susceptible to diarrhoeal diseases compared to those who are hand fed; because colostrum and mothers milk contain immunoglobulins which prevent the pathogens from infecting the gastrointestinal tract. Human milk also contain bifidus factor that promotes the growth of acidophilic intestinal flora that in turn inhibit the pathogenic organism from developing such as *E. coli* (Mata and Urrutia 1971).

Khan and Kamal (1986) reported that one of the mechanisms of causing childhood malnutrition in developing countries is the withdrawal of food during

diarrhoea and mothers should be informed about the increased food needs of children during illness and convalescence. Children who are fed during illness recover more rapidly than those who are not fed (Guerrin 1985). According to Sarker et al. (1983) exclusively breast fed children accept supplementary foods without any adverse effect even though they have acute diarrhoea. In the dietary management of diarrhoea, the deep rooted practice of withholding milk and starving cases of diarrhoea need to be actively discouraged (Ghai and Bhan 1980).

Kumar et al. (1981) reported that malnutrition is perceived as a complication of diarrhoea by 68 percent of mothers interviewed and food restriction was practiced by 93 percent of mothers during pathologic conditions. Ghai and Bhan (1980) reported from their field study in Philippines, that oral rehydration therapy and dietary management during diarrhoeal episodes improved the appetite and resulted in better weight gain in infants and children.

The danger of dehydration induced by diarrhoeal infections is the greatest problem in weaning period,

when the child is in a course of transition from breast to bottle (Gordon et al. 1963). Samadi et al. (1985) reported that 60 to 70 percent of diarrhoeal deaths are caused by dehydration. He also reported that a significant development in recent years has been the discovery of oral rehydration therapy which can be safely and effectively administered to the children with diarrhoea. According to Khubchandani and Sainani (1986) one of the greatest success stories in the history of medicine has been the advent of oral rehydration therapy in the management of diarrhoea. Samadi et al. (1985) further reported that infants suffering from diarrhoea with mild and moderate degrees of dehydration were hydrated with oral rehydration solution and there was no adverse effect of treatment on the process of hydration and maintenance. According to Baumslag et al. (1979) oral rehydration for the treatment of diarrhoea was proposed as early as 1831 for the treatment of cholera. Successful oral rehydration treatment of cholera was tried with a solution of glucose, sodium chloride and potassium chloride. Khubchandani and Sainani (1986) reported that oral rehydration therapy (ORT) slashed cholera deaths from 50 to 1 percent among thousands of Pakistan refugees...

Since 1983 the use of oral rehydration therapy has expanded world wide, to more than 95 countries in the developing world and there has been a four fold increase in the number of packets produced (Gabr 1986). One of the declaration of the summit of SARRC COVENANT ON CHILDREN was drastic reduction in diarrhoeal diseases by using oral rehydration therapy by 1990 (SARRC Report 1986).

A random study conducted by Sachdev et al. (1981) on infants with dehydrating diarrhoea, the infants were given a glucose electrolyte solution containing glucose, sodium and potassium by mouth or vein. The results indicated that all the infants on oral treatment recovered and had no need for intravenous therapy. Thomas et al. (1978) compared the conventional methods of rehydration with glucose electrolyte solution to children with diarrhoea. The findings indicated that electrolytes by mouth are safer, cheaper and more convenient. There was also significant reduction in mortality and complications attributable to intravenous treatment. Kumar (1980) reported that when sugar, salt and water treatment is given orally for patients with acute diarrhoea, coupled

absorption of glucose and sodium takes place and glucose accelerates the absorption of salt and water. He also reported that glucose facilitates sodium absorption and provides calories which has a protein sparing effect and thus ketosis is prevented. Mathan (1985) reported that the diarrhoeal symptom is produced by excess secretion of faecal water and electrolytes. Absorption of sodium is coupled to the absorption of organic solutes such as monosaccharides, aminoacids etc. This is the basis of oral rehydration solution using glucose electrolyte solution. Datta et al. (1984) conducted a study in infants who had been admitted to a hospital in Calcutta with acute watery diarrhoea and moderate dehydration indicated that W.H.O. solution with sodium 90, potassium 20, bicarbonate 30, chloride 20 and glucose 110 mmols per litre helped in rehydration of infants. In a study conducted by Mehta et al. (1984) children with diarrhoea were treated with an oral electrolyte fluid (OEF) containing 25 g of glucose, 3.5 g of sodium chloride, 2.5 g sodium bicarbonate and 1.5 g potassium chloride in one litre of water. The results of the study revealed that the fluid was very effective in preventing moderate and severe dehydration. Experiences of Cocker et al. (1983)

and Rahman (1979) indicated early use of oral rehydration therapy in preventing the adverse nutritional effects associated with diarrhoea. Cocker et al. (1983) further reported that successful rehydration with oral rehydration therapy was achieved without complications in 89.3 percent of the infants studied. Jain et al. (1983) conducted studies in Punjab and suggests that diarrhoea is a major health problem among infants and children. They also reported that children with dehydration were given oral glucose electrolyte mixture provided they were not vomiting and able to retain fluids. Pal (1979) reported that an oral glucose electrolyte solution containing sodium chloride, potassium bicarbonate and glucose was used to maintain fluid and electrolyte balance of the human body. He suggested that home delivery of such oral rehydration fluid would reduce death rate considerably.

Early and adequate replacement of sodium, potassium, bicarbonate and water prevents many complications and death in diarrhoea. Mehta et al. (1984) reported that the advantages of oral rehydration therapy are ease of administration by unskilled personnel, easy availability and inexpensiveness. They also found that administration

that adding amino acid glycine and replacing 20 g of glucose by 50 g of rice powder reduce diarrhoeal volume and duration. Amylose and amylopectin in rice when hydrolysed to glucose in proximal small intestine and glycine in rice were responsible for increasing sodium absorption (Khubchandani and Sainani 1986).

Oral rehydration solution if mixed in the right proportion of sugar can increase the body's absorption of salt and water by 25 times (The state of world's children 1984). Experiences of Khubchandani and Sainani (1986) indicate that glucose electrolyte solutions are better than sucrose electrolyte solutions because sucrose on hydrolysis yields glucose and fructose and fructose is not actively absorbed. Nalini (1978) conducted studies to determine the relative merits of glucose and sucrose in oral electrolyte solutions to replace diarrhoeal fluid losses. Oral glucose and sucrose electrolyte solutions successfully rehydrated 100 and 92 percent of patients respectively. The author concluded after the study that sucrose can substitute glucose in many cases where glucose is unavailable and there is adequate knowledge of oral therapy.

Finberg (1980) stated that a high sodium concentration conflict with the physiology of infancy. The immature renal function, larger insensible waterloss and large extracellular turnover, all warrant the use of oral rehydration solution with low sodium content. According to Nalin (1980) the optimal concentration of glucose is 110 mmol, sodium 40 to 60 mmol, and potassium 25 to 30 mmol. The significance of proper concentration of potassium can be appreciated when one considers that repeated diarrhoeal attacks lower total body potassium. Further hypokalemia is another cause predisposing to hypernatremia hence optimal potassium is necessary. Listernick (1985) stated, that the oral rehydration solution with higher concentration of sodium can be safely and effectively used as a maintenance solution for the treatment of diarrhoea in children older than three months. Chen (1983) reported that appropriate concentrations of sodium and glucose are essential in all rehydration solutions. Since some solutions when used for severe diarrhoea may lead to prolonged acidosis and hypokalemia. Saberi et al. (1983) reported that oral sugar solution with sodium concentration 90 m eq/litre is probably safe and effective in majority of infants with diarrhoeal

dehydration. Steinhoff et al. (1985) compared the accuracy and variability of oral rehydration solution prepared by village health workers using a finger measurement technique and a special oral rehydration solution measuring spoon. It shows that finger measured oral rehydration solution had hypertonic sodium contents and both technique require careful instruction to ensure accuracy. With the right kind of community education programme an effective mix can be made by mothers using domestic sugar, and salt supplying potassium in the form of banana, plantain or papaya (The state of world's children 1984).

Barua (1980) reported that the health service component of any programme is to be concerned with incorporation of new effective strategies; such as oral rehydration therapy along with education in proper dietetic management to reduce diarrhoea related mortality and malnutrition. Clow (1985) reported that education had helped to reduce number of deaths due to diarrhoea in children under five years from 28 in 1978 to 1 in 1983.

According to Guerrin (1985) the prevention programmes of diarrhoea must include breast feeding along

with complementary foods, personal and food hygiene, elimination of wastes, providing safe water supply and public health measures. To protect the children from diarrhoeal infections, a task including health and nutrition education, more and better weaning mixes, hygienic preparation and storage of food, more water and safer sanitation, improved personal and domestic hygiene and immunisation are to be taken up. (The State of World's Children 1984). Mathur and Reddy (1983) reported in their studies that when contaminated water was used to prepare rehydration solution for children, the multiplication of bacteria was greater. They also reported that the available water is boiled for the preparation of solution and it was safe only for 12 hours. Nutrition education will help in improving this unhygienic condition.

Martorell (1975) reported that public health measures aimed at decreasing the prevalence of diarrhoeal diseases through sanitation and medical care would improve physical growth of children in developing countries. Nazir et al. (1985) reported that an intensive oral rehydration campaign resulted in improvements in both age specific mortality and diarrhoea related mortality.

Health education, early institution of oral rehydration solution and free supply of medicines to the needed people will go a long way in reducing the sufferings of ignorants (Gupta 1985). It is important to introduce an appropriate health education programme concerning foods and fluids during treatment of diarrhoea to prevent dehydration and malnutrition (Kumar et al. 1981). According to him understanding the significance of complications by mothers and their active participation in the management of acute diarrhoeal disease will go a long way in reducing the mortality rates in the community.

Sachar (1985) conducted an evaluation of 6 months teaching on oral rehydration therapy. The results indicate that 68 percent of mothers knew about oral rehydration solution and 29 percent knew the preparation and administration of solution at home with readily available salt, sugar and water. He is of the opinion that through repeated training and vigorous efforts mothers can be made self reliant in early use of oral rehydration solution.

MATERIALS AND METHODS

INTRODUCTION

INTRODUCTION

Women and children constitute nearly 70 percent of the population in India. The need for improving the health standards and quality of life of these vulnerable population has been emphasized during the last three decades, through various developmental programmes. Although these developmental programmes have decreased the maternal and child mortality rates, many health problems still remain. These problems are the result of complex interaction between malnutrition and infection. The two ailments which greatly increase infant mortality in the third world are malnutrition and diarrhoea with negative reciprocal effect on each other (Guerrin 1985). Acute diarrhoeal disease is one of the major cause of mortality and morbidity among children of under fives in developing countries especially in slum and coastal areas.

Basic health care is the right of every Indian. But children who die every year of diarrhoea (about 1.5 million) is a tragic symbol of the inefficiency of

MATERIALS AND METHODS

A study on the importance of oral rehydration therapy was undertaken to

- (i) assess the prevalence of diarrhoea among infants and preschool children and its impact on infant mortality rate.
- (ii) find out the causative factors responsible for the incidence of diarrhoea.
- (iii) popularise oral rehydration solution as a preventive measure to reduce diarrhoea through various educational methods and
- (iv) evaluate the education programmes conducted.

A. Area of the study

The selected area for the study is a muslim colony an isolated habitat, in Vizhinjam village. This habitat is selected for the present study owing to the following reasons.

1. This habitat is bounded on the West South and North by the Sea and on the East attached to the adjacent village.

- ii. Among the various villages in the coastal areas of Trivandrum, this habitat is least exposed to any education programmes similar to the ones contemplated.
- iii. The habitat is thickly populated.
- iv. Environmental sanitation is extremely poor due to the lack of sufficient water supply, drainage facilities and consequent difficulties in the disposal of human excreta.

B. Plan of action

The plan of action of the present study comprises

- a. Ecological, socio-economic and environmental features of the area selected for the study.
- b. Food consumption pattern of the families.
- c. Dietary pattern of women and children.
- d. The prevalence of diarrhoea in the area.
- e. The nutritional status of preschool children.
- f. The nutritional/health problems prevalent in the area.

g. Planning and conducting an education programme.

h. Evaluating the education programme conducted.

C. Selection of samples

Of the 543 families residing in the colony area 100 families (approximately 10 percent) were selected by judgement sampling procedure. According to Gupta (1977) in judgement sampling, the choice of sample depends exclusively on the discretion of the investigator. In other words, the investigator exercises her judgement in the choice and include those items in the sample which she thinks are most typical of the universe with regard to the characteristics under investigation. 100 preschool children were selected for assessing their nutritional status.

D. Selection of methods of study

I. A village survey to elicit information on the socio-economic and cultural background and availability of physical facilities within the colony was conducted using a pre tested questionnaire. The questionnaire is presented in Appendix I. The data

were collected by interview and observation methods.

- II. A socio-economic and food consumption survey to collect information on the size of families occupation, income, educational level and food habits of the selected 100 families was conducted using a pretested questionnaire. The questionnaire is presented in Appendix II and the data were collected by interview method. Interview method was selected for collecting data under village survey and socio-economic and dietary survey because this method consists of a 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 stranger (Devadas and Kulandaivel 1975).
- III. Dietary pattern of selected 100 families was determined by collecting information on quantities of food consumed in a day by recall method. The information was collected from the housewife regarding the nature and quantities of foods consumed during the

past 72 hours and necessary entries were made in the schedule.

Since families vary in size and consist of persons of different age groups and conditions, the calculation of foods consumed by women and preschool children in the 100 families surveyed were computed using adult consumption units. From this data, the nutrient intake of women and preschool children were worked out using food composition tables and recommended daily allowances of ICMR (1982).

IV. Weighment survey was conducted in 10 families (10 percent of the already surveyed sample) to get accurate records of actual food intake. In this the investigator weighed the raw foods included in the meal for a day for the women and children. The nutritive value of the raw foods taken was calculated using food composition tables (ICMR 1982). The recommended daily allowance for women and children was used as standard. The difference between nutrients actually consumed and the recommended daily allowance was worked out.

V. Preliminary knowledge of women regarding diarrhoea and oral rehydration therapy was assessed using a suitably structured pretested schedule. The schedule is presented in Appendix III. Data was collected by interview method.

A large number of items (statements) expressing some opinion about diarrhoea, oral rehydration therapy and child nutrition was collected from relevant literature, informal interview with workers in the field and experts in the College. From all these sources a total of 50 items were prepared. The items collected were edited using the criteria suggested by Edwards (1969). After selection, 24 items were retained and care was taken to see that the statements were worded to express positive and negative attitudes. These statements were circulated among specialists to suggest modifications, if necessary. In the light of suggestions made by the specialists the items were modified and rewritten. The selected items were placed in a random sequence against two rating points namely "agree" and "disagree". The statements were included in the schedule.

VI. Nutritional status of preschool children is assessed to locate the prevalence of protein calorie malnutrition,

since this condition is accepted as a major nutrient problem in India among preschool age group (Gopalan 1970). In attempting to address this problem, well established procedures and instruments of measurement were used (NIN 1974).

(i) Anthropometric study was chosen since this is considered to be one of the most practical field techniques for the quantitative assessment of the nutritional status of children (Trowbridge 1979). According to Chen et al (1978) anthropometric measurements are an internationally accepted system for classifying protein energy malnutrition and it will accurately portray the nature, severity and prevalence of the problem. The anthropometric measurements used in the study were taken according to the techniques outlined by Jelliffe (1966). All the anthropometric measurements were conducted by trained personnel.

The height of the children were measured using a stadiometer. The children were made to stand on a flat floor by the scale with feet parallel and with heels, buttocks, shoulders and back of the head touching the upright. The head was held comfortably erect with

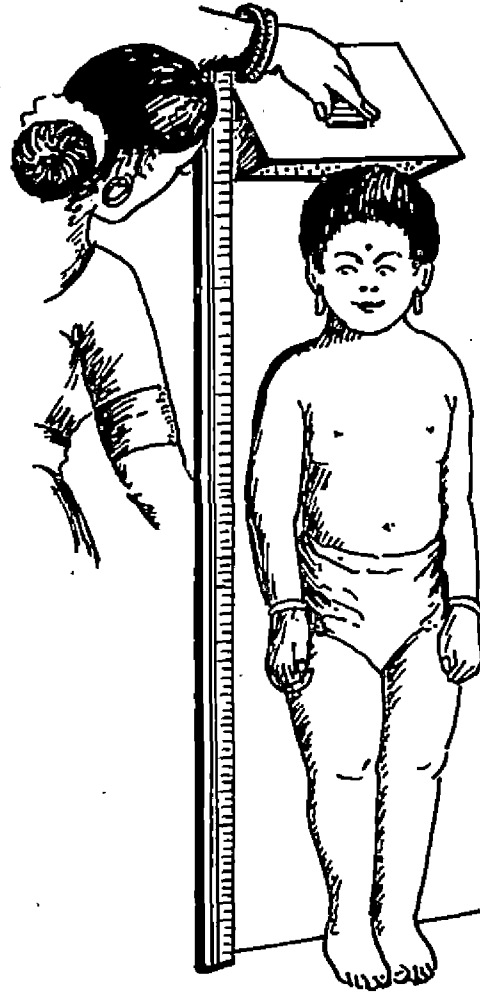
the lower border of the orbit in the same horizontal plane as the external auditory meatus. The arms were hanging at the sides in a natural manner. A wooden block was used as head piece which was gently lowered crushing the hair and making contact with the top of the head (Fig. 1). The measurements were done to 0.5 cm accuracy.

Children were weighed wearing very light clothing. The weight was measured using a beam balance. Beam balance scales were used for measuring weight as they are less likely to be inaccurate if carefully looked after. This was checked frequently at least twice daily during the conduct of the survey. The child was made to stand on the centre of the platform without touching anything else (Fig. 2). Care was taken to use the balance on a firm nontilted surface and it was checked before use. The measurements were done to an accuracy of upto 0.1 kg.

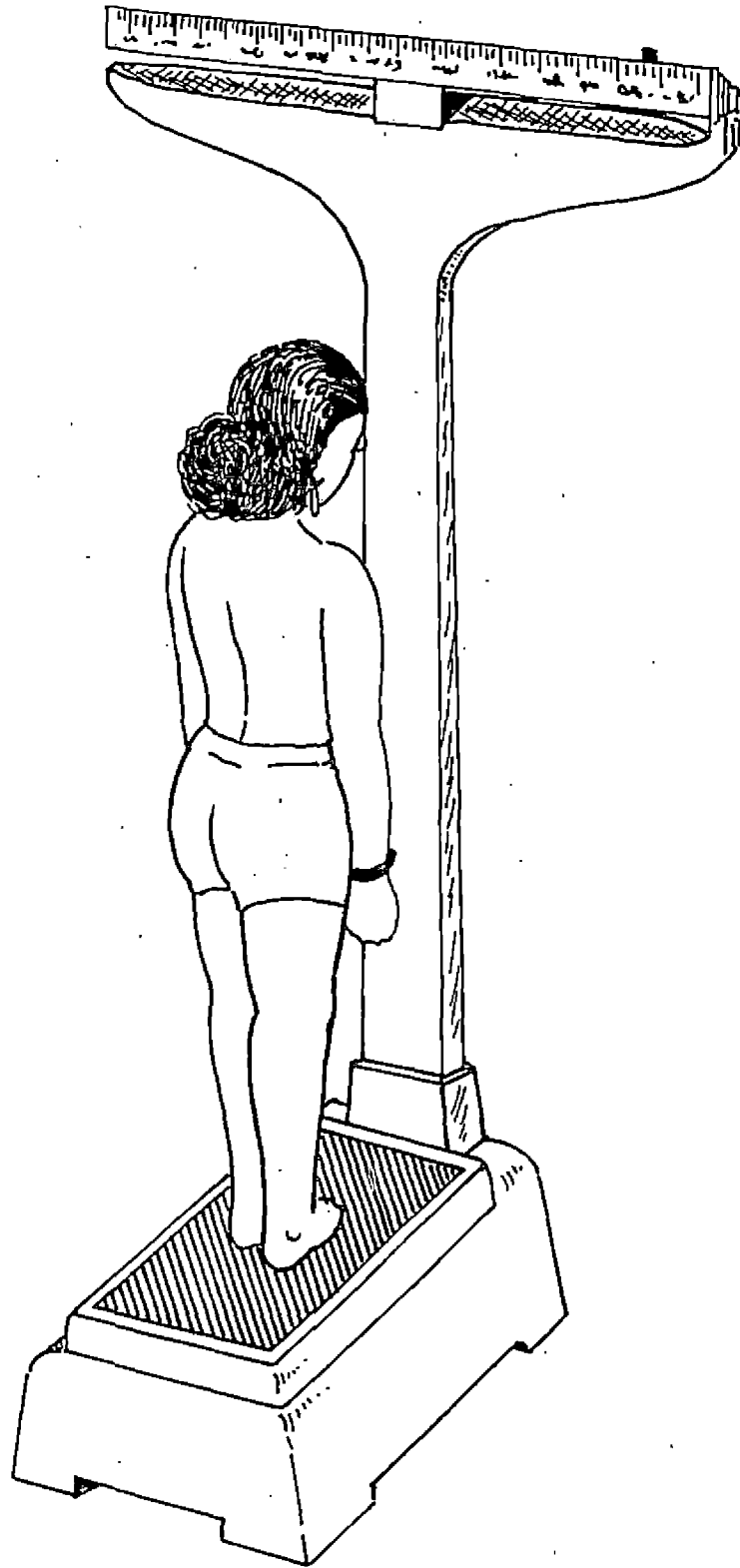
Head circumference was measured with a narrow flexible non-stretch tape made of fiberglass. Head circumference is related mainly to brain size and to a small extent to the thickness of scalp tissues and skull. It is a standard procedure in paediatric practice

FIGURE-1

HEIGHT MEASUREMENT OF
PRE-SCHOOL CHILD.



WEIGHT MEASUREMENT OF A PRESCHOOL CHILD



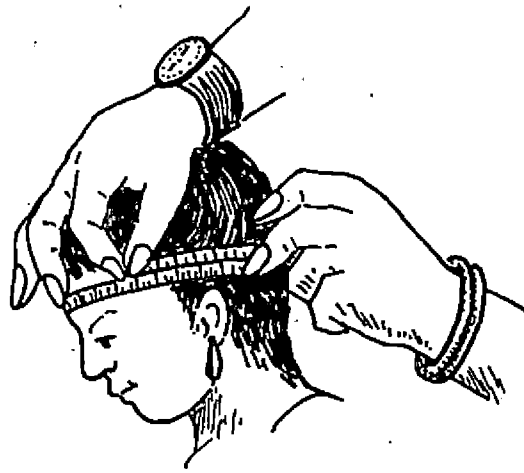
to detect pathological conditions. For taking measurements, the child's head was steadied and the greatest circumference was measured by placing the tape firmly round the frontal bones just superior to the supra orbital ridges, passing it round to the head at the same level on each side and laying it over maximum occipital prominence at the back (Fig. 3). Measurements should be made to the nearest 0.1 cm.

