IMAPCT OF NUTRITION COMMUNICATION INTERVENTION ON THE QUALITY OF MID DAY MERAL PROGRAMME

SHEELAKUMARY J
(2007-16-108)

Thesis submitted in partial fulfillment of the requirement
for the degree of

Master of Science in Home Science
(Food Science and Nutrition)

Faculty of Agriculture
Kerala Agricultural University, Thrissur

Department of Home Science

COLLEGE OF AGRICULTURE

VELLAYANI, THIRUVANANTHAPURAM 695522
2011

DECLARATION

I hereby declare that this thesis entitled **"Impact of nutrition communication intervention on the quality of mid day meal programme"** is a bonafide record of research done by me during the course of research and that the thesis has not previously formed the basis for the award of any degree, diploma, fellowship or other similar title, of any other university or society

Vellayani **Sheelakumary J**

Date: 23-12-2011 **(2007- 16- 108)**

Dr. B. Prasanna Kumari
Associate Professor
Department of Home Science
College of Agriculture
Kerala Agriculture University
Padanakkad, Kasaragod, Kerala

Date: 23-12-2011

CERTIFICATE

Certified that this thesis, entitled **"Impact of nutrition communication intervention on the quality of mid day meal programme"** is a record of research work done independently by **Sheelakumary J (2007 -16 – 108)** 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.

Vellayani

Dr. B. Prasanna Kumari
Chairman
Advisory Committee

CERTIFICATE

We the undersigned members of the advisory committee of **Ms. SHEELAKUMARY J (2007- 16- 108**) a candidate for the degree of Master Science in Home Science agree that this thesis entitled "**Impact of nutrition communication intervention on the quality of mid day meal programme"** may be submitted by **Ms. SHEELAKUMARY J (2007- 16- 108**), in partial fulfillment of the requirement for the degree.

Dr. B. Prasanna Kumari
Associate Professor
Department of Home Science
College of Agriculture, Padanakkad
Kasaragod
(Chairman)

Dr. P.V. Nandini
Professor and Head
Department of Home Science
College of Agriculture
Vellayani
Thiruvananthapuram
(Member)

Dr. S. Syama Kumari
Professor (Rtd)
Department of Home Science
College of Agriculture
Vellayani
Thiruvananthapuram
(Member)

Dr. Anilkumar
Professor (Extension)
Department of Extension
College of Agriculture, Vellayani
Thiruvananthapuram
(Member)

ACKNOWLEDGEMENT

I am grateful to God who provided to my strength zealots to fulfill the task in a satisfactory manner. I am indebted for the numberless blessing that the God showers up on my life. Let me also express my heartful gratitude for being a main stay in the big and small things of the entire study.

Let me place on record my profound feeling of gratitude and indebtedness to the Chairman of the Advisory Committee, ***Dr. B. Prasanna kumary****, Associate Professor, Department of Home Science for her noteworthy guidance, constant encouragement, motherly affection and sincere help during the course of investigation and in the execution of this thesis. This work would not have been possible without her valuable help and support.*

I would profess my sincere gratitude to ***Dr. P.V Nandini Professor*** *and head Department of Home Science ,for her continual and timely advice, constructive criticism and expertise at all the stages of my work.*

I am much greatful to ***Dr. S.Syama kumary (Rtd)****, Professor, Department of Home Science for extending timely and helpful advice and friendly approach during the course of the work.*

My sincere thanks to ***Dr. Anilkumar****, Department of Extension for his guidance and suggestions in the course of this work.*

I greatly acknowledge the patron of College of Agriculture, the ***Dean*** *for providing me all necessary facilities from the university during the whole course of the study.*

I greatly acknowledge the co-operartion rendered by principal and teachers of ***Govt UP School Bhagavathinada*** *Venganoor for their help in the data collection. I also wish to record my gratitude to the students for their whole hearted co-operation which enabled me for the generation of data and completion of my investigation.*

I have intense pleasure in expressing my deep sense of gratitude to ***Dr.N.P Mathew BAMS****, Medical Officer, REg No.5275, Govt. Aurveda Dispensary Kalliyoor for carrying out clinical examination for this work.*

I render my sincere thanks to ***Jayahari Clinical Lab & ECG*** *for carrying out biochemical examination for this work.*

I sincere thank to ***Mr. C.E Ajithkumar*** *, junior programmer of Department of Agricultural Extension for helping me in getting the data analysed.*

I sincerely thank the facilities rendered by the Library of College of Agriculture Vellayani.

I express my sincere thanks to Mary Teacher, Chellammal Teacher, Nirmala Teacher, Soffie Teacher, Geetha Teacher, Rari Teacher, Beela Teacher and especially thanks to Rajani Teacher and Suma Teacher for their noteworthy teaching and wholehearted co-operation during the whole course of the study.

I am thankful to non teaching staff of the Department of Home Science especially vinitha chechi for their co-operation during the entire course of study and preparation of thesis.

Heartfelt thanks to my friends Naziya , Jaziya and Manjusha and my juniors Suma , Sugeetha, Athulya, Aegy, Krishnendu,,Suma and especially thanks to seethal for their wholehearted co-operation during the whole course of the study and offering me their help during a period when the demands of their own research wok their quite compelling.

A special thanks to my roommate Rashmi chechi for helping in the thesis work.

I am most indebted to my loving parents for their affection, constant encouragement, moral support and blessing that have enabled me to complete this work. A special thanks to my brothers, chechies and chettans who has been the source of inspiration throughout my success.

I thank all those who extended help and support to me during the course of my work.

Sheelakumary J
(2007-16-108)

Dedicated to

My Parents

&

My Sisters

CONTENTS

LIST OF TABLES

LIST OF TABLES CONTINUED……..

LIST OF FIGURES

LIST OF PLATES

LIST OF APPENDICES

LIST OF ABBREVATIONS USED

BMI	- Body Mass Index
MDMP	- Mid Day Meal Programme
NSI	- Nutrition Foundation India
NNMB	- National Nutritional Monitoring Bureau
SSA	- Surva Shiksha Abhiyan
MDMS	- Mid Day Meal Scheme
NFI	- Nutrition foundation of India
NFHS	- Nutritional family Health Survey
WHO	- World Health Organization
CSEP	- Comprehensive School Feeding Programme
CED	-Chronic Energy Deficiency
RDA	- Recommended Dietary Allowances
NIN	- National Institute of Nutrition
ICMR	- Indian Council of Medical Research
MUAC	- Mid Upper Arm Circumferences
NP-NSPE	- National Programme- National Support to Primary Education
IDD	- Iodine Deficiency Disorder
UNICEF	- United Nations Children's Fund
FAO	- Food Agricultural Organization
ANP	- Applied Nutrition Programme
CARE	- Co-operative for American Relief Everywhere
CFTRI	-Central Food Technological Research Institute
MPF	- Multi Purpose Food
FCI	- Food Corporation of India
SGRY	- Sampoorna Grameen Rozgar Yojana
PMGY	- Prime Minister Grameen Yojana
DWCRA	- Development of Women Children in Rural Areas

Introduction

INTRODUCTION

The situation of children in India has aptly been described as a silent emergency. In terms of both education and health India has some of the worst indicators of child well being in the world. Nearly half of all Indian children are undernourished when we use the weight -for- age criterion. Infants, pre- school and school children face many health challenges, such as pneumonia, malaria, measles, micro and macro nutrient deficiencies. Because these young children frequently suffer one or several of these problems concurrently, health and nutritional programmes focusing on this age group are extremely valid to improve the quality of their school life (Khera, 2006).

School children (6-14 years) form about 20 per cent of the total population. Free and compulsory education up to the age of 14 years is the constitutional commitment. However, even now school enrolment is not universal and about 40 per cent of the children drop out of primary school. Poor enrolment and high school dropout rate are attributed to poor socio-economic conditions, child labour, lack of motivation and poor nutrition status of the children (Gopalan, 2003).