The flexible non stretch fiberglass tape was used to measure the chest at nipple line (Fig. 3). The average of the inspired and expired chest measurement to the nearest 0.1 cm was taken.

Mid arm circumference is measured to the nearest 0.1 cm with a fiberglass tape by placing gently but firmly round the limb to avoid compression of the soft tissues. The left arm was measured while hanging at its midpoint (Fig. 3).

(ii) The presence or absence of clinical deficiency symptoms attributable to malnutrition was assessed by a qualified physician from the adjacent primary health centre in the broad day light (Fig. 4). The schedule

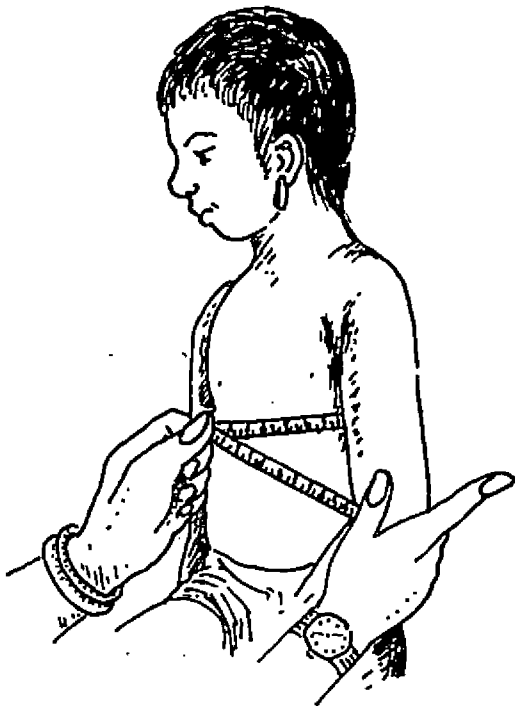
FIGURE-3.



MEASUREMENT OF HEAD
CIRCUMFERENCE



MEASUREMENT OF MID-
UPPER- ARM CIRCUMFERENCE



MEASUREMENT OF CHEST
CIRCUMFERENCE

Fig-4 - Clinical Examination



suggested by National Institute of Nutrition for clinical surveys was used for preparing the proforma. A schedule used for the survey is presented in Appendix IV. A detailed history of child morbidity in preceeding 6 month period were obtained by the recall method from each child's mother.

(iii) Under biochemical studies haemoglobin estimation of preschool children were conducted by cyanmethaemoglobin method (Dacie et al. 1975). Details of the method are presented in Appendix V.

VII. Nutritional health problems prevalent among these families were identified from the data collected. On the basis of the problems located, suitable nutrition education programmes were planned.

VIII. Nutrition education programme was planned on the basis of nutrition and health problem identified. The education programmes planned comprised of exhibitions, cooking demonstrations and other education classes.

An one day exhibition on child nutrition with special reference to diarrhoea and oral rehydration

therapy was organised at the colony. Facilities of a primary school located at the middle of the colony was used for this purpose. The main objective of the exhibition was to focuss attention in a concerted manner on the diarrhoeal control measures with a view to stimulate the widest possible interest in the colony on oral rehydration therapy. The exhibition highlighted various aspects of child health with special reference to the following aspects.

- (i) Causes and effects of infant malnutrition.
- (ii) Balanced diet for a preschool child.
- (iii) Diarrhoea, causes, symptoms, its interaction with malnutrition, prevention of diarrhoea and use of oral rehydration therapy (Fig. 5).
- (iv) Importance of personal and environmental hygiene and worm infestation.

(1) A slide show was arranged along with the exhibition and the slides related to the above topics were projected throughout the day.

Two folders namely "diarrhoea in children" and "oral rehydration therapy for diarrhoea" were prepared.

fig. 5. People viewing exhibition





Versions of these folders translated into English together with printed Malayalam folders are presented in Appendix VI. These folders were distributed during the exhibition. The women who came to see the exhibition were informed about the education classes and cooking demonstrations to be conducted.

(ii) Two nutrition education classes were planned after one week of the exhibition. The classes were conducted in two anganwadies located in the colony. The topics selected for the classes were of nutritional significance of diarrhoea and its treatment with oral rehydration solution. The class was of two hours duration. The first one hour was spent in lecturing and the remaining period was spent for discussion. The education programme was conducted under direct supervision of the academic staff of the College. Lecture classes were supplemented with suitable flash cards. The teaching aids prepared and used for this education programme are presented in Appendix VII. The women were requested to discuss the knowledge so gained from the class with their friends and neighbours. Folders were also distributed after the class.

(iii) Demonstrations on the preparation of oral rehydration solution and other weaning foods suitable for diarrhoeal conditions were conducted at two anganwadies (Fig. 6). During these demonstration classes the women were asked about the importance of using boiled water, washing hands before preparing food and the importance of clean utensils. Then the way of measuring correct amount of sugar and salt required for preparing oral rehydration solution was demonstrated. The steps were repeated several times and the women were persuaded to do the same.

Before the conduct of cooking demonstrations on weaning foods, women were informed about the significance of inclusion of weaning foods in infants diet. Care was taken to stress about the weaning foods suitable for a child with diarrhoea. The important weaning foods like cereal porridges, fruit juices, barley water, kanji water with salt were prepared and shown to them.

The women were informed about low cost solid weaning mixes that can be prepared from locally available foods. Information on few recipes on weaning foods were also disseminated to these women and they were persuaded

Fig-6 - Demonstration on oral rehydration therapy



to do these new recipes. They were also requested to prepare these weaning foods in their houses in the presence of their friends and relatives.

IX. For evaluating the impact of nutrition education programme administered earlier to these women to assess their knowledge on diarrhoea and child nutrition was used. The women who attended the education programmes were requested to give their reaction to each statement included in the questionnaire for assessing their knowledge.

The capacity of women to retain knowledge was also assessed, three times using the same questionnaire at one month interval after the completion of the education programmes. After 6 months of education programme, the rate of adoption was also tested by selecting a random sample of 30 mothers.

RESULTS AND DISCUSSION

RESULT AND DISCUSSION

A study on the importance of oral rehydration therapy in the control of diarrhoea in the coastal areas of Trivandrum district is conducted in a Muslim colony, an isolated habitat, located in the Vizhinjam panchayat of N.E.S. block Athiyannoor. The results of the present study on the importance of oral rehydration therapy in the control of diarrhoea in the coastal areas of Trivandrum are presented and discussed under following heads:

1. Ecological, socio-economic and environmental features of the area selected for the study.
2. Socio-economic and personal characteristics of the families.
3. Food consumption pattern of the families.
4. Dietary pattern of women and children.
5. The prevalence of diarrhoea in the area.
6. The nutritional status of preschool children.
7. The nutritional/health problems prevalent in the area.

8. Planning and conducting an education programme.

9. Evaluating the education programme conducted.

1. ECOLOGICAL, SOCIO-ECONOMIC AND ENVIRONMENTAL FEATURES
OF THE AREA SELECTED FOR THE STUDY

1.1 Socio-economic profile of the panchayat

Vizhinjam panchayat is located about 14 kms away from Trivandrum city on Trivandrum Kovalam route. Total area of this panchayat is around 12.62 square kilometres. Out of this the male population constitute about 51.1 percent and female population constitute 48.9 percent. Total percentage of literates in the panchayat is 54.7. Out of this male literates constitute 46.2 percent and female literate population is 45.2 percent.

Regarding the occupational status of the adult population, 27 percent constitute main workers (23.2 percent male and 3.76 percent female) and 1.7 percent marginal workers (0.98 percent male and 0.71 percent female). The remaining 71.1 percent (44.2 percent male and 26.2 percent female) comprised cultivators (12.4 percent) agricultural labourers (12.9 percent) fishermen

(16.28 percent) household workers (5.5 percent) and others (6.97 percent).

1.2 Socio-economic profile of the colony

The Muslim colony located in the Vizhinjam panchayat selected for the present study is a secluded area, since it is surrounded with sea on three sides and a fish market on the eastern side. The colony is connected to the adjacent village by means of a non-metalled village road. Much of the economic and social backwardness of this place, in general, can be attributed to the lack of communication. All the families located in the colony are Muslims. Educational facilities available in this colony are two anganwadies (preschool centres) and one lower primary school. Medical facilities are not available in the colony and the nearest primary health centre is located about two kilometres away from the colony to render necessary medical help. The colony does not have the service of an mahila samajams or any other voluntary organisations. Feeding centres run by the two anganwadies provide food to the children enrolled.

Since the colony residents give much importance

to religious activities, most of the children are sent to Arabic school located near the colony. Less than one percent of the houses located in the colony are electrified. Within the colony, the market facilities for purchasing food articles, are not available and the colony residents depend on the shops located outside the colony. The price of articles are found to be higher when compared to the prices in the city probably due to additional transportation costs of commodities.

1.3 Living condition of the families

Living condition of the families surveyed are far from satisfactory. 56 percent of the families live in mud plastered huts and 44 percent in medium type of houses. 78 percent of the houses have one or two rooms excluding kitchen and veranda; while 22 percent of the houses have 3 to 4 rooms. Majority of the women are of the view that the houses do not have sufficient ventilation due to lack of windows and doors and they will not get enough air and sunlight.

Piped water from a water supply scheme formed the major source of drinking water. Private wells also

met the drinking water requirements to some extent. 98 percent of the families depend on public taps provided by the panchayat and 2 percent of the families have private wells. Protected drinking water is practically unknown 33 percent of women collect their requirements of water from the public taps in half an hour while 44 percent of women spend two hours per day for this purpose. However 23 percent of the women spend more than three hours a day for this purpose. These variation in the time spent for collection of water can be attributed to differences in minimal requirement, due to family size, walking distances to collection point, wasting time at the public taps for collection etc. Regarding the quantity of water used by the families surveyed 54 percent of the families need 3 to 5 buckets of water daily while 28 percent of the families need 6 to 8 buckets and 18 percent of the women have reported that they have to bring 9 to 11 buckets of water. Since women are engaged mainly in doing this work and since they will be able to carry two buckets at a time this work causes repeated walking to the source of water which is about quarter kms away from their houses. This again indicates that 54 percent of the women walk about $1\frac{1}{2}$ kms a day while 28

percent of the women walk 2 kms for collecting water for drinking purpose alone. It is also estimated that a to and fro walk with a wait at the public tap for her turn to collect water together will take approximately one hour. This clearly indicates the time spent by women for seeking one of the basic needs of their family. Due to lack of fresh water, sea water is often used for cleaning purposes. Majority of the women are (87 percent) generally not in the habit of boiling water for drinking purposes. Probably this may be one of the basic reason for the prevalence of diseases.

Only one community latrine provided by the panchayat is available within the colony and private latrines are available in 2 or 3 houses. There is no drainage facilities within the colony. Many of the houses do not have latrines and the members of 96 percent of the families use the open space near sea coast for disposing human excreta. This unhygienic habit is inculcated in children also due to congested living conditions and scarcity of water. Poor economic condition of these families have aggravated the situation.

97 percent of the families do not have domestic

animals. The remaining three percent of the families have goats and hens and they are also kept in the space in and around the house. Neither compost pits nor soakage pits are available for the disposal of wastes and waste water from the house. Due to lack of space and ignorance women throw household wastes around their houses.

2. SOCIO-ECONOMIC AND PERSONAL CHARACTERISTICS OF THE FAMILY

Socio-economic and personal characteristics of the families selected for the study include details of family size, age wise distribution, educational status and physiological condition of family members, economic status and expenditure pattern of the families.

2.1 Details of family size

Details of family size of the 100 families surveyed are presented in Table 1.

Table 1. Details of family size.

Size of family	Number	Percentage	Adults				Children			
			Males	Percentage	Females	Percentage	Males	Percentage	Females	Percentage
3-5	19	19								
5-8	40	40								
9-11	36	36								
12-14	5	5								
Total	100	100	207	26.5	239	30.6	176	22.5	159	20.3

As indicated in Table 1, the average size of the majority of the families (81%) consist of 5 to 14 members. The families are of nuclear type and the increased size of the families are mainly due to large number of children. This is mainly due to ignorance and religious restrictions against family planning methods. A study on fishermen community conducted by Prema and Menon (1980) in this area indicates similar results. Regarding the sexwise distribution, females constitute slightly higher percentage (50.17) of the population than males (49.83). This result is supported by the census data of 1981 (Manorama year book, 1987).

2.2 Agewise distribution of family members

Agewise distribution of family members are presented in Table 2.

Table 2. Agewise distribution of family members.

Age range	Num- ber	Per- cen- tage	Adults				Children			
			Male	Per- cen- tage	Fe- males	Per- cen- tage	Males	Per- cen- tage	Fe- males	Per- cen- tage
0-5	108	13.9	-	-	-	-	58	7.83	50	6.5
5-10	101	12.8	-	-	-	-	48	6.48	53	6.9
10-20	159	20.30	15	1.92	18	2.29	70	8.90	56	7.14
20-30	116	14.80	61	7.81	55	7.01	-	-	-	-
30-40	129	16.50	31	3.96	98	12.5	-	-	-	-
40-50	94	12.08	45	5.76	49	6.29	-	-	-	-
50 & above	74	9.50	55	7.06	19	2.43	-	-	-	-
Total	781	100	207	26.50	239	30.60	176	22.50	159	20.30

As indicated in Table 2, the total number of family members of the 100 families surveyed is 781. 47 percent of the members belong to the growing stage while 43 percent of the family members are in the prime age group of 20-50. 5 to 9 percent of the family members are in the

old age. Female population constitute 50.17 percent of the family members.

2.3 Educational status of family members

Educational status of family are presented in Table 3.

Table 3. Educational status of family members.

Educational status of family members.	Number	Percentage	Adults				Children			
			Male	Percentage	Female	Percentage	Male	Percentage	Female	Percentage
Illiterate	398	51.0	190	24.30	208	26.10	-	-	-	-
Primary school	250	32.0	43	5.54	114	14.50	45	5.76	48	6.10
Secondary school	109	13.9	43	5.40	38	4.80	13	1.65	15	1.90
High School	24	3.1	11	1.42	6	0.77	3	0.38	4	0.51
Total	781	100								

As revealed in Table 3, 51 percent of adult population are found to be illiterate. But compared to the male population women appear to be better educated contrary

to the usual trends in most communities especially Muslims. This is probably due to the fact that men are in the habit of going to sea from a very early age and thus miss primary schooling. However among adult population, only 3 percent have high school education. However, female children are made to stop schooling beyond primary stage and hence the trend gets reversed again at secondary and high school stage.

2.4 Physiological condition of family members

Physiological condition of family members are presented in Table 4.

Table 4. Physiological condition of family members.

Physiological condition	Number	Percentage	Adults				Children			
			Male	Percentage	Female	Percentage	Male	Percentage	Female	Percentage
Pregnant women	20	2.5	-	-	20	2.5	-	-	-	-
Nursing women	46	5.8	-	-	46	5.8	-	-	-	-
Preschool children	63	8.0	-	-	-	-	34	4.3	29	3.7
Total	129	16.5	-	-	66	8.3	34	4.3	29	3.7

As revealed in Table 4 out of the 781 family members 129 are in one vulnerable condition or other (16.5 percent). Another notable point is that most of the mothers in the families (8.4 percent) are in a vulnerable condition either as pregnant women or as nursing mothers. The nursing period may extent upto $2\frac{1}{2}$ years for male children, and 2 years for female children, 8 percent of the child population in the families surveyed belong to the vulnerable section being preschool children.

2.5 Occupational status of family members

Under occupational status of family members the occupation of the head of the family and women of the house are presented in Table 5.

Table 5. Occupational status of family members.

Occupations	Housewife (percentage)	Head of the family (percentage)
Fishing	-	89.0
Government job	-	1.0
Labourers	3.0	4.0
Merchant	-	2.0
Tailors	-	2.0
Tea shop	-	2.0
Household work	97.0	-

As revealed in Table 7, 89 percent of the male members are engaged in fishing which is a seasonal job. It also depicts that only 3 percent of the women are economically independent while the remaining 97 percent of the women are attending to household work. Unlike in the organised sectors where workers work in shift, get rest and holidays, these fishermen have to work with little period of rest between working schedules when they have employment.

2.6 Economic status of families

Average per capital income of the families surveyed are presented under economic status of families.

Table 6. Economic status of families.

Monthly income	Percentage
200-400	17.0
400-600	36.0
600-800	21.0
800 and above	26.0

As depicted in Table 6, majority of the families

(83 percent) studied are found to be above the poverty line, due to highly fluctuating nature of their income with seasonal variation consequent to the nature of their occupation, at times their income decreases considerably especially in off-season. Periods of affluence due to food catch leads extravagant spending without saving for the off-season. Similarly when considering the family size, this income will be insufficient to meet the basic needs of their daily life.

2.7 Exposure to media

Exposure to mass media by the women is assessed by determining their familiarity with different printed media and radio which are found to be the most popular media in the state (Prema and Menon 1978) and the results are presented in Table 7.

Table 7. Exposure to media (in percentage)

Media	Frequency			Availability		
	Daily	Weekly once	Now & then	Not at all	Own	Neighbours
Newspaper	4.0	1.0	8.0	87.0	3.04	9.88
Magazine	2.0	1.0	15.0	82.0	4.86	13.10
Radio	6.0	4.0	12.0	78.0	20.00	2.00

Data presented in Table 7 reveals that most of the women are illiterate and hence do not read newspapers or magazines and those who are literate also not in the habit of reading newspapers. Very few families are having the facilities of purchasing newspapers (3.04 percent) and magazines (4.86 percent) to be read at their own houses. Thus though 19.30 percent of women are literate, only 16.50 percent have the facility to continue the habit of reading.

Regarding broadcasting media 20 percent of the families have radios in their houses. But on enquiry it is found that very few women (11 percent) are interested to hear educational programme compared to music over the radio. These women are also found to be disinterested in the activities social organisations within or outside the colony.

3. FOOD CONSUMPTION PATTERN OF THE FAMILIES

Food consumption pattern of the families are assessed by determining the monthly expenditure pattern, food expenditure pattern and frequency of use of various foods by these families and mutually cross checked.

3.1 Monthly expenditure pattern of the families

Monthly expenditure pattern of the families assessed are presented in Table 8.

Table 8. Monthly expenditure pattern of the families.

Range of monthly expenditure (in percentage)	Percentage of families					
	Food	Clothing	Shelter	Educa- tion	Health	Enter- tain- ment
0-10	-	93	90	90	7	98
11-20	-	6	7	10	84	2
21-30	-	1	3	-	8	-
31-40	-	-	-	-	1	-
41-50	2	-	-	-	-	-
51-60	9	-	-	-	-	-
61-70	10	-	-	-	-	-
71-80	58	-	-	-	-	-
81-90	21	-	-	-	-	-
91-100	-	-	-	-	-	-

Monthly expenditure pattern of the families are divided into various ranges from 0-10 percent to 91-100 percent. Table 10 depicts that about 20 percent of the

income is spent by the majority for clothing, shelter and health. 79 percent of the families are spending 71-90 percent of their income on food. Families which are spending 41-70 percent of their income on food are having a monthly income of Rs.800 and above. The total expenditure pattern of the families according to their income is analysed; and results are presented in Table 9.

Table 9. Comparison of family income and total expenditure pattern.

Income monthly	Number	Average amount of expenditure
200-400	17	320
400-600	36	519
600-800	21	719
800 & above	26	887

As revealed in Table 9, the expenditure of a family is found to increase in proportion to the income. This finding is statistically tested by applying analysis of variance and the findings are presented in Appendix VIII-a.

From Appendix VIII-a it is clear that the increase in income is influencing significantly the family expenditure. A major factor which influences the food expenditure pattern in this context is family size. Hence this aspect is probed further.

3.2 Food expenditure pattern of the families

Families surveyed have been divided into 8 groups according to their family size. The effect of family size on food expenditure pattern are presented in Table 10.

Table 10. Effect of family size on food expenditure pattern.

Family size	Number	Average amount spent for food
2a + 3c	14	353.5
2a + 4c	12	437.5
2a + 5c	15	461.6
2a + 6c	12	479.1
2a + 7c	22	627.2
2a + 8c	7	656.0
2a + 9c	6	754.1
2a + 10c	3	933.3

a - adult. c - children

Table 10 revealed that there is a steady increase in food expenditure pattern as the size of the family increases due to increase in number of children. But increase in number of adults do not show a steady increase in the food expenditure.

When family size with 10 children and three children are compared there is much difference in the food expenditure. However the data thus collected are statistically analysed and the results are presented in Appendix VIII-b.

From Appendix VIII-b it is clear that the food expenditure of families are found to be influenced significantly by the family size.

Food and health are two aspects complementing each other. The effect of family size on expenditure of health is given in Table 11.

Table 11. Effect of family size on expenditure for health.

Family size	Number	Average amount spent for health
2a + 3c	14	27.86
2a + 4c	12	26.67
2a + 5c	15	33.67
2a + 6c	12	32.5
2a + 7c	22	33.64
2a + 8c	7	32.71
2a + 9c	6	41.67
2a + 10c	3	63.3

When family size with 10 children and three children are compared there is significant difference in their expenditure of money for health. The data thus collected are statistically treated and the results are presented in Appendix VIII-c.

From Appendix VIII-c it is clear that the expenditure of money for health are found to be significantly influenced by the family size.

3.3 Food expenditure pattern with reference to different food items.

Food expenditure pattern with reference to different food items are presented in Table 12.

Table 12. Food expenditure pattern with reference to different food items.

Percentage of food expenditure	Cereals	Pulses	Roots and tubers	Vegetables	Fish	Milk	Meat & egg	Fats & sugar	Nuts and oil-seeds
0-5	-	11	-	20	98	10	15	36	100
6-10	-	2	38	3	2	2	1	38	
11-15	-	-	47	-	-	-	-	26	
16-20	-	-	15	-	-	-	-	-	
21-25	-	-	-	-	-	-	-	-	
26-30	-	-	-	-	-	-	-	-	
31-35	-	-	-	-	-	-	-	-	
36-40	-	-	-	-	-	-	-	-	
41-45	-	-	-	-	-	-	-	-	
46-50	19	-	-	-	-	-	-	-	
51-55	15	-	-	-	-	-	-	-	
56-60	43	-	-	-	-	-	-	-	
61-65	23	-	-	-	-	-	-	-	
66-70	-	-	-	-	-	-	-	-	
71-75	-	-	-	-	-	-	-	-	
75 & above	-	-	-	-	-	-	-	-	
Total	100	13	100	23	100	12	16	100	100

As revealed in Table 12, the highest percent of monthly income is spent for food. So the families are divided into 16 groups according to the amount spent for food viz cereals, roots and tubers, fish, fats, sugar and nuts which are found to be the major food articles purchased by all the families. Next to cereals, weightage is given for roots and tubers since 6 to 20 percent of the income is spent on this item of food. It is to be noted that cereals and roots are the staple foods of these families and occupy a dominant position in the daily menu. Next to cereals and roots a common item in the food expenditure pattern of families is fish, even though very little amount is spent for this food item (0-5 percent). Besides these food articles, food items commonly purchased by all families are sugar, fats and coconut. Comparatively less amount (0.15 percent) is spent on these food items probably they are used as food tasters in their preparations. Protective foods like pulses (15 percent) milk (16 percent) meat and egg (12 percent) are found to be rare items included in the food expenditure pattern of these families. The families which include these foods are also spending very little amount for purchasing these items. This clearly indicates

that the families surveyed are consuming a diet predominant in carbohydrate foods.