According to Rao (2001), high prevalence of low birth weight, high mortality in children and poor maternal nutrition of the mother continue to be nutritional concerns in India. The school age period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence (Williams, 1980). Tackling disease of poor health and nutrition will not only have an immediate effect on an individual's education, by reducing the number of years of schooling health but school and nutrition interventions can have an impact of education on a global scale (Jukes et. al., 2007).

Mid day meal programme is the popular name for the school meal programme in India. It involves provision of lunch/snacks/meal free of cost to school children on school working days (Khera, 2006). The coverage of more than 12 crore children in rural and urban areas under the scheme makes the mid day meal programme one of the largest nutrition support schemes in the world today (Dreze et. al., 2003).

The net impact of the mid day meal on the child's health is ultimately determined by whether the meal is a supplement or a substitute for food intake at home, in terms of both quality and quantity. If the mid day meal is largely a substitute for home food, the nutritional impact may not be large. It may even be negative, if the quality of the school meal is inferior to what would have been consumed at home in the absence of a school meal, and if the consumption of nutritious home food declines as a result of having eaten at school (Khera, 2006).

The midday meal scheme was earlier implemented with a view to supply 300 calories and 8-12 grams of protein per child. However the nutritional norm of 300 calories and 8-12 grams of protein was felt to be inadequate to meet the growing needs of young children, and hence the programme was reviewed. Against the above background a Sub Committee of the National Steering cum Monitoring Committee (NSMC) was constituted in August 2005 in order to make recommendations. Following this, the NP-NSPE, 2006 was evolved which recommended serving a cooked mid day meal with nutritional content as follows Calories 450, Protein 12 grams and adequate quantities of micronutrients like iron, folic acid, vitamin-A etc which is being followed till today.

Nutrition communication interventions are essentially conducted to bring about a change in existing food habits of communities, or to bring about change in nutrition

programmes like supplementary feeding, midday meal programmes or other feeding programmes.

The present study aims to ascertain the impact of a nutrition communication intervention on the quality of mid day meal programme. The nutrition communication intervention programme was planned so as to include an educational session on importance of nutrition of the school going child, The communication module consists of discussion classes on various aspects of nutrition of the school group child as mentioned earlier, with the help of visual aids like charts that were developed for the purpose, role of the midday meal programme in promoting optimum nutrition of the school going child as well as a demonstration of an ideal nutritious meal that can be easily adopted by the school authorities in their midday meal programme. The nutritional status of the selected school children, the knowledge and attitude of the school children with regard to the midday meal programme are also studied so as to gain a better insight of the impact of the midday meal programme on the school children.

Review of Literature

2. REVIEW OF LITERATURE

The present investigation is carried out with a view to assess the 'Impact of nutrition communication intervention on the quality of mid day meal programme'. The review of literature pertaining to the topic has been categorized under the following headings.

2.1 Nutritional status of school children
2.2 Mid day meal programme as a nutrition intervention
2.3 Genesis of mid day meal programme in India
2.4 Mid day meal programme in Kerala
2.5 Successful mid day meal programme in India
2.6 Nutritional importance of mid day meals

2.1 NUTRITIONAL STATUS OF SCHOOL CHILDREN

National Nutrition Monitoring Bureau (NNMB) surveys (2000) indicate that about 70 per cent of children are undernourished and there is about 30 per cent deficit in energy consumption and over 75 per cent of the children have dietary micronutrients deficit of about 50 per cent of dietary micronutrients.

According to the Task Force Report on Micronutrients, 1996, (GOI) high levels of malnutrition particularly among growing children are directly and indirectly associated with high morbidity and mortality. Iron deficiency in school-going children affects their learning ability and concentration power. Even mild deficiencies of micronutrients (vitamin A, iron, folic acid, zinc etc.) affect their growth, development and immunity.

Protein energy mal nutrition has been a common health problem of the third world and it is of much serious concern among children of school going age who are deprived of good and ample nutrition on account of their poor socio-economic status, ignorance and lack of health promotional facilities (Muhammad et. al., 2001).

Nutritional anaemia due to iron and folic acid deficiency is widely prevalent among young children and adolescents. According to NNMB (2003) percentage prevalence of anaemia in school age children (6-14 years) as per studies conducted during 1981 to 1996 ranges from 14 per cent to 96 per cent.

Malnourished children tend to have lower I.Q. and impaired cognitive ability which affects their school performance and productivity in later life (Gopaldas, 2006). Protein Energy Malnutrition among school age children assessed through weight deficit for age is the most sensitive indicator of their nutritional status. Percentage of under-weight children of elementary school-going age of 10-12 years was 30.1 in the severely underweight children (NNMB, 2002).

Vitamin A deficiency affecting growing children is also a public health problem in the country. Vitamin A is important for promoting growth of the child, and building immunity and resistance to diseases. Prevalence of Vitamin A deficiency contributes to diarrhoeal diseases, respiratory infections, measles (Sreelekshmi, 2003).

The nutritional causes for anemia in children are inadequate intake of vitamin B12, inadequate intake of folic acid and malnutrition and the non nutritional causes for anemia are hook worm infestation, excessive loss of iron from the body, educational background, ignorance and poverty (Sulabha, 1990).

Iodine deficiency during childhood, which is the period of maximum growth, can results in loss of I.Q. points and poor physical and mental growth and development. Although, on an average, prevalence of total goiter among 6-12 year old children is about 4 per cent it is 12.2 per cent in Maharashtra and 9 per cent in West Bengal which is much above the WHO cut off level of 5.0 per cent. No state in the country is free from Iodine Deficiency Disorders (IDD) 260 districts out of 321 districts surveyed have more than 10% prevalence of IDD (Gopaldas, 2006).

Ushadevi and Nath (2003) pointed out that in order to meet the daily requirements and to improve their health and nutritional status; there is a need to increase the nutrient intake of school children. A study done by Yamini (2004) in Thiruvananthapuram found that children are eating more meals away from home and those meals are often high in fat and low in fiber rich carbohydrates such as fruits, vegetables and whole grains.

In a study by Raju et al., (2003) on school girls, it was revealed that green leafy vegetables are consumed daily or on alternate days by 36 per cent of the respondents. Umadevi et al., (2006) conducted a study on school children in Namakkal district of Tamil Nadu and found that their actual food intake was inadequate for all food groups except cereals and the diets were deficient in protein, iron, iodine, vitamins, fat and energy when compared to the RDA.

In a study done by Ramachandran (2002) on 13 to18 years old children in India it was seen that the prevalence of overweight was 17.8 per cent among boys and 15.8 per cent among girls. Bharti et al., (2008) reported that weight for age and height for age scores showed a dismal picture of the health condition of children in almost all states in India. The worst affected states are Bihar, Madhyapradesh, Orissa and Uttar Pradesh, while Goa, Kerala and Punjab have the lowest percentage of underweight children according to the z-scores.

In school children, anaemia impairs scholastic performance, and in young women, their reproductive performance (Thirumani and Uma, 2005). Diet and nutrition surveys carried out in India and other developing countries have shown that the diets consumed by school children are deficient in calories, proteins, vitamin A, riboflavin, folic acid and iron (Swaminathan, 1993).

2.2 MID DAY MEAL PROGRAMME AS A NUTRITIONAL INTERVENTION

A major intervention started by the Govt. for realizing the above goal, is the "'Mid Day Meal Scheme" or MDMS) launched in 1995. The aim of MDMS was universalisation of primary education by increasing enrolment, retention and attendance and simultaneously impacting upon the nutrition of students in primary classes (Afridi, 2005).

Mid day meal programme is the popular name for the school meal programme in India. It involves provision of lunch/snacks/meal free of cost to school children on school working days (Khera, 2006). The coverage of more than 12 crore children in rural and urban areas under the scheme makes the mid day meal programme one of the largest nutrition support schemes in the world today (Dreze et al., 2003).

The key objectives of the programme are:

- Protecting children from classroom hunger,
- Increasing school enrolment and attendance,
- Improving socialization among children belonging to all castes,
- Addressing the issue of malnutrition among children and

- Social empowerment of women by creating employment.

MDM seeks to provide for each school child roughly a third of the daily nutrient requirement in the form of a hot fresh cooked meal. It is sometimes argued that in the case of children of poor households, the school meal may become a substitute rather than the supplement for the home meal. A hungry child is a poor learner lacking in concentration. A mid day meal is an important instrument for combating classroom hunger and promoting better learning.

2.3 GENESIS OF MID DAY MEAL PROGRAMME IN INDIA

Mid day meals, as a public welfare concept in India, dates back to 1925 when such a project was launched for the underprivileged children in Madras Corporation area. One of the pioneers, Madras Corporation started providing cooked meals to children in Corporation schools in the Madras city; the programme was later introduced on a larger scale in 1960s.

Tamil Nadu's midday meal programme is among the best known in the country. Besides Madras, several other states/cities of India too have had the mid-day meal programme prior to the Government of India's inititaive. In 1928, Keshav Academy of Calcutta introduced compulsory Mid-Day Tiffin for school boys on payment basis at the rate of four *annas* per child per month. A school lunch programme was started in parts of Kerala in 1941; followed by Bombay implementing a free mid-day meal scheme in 1942, WHO with UNICEF assistance distributed skimmed milk powder to children aged between 6-13 years.

Another project was launched in Bangalore city in 1946 where the scheme provided cooked rice with curds to the children. In 1953, Uttar Pradesh Government introduced a scheme, on voluntary basis, to provide meals consisting of boiled or roaste

or sprouted grams, ground-nut, puffed rice, boiled potatoes or seasonal fruits. Several states introduced such schemes during 1950s, with the aid of international agencies like the UNICEF, FAO and WHO. An Expanded Nutrition Programme was launched jointly by the Government of India and the FAO, WHO, UNICEF during 1958-59, which subsequently developed, into the Applied Nutrition Programme (ANP). Under this, demonstration feeding programmes for the school children wherein nutritious food was cooked by the women groups and fed to the children who come under the nutrition education component.

.

Other international voluntary / charity organizations also assisted this programme by providing nutritious foods and other assistance. As early as far Co-operative for American Relief Everywhere (CARE) provided Corn SoyaMeal (CSM) Balahar, bulgar wheat and vegetable oils.

United Nations Children's Fund (UNICEF) joined hands for the supplementary feeding programme in India to combat malnutrition and provided milk powder/ peanut flour (protein rich foods) as well as imparting nutrition education. Church World Services (CWS) assisted in providing milk powder to Delhi and Madras Municipal Corporation.

Meals for Million (USA) aimed at combating the menace of malnutrition globally. It supplied Multipurpose Food (MPF) and the Indian version of MPF was developed at Central Food Technological Research Institute (CFTRI), Mysore. MPF is a versatile food that can be easily incorporated into snacks and biscuits (Nutro Biscuits), which are nutrient dense, particularly in terms of proteins and vitamins.

A programme with Central Government assistance for mid day meal for the benefit of children enrolled in primary schools throughout the country was considered during 1984-85, and came into being in December 1988, when the Department of Education

formulated a proposal for covering 994 ICDS blocks with concentration of SC/ST children @ Rs.1/- per child per day. The important element of this scheme was:

- The scheme should cover all children in primary classes in government and local body schools
- Mid day meals should be provided on all working days.
  CARE assistance, if any, should be excluded.
- Cereals and to the extent possible pulses, edible oils and condiments should be supplied to the schools through authorized state agencies.

In 1990-91, seventeen State governments were implementing the programme for primary school children between the age group of 6-11 years with varying degrees of coverage. Twelve states namely Goa, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura, and Uttar Pradesh were implementing Mid Day Meal Programme from their own resources. In three states namely Karnataka, Orissa and West Bengal, the programme was implemented partially with assistance from CARE.

A National Programme of Nutritional Support to Primary Education commonly known as MID DAY MEAL PROGRAMME (MDMP) was re-launched by the then Prime Minister of India on 15th August 1995. It was aimed at improving enrolment, attendance and retention, while simultaneously improving the nutritional status of students in primary classes.

The programme envisaged the provision of cooked meals/ processed food of calorific value equivalent to 100g of wheat /rice for children studying in classes IV in all Government, local body and Government aided primary schools free of cost. This recommendation was based on a study done by NNMB (1990-92) on dietary consumption patterns of rural children using a one-day 24-hour recall method. It was

observed that the children had a deficit of the magnitude of 628 kcal and 6-7g protein in the daily diets. From the nutritional angle, the endeavor was to bridge the average nutritional gap of 600 kcal through a balanced diet of cereals, pulses, fats and vegetables; the cereal component could be to the order of 60-90 percent of the calorie deficit or roughly 100g of food grains / child /day.

.

The programme which started in August 1995 attained all India coverage in 1997-98. Initially, it was perceived that the mode of delivery of nutritional support could be in the form of hot cooked meal, precooked food or food grains. Only four states viz. Gujarat, Kerala, Orissa and Tamil Nadu and the Union Territory of Pondicherry were providing cooked meals. All other states were providing dry rations supplied by Food Corporation of India (FCI) distributed under Public Distribution System (PDS) @ 3 kg of food grain per child to a family for ten months which would be equivalent to set norms for 100g /day / child for 200 school days (subject to a minimum attendance of 80 percent).

In April 2001, People's Union for Civil Liberties (Rajasthan) initiated the right to food litigation. This public interest litigation has covered a large range of issues relating to right to food, but the best known intervention by the court is on midday meals.

On November 28, 2001 the Supreme Court of India gave directive making it mandatory for the state governments to provide cooked meals instead of 'dry rations'. In one of its many directions in the litigation, the Supreme Court directed the government to fully implement the scheme of providing cooked meals to all children in primary schools. This landmark direction converted the mid-day meal scheme into a legal entitlement, the violation of which can be taken up in the court of law (Dreze and Goyal, 2003).

In September 2004 the NP-NSPE was revised to provide cooked midday meals to all children in classes1-V. However, the existing rate of Re. 1 towards cooking cost was found to be inadequate for meeting the cost of nutritious meal as per prescribed norms. Absence of kitchen sheds in schools emerged as a critical factor impacting the quality of the programme.

However the nutritional norm of 300 calories and 8-12 grams of protein was felt to be inadequate to meet the growing needs of young children, and hence the programme was reviewed. Against the above background a Sub Committee of the National Steering cum Monitoring Committee (NSMC) was constituted in August 2005 in order to make recommendations, Following this, the NP-NSPE, 2006 was evolved which recommended serving a cooked mid day meal with nutritional content as follows Calories 450, Protein 12 grams and adequate quantities of micronutrients like iron, folic acid, vitamin-A etc which is being followed till today.

Currently, the Government of India (GOI) supplies food grains (wheat /rice) free through food corporation of India (FCI) and reimburses transportation cost at fixed rates to all states. The allocation of various activities like preparation of food, cooking fuel, creation of physical facilities, man power resources and organization of capacity building is being undertaken by the states. Existing development programmes like Sampoorna Grameen Rozgar Yojana (SGRY) and Prime Ministers Grameen Yojana (PMGY) are used for creating physical facilities such as construction of kitchen sheds etc (Gopalan, 2003).

2.4 MID DAY MEAL PROGRAMME IN KERALA

In Kerala, free mid day meals to poor pupils in Lower Primary Schools was introduced with the material assistance of CARE (Co-operative for American Relief Everywhere) during 1961-62 CARE gradually withdrew assistance from 1984 and left the field by 1986. Consequent on the withdrawal of assistance of CARE School Feeding Programme, the Government of Kerala was constrained to take over the responsibility of noon feeding in Primary Schools. Accordingly Kanji Feeding was introduced from 1-12-1984. L.P Schools of both Government and aided schools in 222 fishermen villages and tribal belts were brought under the scheme. Subsequently the programme was extended to all Government and Aided L.P Schools of the state from 31-12-1985.