3.4 Frequency of different items of food use by the families

An important way to assess the popularity of food items is to assess the frequency of use of these items in their daily diet. The data collected on these lines are presented in Table 13.

Table 13. Frequency of different items of food use by the families (in percentage).

Frequency of use	Cereals	Pulses	Roots	Other veg.	Green leafy	Fruits	Milk	Meat	Fish	Fat & sugar	Processed foods	Nuts
Daily	97	-	83	-	-	8	17	-	90	96	-	85
Weekly	3	4	11	6	-	-	-	-	3	4	-	15
Occasionally	-	65	6	57	35	63	40	78	7	6	68	-
Not at all	-	31	-	37	65	29	43	22	-	-	32	-
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 13 indicates that 97 percent of the families

use cereals as staple foods daily while roots and tubers are also included in the daily diet by 83 percent of the families along with cereals. Besides cereals and roots, fish is a common item in 90 percent of the families probably because this food is available at low cost and is often caught by them. As indicated earlier, sugar, fats and nuts are included daily in the diet probably as food tasters. During periods of nonavailability of fish these families depend on seasonal vegetables and fruits like jack and mango for preparing side dishes for the staple food. Whenever, the availability of fish is limited the families are found to be in the habit of using pulses (65 percent) green leafy vegetables (35 percent) and other vegetables (57 percent). Rarely egg, milk and meat are included in their diet due to their poor economic condition. However the majority of the families are reluctant to include food items like green leafy vegetables and pulses in their daily diet. These findings further throw light on the quantitative and qualitative inadequacy of the daily diet consumed by these families and the items of food which can and those which can not be popularised among them.

3.5 Meal pattern of the families

An assessment of the daily meal pattern helps to indicate the distribution of various foods in different meals in a day. Therefore the meal pattern for three consecutive days collected by recall method are analysed and the results are presented in Table 14.

Table 14. Menu for the survey period.

Day	Cereals			Pulses			Roots				Fish			Other veg.			Milk		
	BF	L	D	BF	L	D	BF	L	S	D	BF	L	D	BF	L	D	BF	L	S
I	79	80	97	-	-	-	21	20	-	3	-	77	96	-	3	4	-	-	15
II	83	90	65	4	-	-	17	39	-	35	13	88	94	-	2	-	-	-	-
III	93	100	81	3	3	-	18	10	-	49	-	81	60	-	6	-	-	-	21
AV.	85	90	81	3	3	-	19	23	-	29	13	82	83	-	4	4	-	-	12

* BF - Breakfast, L - Lunch, S - Snacks, D - Dinner

As depicted in Table 14, three meals a day namely breakfast, lunch and supper was found to be common pattern of the families surveyed. Cereals, tubers and fish are the major items in these three meals. Rice is found to be the staple food in the diet. Rice is the form of leftover food and is an important breakfast item among the majority

of families. Roots and tubers mainly tapioca and fish also play a similar role in a few families. Fish and rice form important items in the menu for lunch of the majority of the families while in few families rice and fish are replaced by tapioca and vegetables. Only twelve percent of families have evening snack included in the meal pattern. The main item of this meal is only beverages like coffee or tea. Supper is dominated by rice and fish and or by tapioca. In short it can be stated the daily meal pattern of these families are constituted mainly by rice or tapioca and fish.

3.6 Foods given during special conditions

Infancy, pregnancy and lactation are the important special conditions when adequate care in food consumption is to be made. Data collected on these lines depict that for a child in the age group of 0 to 12 months breastmilk is the major source of sustenance. Breastmilk is continued until the child is in the 3rd year of life by the majority of mothers (79 percent). 14 percent of mothers report that the child is nursed until 2 year of life and 6 percent of mothers nurse the child until 1 year of life. Toddler aged 20-24 months continued to receive breastmilk

though by this stage, the output might have diminishing rapidly. Breastmilk is supplemented by small amounts of biscuits (34 percent) bread (14 percent) and fruits (17 percent) as special foods in infant's diet. The pre-school children are given biscuits (48 percent) and sweets (11 percent) along with a small amount of family staple meal. No special food is prepared at home for the child. However the attempt made by the mothers to give some food as supplementary foods is notable, probably women are unconsciously aware of the need for good food to the young ones, but helpless in meeting the needs due to their present economic condition. Similarly special foods are not given to adolescents pregnant or nursing mothers. In short it can be stated that so far as the diet of preschool children is concerned they are treated as if they are still infants and hence are to be in a state of perpetual undernutrition. According to the views of mothers the child after two, develops a strong instinct for survival and learn to gorge himself on any food that is available. However, the health status of child may give another story.

An enquiry about foods restricted or avoided

during special conditions generally throw light on the food taboos and faulty beliefs of the community. Hence data on these lines were collected and the data indicate that, certain foods such as papaya (35 percent) egg (18 percent) and milk (4 percent) are avoided or restricted under special conditions. Animal foods are avoided in infant's diet by majority of the families since they believe that these foods may cause indigestion. Pregnant women are not allowed to take certain foods like papaya and egg as they may cause abortion. Pregnant women are prevented from having a dinner since they feel that, this may cause discomfort to the woman. They also feel that skipping dinner may help to have smaller sized babies resulting in an easy delivery.

Preparations specially designed for certain occasions give some information on the food habits of the community. The data collected indicate that rice and meat (34 percent) and biriyani (39 percent) for marriage and oratti and meat (81 percent) for other religious occasions are prepared. Sweets (27 percent) and fruits (28 percent) are distributed during births and kanji is (83 percent) a preparation for mourning.

3.7 Storage of food articles

Method of storage of foods is an important factor which may throw light on the hygienic aspect of handling food. Hence data on food storage are collected. Only very few food items are found to be purchased in bulk and stored by these families. Cereals are stored in sacks (77 percent) or in mud pots (23 percent) and tins. The women reported that mud pot is used to store vegetables and some times kept open in buckets. Fish whenever available in excess during the season are dried and stored in tins (28 percent) and mud pots (10 percent).

3.8 Preservation of food articles

Observation by the investigator indicates that the storage methods used by these families and space used for storage by these families are not hygienic. Processing perishable foods may help to make available food during shortage. But the method of preservation used may influence both the nutritional and keeping quality of foods. A common item which is processed and stored by these families is fish. Very conventional methods of processing such as salting and drying are

adopted by 89 percent of families. Very few families (21 percent) are in the habit of processing vegetables.

3.9 Methods of cooking food articles

Data on methods employed for cooking and preparation of different food articles are collected to assess their knowledge regarding correct cooking methods. The data is presented in Table 15.

Table 15. Methods employed for cooking and preparation.

Foods	Absorption	Boiling & straining	Frying	Boiling	Curry
Cereals	-	94	-	6	-
Pulses	-	2	-	98	-
Roots	-	90	-	-	10
Fish	-	-	32	-	68
Meat	-	-	10	-	90
Vegetable	-	-	3	89	89

As indicated in Table 15, cereals and roots are cooked by boiling and straining. Boiling is the cooking method mainly employed for cooking various food articles,

being least expensive. Other methods like frying is used for cooking fish (32 percent) and vegetables (3 percent) by a very few families. Many of the women wash food items after cutting (55 percent) and they wash cereals and vegetables several times. And the vegetables are cut into very small pieces by 93 percent of the women. All these indicate that the women are not aware of the quantity of nutrients lost from the food due to faulty method of processing and cooking.

4. DIETARY PATTERN OF WOMEN AND CHILDREN

Dietary intake of 100 women and 63 children are assessed by a recall method. Comparisons are based on the recommended daily allowances of ICMR (1982). The average quantity of foods consumed by women in normal and special conditions are given in Table 16.

Table 16. Average quantity of foods consumed by women in normal and special conditions.

Food groups	Normal women N-34			Pregnant women N-20			Lactating women N-46		
	Amount consumed (g)	R.D.A. (g)	Percentage of RDA met	Amount consumed (g)	RDA (g)	Percentage of RDA met	Amount consumed (g)	RDA (g)	Percentage of RDA met
Cereals	238.0	300	79.3	240.0	350	68.5	230.0	400	57.5
Pulses	10.0	45	22.2	10.0	45	22.2	15.0	55	27.5
Roots and tubers	159.0	50	318.0	170.0	50	340.0	147.0	50	294.0
Flesh foods	86.0	30	286.0	74.0	30	246.6	80.0	30	266.0
Other vegetables	24.0	75	32.0	20.0	75	26.6	25.0	75	33.3
Sugar	7.3	30	24.3	5.3	40	13.3	150.0	50	33.3
Milk and milk products	7.4	100	7.4	10.5	325	3.2	10.7	325	3.29
Fruits	-	30	-	10.0	30	33.3	-	30	-
Nuts and oilseeds	10.0	30	33.3	7.0	40	17.5	8.8	40	22.0
Fats and oils	10.7	30	35.6	8.5	30	28.3	20.0	30	66.6
Green leafy vegetable	-	125	-	-	100	-	-	150	-
Egg	-	30	-	-	30	-	-	30	-

N - denotes sample size

RDA - Recommended daily allowance

As revealed in Table 16, the diet of the women of the colony in normal as well as in special conditions are inadequate with respect to majority of foods except roots and tubers and fish, because roots and tubers are the staple foods to Keralites and fish is a very common food available in the coastal areas where the study area is located. More than 75 percent of the requirements of cereals for the women in normal conditions are met but the cereals included in the diets of women in special conditions are still inadequate. On comparison, it can be found that the quantity of cereal included by lactating women is less than that of pregnant women and women in normal conditions. Nutritious foods like green leafy vegetables and fruits are completely lacking in the diets of these women in normal conditions as well as during pregnancy and lactation period. Approximately 30 to 35 percent of the requirements of different categories of foods such as cereal and roots and tubers are met. Visible fat intake by these women vary from 8 to 20 g per day and the average consumption of visible fats by these women is 16 g. This is mainly in the form of vegetable oil, especially coconut oil.

The average nutrient consumption of women in

normal and special conditions are calculated using food composition tables (ICMR 1982). The average nutrient intakes of the women in normal, pregnant and lactating condition are given in Tables 17, 18 and 19.

Table 17. Average nutrient consumption of normal women
N = 34.

	Calo- ries (K cal)	Pro- teins (g)	Fat (g)	Cal- cium (mg)	Iron (mg)	Vit.A (I u)	Thia- mine (mg)	Vita- min C (mg)
Average nutrient intake	1188.0	33.7	10.2	411.0	14.3	39.0	0.7	43.0
R.D.A.	1900.0	45.0	35.0	500.0	30.0	3000.0	1.0	50.0
Percentage of R.D.A. met	62.5	74.8	29.1	82.2	47.6	1.3	71.0	86.0

N - denotes number of samples

Table 18. Average nutrient consumption of pregnant women
N = 20.

	Calo- ries (K cal)	Pro- teins (g)	Fat (g)	Cal- cium (mg)	Iron (mg)	Vita- min A (I u)	Thia- mine (mg)	Vita- min C (mg)
Average nutrient intake	1270.0	32.1	10.9	431.0	16.1	28.5	0.9	63
R.D.A.	2200.0	55.0	35.0	1000.0	40.0	3000.0	1.2	50
Percentage of R.D.A. met	57.7	58.3	31.1	43.1	40.3	0.9	75.8	126

N - denotes number of samples

Table 19. Average nutrient consumption of lactating women
N = 46.

	Calo- ries (K cal)	Pro- teins (g)	Fat (g)	Cal- cium (mg)	Iron (mg)	Vita- min A (I u)	Thia- mine (mg)	Vita- min C (mg)
Average nutrient intake	1197.0	39.0	18.3	474.0	17.2	31.3	0.9	56.6
R.D.A.	2600	65.0	50.0	1000.0	30.0	4600.0	1.4	80.0
Percentage of R.D.A.	46.0	60.0	36.6	47.4	57.3	0.68	64.2	70.75

N - denotes number of samples

The mean daily calorie intake of women in normal conditions as well as in special conditions are found to be 1188 to 1270. Compared to normal and lactating women, pregnant women are found to get more calories from their daily diet. However, 63 percent of the calorie requirement of the normal women are met while 58 percent and 48 percent of calorie requirements are met for women in pregnant and lactating condition respectively. As revealed in Tables 17, 18 and 19 women in normal, pregnant and lactating condition are found to receive approximately 58 to 75 percent of protein. Compared to women in pregnant and lactating condition women in normal condition receive more protein food and the protein consumption of pregnant women is insufficient. Similarly, calcium availability from the diet of normal women is found to be (82 percent), sufficient though the women in special conditions are unable to meet even 50 percent of their calcium requirement from the diet they consume. Regarding iron requirement, lactating women surveyed are found to get higher percentage of iron from their daily diet when compared to pregnant women and women in normal conditions. Negligible amount of vitamin A is consumed by women from all groups. Vitamin C

is found to be present in a moderate quantity meeting more than 70 percent of their daily requirement. This is due to the consumption of large quantity of tapioca which is rich in vitamin C. In short, it can be stated that gross deficiencies are noted in the diets of women in normal conditions with respect to vitamin A, iron and fat. Compared to women in normal condition, pregnant women have a higher nutritional requirement. They are less fortunate since they are unable to meet this requirement. The women in normal conditions meet 70 percent and more of their requirements for nutrients like water soluble vitamins like thiamine and vitamin C while the major nutrients like calories, proteins and fat are met only around 50 to 65 percent. The calorie deficiency in the diet of these women may negatively influence the protein availability in the daily diet. In the case of women in lactating condition, requirements of all the nutrients are not met satisfactorily. Among the women of the three groups, women in lactating condition are the worst sufferers while considering their dietary intake and nutrient consumption. Prolonged consumption of such inadequate diets by these women may be responsible for the various health and nutritional hazards prevalent

among women in this community especially after 2 or 3 child births. Such women are found to be very lethargic and less enthusiastic in undertaking various responsibilities including the care of their children.

The average quantity of foods consumed by children in the age group of 1 to 3 and 3 to 5 are given in Table 20.

Table 20. Quantity of foods consumed by children.

Food groups	1-3 years N = 41			3-5 years N = 22		
	Amount consumed (g)	R.D.A. (g)	Percentage of R.D.A. met	Amount consumed (g)	R.D.A. (g)	Percentage of R.D.A. met
Cereals	108.0	150.0	72.0	138.0	200	69.0
Pulses	10.0	40	25.0	21.0	70	30.0
Roots and tubers	48.0	15	320.0	103.0	25	412.0
Fish	57.0	30	193.0	47.5	30	158.0
Other vegetables	10.5	15	70.0	11.0	25	44.0
Sugar	3.8	30	12.6	5.14	40	12.8
Milk	10.6	300	3.6	18.5	200	9.3
Green leafy vegetables	-	50	-	-	75	-
Nuts and oilseeds	7.0	30	23.3	3.5	20	17.5
Fats and oils	3.5	20	17.5	10.0	25	40.0
Egg	-	30	-	-	30	-
Fruits	10.0	30	10.1	-	30	-

As revealed in Table 20, the components of the diets of children (1-3 and 3-5 years) are more or less similar to the diets consumed by adult women. Foods except roots and tubers and fish are inadequate in the diets of the children in the two groups. More than 70 percent of the food requirements of the children in the age group of 1 to 3 are met by foods like cereals, roots and tubers, vegetables and fish included in their diets. Foods such as nuts and oilseeds (23.3 percent) fat and oil (17.5 percent) and fruits (10.1 percent) are not met in adequate amounts in the child's diet. The presence of protective foods like milk and milk products (3.6 percent) are in very negligible amounts. The diets of children completely lack foods like egg and green leafy vegetables. Compared to the diets of children of 1 to 3 years, the food intake of children in the age group of 3 to 5 years are found to be deficient in nuts and oilseeds, while the remaining foods such as cereals, pulses, vegetables, roots and tubers and fats and oils are found to be more than adequate, probably children of this age group are more aggressive in seeking food. Comparison with the recommended daily allowances reveal that roots and tubers and fish are found to be included

in excess. This is the same result obtained for women of different conditions and children in the age group of 1 to 3 years, while the requirements of other food groups are not met sufficiently. The foods supplying major nutrients are cereals (69 percent) sugar (12.8 percent) pulses (30 percent) milk (9.25 percent) nuts and oilseeds (17.5 percent) are included in negligible amounts.

Average nutrient consumption of children of 1 to 3 and 3 to 5 years is given in Table 21 and 22.

Table 21. Average nutrient consumption of children 1-3 years
N = 41.

	Calo- ries (K cal)	Pro- tein (g)	Fat (g)	Cal- cium (mg)	Iron (mg)	Vita- min A (iu)	Thia- mine (mg)	Vita- min C (mg)
Average nutrient intake	691.0	16.5	4.8	223.0	7.2	21.5	0.4	28.5
R.D.A.	1200.0	18.0	25.0	400.0	15.2	1000.0	0.6	30.5
Percen- tage of R.D.A. met	57.5	91.6	19.2	55.8	47.8	2.2	61.6	95.0

N denotes number of samples

Table 22. Average nutrient consumption of children 3-5 years
N = 22.

	Calo- ries (Kcal)	Protein (g)	Fat (g)	Cal- cium (mg)	Iron (mg)	Vita- min A (iu)	Thia- mine (mg)	Vita- min C (mg)
Average nutrient intake	747.0	18.5	4.1	311.0	9.1	31.3	0.41	33.1
R.D.A.	1500.0	22.0	25.0	400.0	15.2	1200.0	0.8	30.5
Percentage of R.D.A. met	49.8	84.0	16.4	77.7	60.6	2.6	51.3	110.3

N denotes number of samples

As depicted in Tables 21 and 22, the daily diets of children of two age groups are found to contain proteins in moderate amounts (84 to 92 percent) However, the calories consumption of the children belonging to two groups are found to be insufficient and meeting only 50 to 58 percent of their daily requirement. Therefore the protein present in the daily diet will be used to meet the energy needs instead of using for body building. Considering the presence of calcium and iron of these two groups the diets of the children of 3 to 5 years

are found to be better. This is probably because of the consumption of roots and tubers and fish. However, minerals available from these diet are insufficient to meet the daily requirements of children of these 2 groups. Children are found to be affected by the absence of vitamin A. While thiamine and vitamin C requirements of these two groups are considerably met by cereals and roots and tubers in their diet respectively.

Dietary intakes of women and children were assessed by one day weighment survey. Comparisons of the diets are made with the recommended daily allowances of ICMR (1982). The average quantity of foods consumed by the women (10) in normal and special conditions is given in Table 23.

Table 23. Average quantity of foods consumed by women in normal and special conditions.

Food groups	Normal women N = 6			Pregnant women N = 1			Lactating women N = 3		
	Amount consumed (g)	RDA	Percentage of RDA met	Amount consumed (g)	RDA	Percentage of RDA met	Amount consumed (g)	RDA	Percentage of RDA met
Cereals	292.0	300	96.6	300.0	350	94.2	327.0	400	81.7
Pulses	10.5	45	23.3	2.8	45	6.2	3.6	55	6.5
Roots and tubers	184.0	50	368.0	214.0	50	428.0	221.0	50	442.0
Nuts and oilseeds	12.7	30	42.3	14.2	30	47.3	14.2	30	47.3
Fruits	7.7	30	25.6	7.1	30	23.6	10.6	30	35.3
Fish	68.7	30	229.0	71.0	30	236.0	70.6	30	235.0
Other vegetables	10.1	75	13.4	-	75	-	-	75	-
Green leafy vegetables	-	125	-	-	150	-	-	150	-
Fats and oils	8.8	30	29.3	7.1	30	238.0	9.0	45	20.0
Sugar	7.3	30	24.3	8.3	40	20.7	8.3	50	16.6
Egg	-	30	-	-	30	-	-	30	-
Milk and milk products	-	100	-	10.5	325	3.2	18.5	325	5.6

As revealed in Table 23, the diets of normal women in normal condition are inadequate in majority of foods except cereals, roots and tubers and fish. In the case of women in all groups the amount of cereal consumed is less than the recommended daily allowances. The amount of roots and tubers and fish consumed is above the recommended daily allowances. Foods like green leafy vegetables and other vegetables are completely lacking in the diets of pregnant and lactating mothers. The findings of the weighment survey are in agreement with the results of the recall method reported earlier.

Average nutrient consumption of women in normal and special conditions is given in Table 24, 25 and 26.

Table 24. Average nutrient consumption of normal women.
N = 6

	Calo- ries (K cal)	Pro- teins (g)	Fat (g)	Cal- cium (mg)	Iron (mg)	Vita- min A (iu)	Thia- mine (mg)
Average nutrient intake	1643.0	37.4	15.5	437.0	160.0	21.8	0.8
R.D.A.	1900.0	45.0	35.0	500.0	30.0	3000.0	1.0
Percentage of R.D.A. met	86.4	83.1	44.2	87.4	53.3	0.7	84.0

N denotes number of samples

Table 25. Average nutrient consumption of pregnant women.

N = 1

	Calo- ries (K cal)	Pro- teins (g)	Fat (g)	Cal- cium (mg)	Iron (mg)	Vita- min A (iu)	Thia- mine (mg)
Average nutrient intake	1666.0	42.1	21.8	470.0	11.7	19.6	.0.8
R.D.A.	2200.0	55.0	35.0	1000.0	40.0	3000.0	.1.2
Percentage of R.D.A. met	75.7	76.5	62.2	47.0	29.2	0.7	70.8

N denotes number of samples

Table 26. Average nutrient consumption of lactating mothers.

N = 3

	Calo- ries (K cal)	Pro- teins (g)	Fat (g)	Cal- cium (mg)	Iron (mg)	Vita- min A (iu)	Thia- mine (mg)
Average nutrient intake	1751.0	39.0	18.3	474.0	17.2	33.3	0.8
R.D.A.	2600.0	65.0	50.0	1000.0	30.0	4600.0	1.4
Percen- tage of R.D.A. met	67.3	60.0	36.6	47.4	57.3	0.7	57.1

N denotes number of samples

On an average women in pregnant and lactating conditions receives 60 to 75 percent of their calories, 60 to 75 percent proteins and 30 to 60 percent of fat when compared to recommended daily allowances. Women in normal condition receive more nutrients when compared with women in special conditions. The findings of the survey are in full agreement with the results of the recall method except in the case of calories and proteins. Probably because of the advance information regarding the conduct of a weighment survey, the women might have included more foods.

The average quantity of foods consumed by children assessed by weighment survey is given in Table 27.

Table 27. Average food consumption of children.