During 1987-88 the scheme issued different shape. The area of feeding was widened. As a matter of policy of Government the programme was extended to all Upper Primary Schools and Upper Primary sections in High Schools from 1987-88 with effect from 15-8-1987. It was introduced as a people's programme. Feeding committee was constituted in every feeding centre. The committee consisted of the Headmaster of the school, PTA President, a representative of teachers and a nominee of local body. The committee was to conduct the supply of Noon Meals in schools with the assistance of local people and Government. The committee selected the pupils for feeding. The food grains used to feed the pupils were rice and green gram. The ration paid per pupil per day was 60 grams of rice coupled with green gram of 30 grams and palmolien and condiments. Boiled rice and side dish prepared with green gram, palmolien and condiments were served as Noon Meal to every needy pupil.

The scheme was implemented through the heads of schools. The food materials for feeding were made available on credit basis through the Civil Supplies Corporation. The Heads of schools are to collect the feeding materials from the

nearest Maveli store on production of indents duly passed by the Assistant Education Officer concerned.

Since the introduction of the NP-NSPE (National Programme National Support to Primary Education) by Government of India, on the 15th of August 1995, the noon feeding scheme of the State was also brought under the NP-NSPE. Accordingly, Government of India issued 100 gram rice/pupil completely free of cost to pupils of Standard. I to V, who are in the list of noon feeding.

But the scheme was introduced in Kerala, with a slight difference. Here the scheme was extended to pupils of Standard VI and VII also. Similarly, while Government of India allows 100 gram of rice/pupil, the state supplies only 60gram/pupil. But in order to compensate this, 30 grams of any one pulse item such as Green gram, Bengal gram, Turdhal or Lobia was also supplied per pupil, as side dish, since the rice was supplied as cooked food to pupils. The entire cost of purchase of these pulse items is met by the State Government.

In addition to the regular noon feeding in schools special rice 5 Kg. per pupil, who are in the feeding list was supplied during Onam, X'mas and Ramzan. It was started from the Academic year 1997-98 and is still continuing.

2.5 SUCCESSFUL MID DAY MEAL PROGRAMME IN INDIA

Tamil Nadu - the pioneer state of the MDMP, by far has the greatest success story. The mid day meal scheme for school children was introduced in Tamilnadu as early as 1925 by the Corporation of Madras, but became a state -wide scheme in 1956 under then chief minister the late K Kamraj who introduced it in Adi Dravida Community schools as the 'Poor Feeding ' programme. In 2003, Tamil

Nadu catered to approximately a total of 10 million children in the primary and middle schools and 9 lack under-5s through the child welfare centers.

The mothers' group of each school selects from among themselves those who will cook and serve the meals. The cooking is done on the school premises and they ensure that each child gets a hot meal of rice, Sambhar and greens or koottu (mixed vegetables) (Swaminathan et al, 2004). Tamil Nadu has an MDM committee, which has drawn up a weekly menu, providing for variety and ensuring that the children get balanced nutritious meals. The involvement of the mothers in the meal programme has had many positive spin-offs. Their presence on the school premises and the constant and regular monitoring by the state authorities ensure that teachers do not absent themselves from work and classes are run on a regular basis.

One of the reasons for the success of this programme in this state can be attributed to the fact that the empowerment of women issue was also integrated into this scheme by providing greater opportunities for both women in rural and urban areas, preference being given to widows and destitute women.

Gujarat has an extremely effective-Mid Day-Meal Programme (MDMP). In addition to the cooked food, Government of Gujarat also provides from their budgetary sources, a package of micro-nutrient supplements and medicines, like Vitamin A for the control of night blindness, tablet Albendazole for de-worming, and tablet Ferrous Sulphate as a control for iron deficiency, to all the primary school children to sustain the health standard along with the nutritional standard. This scheme is operative since 1993.

This 'package' of MDM along with de-worming and Iron tablets to combat anaemia as a 'built-in' component has been widely acclaimed by the Government of

India, UNICEF, World Health Organization and other leading organizations (Dreze, 2004).

An example of NGO and Government of India partnership is ISKCON supplying MDMs in Bangalore and Delhi. State Governments can select NGOs for the programme; and the food grains and transportation cost are made available to these NGOs who in turn take on the responsibility of converting the grains into a cooked meal. The Akshaya Patra Foundation (ISKCON) has been providing free meals everyday to children studying in government schools in and around Bangalore city, Hubli, Mysore, Hassan and Mangalore in southern India. The Akshaya Patra Mid-day Meal Programme now serves 1,19,000 meals everyday in Bangalore (Khera, 2006).

In Andhra Pradesh, the MDMP is being implemented by organizations like DWCRA and NGOs like Naandi and ISKCON. A model for public-private partnership evolved in Hyderabad where Naandi Foundation manages a central kitchen to provide cooked meals to about 2 lakh children in Hyderabad (Josephine and Raju, 2008).

2.6 NUTRITIONAL IMPORTANCE OF MIDDAY MEALS

The net impact of MDM on the child's health is ultimately determinded by whether the meal is a supplement (a net addition) or a substitute for food intake at home, in terms of both quality and quantity. If the mid day meal is largely a substitute for home food ,the nutritional impact may not be large it may even be negative, if the quality of the school meal is inferior to what would have been consumed at home in the absence of a school meal and if the consumption of nutritious home food declines as a result of having eaten at school(Khera, 2006).

It is sometimes argued that in the case of children of poor households, the school meal may become a substitute rather than the supplement for the home meal (Blue 2005) in her study in Udaipur, found that the school meal was a substitute for home food .

According to Gopalan (2006) it is important that meal should contain apart from cereals a good quantity of vegetables particularly, dark green leafy vegetables, as these are important to combat micronutrient deficiencies. Apart from nutritive value, is important to ensure the hygienic quality of the meal served.

Provision of micronutrients (such as iron, vitamin, vitamin A and iodine and deworming tablets are other simple and low cost health interventions that can be fruitfully combined with the MDMS.

According to Rajammal et al., (1994) nutrition education imparted through the school curriculum and lunch programme had a significant higher beneficial effect than when imparted through the curriculum alone.

Lakshmaiah et al., (1999) conducted a study to assess the effect of the Mid Day Meal (MDM) Program on enrolment, attendance, dropout rate and retention rate in the schools and its impact on nutritional status as well as on school performance. A total of 2,694 children (MDM: 1361; Non-MDM: 1333) from 60 schools were covered in the study. Results of the study indicated better enrolment and attendance, higher retention rate with reduced dropout rate, a marginally higher scholastic performance and marginally higher growth performance of MDM children.

ACNielsen, the world's leading marketing research information company, conducted an impact assessment study of meals served by Akshaya Patra in 2006. Among many positive results, the study found significant improvement in school attendance and the retention of students in school, and better student.

An evaluation of the noon meal programme in Coimbatore city was conducted by Subapriya et al., (2006) it was found that beneficiaries had better health and nutritional status than non beneficiaries and all the beneficiaries stated that the noon meal scheme is a valuable one.

Gopalan (2003) has pointed out that it is important to note that it is not merely the long term effects of the school meal on the nutritional status but its Short Term Effects of the school meal on learning ability that should be considered important.

MDM could also include in the pupils good dietary habits and promote personal hygiene and awareness of the importance of environmental sanitation. It could also be a valuable means of imparting health and nutrition education not only to children but also to the parents and the community.

Gangadharan (2006) conducted a sudy on the noon meal scheme in Kerala and recommended the following:

The existing Noon Meal Scheme needs to be re-crafted as a Comprehensive School Feeding Programme (CSFP) to meet the complete health and growth requirements of students up to class tenth. The existing school-based programme management is costly and defective due to various reasons. Therefore, it has to be

replaced with the popular and compact Centralized Kitchen System, as far as possible.

The Planning Commission has undertaken a detailed evaluation study in 2006–07 to assess the impact of MDMS and found that MDMS appears to have had a positive impact on school attendance and nutritional status of children through removal of classroom hunger.