Food groups	1-3 years N = 4			3-5 years N = 3		
	Amount consumed	R.D.A.	Percentage of R.D.A. met	Amount consumed	R.D.A.	Percentage of R.D.A. met
Cereals	126.0	150	84.0	186.0	200	93.0
Pulses	3.3	40	8.1	4.2	70	5.9
Roots and tubers	41.0	15	273.0	95.2	15	634.0
Nuts and oilseeds	48.5	30	28.3	11.5	20	57.5
Fruits	7.5	30	25.0	10.5	30	35.0
Fish	48.0	30	160.0	53.5	30	178.3
Other vegetables	13.5	15	90.0	13.6	25	54.0
Green leafy vegetable	-	50	-	-	75	-
Milk and milk products	20.5	300	6.8	4.7	200	7.3
Egg	-	30	-	-	30	-
Fats and oils	3.8	25	15.2	4.9	25	19.6
Sugar	4.5	40	11.25	7.1	40	17.7

N denotes number of samples

As revealed in Table 27, the diets of children in the age groups of 1 to 3 and 3 to 5 are inadequate in majority of foods except roots and tubers and fish. The average nutrient consumption of these children is given in Tables 28 and 29.

Table 28. Average nutrient consumption of children 1-3 years.

	Calo- ries (Kcal)	Pro- teins (g)	Fat (g)	Cal- cium (mg)	Iron (mg)	Vita- min A (iu)	Thia- mine (mg)
Average nutrient intake	841.0	17.5	10.0	140.0	9.1	23.1	0.3
R.D.A.	1200.0	18.0	25.0	400.0	15.2	1000.0	0.6
Percent- age of R.D.A. met	70.0	97.2	40.0	35.0	60.6	2.3	60.0

Table 29. Average nutrient intake of children 3-5 years.

	Calo- ries (Kcal)	Pro- teins (g)	Fat (g)	Cal- cium (mg)	Iron (mg)	Vita- min A (iu)	Thia- mine (mg)
Average nutrient intake	947.0	21.0	10.0	250.0	8.6	11.5	0.4
R.D.A.	1500.0	22.0	25.0	400.0	15.2	1000.0	0.6
Percentage of R.D.A. met	63.1	95.4	40.0	62.5	57.3	1.2	76.6

Children in the age group of 1 to 3 and 3 to 5 years receive 60 to 70 percent of calories, 90 percent proteins and 2 percent vitamin A and 60 to 70 percent vitamin C. Gross deficiencies are noted in the diets of the preschool children with respect to vitamin A and iron.

A comparison of the data on food and nutrient intake of the children by the recall method as against the weighment survey indicates a higher consumption of calories and proteins as assessed by the latter method. This better consumption of calories and proteins could be due to two possible reasons. In the recall method, the mothers interviewed might not be recalling correctly the quantities consumed leading to a decrease in the reported quantities compared to the actual intake. In the weighment method the earlier knowledge about the weighment of food preconditions the family to consume more during the period to show off to outsiders about their better circumstances. This leads to an exaggerated quantity higher than the actual consumed during normal periods.

The dietary consumption of women and children

when assessed through recall method and weighment method threw light on the calorie deficiency status of the diets of children and women. The calorie deficiency seem to neutralise the advantages of inclusion of protein foods in their diets especially in the diets of the children. Probably prolonged consumption of such diets have resulted in deficient nutritional status of children, which is clearly depicted in the anthropometric and clinical studies conducted among these population. The morbidity status of this population is also considerably influenced by this dietary pattern.

5. THE PREVALENCE OF DIARRHOEA IN THE AREA

5.1 Morbidity profile of the colony

In rainy seasons due to lack of sanitary facilities in the environment and unhygienic handling of foods there are outbreaks of infectious diseases. Trowbridge (1979) reports that diarrhoea is highest during the beginning of rainy months. In 1984 there was an outbreak of cholera in the colony.

Major health problems prevalent in this area among infants include, diarrhoea, worm infestation and

dysentery. In preschool children mumps, cholera, measles, diarrhoea, dysentery and viral fever are common while among adults, diarrhoea, viral fever are reported. However, nutritional disorders like kwashiorker and marasmus was not reported so far from this area.

The colony residents are not exposed to any form of non formal education programme except a nutrition education programme in 1980 and an immunisation camp in 1985-'86 conducted by the Department of Health Services under the Integrated Child Development Scheme.

5.2 Incidence of diarrhoea in the colony

An attempt is made to understand the traditional beliefs and practices about the causes and treatment of diarrhoea. Diseases like fever, diarrhoea and vomiting are very common in children and in 47.5 percent of the families at least one member is suffering from diarrhoea during the survey period. Safe water supply and sanitary facilities are seldom available in the colony. Carelessness and overstretched primary health care lack of immunisation programmes are partially responsible for this condition. Data collected on the occurrence of

diarrhoea in the colony are presented in Table 30.

Table 30. Occurrence of diarrhoea.

Family position	Percentage
Son	47.2
Daughter	33.3
Mother	13.8
Father	5.8

The Table 30 depicts that diarrhoea is more prevalent among boys probably because of their greater exposure to unhygienic conditions while playing. Diarrhoea seems to be very common in the age group of 1 to 5 (61.1 percent). The information furnished by the mothers on the severity of diarrhoea is presented in Table 31.

Table 31. Duration of diarrhoea.

Duration	Percentage
1-2 days	11.1
3-4 days	16.6
5-6 days	50.0
6 & above	22.0

As indicated in Table 31, majority of the sick children are not attended immediately by the mothers. The parents seek medical attention belatedly often after a week waiting. Prolonging this pathological condition of diarrhoea in children generally increases their nutritional requirement which is not adequately met leading to a worsening of the health condition.

In majority of diarrhoeal cases the duration may extend upto 5 to 6 days and in most cases it is associated with vomiting. This clearly indicates heavy loss of water from the body through both stools and vomiting. Most of the women (81 percent) have reported that the children are taken to the hospital if the diarrhoeal attack is severe after one week while the remaining women seem to neglect the situation.

As reported, 66.6 percent of the diarrhoeal diseases are cured after seeking medical help. Among the cases reported 11 percent of the children are having continuous diarrhoeal condition probably because of their malnourished condition and also due to the severity of the disease.

Majority of the women (64 percent) in the project

area consider allopathic medicines to be the best for diarrhoea. Most of the mothers (77 percent) restrict the intake of food of children during diarrhoea. They give only less amount of food during diarrhoea compared to normal condition. The mothers are not aware of the fact that children need to be fed appropriately during diarrhoea and to continue extra feeding for at least several weeks after the child has recovered. Breast feeding is not common during diarrhoeal conditions and solid foods are avoided during these conditions. Most of the mothers are not aware of the cause of diarrhoea. 22 percent felt that this pathological condition is due to indigestion 39 percent of the women feel that it is a punishment of God.

5.3 Knowledge of women regarding diarrhoea

Twenty four statements pertaining to diarrhoea are prepared. The main purpose of these statements is to test the awareness of the mothers regarding diarrhoea and regarding the health hazards faced by their children. Few statements are based on the factors related to the effect of diarrhoea and its treatment, knowledge of these mothers about home remedies in controlling diarrhoea

is evaluated. Few statements on the significance of environmental sanitation and scientific infant feeding and child care practices are also included, since these aspects are closely related to the occurrence of diarrhoea and these factors have a negative impact on the health status of the children.

These statements are administered to 100 housewives of the families where the baseline survey is conducted and they are requested to give their reactions to each statement on two points 'agree' and disagree. Agree and disagree are given respectively the scores of '1' and '0'. If the item is positive and is favourable to the psychological object under study, if the item is negative and is unfavourable to the psychological object under study. The scoring system is reversed. The total score of a housewife is obtained by summing the weights of individual items responded.

Practical experience of mothers regarding diarrhoea is assessed by using statements related to the prevalence of infectious condition, influence of feeding practices and seasonal variation in the occurrence of diarrhoea.

The awareness of mothers on the impact of diarrhoea on children is assessed by using statements related to certain symptoms like weight loss, dehydration and death. Knowledge of mothers on predisposing factors to other infectious diseases and to the repeated attacks of diarrhoea are also tested.

Knowledge of mothers regarding the statement of diarrhoea is assessed by using statements related to home remedies like salted rice water, coconut water and feeding practices followed during diarrhoeal conditions while the new technologies like treatment of diarrhoea with oral rehydration solution is also checked.

A few statements related to the significance of personal and environmental hygiene are included. Statements on scientific infant feeding, child care practices and health care measures are also included to assess the knowledge of mothers on these lines.

The mean score obtained by these housewives for all the 24 statements are worked out and the results are presented in Table 32.

Table 32. Mean score obtained for the statements on diarrhoea.

Aspects	Mean score	Neutral score
Statements on diarrhoea	12.1	12

Table 32 indicates that the mean score obtained, for the statements on diarrhoea is 12.1 and is slightly above neutral score for the statements. On further analysis it is observed that 51 percent of the mothers had scores ranging from 0 to 12 which is below neutral score and 49 percent of the mothers had scores ranging from 12 to 24 which is above the neutral score. Maximum score of 19 is obtained by 1 percent and minimum score of 8 is obtained by 4 percent of the mothers.

Mean score obtained by the mothers for the statements pertaining to the prevalence of diarrhoea was worked out and the results are presented in Table 33.

Table 33. Mean score obtained for the statement pertaining to the prevalence of diarrhoea.

Statements	Mean score for statements expressed by the mothers	Percentage of mothers who got '0' for the statement	Percentage of mothers who got '1' for the statement
Diarrhoea is an infectious disease	0.18	82	18
Diarrhoea occurs commonly in children	0.60	40	60
Diarrhoea occurs mainly in rainy season	0.64	36	64
Diarrhoea occurs more in bottledfed children	0.29	71	29

As revealed in Table 33, the majority of the mothers (60-64 percent) are aware of the seasonal prevalence of the condition among children, probably from the experience of their own life or by observing the problems of neighbours, friends relatives etc. However many of them (71 to 82 percent) are unaware of the seriousness of this hazardous condition and the implication of the type of food consumed by the children on this condition.

Mean score obtained by the mothers for the statements pertaining to the seriousness of the diarrhoea are presented in Table 34.

Table 34. Mean score obtained for the statements pertaining to the seriousness of diarrhoea.

Statements	Mean score	Percentage of mothers who got '0' for the statement	Percentage of mothers who got '1' for the statement
Diarrhoea leads to weight loss	0.17	83	17
Dehydration is the major symptom of diarrhoea	0.28	72	28
Death may occur due to diarrhoea	0.65	35	65
Repeated attacks of diarrhoea predisposes the child to other infectious diseases	0.21	79	21
Repeated attacks of infectious diseases lead to ill health	0.09	91	9

As indicated in Table 34, 65 percent of the mothers are aware of the fact that diarrhoea may lead

to death probably because of their practical experience. But majority of them seem to be ignorant of the fact that diarrhoea may lead to weight loss, dehydration, ill health and will act as a predisposing factor for the occurrence of other infectious diseases. Mean score obtained by mothers for the statements pertaining to the treatments of diarrhoea are presented in Table 35.

Table 35. Mean score obtained for the statements pertaining to the treatment of diarrhoea.

Statements	Mean score	Percentage of mothers who got '0' for the statement	Percentage of mothers who got '1' for the statement
Salted rice water is good for diarrhoea	0.69	31	69
Oral rehydration therapy is very expensive	0.29	71	29
Oral rehydration solution should be heated before use	0.11	89	11
Instead of sugar jaggery can be used for preparing oral rehydration solution	0.08	92	8
Enough water should not be given to children suffering from diarrhoea	0.48	52	48
Diarrhoea can not be cured by oral rehydration solution	0.28	72	28

As revealed in Table 35, 69 percent and 48 percent of the mothers are aware of the significance of feeding children with salted rice water and water during diarrhoeal condition respectively. Very few mothers had knowledge about oral rehydration therapy (29 percent) and the technology to be followed in preparing oral rehydration solution (8 to 11 percent). And very few mothers (28 percent) seem to have confidence in oral rehydration solution.

Mean score obtained by the mothers for the statements by which their knowledge on environmental sanitation is tested are presented in Table 36.

Table 36. Mean score obtained for the statements on environmental sanitation.

Statements	Mean score	Percentage of mothers who got '0' for the statement	Percentage of mothers who got 1 for the statement
Dirty long nails are unhygienic to health	0.41	59	41
The wells should be kept clean	0.81	19	81
Flies and diarrhoea are closely related	0.35	65	35
Flies can not be controlled by keeping the environment clean	0.48	52	48

As indicated in Table 36, knowledge of the mothers regarding the significance of environmental sanitation seem to be varying. In general the mothers are aware of the need for maintaining personal hygiene (41 percent), relation between diarrhoea and harmful flies (35 percent) and controlling flies (48 percent). A salient finding in this is that majority of mothers realised the necessity of keeping wells clean but they don't do so due to various factors which are beyond their control.

Mean score obtained by the mothers for the statements pertaining to scientific infant feeding and child care practices was worked out and the results are presented in Table 37.

Table 37. Mean score obtained for the statements pertaining to scientific infant feeding and child care practices.

Statement	Mean score	Percentage of mothers for who got '0' for the statement	Percentage of mothers who got 1 for the statement
Breast milk should be given at least for one year	0.91	9	91
Breast feeding can be started few hours after birth	0.45	55	45
Supplementary feeding along with breast milk is necessary for a child	0.10	90	10
Immunisation should be given at specified intervals	0.81	19	81

As revealed in Table 37, 81 percent of the mothers are aware of the significance of immunisation programmes probably because of the massive immunisation programme implemented by the Government in the rural areas. Significance of breast milk as the first food to the infant is also realised by majority of the mothers (91 percent) mainly because breast milk is the only source of food to the infant in such economic condition. But 45 percent of the mothers have realised the importance of starting breast milk on the first few hours. But the ignorance of the women (90 percent) regarding the supplementary foods are correctly revealed in the mean score obtained for the statement.

Knowledge of mothers related to various aspects of diarrhoea are discussed on the basis of their experience and exposure to various available sources and scores obtained by the mothers are consolidated and presented in Table 38.

Table 38. Knowledge of mothers related to various aspects of diarrhoea.

Aspects	Number of statements	Maximum score to be obtained	Mean score
Prevalence of diarrhoea	4	4	2.71
Effect of diarrhoea	5	5	1.78
Treatment of diarrhoea	7	7	2.91
Environmental sanitation	4	4	2.60
Scientific infant feeding and child care practices	4	4	2.10

Regarding the prevalence of diarrhoea the mean score of mothers is 2.71 which is only 67.75 percent of the maximum score to be obtained for these statements. 40 percent of the mothers surveyed had scores ranging from 0 to 2 for these statements, which is below the neutral score and 60 percent of the mothers had scores ranging from 3 to 4. The maximum score of 4 is obtained by 17 percent of the mothers surveyed. This clearly depicts that many of the mothers are fully aware of the prevalence of diarrhoea as an infectious condition and

the seasonal variation in its occurrence.

Regarding the knowledge of the mothers on the effect of diarrhoea the average mean score obtained is 1.78 which is only 35.60 percent of the maximum score to be obtained for these statements. 83 percent of the mothers had scores ranging from 0 to 2 for these five statements; which is below the average mean score of 5. 17 percent of the mothers had scores ranging from 3 to 5 and the maximum score of 5 is obtained by 9 percent of the mothers. This clearly indicates that this women need education on the ill effects of diarrhoea on the children immediately since they are not at all aware of the ill effects of diarrhoea such as weight loss, dehydration etc.

Regarding the treatment of diarrhoea the mean score obtained by mothers is 2.92 which is only 41.71 percent of the maximum scores to be obtained for these statements. 69 percent of mothers had scores ranging from 0 to 3 and 31 percent of mothers had scores ranging from 4 to 7. Maximum score of 5 is obtained by 25 percent of the mothers. However sufficient information on oral rehydration therapy need to be fed to these

mothers.

Knowledge of the mothers on scientific infant feeding and child care practices is assessed and the mean score obtained is 2.1 which is only 52.5 percent of the maximum score. 70 percent of the mothers had scores ranging from 3 to 4 and the maximum score of 4 is obtained by 0 percent of the mothers. This indicates that majority of mothers do not have a clear concept about scientific infant feeding and child care practices.

Level of knowledge of the mothers are determined by determining the number of statements answered correctly by them. The mothers who answered 6 statements, the group whose level of knowledge is considered as 25 percent and below while the mothers who answered 7 to 12 statements are grouped in the category of group 20 to 50 percent level of knowledge. Similarly the mothers who answer 13 to 18 statements correctly are grouped under the third category with the level of knowledge 51 to 75 percent. The mothers who answered 19 to 24 statements correctly are categorised in the fourth group where the level of knowledge is 76 to 100 percent. The details worked out are presented in Table 39.

Table 39. Level of knowledge of mothers.

Level of knowledge	Percentage of women
Below 25 percent	1
26 to 50	53
51 to 75	45
76 to 106	1

The Table 39 depicts that 53 percent and 45 percent of the mothers had their knowledge level from 25 to 50 percent and 51 to 75 percent respectively. Very few mothers (1 percent each) have knowledge upto the level of 76 to 100 percent as well as below 25 percent.

Impact of the age of these mothers on their level of knowledge were assessed and the results are presented in Table 40.

Table 40. Impact of age on the level of knowledge of mothers.

Age range of mothers	Mean score	Number of mothers below neutral score	Number of mothers above neutral score
(1) 15 to 25	18.5	10	15
(2) 26 to 35	16.1	8	10
(3) 36 to 45	11.6	8	11
(4) 46 to 55	8.2	9	7
(5) 56 and above	6.1	6	8

As indicated in Table 40, age is found to be a disseminating factor in acquiring knowledge. As age advances the mean score obtained by these mothers seem to reduce. Young mothers are more aware of the ill effects of diarrhoea. The influence of age on the level of knowledge was statistically studied and the results are given in Table 41.

Table 41. Age and level of knowledge of mothers.

Age groups compared	t value
1 vs 2	3.72*
1 vs 3	4.23*
1 vs 4	19.6*
1 vs 5	25.2*
2 vs 3	8.06*
2 vs 4	15.3*
2 vs 5	20.7*
3 vs 4	8.2*
3 vs 5	14.8*
4 vs 5	6.9*

*significant at 1% level

As revealed in Table 41, mothers belonging to different age groups differ significantly in their level of knowledge.

Level of knowledge of mothers in relation to the number of children is assessed and the results are presented in Table 42.

Table 42. Impact of number of children on the knowledge level of mothers.

Number of children	Mean score	Number of mothers below neutral score	Number of mothers above neutral score
(1) 1 to 3	3.00	14	18
(2) 3 to 5	3.15	12	18
(3) 6 to 8	2.90	10	6
(4) 9 to 11	3.05	15	7

The Table 42 depicts that generally number of children does not seem to a factor which may influence the level of knowledge of the mothers on the ill effects of diarrhoea. The influence of number of children on the level of knowledge of the mothers is statistically studied and the results are presented in Table 42.

Table 43: Statistical analysis of number of children on the knowledge level of mothers.

Number of children compared	t value
1 vs 2	1.30
1 vs 3	0.90
1 vs 4	0.45
2 vs 3	2.23*
2 vs 4	0.84
3 vs 4	1.20

*significant at 1 percent level

As revealed in Table 43, there is significant relation between the level of knowledge and number of children except in the scores obtained between women having 3 to 5 children and 6 to 8 children.

Level of knowledge and economic status of the families are assessed and the results are presented in Table 44.

Table 44. Economic status and level of knowledge of mothers.

Monthly income	Mean score	Number of mothers above neutral score	Below neutral score
200 to 300	2.5	7	14
300 to 400	2.6	4	13
400 to 500	2.1	14	8
500 to 600	2.5	9	15
600 and above	2.5	6	10

As indicated in the Table 44, there is not much difference in the mean scores with regard to their income.

Table 45. Statistical analysis of income on the knowledge level of mothers.

gps compared	t value
1 vs 2	1.20
1 vs 3	5.30*
1 vs 4	0
1 vs 5	0
2 vs 3	6.09*
2 vs 4	1.08
2 vs 5	1.08
3 vs 4	4.40*
3 vs 5	4.60*
4 vs 5	0

As indicated in the Table 45, there is significant difference in the knowledge level of mothers of income group 200 and 500 and 300 and 500. There is not much difference between other groups.

6. THE NUTRITIONAL STATUS OF PRESCHOOL CHILDREN

Nutritional status of the selected preschool children is assessed by collecting base line information on anthropometric measurements, clinical tests and haemoglobin estimation. Baseline anthropometric data are collected through a cross sectional survey on child health in the age group of 2 to 5. The anthropometric measurements of preschool children thus collected are compared with standards suggested by Rao et al. (1976). Deviation of each age group from the standard and the average anthropometric measurements of the children are given in Appendix IX.

Weight for age profile of the preschool children surveyed is presented in Table 46.

Table 46. Weight for age profile.