Materials and Methods

3. MATERIALS AND METHODS

The methodology adopted for the study entitled '**Impact of nutrition communication intervention on the quality of mid day meal programme'** is presented in this chapter under the following heads.

3.1 Selection of locale.

3.1.1 Selection of schools.

3.1.2 Selection of respondents.

3.2 Conduct of study.

3.2.1 Assessment of quality of mid day meal programme in the selected schools.

3.2.2 Assessment of personal and socio economic characteristics of participants.

3.2.3 Assessment of food computation pattern of the participants.

3.3 Assessment of nutritional status of selected respondents partaking the mid day meal programme through

3.1 Anthropometric Measurements.

3.2 Nutrient intake, (computed by 24 hour recall method).

3.3 Clinical examination

3.4. Biochemical assessment

3.5 Preparation of nutrition communication module.

3.6 Development of low cost nutrient rich and tasty meal for inclusion in the nutrition intervention communication.

3.7 Conduct of the nutrition communication intervention programme.

3.8 Assessment and impact of the nutrition programme.

3.1 SELECTION OF LOCALE

The selection of locale of the Thiruvananthapuram district.

3.1.1 Selection of School

Three government Upper Primary Schools namely Govt. U P school Punkulam, Govt. U P School Bhagavathinada, Ambalathara Govt U P School from rural, urban and costal area respectively were chosen for the conduct of the study.

3.1.2 Selection of Respondents

3.1.2.1 School children associated with the mid day meal programme in the three schools were purposively selected for the ascertaining the conduct of the programme. Thus, headmaster/ headmistress and teachers concerned with the implementation of mid day meal programme and cooks from the three schools were selected for the study.

3.1.2.2 Fifty school children selected randomly from the schools having poorest performance with regarded to conduct of the mid day meal programme were selected for conduct of the nutrition communication intervention. The children studying in classes V and VI of the school were selected from among the participants of the programme

3.2 LOCALE OF THE STUDY

3.2.1 Assessment of quality of mid day meal programme

The quality of the midday meal supplied in the selected schools was studied with respect to various parameters to identify the lacunae in the existing programme. The quality parameters selected were:

1. Infrastructure and space available in the school for cooking and serving meals.
2. Total quantity of food cooked and served in relation to number of children partaking the meal.
3. The menu followed for the mid day meal programme for a week.
4. Inclusion of vegetables, green leafy vegetables and fruits in the mid day meal.
5. Nutritional quality of meal per serve.
6. Hygienic practices followed in the preparation of the mid day meal.
7. Availability of drinking water in the school.
8. Waste disposal measures followed.

Scores were allotted for each of the parameters mentioned above as shown below:

Highly adequate - 4

Adequate -3

Inadequate -2

Highly Inadequate -1

The total score obtained by each school for the various parameters was computed. Based on these, the schools were classified as having good and bad performance with respect to the conduct of the mid day meal programme.

3.2.2 Selection of school for conducting the intervention programme.

Based on the quality parameters of the mid day meal programme the total performance score of the schools was computed. Since Bhagavathinada UP school of obtained the poorest score with regard to the implementation of the mid day meal programme, it was selected for conduct of the nutrition communication programme and to find out the impact of the nutrition communication on the quality of the mid day meal programme later.

3.2.3 Assessment of socio economic status of the respondents

The socio economic level of the subjects such as social, economic, religious, aspects and their family background in general have a very distinct part to play in determining the attitude, food composition, and health and behaviour pattern of the individual. Meer et al., (1999) has opined that the socio economic condition in which one lives is said to have a direct impact on food habits and nutritional status.

In order to elicit the information regarding personal and socio economic background of the respondents and their families, details like age, religion, family type and size, educational status and occupation were collected.

3.2.4 Assessment of nutritional status of the selected respondents

Nutritional status is defined as the state of health enjoyed as a result of nutriture (Kamath, 1986). It is one of the critical indicators of health; therefore, regular nutritional assessment is important to maintain the health of participants (Moury and Jaya, 1997)

The methods to assess the nutritional status in this study included anthropometric measurements, biochemical assessment, clinical examination and computation of nutrient intake by 24 hour recall method.

3.3 ANTHROPOMETRIC MEASUREMENTS

Nutritional anthropometry is the measurements of human body at various ages and levels of the nutritional status of and this is based on the concept that an appropriate measurement should reflect any morphological variation occurring due to the significant functional and physiological change. The following anthropometric measurements were taken (Bamji et al., 2005) (AppendixV). Nutritional anthropometry can be used to understand whether is person is underweight, normal weight, overweight or obese (Rao, 1996).

Various methods have been suggested to classify children in to various nutritional grades using anthropometric measurements like weight, height and mid upper arm circumference, waist hip ratio etc (Rahmnath et al.,1993)

In this study height, weight, MUAC were calculated. Body mass index from weight and height measurements were calculated.

3.3.1 Weight

Body weight is most widely used to sensitive and simplest reproducible anthropometric measurement. It indicates the body mass indicates the body mass and is a composite of all body constituents like water, mineral, fat portion and bone. It reflects more recent nutrition (Srilakshmi, 2003)

For weighing, platform weighing balance was used as it is portable and is convenient to use in the field. The weighing scale was checked periodically for accuracy. The scale was adjusted to zero before each measurement. The subjects having minimum clothing were asked to stand on the plat form of the scale, without touching anything and looking straight ahead. The weight was recorded to the nearest of 0.5kg. Each reading was taken twice to ensure correctness of the measurements.

3.3.2 Height

Height of the total length of the apart from nutritional and environmental factors. The extend of height deficit in relation to age as compared to region standard is regarded as a measure of the duration of malnutrition (Gopaladas and Sheshadri, 1987).

Plate 1: Weight assessment

Plate 2: Assessment of mid upper arm circumference

To determine height, a stadiometer was used. The respondents were asked to remove their slippers and to stand with centre of the back touching the wall with feet paralleled and heels, buttocks, shoulder and back head touching the wall. The head was held comfortably erect; the arms hanging close by the side. The moving head piece of the stadiometer was lowered to reset flat on the top of the head and the measurement was taken. Height was read to the nearest 0.1cms. An average of the three measurements of height of the respondent was taken.

3.3.3 Body mass index

BMI is regarded as a good indicator of nutritional status. BMI is expressed as the ratio of weight to height squire i.e., weight (kg)/ height (m). It is an indicator of general obesity. A person with BMI between 25-29.9 is identify by the overweight and the one with BMI of 30 above or above is considered as obese (WHO, 1995). This was used as a good parameter to grade chronic energy deficiency (James et al 1998). Based on their BMI the participants were graded following the procedure cited by Srilakshmi (1997).

3.3.4 Mid Upper Arm Circumferences (MUAC)

According to srilakshmi MUAC indicates the status of muscle development. This is also one of the anthropometric measurements used to the measure obesity in adults. In this study, this measurements was also taken for comparison with normal weight children and standards suggested by Jellifee (1976) (Appendix VI)

For assessing the MUAC, fiberglass tape was used. On the left hand of the children, the midpoint between the tip of the acromion of the scapula and the tip of the olecranon of the forearm bone was located with the arm flexed at the elbow and marked with a marker pen and the reading was taken to the nearest 0.1cm. The MUAC of the children were thus computed.

3.4 BIOCHEMICAL ASSESSMENT

Biochemical assessment is another important tool for assessing the nutritional status of the subject.

There are several biochemical indicators of malnutrition specified for different nutritional deficiencies. According to Park (1997) haemoglobin level is a useful index of the overall state of nutrition irrespective of its significance in aneamia The heamoglobin content of the subject was estimated by Cyanmetheamoglobin method as described in the manual of Laboratory Techniques by NIN (ICMR, 1994) (Appendix VI)

3.5 CLINICAL EXAMINATION

Clinical examination is stated to be one of the most essential and the simplest methods used in the evaluation of nutritional status (Gupta et al, 1998). It is a part of nutritional assessment through which direct information of signs and symptoms of dietary deficiency could be obtained (Swaminathan, 1993).

Plate 4: Biochemical assessment for the students

The presence or absence of clinical deficiency symptoms, which is an index of nutritional status, was assessed by a qualified physician using the proforma made for the purpose. The incidence of the clinical signs and symptoms prevalent were then tabulated (Appendix VII).

3.6 ASSESSMENT THROUGH INTAKE BY 24 HOUR RECALL METHOD

The 24 hour recall method was used to ascertain actual food intake by the participants. For this a set of cups and spoons were first standardized by the investigator following the procedure given by Thimmayamma and Rao (2003). The participants were asked about the type of preparations they had for breakfast, lunch, teatime and dinner and raw ingredients used for each of the preparations. The quantity consumed by them was then assessed using the standardized cups. The cups were used to aid the participants to recall the quantities prepared and eaten. Later the raw food equivalents of the food consumed by the participants were computed and their nutritive value was calculated using food composition tables.

3.7 FOOD USE FREQUENCY

Frequency of use of different food items in the dietaries of the respondents clearly indicate the adequacy of the diet consumed by them. In this study, food use frequency was measured using a check list. The locally popular food and preference for each food were rated separately.

The percentage of total score for each food used by participants as well as the preference score of the respondents for different food items were calculated separately using the formula suggested by Reaburn et al. (1979)

Percentage of total score for each food items

$$= \frac{R_1S_1 + R_2S_2 + R_3S_3 + \ldots\ldots\ldots\ldots\ldots\ldots\ldots Rn\ Sn}{n}$$

S_1: Scale of rating given for frequency of use of a food item (i=1, 2, 3……6)

R_1: Percentage of respondents coming under each frequency group (i=1, 2, 3…….6)

n: Maximum scale rating (n=6)

The mean score was calculated using the formula given below

Mean score for each food group

$$= \frac{R_1S_1 + R_2S_2 + R_3S_3 + \ldots\ldots\ldots\ldots\ldots\ldots\ldots Rn\ Sn}{100}$$

The percentage of participants using each food item and also their preference for each item was then computed.

3.8 NUTRITIONAL STATUS INDEX OF THE RESPONDENTS

Nutritional status index (NSI) of the respondents was assessed using the parameters such as weight, height, mid upper arm circumferences and heamoglobin level of the participants. The formula NSI developed for the ith sample was

$$NSI = \frac{\Sigma_{j=1} X_{ij} W_j}{\Sigma W_j}$$

Where $W_j = \frac{1}{Var (X_{ij})}$

X_{ij}= observation

i=1, 2, 3….n= Number of the respondents.

j=1, 2, 3….k= Number of the variables.

3.9 PREPARATION OF NUTRITION COMMUNICATION MODULE

Based on the evaluation of the conduct of the mid day meal programme in the selected schools and assessment of nutrition knowledge and attitude of the children and their nutritional status, a nutrition communication module relating to was prepared. The nutrition communication module was prepared based on the areas of nutrition of the school going child with the following content.

- Signs of a healthy child
- Importance of balanced diet
- Nutrition of school going children

- The midday meal programme and its importance in the nutrition of the school going child.

3.10 DEVELOPING A LOW COST NUTRIENT RICH AND TASTY MEAL FOR INCLUSION IN THE NUTRITION COMMUNICATION INTERVENTION

Based on the lacunae identified during the conduct of the study, and based on review of studies implemented regarding the mid day meal programme, a low cost nutrient rich and tasty meal that could be adopted for the mid day meal programme was formulated and standardized. The main ingredients used in the meal were the same as that supplied by the government for the mid day meal programme in the state, i.e. rice 60 g and green gram 30 g /student. So the main ingredients used were 60 g of rice and 30 g of green gram 25 g each of locally available, low cost vegetables like pumpkin and banana and drumstick leaves, along with 5 g of coconut, salt and some spices added for taste. Care was taken to see that the cooking method adopted was one which could be followed by the schools using firewood which is the commonly used fuel. The cooking of the meal was done by absorption method. This procedure was selected since it could be followed for large scale cooking in the schools. The recipe was prepared in the foods laboratory and the quantity of cooked meal was measured. The 'nutri meal' thus prepared was subjected to organoleptic evaluation among the faculty members, and post graduates students of the department, using a score card prepared for the purpose. Based on the organoleptic evaluation, changes were made in the recipe formulation and the recipe for nutri meal was finalized. The nutritive value of the nutri meal was also calculated. The recipe for nutri meal and its nutritive values are given in Table17. The cost of the nutri meal was calculated which worked out to Rs/-4.25 per serving.

Plate 4: Low cost nutrient rich meal developed – 'Nutri Meal*'

*Got second prize in the mid day meal recipe competition for southern zone by Avinashilingam University.

9 CONDUCT OF THE NUTRITION COMMUNICATION INTERVENTION

With the aid of nutrition communication module developed for the study, the intervention programme was conducted in the school having the poorest performance with regard to conduct of mid day meal programme. The intervention programme was planned and conducted in the school from morning till evening with the help of the school authorities. The communication module consisted of discussion classes on various aspects of nutrition of the school child as mentioned earlier, with the help of visual aids like charts that were developed for the purpose (Appendix XII). The awareness programme was conducted in the forenoon sessions for the students and teachers involved in the mid day meal programme. Demonstration on the standardized nutri meal was conducted as part of the intervention programme. The School authorities, mid day meal committee members, cooks, helper, parents and other teachers and the selected children took active part in the intervention programme.

3.11 ASSESSMENT OF THE IMPACT OF NUTRITION COMMUNICATION INTERVENTION.

The impact of the nutrition communication intervention was assessed after a month by

a) Observing the general conduct of the mid day meals with regarded to selected parents as to find out improvement if any in the mid day meal programme in the school.

b) Improvement in nutritional knowledge of the children.

Plate 6 a & b: Nutrition communication intervention programme

c) Change in the attitude of the children towards the mid day meal programme.

ANALYSIS OF DATA

The data collected were coded and respondents to statistical analysis. The statistical procedures used were mean, percentage, standard deviation correlation and t'test. The results of the statistical analysis and findings have been presented in the ensuring chapter.

Results

4. RESULTS

The results of the present study entitled '**Impact of nutrition communication intervention on the quality of mid day meal programme'** are presented as follows.

4.1 Assessment of quality of mid day meal progaramme in the selected schools.

4.2 Personal and socio-economic characteristics of the respondents

4.3 Food consumption pattern of the respondents

4.4 Assessment of Nutritional status of the respondents

4.5 Preparation of 'Nutri Meal' calculation of the nutritive value and Organoleptic assessment of the nutri meal.

4.6 Impact of nutrition communication intervention on knowledge and attitude of respondents and quality of mid day meal supplied.

4.1 ASSESSMENT OF QUALITY OF MID DAY MEAL PROGRAMME IN THE SELECTED SCHOOLS

The midday meal programme being implemented in the three schools was studied both by observation and by means of an interview schedule prepared for the purpose. The parameters studied were

1. Infrastructure and space available in the school for cooking and serving meals.
2. Total quantity of food cooked and served in relation to number of children partaking the meal.

3. The menu followed for the mid day meal programme for a week.

4. Inclusion of vegetables and green leafy vegetables and fruits in the mid day meal.

5. Nutritional quality of meal per serve.

6. Cooking practices followed in the preparation of the mid day meal.

7. Availability of drinking water in the school.

8. Waste disposal measures followed.

Based on observation by the investigator and interview of the personnel involved in the programme, scores were allotted for each of the selected parameters. The scores obtained by the three schools are as follows:

Table 1: Score obtained by the schools for the different quality parameters

Parameters	UP School Ambalathara	UP School Punkulam	UP School Bhagavatinada
Maximum Score	4	4	4
Infrastructure and space available	3	3	3
Quantity of food cooked and served	3	3	3
Menu quality	4	4	2
Inclusion of leafy and other vegetables	3	3	2
Nutritional quality of meal	4	4	2
Cooking practices followed	3	3	3
Availability of drinking water	3	3	3
Waste disposal measures	3	2	2
Total	26	25	20

From Table 1, it can be seen that UP School Ambalathara scored the highest with regard to the different quality parameters regarding the implementation of the midday meal programme followed by UP School at Punkulam. The UP School at Bhagavatinada scored the least among the three schools.