Age in ranges (months)	Sex	Number of children	Observed value (kg)	Standard (kg)	t value
6 to 12	M	-	-	-	-
	F	6	7.2	7.75	1.41
13 to 18	M	-	-	-	-
	F	-	-	-	-
19 to 24	M	-	-	-	-
	F	5	9.4	9.50	0.22
25 to 30	M	-	-	-	-
	F	-	-	-	-
31 to 36	M	6	10.4	11.25	1.89
	F	4	10.6	11.00	8.83
37 to 42	M	5	11.7	13.40	4.53*
	F	2	11.0	12.00	0.71
43 to 48	M	10	12.6	14.25	6.29**
	F	12	11.9	13.50	2.85*
49 to 54	M	5	14.2	15.50	4.11*
	F	-	-	-	-
55 to 60	M	13	13.9	16.40	5.96**
	F	17	13.6	15.25	4.45**
61 to 66	M	2	14.8	17.28	3.09*
	F	4	13.8	16.74	1.60

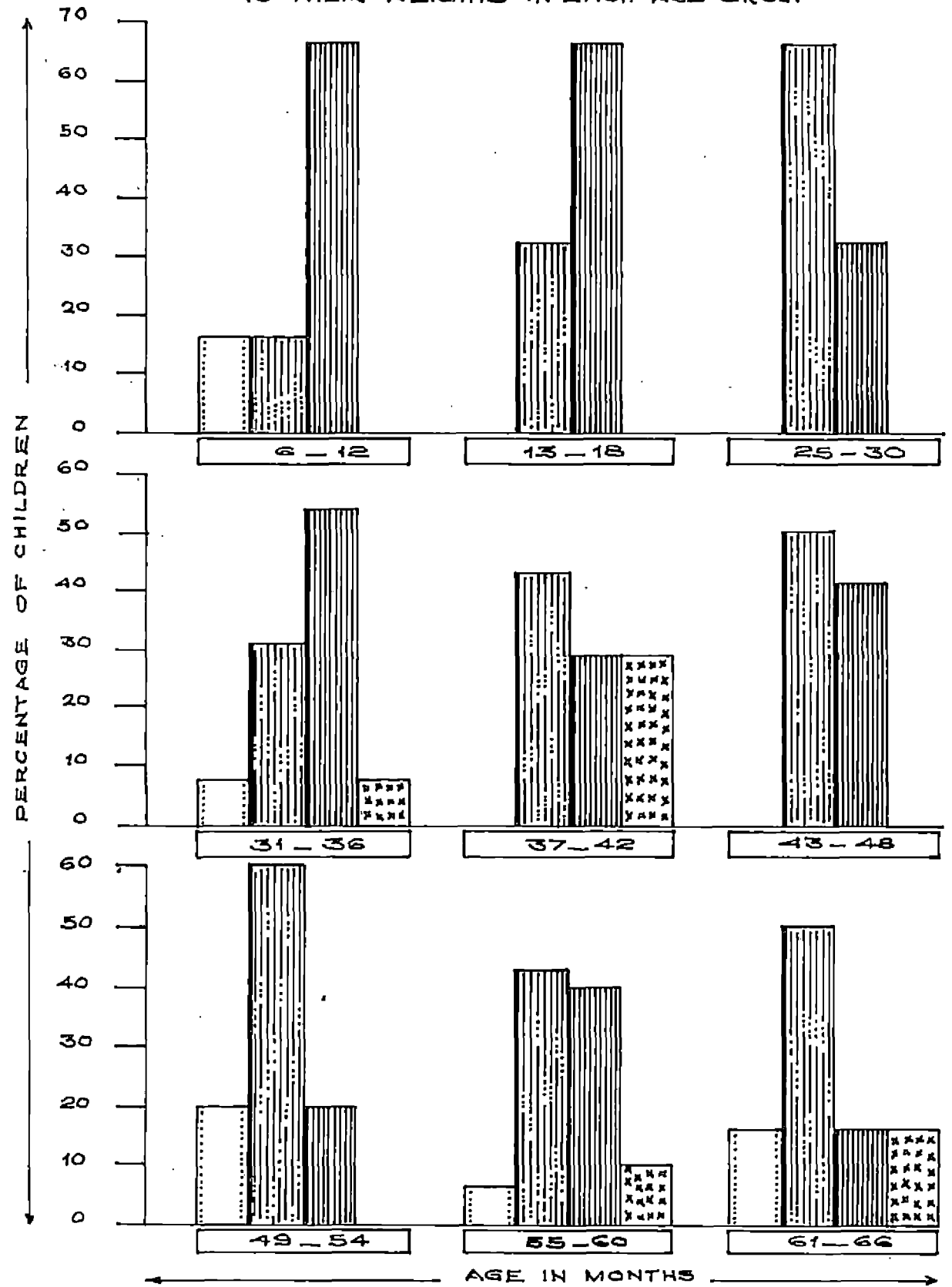
*Significant at 5 percent level

** " " 1 " "

The weight for age profile of the preschool children, when compared with reference standard depicts that all the measurements of these children are below the reference standard. There is significant difference in weight between the study samples and the standards except for the age groups of 12 to 24 months and 24 to 36 months. The children are classified by Gomez system (NIN 1975) which termed young children, who are between 90 percent and 75 percent of the Harward standard for body weight as first degree malnutrition, between 75 percent and 61 percent as second degree malnutrition and 60 percent and below as third degree malnutrition respectively, and the results obtained by Gomez grading are presented in Table 48 and Fig.7.

FIGURE-7

PERCENTAGE DISTRIBUTION OF CHILDREN SURVEYED ACCORDING TO THEIR WEIGHTS IN EACH AGE GROUP



ABOVE 90 PERCENT HARVARD STANDARD (NORMAL)
 75-90 PERCENT 1st DEGREE MALNUTRITION

BELOW 60 " 3rd DEGREE MALNUTRITION
 60-75 " 2nd "

Table 47. Percentage distribution of preschool children surveyed according to their weights in each age group.

Age group in ranges (mothers)	Total child- ren	Normal		1st degree malnutrition		2nd degree malnutrition		3rd degree malnutrition	
		Num- ber	Per- cen- tage	Num- ber	Per- cen- tage	Num- ber	Per- cen- tage	Num- ber	Per- cen- tage
6 to 12	6	1	16.6	1	16.6	4	66.6	-	-
13 to 18	6	-	-	2	33.3	4	66.6	-	-
19 to 24	2	-	-	-	-	2	100.0	-	-
25 to 30	3	-	-	2	66.6	1	33.3	-	-
31 to 36	13	1	7.6	4	30.7	7	53.8	1	7.6
37 to 42	7	-	-	3	42.8	2	28.5	2	28.5
43 to 48	22	2	9.1	11	50.0	9	40.9	-	-
49 to 54	5	1	20.0	3	60.0	1	20.0	-	-
55 to 60	24	2	8.3	10	41.6	9	37.5	3	12.5
61 to 66	6	1	16.6	3	50.0	1	16.6	1	16.6

Among the children comprising all age groups approximately 44.84 percent of the children show evidence of second degree malnutrition. This observation confirmed by the survey of dietary intake and morbidity. A greater incidence of second degree malnutrition is prevalent among

6 to 12 months and 13 to 18 months age group. The incidence of third degree malnutrition is more prevalent among 37 to 42 months age group. Significant variation found during weaning period, when probably the supplementary foods are not introduced properly in the child's diet is another notable point.

Height for age profile is presented in Table 48.

Table 48. Height for age profile.

Age in ranges (months)	Sex	Number of children	Observed (cm)	Standard (cm)	t value
6 to 12	M	-	-	-	-
	F	6	68.5	75.4	12.7**
13 to 18	-	-	-	-	-
	F	5	77.9	84.8	3.5*
19 to 24	M	-	-	-	-
25 to 30	-	-	-	-	-
31 to 36	F	4	83.25	92.9	7.8**
	M	6	86.4	92.9	9.1**
37 to 42	M	5	89.3	92.9	4.3*
	F	2	86.75	92.9	11.9
43 to 48	F	12	90.25	99.2	11.7**
	M	10	96.7	99.2	1.3
49 to 54	M	5	100	92.2	1
	F	-	-	-	-
55 to 60	M	17	100	99.2	4.7**
	F	13	99.5	99.2	4.0*
61 to 66	M	2	104	106.4	1
	F	4	101.7	106.4	4.2*

*Significant at 5 percent level.

**Significant at 1 percent level.

As revealed in the Table 48, there is significant difference between the study sample and the standards of height except in the age group of 49 to 54 months. A deficit in height usually indicates chronic and prolonged under nutrition.

Profile of arm circumference for different age groups is presented in Table 49.

Table 49. Profile of arm circumference for different age groups.

Age in ranges (months)	Sex	Number of children	Observed (cm)	Standard (cm)	t value
6 to 12	F	6	12.5	14.8	5.87**
	M	-	-	-	-
13 to 18	-	-	-	-	-
	F	5	13.6	15.4	3.30*
19 to 24	M	-	-	-	-
25 to 30	-	-	-	-	-
31 to 36	M	9	13.6	16	11.40**
	F	4	14.1	15.9	6.85**
37 to 42	M	3	14.4	16.0	4.73**
	F	2	14.2	15.9	6.07*
43 to 48	F	12	14.2	16.4	9.44**
	M	10	14.6	16.3	9.04
49 to 54	M	5	14.4	-	-
	F	-	-	-	-
55 to 60	F	17	14.3	16.5	6.41**
	M	13	14.6	16.4	5.07**
61 to 66	M	2	15.1	16.4	2.59
	F	4	14.6	16.5	5.20*

*Significant at 5 percent level

**Significant at 1 percent level

As revealed in Table 49, there is significant difference between the study sample and the standards of arm circumference except in the male children in the age group of 61 to 66 months and the female children in the age group of 13 to 24 months.

Profile of chest circumference for different age groups is presented in Table 50.

Table 50. Profile of chest circumference for different age groups.

Age in ranges (months)	Sex	Number of children	Observed (cm)	Standard (cm)	t value
6 to 12	M	-	-	-	-
	F	6	43.9	44.7	1.39
13 to 18	-	-	-	-	-
19 to 24	M	-	-	-	-
	F	5	46.4	47.2	1.78
25 to 30	-	-	-	-	-
31 to 36	M	6	47.6	50.9	2.97*
	F	2	48.5	49.5	1.33
37 to 42	M	5	49.1	51.9	4.40*
	F	2	48	50.5	3.57
43 to 48	M	10	50.4	52.6	5.04**
	F	12	47.8	51.3	4.92**
49 to 54	M	5	52.4	53.1	1
	F	-	-	-	-
55 to 60	M	13	51.2	53.4	3.12**
	F	17	51.0	52.6	1.77

*Significant at 5 percent level

**Significant at 1 percent level

As revealed in Table 50, there is significant difference between the study sample and the standards of chest circumference except in female children belonging to the age group of 13 to 24 and 49 to 54 months.

Profile of head circumference for different age groups is presented in Table 51.

Table 51. Profile of head circumference for different age groups.

Age in ranges (months)	Sex	Number of children	Observed (cm)	Standard (cm)	t value
6 to 12	M	-	-	-	-
	F	6	44.1	45.4	3.26*
13 to 18	-	-	-	-	-
19 to 24	M	-	-	-	-
	F	5	45.9	46.7	2.70
25 to 30	-	-	-	-	-
31 to 36	M	6	48.1	49.1	4.21**
	F	4	47.0	47.8	2.61
37 to 42	M	5	48.0	50.5	10.40*
	F	2	48.0	48.5	0.42
43 to 48	M	10	48.6	50.7	5.83**
	F	12	47.8	48.6	1.33
49 to 54	M	5	49.1	50.9	10.60**
	F	-	-	-	-
55 to 60	M	13	48.8	51.0	3.09**
	F	17	48.6	48.9	1.60

*Significant at 5 percent level

**Significant at 1 percent level

As revealed in Table 51 there is significant difference between the study sample and the standards of head circumference except in the female children in the age group of 13 to 36 months, 37 to 42 months, 43 to 48 months and 49 to 54 months.

Heights and weights are the most commonly used measurements in these type of studies and in the present study, heights and weights of preschool children are compared with standard value for their age. Average height for weight and the deviation of each age group from the standard height is given in Appendix X.

Smaller height is suggested for smaller physical stature, still even after allowing for a smaller height under normal children maintain low body weight. Therefore the rate of height to weight is taken into consideration and presented in Table 52.

Table 52. Weight for height profile of preschool children.

Weight (kg)	Number of children	Average observed height (cm)	Standard height (cm)	t value
(1)	(2)	(3)	(4)	(5)
10.0	6	86.25	89.5	1.87
10.5	2	89.75	92.0	2.90
11.0	7	87.50	94.7	3.89**
11.5	4	87.30	97.5	5.39*

(1)	(2)	(3)	(4)	(5)
12.0	11	93.2	100.0	6.20**
12.5	9	94.4	102.5	2.75*
13.0	8	93.75	105.0	7.05**
13.5	5	96.2	108.0	4.37*
14.0	10	100.4	110.5	7.16**
14.5	7	102.0	113.0	7.23**
15.0	7	103.4	115.5	8.20**
15.5	3	104.0	118.5	7.75*

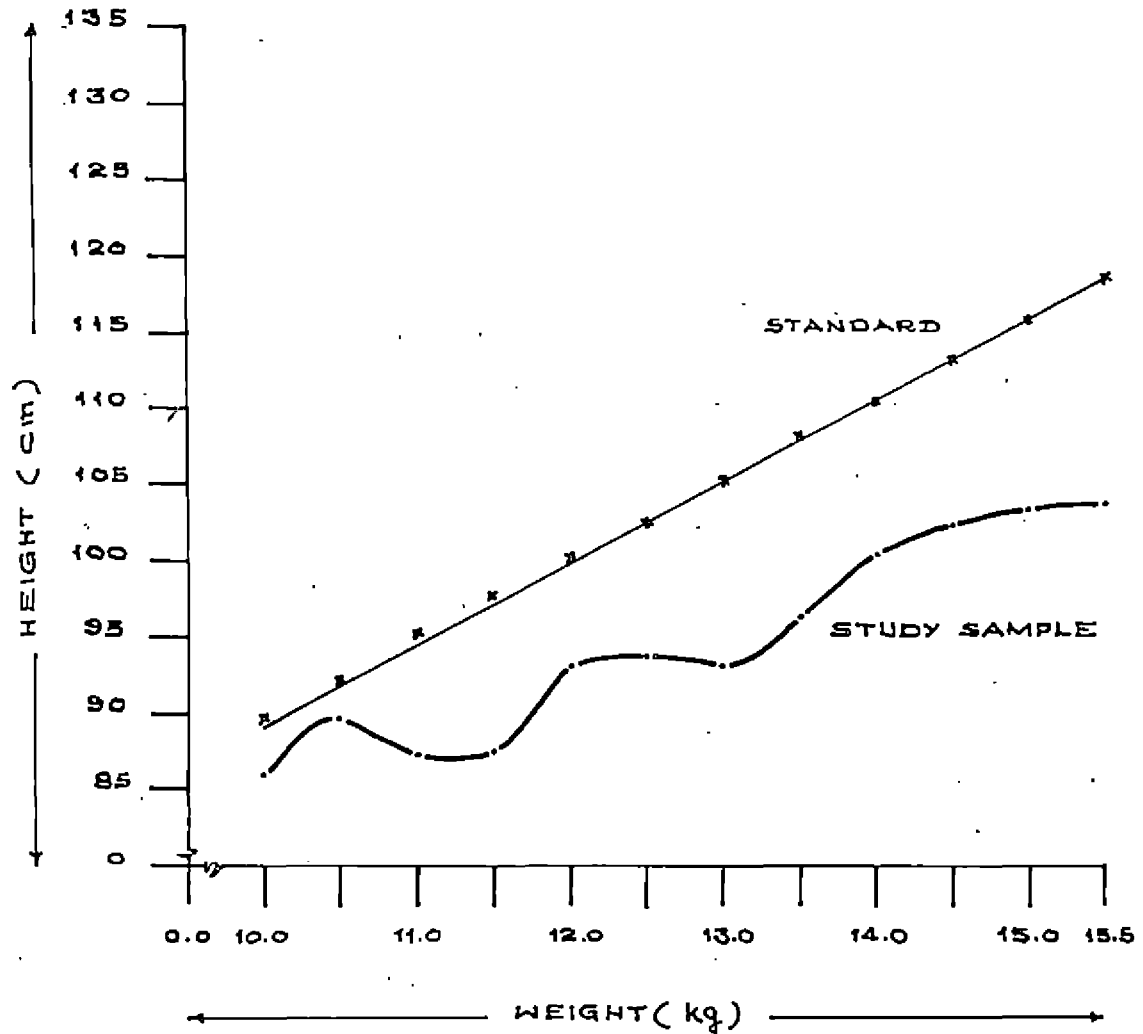
*Significant at 5% level

**Significant at 1% level

The height for weight profile of preschool children when compared with reference standard indicates that the heights of selected children are below the standard height for weight. There is significant difference between the heights of study sample and the reference standard. Graph gives the difference in physical stature between the standards and the sample studied (Fig. 8). The difference is mainly due to differences in nutrition.

Chest/head ratio of preschool children are also

DIFFERENCE IN PHYSICAL STATURE BETWEEN
STANDARD AND STUDY SAMPLE



assessed to have an idea about the body build of the children and is given in Table 53.

Table 53. Chest/head ratio of preschool children.

Age in ranges	Sex	Number of children	Percentage of children with chest/head ratio less than 1
0-12 months	F	9	44.4
	M	9	55.5
12-24 months	F	6	85.7
	M	2	100.0
24-36 months	F	6	33.3
	M	7	57.1
36-48 months	F	13	53.8
	M	13	38.4
48-60 months	F	17	17.6
	M	16	25.0

As indicated in Table 53, in all age groups majority of children had chest head ratio below 1 except in male children of 12 to 24 months.

Wadsworth (1963) had stated that in tropical communities actual clinical signs of malnutrition may be uncommon although anthropometry may show malnutrition to be widespread. Most signs of malnutrition are not specific due to lack of one nutrient and can often be

produced by various non-nutritional factors, since they have complex aetiology, with the nature of some of the underlying factors and interrelationships still unknown (Beaton 1964). In the present study assessment of the physicians on the general appearance of preschool children like appearance of hair etc. and other clinical symptoms identified during this test are presented in Table 54.

Table 54. Prevalence of clinical signs of malnutrition among preschool children.

Clinical signs	24-36 months N-21		36-48 months N-25		48-60 months N-10		60-72 months N-4	
	Number of children	Percentage	Number of children	Percentage	Number of children	Percentage	Number of children	Percentage
Anaemia	12	57.1	2	8.0	1	10	2	50.0
Protein calorie malnutrition	2	9.5	2	8.0	1	10	-	-
Bitot's spots	2	9.5	-	-	-	-	-	-
Knock knees	-	-	-	-	-	1	1	25.0
Flat foot	-	-	1	4.0	-	-	-	-
Thyroid dysfunction	-	-	1	4.0	-	-	-	-
Caries	8	38.0	3	12.0	1	10	1	10.0

N denotes sample size

The deficiency diseases like anaemia are common in this area probably due to worm infection. This finding is strengthened by the morbidity data collected and presented in Table 55. Protein deficiency and vitamin A deficiency are seen in small numbers. Parasitic infection is very common and most of the deficiency diseases are associated with these infections.

Morbidity profile of the preschool children are presented in Table 55.

Table 55. Morbidity profile of preschool children.

Episodes of illness	24-36 months N-21		36-48 months N-25		48-60 months N-10		60-72 months	
	Number of children	Percentage	Number of children	Percentage	Number of children	Percentage	Number of children	Percentage
Respiratory infection	-	-	2	8.0	8	80	1	25.0
Gastro intestinal problems	4	19.0	6	24.0	3	30	1	25.0
Whooping cough	2	9.5	-	-	2	20	-	-
Conjunctivitis	3	14.2	2	8.0	1	10	-	-
Pyoderma	-	-	2	8.0	-	-	1	25.0
Rhinitis	-	-	4	16.0	-	-	2	50.0
Viral infection	-	-	2	8.0	-	-	1	25.0
Parasitic infestation	20	90.2	14	56.0	8	80	2	50.0
Scabies	1	4.7	2	8.0	-	-	-	-
Style	-	-	2	8.0	-	-	-	-

N denotes sample size

The Table 55 reflects the actual incidence of illness. Illness most frequently suffered are parasitic infections, respiratory infections and gastrointestinal disorders. Incidence of conjunctivitis are also prevalent. It is to be noted that only such a profile can be expected from the living condition followed by these families.

Malnutrition along with clinical symptoms associated with changes in composition of blood is indicated by data collected on haemoglobin levels of the children, and is presented in Table 56.

Table 56. Grouping of the children based on haemoglobin content.

Haemoglobin levels mg/100 ml	Number of children	Percentage
8-9	7	11.6
9-10	19	31.6
10-11	16	26.6
11-12	14	23.3
12-13	3	5.0
13 and above	1	1.6
Total	60	100

Table 56 shows that 43.21 percent of children have haemoglobin levels below 10 g per 100 ml.

7. IDENTIFICATION OF NUTRITION/HEALTH PROBLEMS PREVALENT IN THE AREA.

The data collected on socio-economic and environmental characteristics of the families, food consumption pattern of the family, the dietary pattern of the women and children and the results of anthropometric and clinical studies on the children clearly depicts certain nutrition/health problems of the families residing in the area and the problems thus identified are presented in Table 57.

Table 57. Nutrition and health problems identified and remedial measures suggested.

Problems identified	Remedial measures suggested by disseminating information on	Education programme planned
(1)	(2)	(3)
1. Introduction of supplementary foods at irregular intervals during weaning period	Importance of supplementary feeding	Demonstration on the preparation of weaning mixes using locally available foods
2. Unhygienic environment	The ill effects of unhygienic environment	Education classes

(1)	(2)	(3)
3. Contaminated drinking water	Hazards of using contaminated water	Exhibitions
4. Prevalence of deficiency diseases	Significance of nutritious foods in the daily diet	Exhibitions
5. Prevalence of infectious diseases like diarrhoea	Significance of oral rehydration therapy and the importance of feeding during diarrhoea	Demonstrations on oral rehydration therapy, and other liquid foods to be fed during diarrhoeal conditions
6. Occurrence of parasitic infection among infants and toddlers	Importance of environmental sanitation and personal hygiene	Education classes

As revealed in Table 57, along with the problems identified, remedial measures suggested and the education programme planned are indicated. The education programme is based on child health and nutrition. Attempt is made to push oral rehydration therapy into the front-line as a commitment to child survival revolution since oral rehydration therapy is a technique among the lowest cost public health weapons ever devised and since it is capable of overcoming a synergistic group of illnesses

which are responsible for more than half of child malnutrition. The most commonly available treatment for diarrhoeal dehydration at present is intravenous therapy which is expensive and requires trained personnel, and a relatively sterile environment and is available in fixed health facilities which serve only a small portion of the country's rural population.

8. PLANNING AND CONDUCTING EDUCATION PROGRAMME

The central objective of these education programmes is to give information regarding home treatment of diarrhoea including proper preparation and administration of oral rehydration therapy. It is also expected that the preparation cost of oral rehydration therapy can be reduced and several diarrhoea related prevention techniques can be introduced to the rural families through these education programme. Education programme planned combined exhibition, education classes and cooking demonstrations.

The basic message stressed throughout the education programmes is administration of oral rehydration solution correctly when your child have diarrhoea;

continue, feeding and breast feeding during diarrhoeal episodes and seek help if the child's condition become worse. Care was taken to stress the fact that oral rehydration therapy is only a remedy for lost appetite and an aid to recovery but not as a remedy for diarrhoea.

8.1 Exhibition

An one day exhibition on the importance of child nutrition is conducted for the benefit of the residents of the Vizhinjam muslim colony. Charts and posters (6) and 8 samples of weaning food were displayed. Along with the exhibition a slide show is arranged and slides are shown continuously.

The exhibition is opened to the public from 10 a.m. to 5 p.m. During the morning session about 34 mothers and 78 children visited the exhibition while in the afternoon 87 mothers and 158 children visited the exhibition. In general majority of mothers came in the afternoon because they are free at that time after their household work. Charts (12) posters (6) are used to convey the messages to the common people. Slides related to health (30) and nutrition (20) are

projected to attract attention and folders on 'diarrhoea in children', oral rehydration therapy for diarrhoea, 'weaning foods' and 'importance of breast feeding' are distributed to literate women. Women in general showed more anxiety to topics related to child health. Importance of a balanced diet, preparation of oral rehydration solution, preparation of weaning foods from low cost locally available foods are the important areas about which women are anxious to collect more details. Women spent about half hour to one hour in seeing the exhibition.

Nutrition education classes

Education classes are conducted in two anganwadies located in the colony. These education programmes are conducted after one week of the exhibition. The duration of the education programme is two hours. During these education classes topics related to child health and nutrition are discussed in detail. These two education classes are attended respectively by two groups of women numbering 38 and 41. The education programme on child health and nutrition is followed by active discussion. Women are very much interested to know in

detail about the importance of feeding infants and children during normal and diseased conditions.