4.2 PERSONAL AND SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

Fifty respondents were selected from the Bhagavatinada UP School which was chosen for the conduct of the intervention programme. Personal and socio-economic characteristics of the sample which included sixty percent boys and forty percent girls were assessed in order to elicit information regarding their age, religion, type of family, family size, ordinal position, family income, and educational status of the family members. The distribution of the respondents based on their personal and socio-economic characteristics is shown in Table II.

Table 2: Percentage distribution of respondents based on their personal and socio-economic characteristics

Variables	Category	No	Percentage (n=100)
Age of participants	11 years 12 years	13 37	26 74
Gender	Male Female	30 20	60 40
Religion	Hindu Christian Muslim	41 8 1	82 16 2
Type of family	Joint Nuclear Extended	32 16 4	32 64 4
Family size	Small (1-4) Medium (5-7) Large (>8)	28 21 1	56 42 2
Ordinal position	1st 2nd 3rd	20 26 4	40 52 8

4.2.1 Age of the participants

Table I shows that among the respondents surveyed twenty six per cent belonged to the age group of 11 years, and seventy four per cent were in the age group of 12 years.

4.2.2 Religion

Religion plays a dominant role in the process of socialization and it helps to maintain the stability of social system and social relationship. Table 2 depicts the religion wise distribution of the respondents. Eighty two per cent of the respondents were Hindus, while sixteen per cent belonged to Christian and remaining two per cent were Muslims.

4.2.3 Type of family

The family type has been classified into nuclear, joint and extended based on composition. Joint families include parents, children, grand parents and other relatives where as extended families have parents their children and one or two relatives residing in the family and nuclear families have only parents and their children under the same roof. In this study sixty four per cent of the respondents were from nuclear families. While thirty two per cent belonged to from joint families and four percent from extended families.

4.2.4 Family size

Table 2 indicated that majority i.e. fifty six per cent of the respondents belonged to small family category with 1 to 4 members. Forty two per cent of the respondents belonged to the medium sized families with 5 to 7 members and four per cent had more than eight members in the family.

4.2 .5 Ordinal position

Data regarding the ordinal positions of respondents in their families are given in Table 2. When ordinal position of the subjects was considered, fifty two per cent were middle born while forty per cent were first born and eight per cent were last born.

4.2.6 Educational status of parents

The educational status of the parents was studied and is presented in

Table

Table 3: Distribution of respondents based on the educational status of parents

Education	Educational status			
	Father (Number)	Percent (n=100)	Mother (Number)	Percent (n=100)
Illiterate	2	4	2	4
Lower primary	7	14	6	12
Upper primary	8	16	12	24
High school	7	54	23	46
College	5	12	7	14

From Table 3 it can be seen that the educational status of parents of the sample was seen to range from illiterate to college education. It can also be seen that the majority of parents had studied up to high school level. Also four per cent of both fathers and mothers were illiterate.

4.2.7 Employment status of the parents

Data regarding the employment status of the parents of the respondents is presented in table 4

Table 4 : Distribution of respondents based on the employment status of parents

Employment	Employment status			
	Father (Number)	Percentage (n=100)	Mother (Number)	Percentage (n=100)
Unemployed	-	-	40	80
Self employed	11	22	6	12
Casual labour	35	70	3	6
Private	2	4	-	-
Government	2	4	1	2

From the table it can be seen that with regard to employment status of parents, none of the respondents fathers were unemployed. Seventy per cent of fathers were found to be casual labourers while twenty two per cent were self employed. Four per cent were working in private and government agencies.

With regard to employment status of mothers, it was seen that the majority were house wives and hence unemployed. Twelve per cent of the mothers were self employed while six per cent were working as casual labourers and two per cent were government employees. None of the respondents mothers were employed in private agencies.

4.2.8 Monthly family income of the respondents

Table 5 shows that the monthly income of the family ranged between Rs: 2500-8500. The table reveals that the income of forty four per cent of the

respondents ranged from Rs: 4501-6000 and twenty six per cent of the participants ranged from Rs: 3501-4500. Fourteen per cent came in the income range of Rs: 2500-3500 while remaining ten per cent came in the income range of Rs: 6001-8500. Six per cent of respondents had a monthly income greater than Rs: 8501.

Table 5: Distribution of respondents based on the monthly income of the parents.

Total monthly income	Total(n=50)	Percentage(n=100)
2500-3500	7	14
3501-4500	13	26
4501-6000	22	44
6001-8500	5	10
> 8501	3	6

4.3 FOOD CONSUMPTION PATTERN OF THE REPONDENTS

Food consumption pattern of the respondents was assessed through diet survey. Details regarding food habits and frequency of use of the various food items were collected and the results obtained are presented in Table 6

Food habits of the respondents showed that all of them were non vegetarians.

Based on the frequency of use of the various fruits and vegetables by the subjects, percentage of total score for each food items was calculated using the formula suggested by Reaburn et al. (1979)

Percentage of total score for each food items

$$= \frac{R1S1 + R2S2 + R3S3 + \ldots\ldots\ldots\ldots\ldots\ldots Rn\ Sn}{N}$$

S1: Scale of rating given for frequency of use of a food item (i=1, 2, 3……6)

R1: Percentage of respondents coming under each frequency group (i=1, 2, 3…….6)

N: Maximum scale rating (n=6)

Table 6 revealed that the food items like cereals, milk and milk products, nuts and oil seeds, sugar and beverages were consumed daily by all the respondents.

Seventy six per cent of the respondents used pulses thrice a week. Twenty four per cent of the participants used pulses only once in a week.

The daily consumption of green leafy vegetables was found to be very low (four per cent). The majority of respondents were consuming leafy vegetables fortnightly, i.e. forty two per cent. Twenty two per cent of the respondents were found to consume leafy vegetables ones in a month and eighteen per cent used leafy vegetables only occasionally. Fourteen per cent of the respondents used green leafy vegetables thrice in a week.

Consumption of roots and tubers were found to be thrice a week among the respondents. Thirty six per cent of the respondents were found to consume tubers thrice in a week. Twenty four per cent of the respondents consumed tubers once a week and twenty per cent once a month. Sixteen per cent of the respondents consumed roots and tubers daily.

Consumption of other vegetables was found to be daily, among forty per cent of the respondents. Twenty eight per cent of the respondents consumed vegetable thrice in a week and twenty per cent of the respondents consumed vegetables once in a week.

Only ten per cent of the respondents consumed fruits daily. Majority of the respondents consumed fruits once a week, i.e. forty two per cent. Thirty four per cent of the respondents consumed fruits once in a month. Twelve per cent of

the respondents consumed fruits weekly thrice and only two per cent consumed occasionally.

Majority of the respondents were found to consume fish daily, i.e. forty four per cent. Twenty two per cent of the respondents consumed fish once in a week and thirty four per cent consumed fish thrice in a week.

Forty eight per cent of the respondents consumed egg once in a month and twenty four per cent of the participants consumed eggs once in a week. Twenty per cent of the respondents consumed eggs occasionally and eight per cent of the respondents consumed eggs thrice in a week. None of the respondents consumed egg daily.

Consumption of meat was found to be only once in a month among the majority of respondents, i.e. sixty six per cent. Twenty per cent of the consumed meat once in a week and ten per cent of the respondents consumed occasionally. Four per cent did not consume meat at all.

None of the respondents consumed preserved foods daily. Twenty four per cent of the respondents consumed preserved foods thrice in a week. Thirty two per cent of the respondents consumed preserved foods once in a month and twenty six per cent of the respondents consumed preserved foods once a week.