Demonstrations

Demonstration on the preparation of oral rehydration solution and weaning foods suitable for diarrhoeal conditions are also conducted in the two anganwadies on two independent days. The demonstration was conducted on a raised platform. These demonstrations mainly discussed on performance, mixing and administering these formulae and teaching the mothers to do likewise. During the conduct of cooking demonstrations the women are kept occupied by conducting a discussion on the importance of feeding sick children. 61 and 72 mothers attended these demonstrations. Compared to previous education classes, attendance of the mothers for the demonstration are better. Women are more attentive in the demonstration classes, when compared to the education classes. The important points of demonstration is explained once again and is discussed with the mothers. Women are persuaded to ask questions pertaining to it and their doubts are cleared during discussion. They are assured of the advantages of the cheap home made solutions in the

control of diarrhoea.

9. EVALUATION OF EDUCATION PROGRAMME

The gain in knowledge and rate of adoption of these new practices by these women are assessed at uniform intervals after one month, two month and three months. The results are presented in Table 58.

Table 58. Gain in knowledge.

Evaluation	Number	Average score	Maximum score
Initial	100	12.1	24
After education programme	100	22.0	24

Table 58 depicts that there is considerable increase in the gain in knowledge of these women since the rate of increase in gain in knowledge is 42 percent.

Table 59. Rate of retention

Evaluation	Number	Average score	Maximum score
After one month of the education programme	100	22.1	24.0
Two months	100	21.9	24.0
Three months	100	21.6	24.0

As indicated in Table 59, there is steady decline in the retention of knowledge by these women. The data is analysed statistically and is presented in Appendix-XI.

Significant difference in the average score is obtained after conducting the education programme. Their average score is 12.1 before the education programme. When the respondents are interviewed after one month of the education programme, a significant increase in the average score is noticed. Their average score is 22.1 at that time. The evaluation is conducted with the same schedule prepared earlier when they interviewed again twice with an interval of one month. No improvement in average score is noticed but a slight reduction in average score is noticed. Their score decreased to 21.9 and 21.6 respectively. The knowledge status of women is given in Table 60.

Table 60. Evaluation after one month.

Knowledge level	Percentage of women
Below 25	-
26 to 50	-
51 to 75	-
76 to 100	100

Table 61. Evaluation after two months.

Level of knowledge	Percentage of women
Below 25	-
26 to 50	-
51 to 75	-
76 to 100	100

Table 62. Evaluation after three months.

Level of knowledge	Percentage of women
Below 25	-
26 to 50	-
51 to 75	1
76 to 100	99

As indicated in Tables 60, 61 & 62, the level of knowledge of these women is in between 76 to 100. Periodical evaluation of the education programme demonstrates that the education programme is successful in giving mothers health information and getting them to change specific behaviour related to their response to diarrhoea.

After 6 months of education programme the rate of adoption of mothers on the knowledge of diarrhoea is tested by selecting a random sample of 50 mothers (Diarrhoea occurs in 80 percent of families). Frequency of occurrence of diarrhoea among the families is presented in Table 63.

Table 63. Frequency of occurrence

Frequency	Percentage
1	44.0
2	22.0
3	12.0
4	2.0

In majority of the families (44 percent) diarrhoea occurred once, and in 22 percent of families diarrhoea occurred twice. Foods given during diarrhoeal conditions are given in Table 64.

Table 64. Foods given during diarrhoea.

Weaning foods	Percentage
Lime juice	40.0
Kanji water	60.0
Weak tea	13.3
Home made ORS	56.6
ORS packets	16.6
Coconut water	6.6

As indicated in Table 64, 56.6 percent mothers use home made oral rehydration solution in the control of diarrhoea. 16.6 percent use oral rehydration salts available in packets from the nurse and anganwadies. Salted rice water is given to children by majority of mothers. Tea, lime juice, coconut water is also used. Treatment with oral rehydration solution and other liquid foods reduced the severity of disease in majority of the cases and only 6.6 percent sought medical help. This clearly indicate that the mothers have adopted, the simple technique of oral rehydration therapy.

SUMMARY

SUMMARY

In developing countries, acute diarrhoeal diseases is one of the major causes of mortality and morbidity among children of under fives. A major goal of the country is to develop a rational and consistent policy on the appropriate management of diarrhoea at home. Oral rehydration therapy is found to be one of the simple technology suitable for diarrhoeal treatment.

A village survey, a baseline survey on socio-economic and dietary pattern of selected families, assessment of the nutritional status of the preschool children of the community using anthropometric, clinical and biochemical studies and assessment of the knowledge of the women on diarrhoea by administering suitable scales are the various methods used to locate the nutrition and health problems of the community with special reference to diarrhoea. On the basis of the problems located nutrition education programmes are conducted on the prevention and control of diarrhoea. The education programmes are evaluated using a suitably structured schedule. The data thus collected are analysed statistically.

The details of the village survey throw light on the physical facilities available in the village, and the environmental features of the families residing in the area.

The baseline survey on socio-economic, food consumption and dietary pattern of the families conducted impart information on education, income, physiological condition and exposure to mass media by the family members. The expenditure pattern of the families, frequency of use of various foods during physiological and pathological conditions are other informations available from the above survey.

The survey further revealed that the majority of families residing in the area belonged to socially and economically under privileged community. Majority of the women are illiterate and they are not exposed to any type of educational activity in the colony. The food consumption pattern of the families are influenced by family income and family size. There is significant difference in the expenditure of food with increase in family size and family income. Cereals and roots and tubers are the staple foods of these families and occupy

dominant position in the daily menu. The diets of pregnant, lactating and normal women are deficient in calories and protective nutrients like vitamins and minerals. Proteins are consumed in moderate amounts, but the diet as a whole is deficient in energy giving foods. The results of the weighment survey indicate that the women in special conditions are the worst sufferers due to their higher nutrient requirements.

Outbreaks of infectious diseases are very common in the area among children. Lack of safe drinking water, lack of sanitary facilities, negligence and overstretched primary health care and lack of immunisation programmes are responsible for above conditions.

With reference to the nutritional status of children, data collected by the anthropometric studies clearly indicated that the measurements of study group are below standard. Clinical and biochemical studies also depict a state of undernutrition among these children.

Based on these results nutritional/health problems prevalent in the community are located and a

series of education programmes are planned and conducted. The education programmes include exhibition on child health, nutrition education classes on diarrhoea, its prevention and causes, demonstration on the preparation of oral rehydration solution and cooking demonstrations on weaning foods suitable for diarrhoeal conditions. Education materials such as folders on 'oral rehydration therapy' and 'diarrhoea' are prepared and distributed to the participants of the education programme. The women in general are very enthusiastic about the information imparted to them through these education programmes.

Evaluation of the education programme is conducted three times with one month interval after the education programme and the results of the evaluation indicate that there is significant difference in the gain in knowledge of women before and after the education programme and the retention of knowledge decreases as the time lag between the education classes and evaluation increases. The education programme helped the women to change their attitude and to make them conscious of the feeding practices to be followed during diarrhoeal conditions. After six months, the rate of adoption is also

tested and it clearly indicate that most of the mothers use home made oral rehydration solution and other liquid foods in the treatment of diarrhoea. Based on the above facts it is accepted that the education programme conducted is very effective in imparting necessary information on the control of diarrhoeal diseases.

REFERENCES

REFERENCES

- Adhikari, M.U. and Hewitt, C.J. (1985). Enteropathogenic E.coli and enterotoxigenic related diarrhoeal disease in neonatal unit. Annals of Tropical paediatrics. 5(2): 19-22.
- Ashworth, A. and Feachem, R.G. (1985). Interventions for the control of diarrhoeal diseases among young children, prevention of low birthweight. Bullettin of W.H.O. 63(1): 165-184.
- Barua, D. (1980). W.H.O. activities for control of diarrhoeal disease in developing countries. Indian Journal of Paediatrics. 47(387): 260.
- Baumslag, N., Mason, L.G., Davis, R. and Sabin, E. (1975). Diarrhoeal diseases and oral rehydration. An annotated bibliography. Office of International health; U.S. department of health, education and welfare, Washington, U.S.A. : 132.
- Barrel, R.A.E., Rowland and Michael, G.M. (1979). Infant foods as potential source of diarrhoeal illness in Africa. Transactions of the Royal Society of Tropical Medicine and Hygiene. 73(1): 85-90.
- Beaton, G.H. (1964). Interrelationships of nutrients Proceedings of Nutrition Society of India. 23: 30.
- Bhatia, B.D., Agarwal, A.K., Singla, D.N. and Sanyal, S.C. (1980). Environmental factors and microbial flora in hospitalized children with diarrhoea. Indian Paediatrics. XVII, April: 169.
- Black, R.E., Brown, K.H. and Becker, S. (1984). Malnutrition is a determining factor in diarrhoeal duration but not in incidence among young children in a longitudinal study in Bangladesh. American Journal of clinical nutrition. 39(1): 87-94.

- *Brown, K.H., Gaffar, A. and Alamgir, S.M. (1979).
Journal of Paediatrics. 15: 95-160.
- Chen, L.C., Chowdhury, A. and Huffman, S. (1978).
Classification of energy-protein malnutrition by
anthropometry and subsequent risk of mortality.
International centre for diarrhoeal disease research.
Dacca, Bangladesh: 24.
- Chen, L.C. (1983). International Conference on ORT
Assignment children. 61/62: 150.
- *Chen, L.C., Hug, E. and Huffman, S.L. (1981). American
journal of Epidemics 114: 284.
- Chakraborty, A.K. and Das, J.C. (1983). Comparative
study of the incidence of diarrhoea among young
children in two environmental situations in
Calcutta. Indian Paediatrics. 20(12): 907-913.
- Clow, D.J. (1985). Control of diarrhoeal disease in
Tonga. British Medical Journal. 290 (6469):
690-692.
- Cocker, A.O., Agbonlahor, D.E., Solanke, E.O., Ogunbi, O.
and Ahmed, I. (1983). Oral rehydration of infants
with diarrhoea, Nigerian experience. Journal of
Tropical Paediatrics. 29(2): 124-125.
- Cushings, A.H. and Anderson, L. (1982). Diarrhoea in
breast fed and non breast fed infants. Paedia-
trics 70: 921-925.
- Dacie, J.V., Lewis, S.M. and Canon, S. (1975). Practical
haematology. Churchill, Livingstone. 5th edition:
31.

- Daniel, P., Pasada, G. and Mata, L. (1983). Treatment of neonates with dehydrating diarrhoea with oral glucose electrolyte solution. Journal of Paediatrics. 102(1): 153-156.
- Datta, P. (1985). Recent advances in the management of acute diarrhoeal disease. Indian Journal of Public Health. XXIX: 100-103.
- Datta, P., Bhattacharya, S.K., Datta, A., Bhattacharya, O.N. and Pal, S.C. (1984). Effectiveness of oral glucose electrolyte solution in the treatment of acute diarrhoea in neonates and young infants. Indian Journal of Medical Research. 80(10): 435-438.
- Daral, T.S., Singh, H.P., Sachdev, H.P., Manmohan, M., Mathur, S.K. and Bhargava, S. (1985). Acute dehydrating diarrhoea. Indian Paediatrics. 22(5): 333-337.
- Devadas, R.P. and Kulandaivel, K. (1975). In: Handbook of Methodology of research. Sri. Ramakrishna mission vidyalaya press, Coimbatore: 94.
- Donoso, G. (1979). Weanling diarrhoea. An overview of its nutrition and public health importance. Indian Journal of Nutrition and Dietetics. 16: 103-105.
- Edwards, A.L. (1969). Technique of attitude scale construction. Vakils, Feller and Simons Private Limited: 110.
- Faisal, A., Hassan, A.K. and Majeed, M. (1984). Basic epidemiological aspects of acute gastroenteritis in a regional hospital in Kuwait. Annals of Tropical Paediatrics. 19(4): 113-115.
- Feachem, R.G. and Koblinsky, M.A. (1984). Interventions for the control of diarrhoeal diseases among young children, promotion of breast feeding. Bulletin of W.H.O. 62(2): 271-291.

- *Finberg (1980). Journal of Paediatrics. 17: 96-101.
- Gabr (1986). Effective implementation of ORT programmes. Dialogue on Diarrhoea 24: 4.
- Ghai, O.P. and Bhan, M.K. (1980). Diarrhoea in infants and children. Indian Paediatrics 17: 719-720.
- *Ghai, O.P. and Jaswal, V.N. (1970). Indian Journal of Medical Research. 58: 789.
- Gopalan, C. (1970). Nutritional problems in India. Nutrition excerpta medica. International Congress Series No. 213: 579. Amsterdam.
- Gordon, J.E., Chitkara, I.A. and Wyon, J.B. (1963). Weanling diarrhoea. American Journal of Medical Sciences. 6(10): 245-255.
- *Gracy, M. and Cullity, G.J. (1977). Archives of Diseased Children 52: 325.
- Guerrin, N. (1985). Diarrhoeal diseases. Children in the Tropics. 158(5): 65.
- Gupta, S.N. (1985). Diarrhoea at Indo Nepal border. Journal of Indian Medical Association. 83(4): 110-111.
- Gupta, J.P. (1977). Social welfare service for the aged, social welfare. Central Social Welfare board, New Delhi. XXIV(9): 3.
- Hernan, D.L., Valverde, V., Jose, M. and Klein, E.R. (1983). Diarrhoeal diseases, nutritional status and health care. Analysis of their interrelationships. Ecol. food. Nutr. 12(4): 229-234.

- ICMR (1982). Gopalan, C., Ramasastry, B.V. and Balasubramanian, S.C. In. Nutritive value of Indian foods. NIN, ICMR, Hyderabad : 60-110.
- Indirabai, I., Kumar, R. and Reddy, O.G. (1980). A study of oral rehydration therapy in childhood diarrhoea. Indian Journal of Paediatrics. 47 (5043): 279-282.
- Jelliffe, D.B. (1966). Assessment of nutritional status of the community. W.H.O. Monograph Series. Geneva: 10-78.
- Jain, M.K., Komavor, V., Vora, J.N., Irani, S.F., Kale, V.V. and Iyyer, L. (1983). Evaluation of clinical criteria for the management of acute diarrhoea in infants and children. Indian Paediatrics. 20(7): 487-497.
- Kenneth, H., Brown, M.D., William, C. and Mackan, N. (1984). Nutritional management of acute diarrhoea. Paediatrics 73(2): 119-120.
- Khan, M.U. and Kamal, A.K. (1986). Withdrawal of food during diarrhoea. Major mechanism of malnutrition following diarrhoea in Bangladesh children. Journal of Tropical Paediatrics. 32(4): 101.
- Khubchandani, R.P. and Sainani, G.S. (1986). Current trends in oral rehydration. Journal of Applied Medicine. 12(8): 109.
- Kumar, V. (1980). Oral rehydration therapy for diarrhoea in children. Indian Paediatrics. 17(8): 739-743.
- Kumar, V., Clements, C., Marwah, K. and Diwedi, K. (1981). Maternal beliefs regarding diet during acute diarrhoea. Indian Journal of Paediatrics. 48(405): 509-603.

- Kumar, V., Clements, C., Marwah, K. and Diwedi, K. (1985). Beliefs and therapeutic preferences of mothers in the management of acute diarrhoeal disease in children. Journal of Tropical Paediatrics. 31(2): 109-112.
- Lindzey (1954). In. Hand book of social psychology. Vol. I : 449. Anderson and Wesley.
- Listernick, R., Ziezerl, L. and Davis, A.T. (1985). Oral glucose electrolyte solutions as maintenance therapy of acute diarrhoea. American Journal of Diseases in Children. 139(6): 571-574.
- Manorama Year book (1987). A handy encyclopaedia of modern knowledge. Manorama publishing house. P.B. No. 26, Kottayam: 378.
- Mathur, R. and Reddy, V. (1983). Bacterial contamination of oral rehydration solution prepared from well water. Indian Journal of Medical Research. 78(2): 814-818.
- Mata, L.G. and Urrutia, J.J. (1971). Intestinal colonisation of breastfed children in rural area of low socio-economic level. AM. N.Y. Academic Sciences. 176: 93.
- Mandal, A.K., Tiwari, I.C. and Sanyal, S.C. (1983). Incidence of diarrhoeal disease episodes in an urban slum area with special reference to under fives. Indian Journal of Public Health. XXVII(4): 156-157.
- Mathan, M.M. (1985). Pathophysiology of acute diarrhoea. Proceedings of Nutrition Society of India. 31: 17-31.
- Mathur, R. (1985). Aetiology of gastroenteritis in children. Proceedings of Nutrition Society of India. 31: 17-31.

- Martorell, R. (1975). Diarrhoeal disease and growth retardation in preschool Guatemalian children. American Journal of Physical Anthropology. 43(3): 341-346.
- Mehta, N.M., Dhan, S. and Patel, N. (1984). The role of oral rehydration in the management of acute diarrhoea in children. Journal of Tropical Paediatrics. 30(2): 83-86.
- Nalin, D.R. (1978). Comparison of sucrose with glucose in oral therapy of infant diarrhoea. Lancet. 2(8084): 277-279.
- *Nalin (1980). Journal of Paediatrics. 97: 848.
- Nazir, M., Pardede, N. and Ismail, R. (1985). Incidence of diarrhoeal disease and related mortality in rural swampy land area of Indonesia. Journal of Tropical Paediatrics 31: 268-270.
- NIN (1975). National nutrition Monitoring Bureau. Report for the year 1975: 8.
- NIN (1974). Field studies - relative merits of anthropometric indices in the assessment of protein calorie malnutrition. Annual report for 1973: 51. Hyderabad.
- Pal, S.C. (1979). Oral rehydration, drug and diet in the treatment of weanling diarrhoea. Indian Journal of Nutrition and Dietetics. 16(4): 16-20.
- Parker, R.L., Rinchart, W., Piotrow, P. and Doucette, L. (1984). Oral rehydration therapy for childhood diarrhoea. Population reports series L. No. 2 July Aug. : 41-75.

- Prema, L. and Menon, A.G.G. (1978). The credibility of various sources of information on human nutrition. Agricultural Research Journal of Kerala. 16(12): 217-222.
- Prema, L. and Menon, A.G.G. (1980). Food consumption level and nutritional status of fishermen community in Trivandrum district. Agricultural Research Journal of Kerala. 18(2): 208-212.
- Rahman, M. (1979). Aetiological and epidemiological considerations on weanling diarrhoea. Indian Journal of Nutrition and Dietetics. 1(16): 114-116.
- Rahman, M., Bari, A., Molla, A.M. and Greenough, W.B. (1985). Mothers can prepare and use rice salt oral rehydration solution in rural Bangladesh. Lancet. 2(7): 539-540.
- Rao, D.H., Sathyanarayana, J. and Gowrinath, S. (1976). Growth pattern of well to do Hyderabad preschool children. Indian Journal of Medical Research. 64(7): 629-638.
- Rai, V., Manmohan, M., Bhargava, S.K. and Daral, T.S. (1985). W.H.O. recommended oral rehydration solution in acute diarrhoeal dehydration in infants. Indian Paediatrics. 22(7): 493-495.
- Roy, S.K., Rabbani, G.H. and Black, R.E. (1984). Oral rehydration safely used in breastfed children without additional water. Journal of Tropical Medicine and Hygiene. 87(1): 11-13.
- Saberi, D., Mohammed, S. and Azad, M. (1983). Oral rehydration of diarrhoeal dehydration comparison of low and high sodium concentration in rehydration solution. Acta Paediatrica Scand. 72(2): 167-170.

- Sachar, R.K., Javal, G.S., Cowan, B. and Grewal, A. (1985). Home based education of mothers in the treatment of diarrhoea with ORS. Journal of Diarrhoeal diseases Research. 3(1): 29-31.
- Sachdev, H.P.S., Bhargava, S.K., Gupta, B.D., Narula, S., Daral, T.S. and Mohan, M. (1984). Oral rehydration in neonates and young infants with dehydrating diarrhoea. Indian Paediatrics. 21(3): 195-199.
- Samadi, A.R., Ahmed, S.M., Bardhan, P.K., Huq, M., Islam, M.R. and Wahed, M.H. (1985). Treatment of infantile diarrhoea with standard oral rehydration solution and early introduction of milk feeds. Journal of Tropical Paediatrics. 31(3): 162-166.
- SARRC Report (1986). 'Children first' Report on SARRC Conference on South Asian Children. New Delhi 1986: 3.
- Sarker, A.S., Molla, M.A. and Rahman, M. (1983). Impact of supplementary feeding on intake of breastmilk in diarrhoea. Lancet. 12(10): 1349-1350.
- Sommer, A. (1984). Low vitamin A linked to death. Science News. 13: 7.
- Steinhoff, M.C., Srilatha, V.U., Thilakarasi, N., Abel, R. and Mukargi, D.S. (1985). Fingers or spoons to make oral rehydration solution. Transactions of the Royal Society of Tropical Medicine and Hygiene. 79(3): 366-368.
- The State of the world's children (1984). United National Children's Fund. Oxford University press: 71-73.
- Thompkins, A. (1985). Persistent diarrhoea adding to malnutrition. Dialogue on Diarrhoea. 23: 7.

- Thomas, K., Chitralkha, S., Narayanan, K. and Philip, E. (1978). Oral rehydration therapy in childhood diarrhoea a comparative study. Indian Paediatrics. 15(10): 791-796.
- Trowbridge, F.L. and Newton, L.H. (1979). Seasonal changes in malnutrition and diarrhoeal disease among preschool children in El Salvador. American Journal of Tropical Medicine and Hygiene 28(1): 136-141.
- Trowbridge, F.L. (1979). Clinical and biochemical characteristics associated with anthropometric and nutritional categories. American Journal of Clinical Nutrition 32(4): 758-766.
- W.H.O. and UNICEF (1983). The management of diarrhoea and use of oral rehydration therapy. A joint W.H.O./UNICEF statement. W.H.O. Geneva: 1-15.
- *Wittman, W. and Hansen, J.D. (1965). South African medical journal. 1(4): 39-43.
- Wadsworth (1963). Nutrition Surveys, clinical signs and biochemical measurements. Proceedings of Nutrition Society of India. 22: 72.
- Zoysa, O.E. and Feachem, R.G. (1985). Interventions in the control of diarrhoeal diseases among young children. Rotavirus and cholera immunisation. Bulletin of W.H.O. 63(3): 569-583.
- Zoysa, D.C., Feachem, R.G., Kirkwood, B., Smith, E.L. and Lowenson, R. (1984). Home based oral rehydration therapy in rural Zimbabwe. Transactions of the Royal Society of Tropical Medicine and Hygiene 78(1): 102-105.

*Original not seen.

APPENDICES

APPENDIX-I.

College of Rural Home Science

Vellayani

Village Survey

- I. Physical facilities available in the village.
- a. Name of village or villages located in that area.
 - b. Name of panchayat
 - c. Name of nearest important town and the distance from the village.
 - d. Area (sq. kms)
 - e. Details regarding the boundaries with important land marks.
 - North
 - South
 - East
 - West
 - f. Total number of houses in the village.
 - g. Approach Road

Details of the Road	Access to different parts of the village
---------------------	--

Metalled road

Tar road

Non-metalled
village road

h. Educational facilities available in the village.

S. No.	Facilities	No.	No. of children	No. of teachers
1.	Preprimary schools (Anganwadies)			
2.	Primary schools			
3.	Secondary schools			
4.	High schools			
5.	College			
6.	Library			

i. Other facilities available in the village.

S. No.	Facilities	In the centre of the village	Outside the village	Far away from village
1.	Post Offices			
2.	Telegraph Offices			
3.	Banks			
4.	Co-operative banks			
5.	Co-operative societies			
6.	Temples			
7.	Churches			
8.	Mosques			
9.	Mahila samajams			
10.	Youth organisations			
11.	Orphanages			
12.	Feeding centres			
13.	Any other/ specify			

j. Is the village electrified

1. Number of houses electrified
2. Total number of lanes/streets in the village electrified

k. Is there any market if yes please specify

Number	Markets	Within the village	Outside the village	Far away from village
--------	---------	--------------------	---------------------	-----------------------

1. Vegetable & fruits
 2. Fish market
 3. Meat shops
-

l. Cost of different foodstuffs/kg available in different village shops.

Foodstuff	Cost/kg 1st shop	Cost/kg 2nd shop
Rice		
Red gram		
Cowpea		
Wheat flour		
Sugar		
Jaggery		
Bengal gram		
Black gram		
Chilli powder		
Coriander		
Onion		
Potato		
Coconut oil		
Salt		

m. Which is the major source of drinking water

1. Panchayat water supply
2. Private taps
3. Taps in the street
4. Wells
5. Tanks
6. Ponds/lakes
7. Rivers
8. Sea

II. Socio-economic and cultural background of villagers

1. Total population of the village

- a. Number of men
- b. Number of women
- c. Number of children

2. Educational background of villagers

	Male	Female
Literates		
Illiterates		

3. Religious background of villagers

Religious groups	Number
Christians	
Muslims	
Hindus	
SC/ST	

4. Occupational status of villagers

Major occupation	Number
a. Cultivators	
b. Agricultural labourers	
c. Fishermen	
d. Shop keepers	
e. Household workers	
f. Others	

5. What are the major means of transport

- 1.
- 2.
- 3.

6. Facilities for disposal of human excreta

1. Private latrines
2. Community latrines
3. Open space

7. Mention the type of latrines

8. Is there any drainage facilities Yes/No

9. Mention the incidence of any calamities like famine, contagious disease during the past 5 year period.

Year	Calamities	Extent of damage

10. Mention the important local festivals celebrated.

Festival	Month in which it is celebrated

11. Developmental programmes implemented.

Programmes	Year	Number of beneficiaries
1. School lunch programme		
2. A.N.P.		
3. ICDS		
4. Other programmes/ specify		

12. Health services available in the village.

Facilities	Number	Location
1. Primary health centres		
2. Sub centre		
3. Family planning centre		
4. Private hospitals		
5. Ayurvedic hospital Homoeo clinics		

13. Entertainment facilities available in the village.

1. Radio
2. Parks
3. Clubs

14. Education programmes conducted.

Programmes	Year	Number of beneficiaries
CPNP		
ANP		
ICDS		

C. Information of the health activities of the primary health centre.

1. Name of primary health centre
2. Name of block
3. Population covered
4. Number of medical officers available at present.
5. Total number of sub centres
6. Major health problems/nutritional disorders prevalent in the area among children.

No.	Infants	Preschool	Others
1			
2			
3			
4			
5			
6			

7. Number of cases of malnutrition identified at the primary health centre during the past one year among infants and preschool children.

1. Kwashiorkor
2. Marasmus
3. Vitamin A deficiency
4. Anaemia
5. Any other

8. Which of the following programmes are in operation in the area - Give average of the past one year.

1. Massive vitamin.A solution distribution
2. Folic acid tablet distribution
3. Immunisation

9. What is the role of primary health centre in the ongoing of the feeding programmes in the area.

1. A.N.P.
2. S.N.P.
3. Mid day meal programme
4. ICDS
5. Balawadi feeding

APPENDIX II.

COLLEGE OF RURAL HOME SCIENCE

VELLAYANI

A schedule to elicit information on socio-economic,
food consumption and dietary pattern of selected families
in Vizhinjam

1. Serial Number of family :
2. Name of respondent :
3. Address :
4. Religion: Caste :
- Hindu 1
- Christian 2
- Muslim 3
- Other 4

Size and composition of family:

Sl. No.	Relationship with head of the family	Age	Sex	Education	Physiological condition
---------	--------------------------------------	-----	-----	-----------	-------------------------

2. From where do you read newspapers:

own house

neighbourhood

Library

3. Do you read articles on maternal and child care:

Yes

No

C.1. Do you read magazines:

No

Daily

Weekly thrice

Weekly twice

Weekly once

Now & then

2. From where do you read:

Own house

Neighbourhood

Library

D. Do you get direct information on maternal and child care from governmental or other agencies. If so, please furnish the details.

Agencies	Once in a week	Once in two weeks	Once in a month	Occasionally
----------	-------------------	----------------------	--------------------	--------------

b. Do you gather information on maternal and child care from neighbours/friends/relatives.

E. Membership in political or social organisations:

a) Do you have membership in political or social organisations. Yes/No

b) If yes please furnish the details regarding organisation in which you participate.

Mahila Samajam/Discussion forum/
Applied nutrition/Feeding centres/Panchayat/
other Organisations

F. Do you participate in activities of any of the organisations outside your village. If yes, name the organisation.

Yes/No

a) Are you an office bearer or a member of any of the above mentioned organisation.

Yes/No

b) Do you participate regularly in the meeting of such organisation.

All meetings

Rarely

Do not participate

III. Monthly Expenditure Pattern

ITEMS	Expenditure	
	Rs.	Ps.
Food		
Clothing		
Shelter		
Transport		
Education		
Entertainment		
Health		
Savings		
Miscellaneous		

Expenditure of food:

Items	Frequency of purchase			Purchased from shops		Produced at home	
	Weekly	Monthly	Occasionally	Qty.	Amount spent	Qty.	Amount spent
Cereals							
Pulses							
Leafy vegetables							
Roots and tubers							
Other vegetable							
Fruits							
Milk & Milk products							
Fleshy foods							
Nuts and Oilseeds							
Spices and condiments							
Others							

Frequency of use of different food materials

Food groups commonly used	Frequency of use of food stuffs					Not at all
	Daily	Weekly	thrice	Twice	Once	
1. Cereals						
2. Pulses & Legumes						
3. Roots and tubers						
4. Other vege- tables						
5. Green leafy vege- tables						
6. Fruits						
7. Milk & Milk products						
8. Meat						
9. Fish						
10. Egg						
11. Fats & oil						
12. Sugar & Jaggery						
13. Readily made processed foods like Jam, squash, pickles, noodles etc.						
14. Bakery items						

3. Menus for survey period

Menu	Preparation			Main Ingredients			No. of members taking food			Visitors or Servants		
	I	II	III	I	II	III	I	II	III	I	II	III
Break-fast												
Lunch												
Tea												
Dinner												
Other snacks												

4. Method of preparation for cooking:

Stage	Cereal	Vegetables	Fruits
Washing before cutting			
After cutting			
Number of times			
Cutting size			

5. Methods employed for cooking:

Foods	Boiling		Steam- ing	Roast- ing	Fry- ing	Any other
	Absorp- tion	Strain- ing				
Cereals and Pulses						
Leafy vegeta- ble						
Roots & Tubers						
Other vegeta- ble						
Fruits						
Fish & Meat						
Egg						
Milk						
Others						

Methods of storage of foods:

Foods	Methods	Remarks
Cereals		
Pulses		
Leafy vegetables		
Other vegetables		
Fruits		
Milk		
Meat		
Egg		
Fish		
Others		

Food preservation at home:

Food preserved	Method used	Method of using preserved items
----------------	-------------	---------------------------------

Foods given during special condition:

Condition	Breakfast	Lunch	Dinner	Remarks if any
Infancy				
Preschool period				
School going period				
Adolescent period				
Pregnancy				
Lactation				

Foods restricted in special condition:

Condition	Breakfast	Lunch	Dinner	Reason for restrictions
-----------	-----------	-------	--------	-------------------------

Preparations on special occasions:

Occasion	Special preparation	Significance
Birth		
Marriage		
Death		
Others		
Religious functions		

APPENDIX III.

COLLEGE OF RURAL HOME SCIENCE
VELLAYANI

Statements to assess the knowledge of women on diarrhoea.

Base line information

1. Type of house: Hut
Medium
Bungalow
2. Number of rooms:
3. Doors and windows: Less
Satisfactory
4. Will you get enough air and sunlight. Yes
No
5. Major source of drinking water: Wells Common/special
Ponds
Pipes
6. For drinking purpose what type of water will you use.
Boiled water
Unboiled water
7. Distance from the house for collecting water:
Nearby
Away
Far away

8. Amount of water used daily.

9. Do you have facilities for disposing human excreta.

Latrines

Open space

10. Do you have domestic animals. Yes
If yes distance from the house. No

Near

Away

Far away

11. If there a compost pit: Yes

No

12. Do the members of the Yes
family suffers from any
diseases. No

13. At present how many of the family members suffers
from diarrhoea.

Information regarding diarrhoea patient

1. Family position of patient

2. Age

3. Sex

4. How long it is

5. Is there vomiting

6. What type of treatment you have

1. Home treatment
2. Consulted a doctor and gave medicines.
3. Admitted in Government hospital.
4. Admitted in private hospital.

7. Condition of patient after the treatment.

- Cured
- Slightly better
- Not cured

8. Due to this disease how many days you were absent from school or job.

9. Weight loss.

10. How many times diarrhoea occurs in a day to consider it as a disease.

- Once
- Twice
- Thrice
- More than thrice

11. Any of the family members is affected with diarrhoea in the previous year.

- Yes
- No

12. Do you know the home treatments during diarrhoea

Yes

No

13. If yes what are they. Oral rehydration therapy

Kanji water

Coconut water

Weak tea

14. Which are the symptoms of diarrhoea that led you to visit a doctor.

Dehydration

Vomiting

Diarrhoea

Others

15. Which type of treatment is better for diarrhoea.

Allopathy

Ayurveda

Homoeo

Naturopathy

16. Foods that can be given during diarrhoea.

Liquids

Semi-solid

Solid

17. Foods that can not be given during diarrhoea.

Vegetables

Liquids

Non-vegetarian foods

18. What are the causes of diarrhoea.

19. Have you been given information on treating a child with diarrhoea.

Yes

No

If yes from where

Mahila Samajam

Balawadi

Friends

20. Amount of money spent for treatment.

III. Statement to measure their knowledge on diarrhoea

1. Diarrhoea is an infectious disease. Yes/No
2. Diarrhoea occurs commonly in children. Yes/No
3. Diarrhoea occurs mainly in rainy season. Yes/No
4. Diarrhoea occurs more in bottle fed children. Yes/No
5. Diarrhoea leads to weight loss. Yes/No
6. Dehydration is the major symptom of diarrhoea.
7. Death may occur due to diarrhoea.

- | | |
|--|-----------|
| 8. Repeated attacks of diarrhoea predisposes the child to other infectious diseases. | Yes
No |
| 9. Enough water should be given to children suffering from diarrhoea. | Yes
No |
| 10. Diarrhoea can be cured by oral rehydration therapy. | Yes
No |
| 11. Salted rice water is good for diarrhoea. | Yes
No |
| 12. Breast milk should be given to infants suffering from diarrhoea. | Yes
No |
| 13. Breast milk should be given at least for one year. | Yes
No |
| 14. Breast feeding can be started few hours after birth. | Yes
No |
| 15. Supplementary foods along with breast milk is necessary for a child. | Yes
No |
| 16. Immunisation should be given at the specified intervals. | Yes
No |
| 17. Flies and diarrhoea are closely related. | Yes
No |
| 18. Flies can be controlled by keeping the environment clean. | Yes
No |
| 19. Repeated attacks of infectious diseases leads to ill-health. | Yes
No |

- | | |
|---|-----|
| 20. Dirty long nails are unhygienic to health. | Yes |
| | No |
| 21. The wells should be kept clean | Yes |
| | No |
| 22. Oral rehydration therapy is very expensive. | Yes |
| | No |
| 23. Oral rehydration solution should be heated before use. | Yes |
| | No |
| 24. Instead of sugar jaggery can be used for preparing oral rehydration solution. | Yes |
| | No |

Emaciation	Cranio-tabes
Marasmus	Epiphyseal enlargement
Conjunctival xerosis	Beading of ribs
Bitot's spots	Knock-knees/bow legs
Corneal xerosis/ Keratomalacia	Frontal parietal bossing : caries
Corneal opacity	Teeth : Mottled enamel
Night blindness	Enlargement of spleen
Photophobia	Enlargement of liver
Anaemia	Soft
Nasolabial dyssebacea	Firm
	Hard
Angular stomatitis	Thyroid enlargement
Cheilosis	Others
red & raw	

Tongue: Papillae-atrophic
Papillae-hypertrophic

*For children below 5 years only.

Morbidity profile of preschool children.

Diseases	1 month	2 months	3 months	4 months	6 months
----------	---------	----------	----------	----------	----------

APPENDIX V.

Haemoglobin-cyanmethaemoglobin method

Principle

Haemoglobin is converted into cyanmethaemoglobin by the addition of potassium cyanide and ferricyanide. The colour of cyanmethaemoglobin is read in a photo-electric calorimeter at 540 n.m. 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 1 litre distilled water.

Procedure

20 ul of blood are 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

on 5 ml Drabkins solution taken in a test tube wait for 30 minutes and mix the contents on a vortex mixture and take the readings.

Construction of standard curve

If the blood drawn from the subject contain haemoglobin 15 g/dl after estimation then prepare three reference standards as follows.

1. Reference standard A.

4 ml blood in 1000 ml Drabkins reagent contain haemoglobin 15 g/dl.

2. Reference standard B.

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

3. Reference standard C.

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

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

APPENDIX VI.

Diarrhoea in children

Kerala has got greater achievements in the field of health due to the low infant mortality rate and general death rate. The main reason of many diseases in our country is due to the lack of knowledge and awareness of people in observing health practices.

Children constitute 16 percent of our population. Today's children are tomorrow's citizens. Repeated attacks of infections and malnutrition will affect the health of children.

Diarrhoea is common in our country. It is estimated that about 50 lakhs of children will die in India due to diarrhoea every year. Diarrhoea occurs in children of all age groups but it is more common in children below 5 years.

Important causes of diarrhoea are

1. Unbalanced dietary pattern
2. Contaminated and allergy causing foodstuffs
3. Excessive food consumption

4. Worm infestation
5. Decayed foodstuffs
6. Unhygienic environment

Enormous amounts of salt and water is lost continuously from the body of a child with diarrhoea. This will lead to malnutrition when condition become severe, the child loses appetite and the body's capacity to utilise nutrients is also reduced which is consumed in inadequate amounts.

Important points to check diarrhoea

1. Breast feeding should be made compulsory
2. Avoid bottle feeding
3. Give only foods which are prepared under hygienic conditions.
4. Special care should be given to the health of children.
5. House and premises should be kept clean
6. Use boiled water
7. Latrines should be used for the disposal of human excreta.
8. Fresh and hot foods should be given to children
9. Hands should be washed before giving food to children.

Oral rehydration therapy for diarrhoea

Diarrhoea is the major reason for the death of children in our country. Diarrhoea leads to malnutrition in children.

Dangerous symptoms of diarrhoea are

1. Excessive vomiting and watery stools
2. Increased thirst and giddiness
3. Decreased quantity of urine
4. Dryness of lips and tongue
5. Sunken eyes
6. Reduced body weight

All the signs and symptoms of diarrhoea will not always be present in all the patients. However medical attention is to be sought as soon as the symptoms appear.

The only way to reduce the severity of the disease is the prevention of dehydration due to diarrhoea.

Oral rehydration therapy is the easiest method used to reduce death rate due to diarrhoea and to lessen the severity of diarrhoea.

Method of preparation

Available in packets

Sodium chloride	- 3.5 g
Sodium bicarbonate	- 2.5 g
Potassium chloride	- 1.5 g
Glucose/sugar	-20.0 g

The salts are dissolved in one litre of boiled and cooled drinking water.

Home made solutions

2 teaspoons of sugar and $\frac{1}{2}$ teaspoon of salt is dissolved in one glass of boiled and cooled water. It tastes similar to tears. Besides oral rehydration solution, lime juice, weak tea and coconut water can also be given to the child during diarrhoea.

Precautions to be taken while preparing ORS

1. Do not boil the solution after preparation
2. Prepare fresh solution daily
3. Protect the solution from flies
4. Half cup of solution should be given to the child at half an hour interval.

5. Use protected water and clean utensils

Breast feeding along with oral rehydration therapy helps to prevent malnutrition.

Printed Malayalam folders

വയറിളക്കം
കുട്ടികളിൽ

വയറിളക്കത്തിനു
പാനീയ
ചികിത്സ

ചാർട്ട്. 1.

വിരശല്യം

ശോഷിച്ചശരീരവും ഒട്ടിപ്പകുതിയും ഉന്തിയവയറുമാലി
നടക്കുന്ന അനേകം കുട്ടികളെ നാം കണ്ടിരിക്കും.

തീരെ ആരോഗ്യമില്ലാത്ത ഈ കുട്ടികൾ വിരബാധയുടെ
അടയാളമാണ്.

വിരകൾ നമ്മുടെ ആഹാരത്തിലുള്ള പോഷകങ്ങൾ
വലിച്ചെടുത്തു വളരുന്നു.

അങ്ങനെ ആരോഗ്യം നശിക്കുന്നു.

ചാർട്ട്- 2.

വീരബാധയുടെ ലക്ഷണങ്ങൾ

- * വിളമ്പ്.
- ** വിശപ്പില്ലായ്മ.
- *** ഇടവിട്ടുള്ള വയറിളക്കം.
- **** ശ്വാസകോശാസുഖങ്ങൾ.
- ***** ദേഹം ചൊരിഞ്ഞുതടിക്കാൻ.
- ***** മണ്ണു തിന്നുക.

ചാർട്ട്- 3.

പ്രത്യേകം ശ്രദ്ധിക്കേണ്ടവ

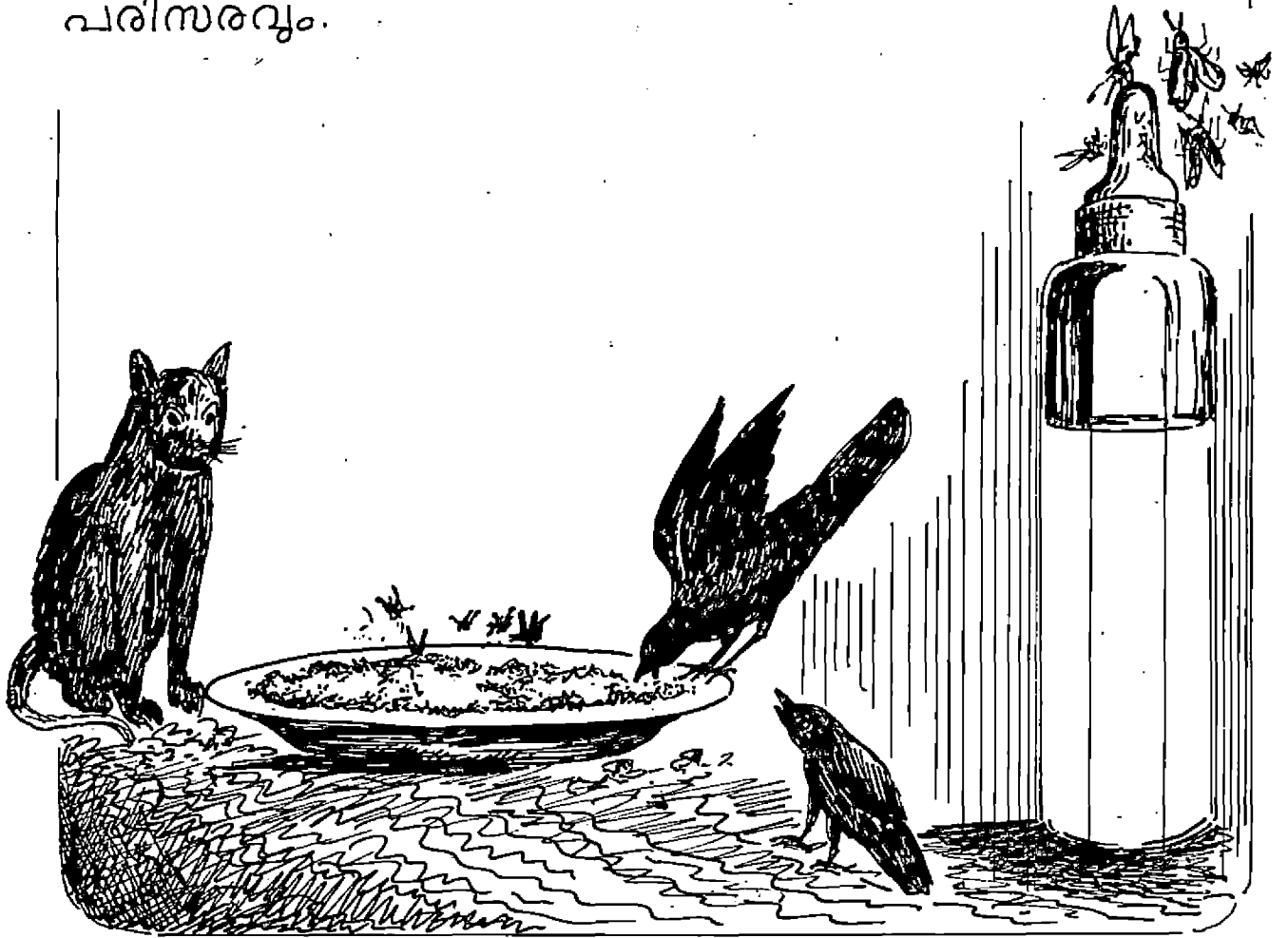
- * തുറസ്സായ സ്ഥലങ്ങളിൽ മലവിസർജ്ജനം ചെയ്യരുത്.
- ** വൃത്തികെട്ട പരിസരങ്ങളിൽ മണ്ണു വാരികളിക്കാൻ കുട്ടികളെ അനുവദിക്കരുത്.
- *** കൈകൾ വൃത്തിയാക്കാതെ ആഹാരം കഴിക്കാൻ കുട്ടികളെ അനുവദിക്കരുത്.
- **** കുട്ടികളെ പാദരക്ഷകൾ അണിയിക്കുക.
- ***** ഇടക്കിടെ കുട്ടികളുടെ മലം പരിശോധിക്കുക.

ചാർട്ട്-4.

വയറിളക്കത്തിന്റെ
പ്രധാനകാരണങ്ങൾ.

* ആഹാരപാനീയങ്ങളിലൂടെ പകരുന്ന അതിസൂക്ഷ്മങ്ങളായ രോഗാണുക്കൾ.

** ശുചിത്വമില്ലാത്ത ആഹാരവും പരിസരവും.

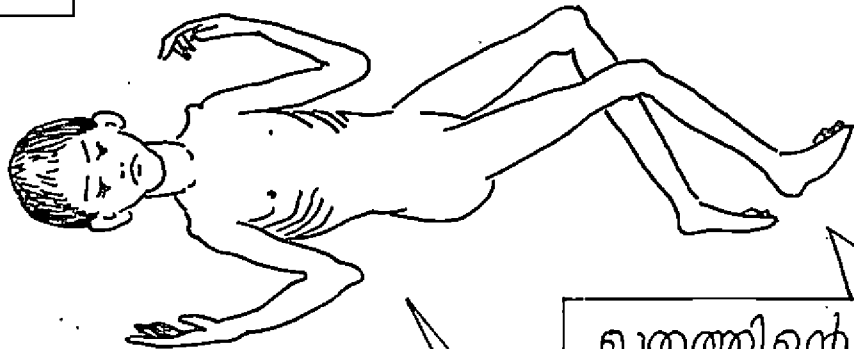


വയറിളക്കത്തിന്റെ ധാരക ലക്ഷണങ്ങൾ.

നാക്കും ചുണ്ടും ഉണങ്ങുക

അമിതമായ വയറിളക്കവും ചെർദ്ദിയും

കണ്ണുകൾ കുഴിഞ്ഞിരിക്കുന്നു



മൂത്രത്തിന്റെ അളവ് കുറയുക

ശക്തിയായ പനി

തൊലി ചുളുങ്ങുക

ചാർട്ട് - 6.

പാനീയചികിത്സകൊണ്ടുള്ള പ്രയോജനങ്ങൾ

* ലളിതമായ ചികിത്സ.

** ചെലവു കുറവു.

*** വീട്ടിൽതന്നെ തയ്യാറാക്കാം.

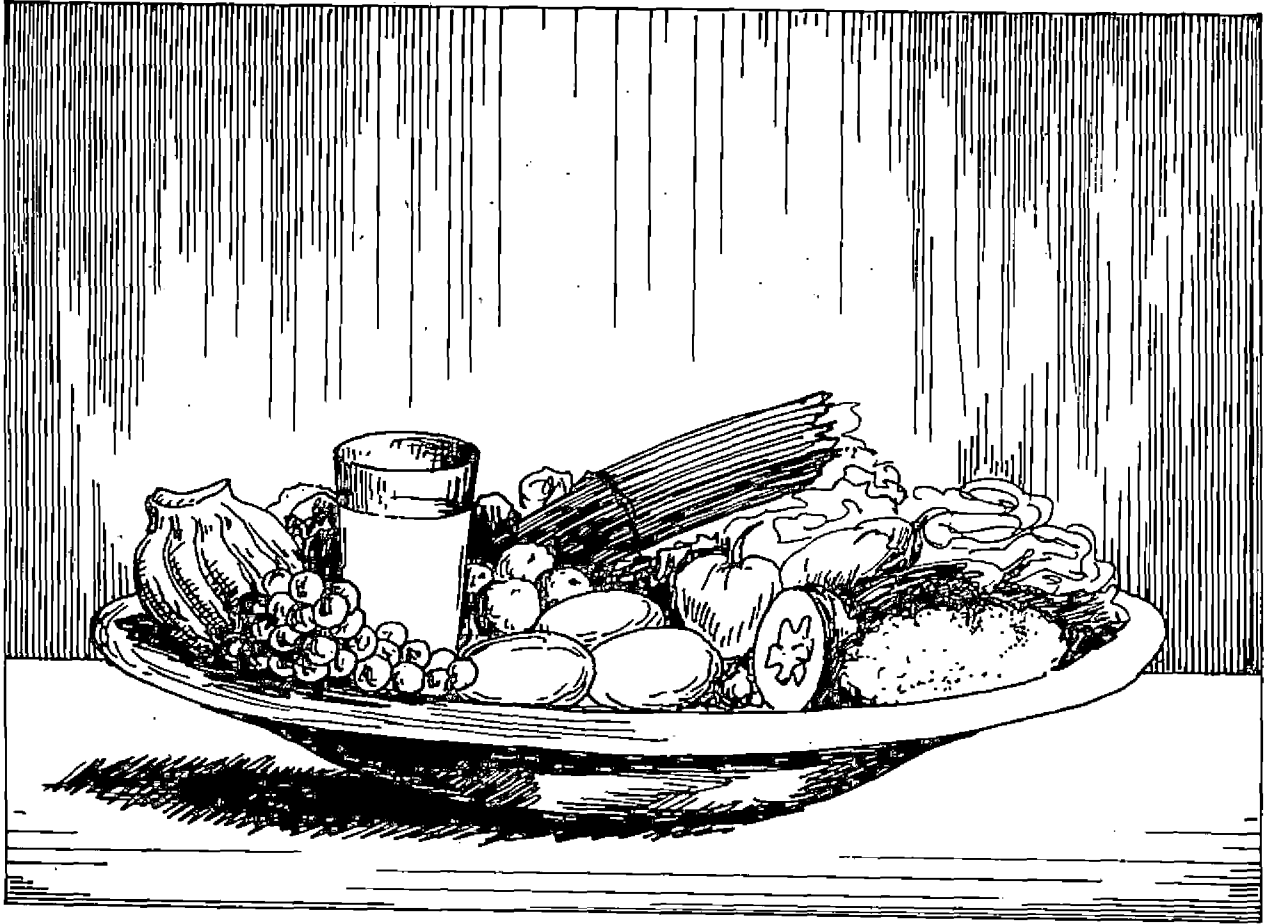
**** വയറിളക്കം മൂലമുള്ള മരണം തടയുന്നു.

***** വിലപിടിപ്പുള്ള ഉപകരണങ്ങളുടെയോ
പരിശീലനം ലഭിച്ച ആളുകളുടെയോ
സഹായം ആവശ്യമില്ല.



പ്ലാഷ്കാർഡ്. 1. മുലപ്പാലുടുന്ന കുട്ടികളിൽ വലറിളക്കംകുറവാണ്, കാരണം മുലപ്പാൽ ശുചിത്വമുള്ളതും രോഗപ്രതിരോധശക്തിയുള്ളതുമാണ്.

അതുകൊണ്ട് മുലപ്പാലുടുന്ന കുഞ്ഞുങ്ങൾക്ക് രോഗങ്ങളെ ചെറുത്തുനിൽക്കാനുള്ള ശക്തി കൂടുതലാണ്.



പ്ലാഷ്കാർഡ് - 2

മൂലപ്പാലിനോടൊപ്പം 4 ഓസത്തിനശേഷം
കുഞ്ഞിനു കൊടുക്കാവുന്ന മറ്റാഹാരങ്ങൾ.



പ്ലാഷ്കാർഡ്- 3

കുട്ടിയുടെ ആരോഗ്യകരമായ വളയ്ക്കു് 4 മാസത്തിനുശേഷം മുലപ്പാലിനു പുറമെ മറ്റു കട്ടിയാഹാരങ്ങളും വേണം.

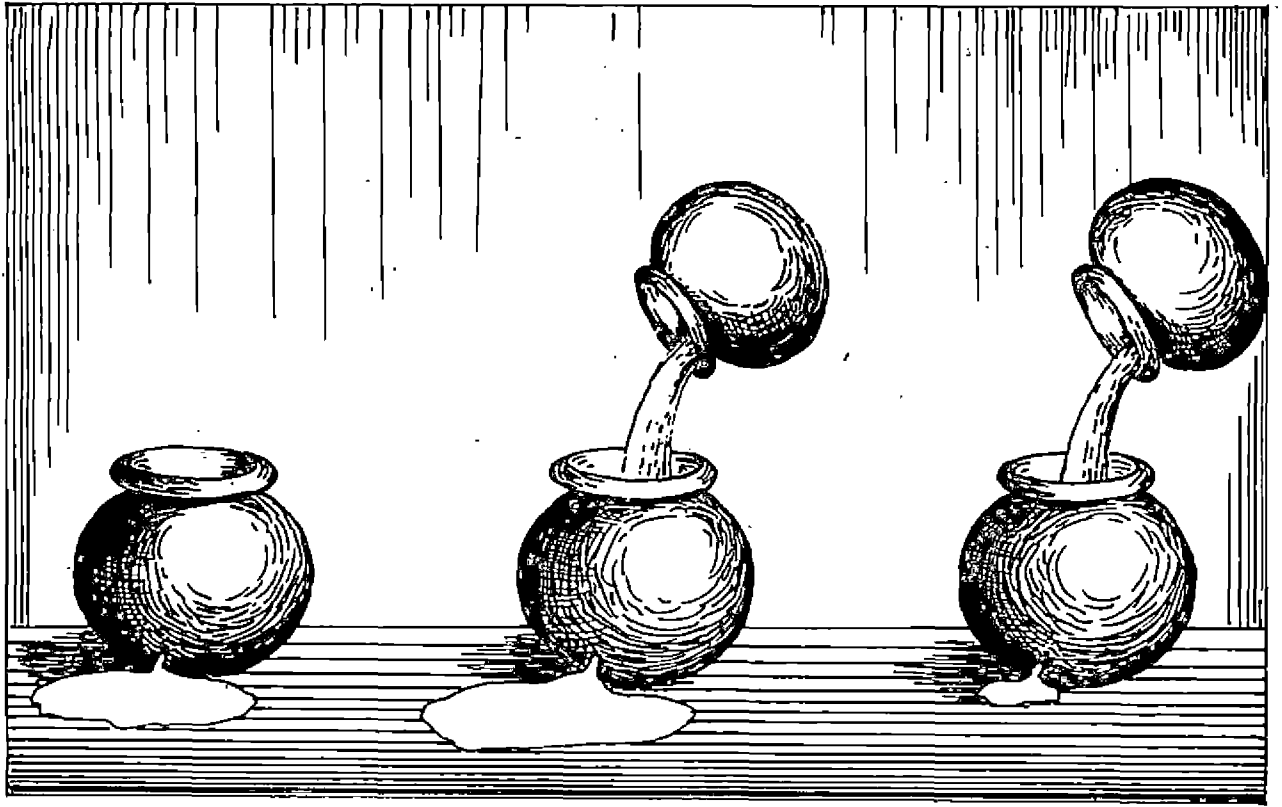
ഇവിടെ സുലഭമായി കിട്ടുന്ന ഗോതമ്പു്, കൂവരകു്, കടല ഇവ കൊണ്ടു് ഇതു് വേഗം തയ്യാറാക്കാവുന്നതുമാണു്.



പ്ലാഷ്കാർഡ് - 4.

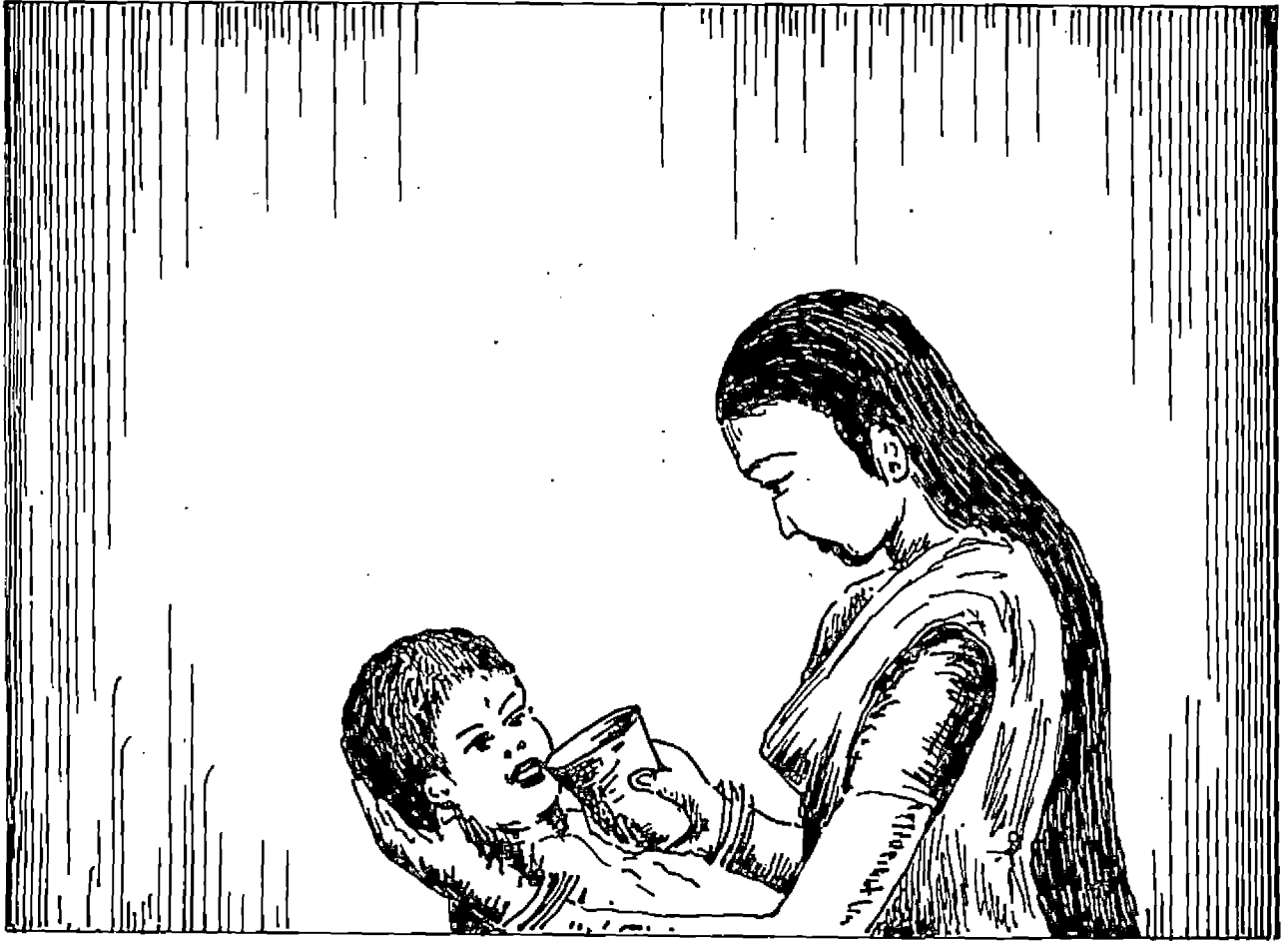
വൃത്തിയില്ലാത്ത ചുറ്റുപാടുകൾ വലറിക്കൊണ്ടിരിക്കുന്ന കാരണമാണ്.

ശുചിത്വമില്ലാത്ത പരിതസ്ഥിതിയിൽ സൂക്ഷ്മാണുക്കൾ
ധാരാളമായി പെരുകുന്നു.



ഘോഷ്കാർഡ് - 5.

കുഞ്ഞിനു വലുറീളക്കും ഉണ്ടാകുമ്പോൾ ധാരാളം ജുലാംശം ശരീരത്തിൽനിന്നും നഷ്ടപ്പെടുന്നു.



പ്ലാസ്കാർഡ് - 6

പാനീയചികിത്സയാണ് ഈ നഷ്ടപ്പെട്ട ജലം
വീണ്ടെടുക്കാനുള്ള ഘലപ്രദമായ മാർഗ്ഗം.



പുറംകാർഡ്. 7

APPENDIX VIII.

- a. Analysis of variance between family income and total monthly expenditure pattern.

Degrees of freedom	Sum of square	Mean sum of square	F
Total 100	4226551		
Treatment 4	3954478	988619	348**
Error 96	272073	2834	

**Significant at 1 percent level

- b. Analysis of variance of food expenditure pattern classified by family size.

Degrees of freedom	Sum of square	Mean square	F
Total 90	3706525		
Treatment 7	1736877	248125	10.4**
Error 83	1969648	23730	

**Significant at 1 percent level

- c. Analysis of variance of family size on expenditure for health.

Degrees of freedom	Sum of square	Mean square	F
Total 90	18253		
Treatment 7	4121	588.7	3.40*
Error 83	14132	170.2	

*Significant at 5 percent level

APPENDIX IX.

Average anthropometric measurements

Measure- ments	0-11 months		12-23 months		24-35 months		36-49 months		47-60 months	
	M	F	M	F	M	F	M	F	M	F
Height (cm)	- 59.3 (6)		- 68.3 (5)	83.3 (4)	83.5 (6)	83.3 (6)	89 (15)		100.3 (17)	98.8 (18)
Weight (kg)	- 5.9		- 8.0	10.7	10.4	12.6	11.6		14	13.1
Arm circum- ference (cm)	- 12.5		- 13.5	13.6	14.2	14.5	14.2		14.6	14.4
Head cir- cumference (cm)	- 41.4		- 46.9	48	47.9	49.3	48.1		50.1	49.1
Chest circum- ference (cm)	- 41.5		- 45.1	48.2	48.5	50.1	47.8		51.6	51

*Figures in paranthesis denotes number

Anthropometric measurements

Measurements	Boys				Age	Girls			
	Above 90 per-cent	75-90 per-cent	60-75 per-cent	Devia-tion		Above 90 per-cent	75-90 per-cent	60-75 per-cent	Devia-tion
Weight	-	-	-	-	12 M	-	4	4	-1.53
	-	4	-	-1.85	24 M	2	1	1	-1.30
	3	5	1	-1.08	36 M	2	2	2	-0.50
	-	4	1	-1.07	42 M	1	1	1	-1.10
	2	8	-	-1.65	48 M	6	5	5	-1.12
	3	2	-	-1.30	54 M	-	-	-	-
	3	6	3	-2.40	60 M	9	7	1	-2.50
	-	2	-	-2.53	66 M	1	2	1	-2.99

M - months

Height	Age	Above 90 percent	80-90 percent	75-80 percent	Deviation
	1+	0	2	4	-6.90
	2+	1	4	4	-5.30
	3+	1	10	9	-8.70
	4+	11	15	1	-1.35
	5+	13	17	5	-2.38

continued on next page

Arm circumference

Boys					Girls			
Standard	85-90 percent	75-85 percent	Devia- tion	Age	Stan- dard	85-90 percent	75-85 percent	Devia- tion
-	-	-	-	1 ⁺	1	4	1	-2.64
-	0	4	-1.5	2 ⁺	-	4	1	-2.40
1	13	-	-2.1	3 ⁺	-	5	1	-2.10
2	10	3	-1.8	4 ⁺	2	10	-	-2.19
4	11	-	-1.8	5 ⁺	-	18	2	-2.115

Chest circumference

Standard	Deviation	Age	Standard	Deviation
44.7	-0.78	12 M	-	-
47.2	-0.80	24 M	-	-
-	-	30 M	-	-
49.5	-1.00	36 M	50.9	-3.23
50.5	-2.50	42 M	51.9	-2.80
51.3	-3.45	48 M	52.6	-2.15
-	-	54 M	53.1	-0.68
52.6	-2.52	60 M	53.4	-2.26

Head circumference

Standard	Deviation	Age	Standard	Deviation
45.4	-1.32	12 M	-	-
46.7	-0.08	24 M	-	-
47.8	-0.66	36 M	49.1	-1.05
48.3	-1.00	42 M	50.5	-2.18
48.6	-0.80	48 M	50.7	-2.09
-	-	54 M	50.9	-1.80
48.9	-2.76	60 M	51.0	-2.13

APPENDIX X.

Weight for height of young children

Weight	Average Height	Total No. of child- ren	Above 90 per- cent	No. of child- ren	80-90 per- cent	No. of child- ren	Below 80 per- cent	No. of child- ren	Ave- rage devia- tion
10.0	86.25	6	83.5	3	83.5	3	79.0	-	-3.25
10.5	89.75	2	92.0	1	86.0	1	81.0	-	-2.25
11.0	87.5	7	94.7	1	88.5	4	83.2	2	-7.00
11.5	87.3	4	100.0	-	95.5	-	87.5	4	-12.60
12.0	93.2	11	102.5	1	97.5	4	89.5	6	-10.60
12.5	94.4	9	102.5	1	197.5	3	89.5	5	-11.00
13.0	93.75	8	105.0	-	100.0	3	91.5	5	-11.25
13.5	96.2	5	108.0	-	102.5	2	93.5	3	-11.80
14.0	100.4	10	110.5	-	104.5	5	96.0	5	-9.95
14.5	102.0	7	113.0	-	107.0	2	98.0	5	-11.00
15.0	103.4	7	115.5	-	109.5	2	100.0	5	-12.3
15.5	104.0	3	118.5	-	111.5	1	102.0	2	-14.5

90 percent Normal 80-90 percent Moderate Below 80 per-
cent Severe

APPENDIX XI.

Statistical analysis

Source	Degrees of freedom	Sum of square	Mean sum of square	F value
Treatment	3	7196	2398.8	827**
Error	396	1148.3	2.8	
Total	399	8344.9		

**Significant at 1 percent level

**THE IMPORTANCE OF ORAL REHYDRATION THERAPY
IN THE CONTROL OF DIARRHOEA
IN THE COASTAL AREAS OF TRIVANDRUM DISTRICT**

BY
GINCY GEORGE

**ABSTRACT OF A THESIS
SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT
FOR THE DEGREE OF
MASTER OF SCIENCE
IN FOOD SCIENCE AND NUTRITION
FACULTY OF AGRICULTURE
KERALA AGRICULTURAL UNIVERSITY**

**COLLEGE OF RURAL HOME SCIENCE
VELLAYANI, TRIVANDRUM**

1987

ABSTRACT

A study on the importance of oral rehydration therapy is conducted at muslim colony located in Vizhinjam panchayat, to assess the prevalence of diarrhoea among infants and preschool children and its impact on infant mortality rate, to find out the causative factors responsible for the incidence of diarrhoea, to popularise oral rehydration solution as a preventive measure to reduce diarrhoea through various educational methods and to evaluate the education programmes conducted.

The results of the village survey and food consumption survey conducted among selected 100 families in the colony revealed the lack of physical facilities such as water, latrines, drainage etc. This resulted in poor environment and personal hygiene. Majority of the families surveyed in the study belong to underprivileged communities both socially and economically, with low literacy level. The survey reveals that the food consumption pattern of these families are very much influenced by the family size and family income. Their diets are found to be deficient in carbohydrates but are

moderate sources of proteins. The results of the weight survey and survey by recall method clearly indicate that the diets of mothers and children of these families are deficient in calories and protective nutrients.

Outbreaks of infectious diseases are very common in the area among children. Lack of safe drinking water, lack of sanitary facilities, negligence and overstretched primary health care are responsible for the above condition. Regarding the nutritional status of children in that area, clear cut symptoms of deficiencies are not present but they are in a state of perpetual undernutrition.

Based on the above results certain nutrition/health problems are located and a series of education programmes are planned and conducted. The education programme include exhibition, education classes and cooking demonstrations; and the women are very enthusiastic in participating in the education programmes.

Evaluation of the education programme is conducted three times with one month interval and the results of evaluation indicate that there is increase

in the knowledge of mothers with regard to the treatment and prevention of diarrhoea. The rate of adoption of the new technology namely using oral rehydration therapy for diarrhoea is also tested after six months. The results indicate that most of the mothers in the colony use on home made oral rehydration solution in the treatment of diarrhoea.