Forty six per cent of the respondents used bakery foods once in a week and twenty two per cent used them once a month only. Twenty four per cent of the respondents consumed bakery foods thrice in a week. Only four per cent consumed bakery foods daily.

Table 6: Frequency of use of various food items by the respondents

Food items	Daily	Per cent	Weekly Thrice	Per cent	Once in a Week	Per cent	Once in a Month	Per cent	Occasionally	Per cent	Never	Per cent	Total
Cereals	50	100	-	-	-	-	-	-	-	-	-	-	100
Pulses	12	24	38	76	-	-	-	-	-	-	-	-	100
Green leafy vegetables	2	4	7	14	21	42	11	22	9	18	-	-	100
Other vegetables	20	40	14	28	10	20	6	12	-	-	--	-	100
Roots& Tubers	8	16	18	36	12	24	10	20	-	-	-	-	100

Fruits	5	10	17	34	21	42	6	12	1	2	-	-	100
Milk& Milk product	50	100	-	-	-	-	-	-	-	-	-	-	100
fish	22	44	17	34	11	22	-	-	-	-	-	-	100
Meat	-	-	-	-	10	20	33	66	5	10	2	4	100
Egg	-	-	4	8	12	24	24	48	10	20	-	-	100
Nuts and Oil seeds	50	100	-	-	-	-	-	-	-	-	-	-	100
Sugar	50	100	-	-	-	-	-	-	-	-	-	-	100
Preserved Foods	-		12	24	13	26	16	32	5	10	-	-	100
Bakery items	2	4	12	24	23	46	11	22	-	-	-	-	100
Beverages	50	100	-	-	-	-	-	-	-	-	-	-	100

Table 7: Food use frequency score obtained for various food items

Food items	**Food use frequency score**	**Per cent (n=100)**
Cereals	6	100
Pulses	4.58	76.33
Green leafy vegetables	3.44	57.33
Other Vegetables	3.61	59.2
Roots and Tubers	4.40	73.33
Fruits	4.38	73
Milk and Milk Product	6	100
Fish	4.78	80
Meat	3.02	50.33
Egg	3.20	53.33
Nuts and oil Seeds	6	100
Sugar	6	100
Processed Foods	4.22	70.33
Bakery items	3.94	65.66
Beverages	6	100

Table 7 revealed the mean food use frequency scores and percentage of total scores obtained for each food group by the respondents. Food use frequency percentage of 100 was obtained for food items like cereals, milk and milk product, nuts and oil seeds, sugar and beverages for the respondents. A percentage score of 59.2 obtained for other vegetables, while for green leafy vegetables it was only 57.33. In the case of fish, the frequency percentage obtained was 80.

With regard to pulses, roots and tubers, fruits and processed foods, the food frequency percentage scores were found to be 76.33, 73.33,73 and 70.33 respectively. Bakery items were found to have percentage frequency scores of 65.66 while egg and meat had percentage frequency scores of 53.33 and 50.33 respectively

Based on the percentage frequency, food groups included in the daily dietaries by the respondents were classified as most frequently used, (percentage score above80), medium frequently used (percentage scores 60-80), and less frequently used (percentage scores 50-60).

Table 8: Frequency of use of food groups based on percentage frequency

Most Frequently used	Medium Frequently used	Less Frequently used
Cereals Milk and Milk products Nuts and oil Seeds Sugar Fish Beverages	Pulses Roots and Tubers Fish Processed Foods Bakery foods Fruits	Green Leafy Vegetables Other Vegetables Meat Egg

The above table indicates that cereals, milk and milk products, fish, nuts and oil seeds, other vegetables, sugar, and beverages are the most frequently used food items among the respondents. Pulses, roots and tubers, processed foods and bakery foods were found to be medium frequently used and green leafy vegetables, meat and egg to be less frequently used items in the diet.

4.4 ASSESSMENT OF NUTRITIONAL STATUS

Assessment of nutritional status of the respondents in this study was done using anthropometry, clinical examination and haemoglobin level.

4.4.1 Anthropometric measurements

Anthropometry is one of the most frequently used methods for assessing nutritional status. In this study, the anthropometric measurements recorded were height, weight, BMI and mid upper arm circumference. The details are given the Appendix V.

Weight and Height of the respondents

Weight and height of the respondents in the present study were measured and compared with the standards used the details are presented in Table 9.

Table 9: Age and sex wise distribution of the respondents based on their height and weight

Age of the subjects	Number	Weight (kg)			Height (cm)		
		Standard*	Below standard	normal	Standard*	below standard	normal
11 year	Boys(8) Girls(5)	33.96 36.26	4(50) 2(40)	4(50) 3(60)	142.73 145.11	3(38) 2(40)	5(62) 3(60)
12 year	Boys (22) Girls(15)	37.25 42.51	4(18) 5(33)	18(82) 10(60)	148.40 151.47	7(32) 5(33)	15(68) 10(67)

*Source: Gopaldas, 1987. Figures in parenthesis indicate per cent.

Table 9 shows that fifty per cent of the 11 years old boys had weights below standard while fifty per cent were of normal weight. With regard to girls forty percent of them were below standard weight and sixty percent were found to be normal.

With regard to 12 years old boys eighty two percent of boys were having normal weight while eighteen per cent were below standard. However, only sixty seven percent of the girls had normal weight while 33 per cent were below standard weight.

In case of height measurements thirty eight per cent of the 11 year old boys and forty per cent of girls were below standard. Sixty two per cent of the 11 year old boys and sixty per cent of girls had normal height. With regard to height measurements of 12 years old, thirty two and thirty three per cent of boys and girls respectively had heights below standard, while sixty eight and sixty seven percent of them had normal heights.

4.4.1.2 Body Mass Index (BMI)

Body Mass Index of the respondents was computed in order to classify them according to different categories of nutritional status. The BMI of the respondents was calculated and the respondents were classified accordingly. Table to shows the distribution of respondents based on the BMI

Table 10: Distribution of respondents based on their BMI

BMI classification standards*	Number (n=50)	Per cent (n=100)
<15 CED	24	48
15-22 Normal	25	50
>22 over weight	1	2
>25 obese	-	-

* Source: Elizabeth(2005). Figures in parenthesis indicate per cent.

Table 10 shows that fifty percent of the respondents were normal and forty eight per cent had were severe chronic energy deficient (CED). Two per cent were overweight and none were obese.

4.4.1.3 Mid Upper arm Circumferences of the respondents

The mid upper arm circumferences of the respondents were measured and is presented in Table 11

Table 11: Mid Upper arm Circumferences of the selected respondents

Age of the subjects	Number (n=50)	Mid upper arm circumference		
		Standard*	Below std	Normal
11 year	Boys (8) Girls(5)	19.16 19.51	2(25) -	6(75) 5(100)
12 year	Boys (22) Girls(15)	20.11 20.82	9(45) 5(33)	12(55) 10(67)

*Source: Gopaldas, 1987. Figures in parenthesis indicate per cent.

Table 11 shows that based on mid upper arm circumference seventy five per cent of the 11 years had normal MUAC. In case of girls, all of them had normal MUAC. In the case of twelve year olds, fifty five per cent of boys and sixty seven per cent of girls had normal mid upper arm circumference.

4.4.1.4 Mean nutrient intake of the respondents

Based on the 24 hour recall conducted among the participants, their mean nutrient intake was calculated and the data is presented in Table 13. Apart from

energy, protein, fat and iron intake of the participants were found out separately for boys and girls.

Table 12: Mean nutrient intake of the respondents (boys)

Nutrients	Mean intake	RDA*	Percentage met	Percentage deficit
Energy (kcal)	1215	2150	56.5	-
Protein(g)	12	53	22.6	-
Fat(g)	17	15	106.6	-
Iron(mg)	25.1	28	89.6	10.4

*Source: NIN 1984 Figures in parenthesis indicate per cent.

From Table 12, it can be observed that the mean energy intake of boys was 1215 kcals, which was found to meet about 56.5 per cent of the recommended allowances. Mean protein intake was 12g, which met 22.6 per cent of RDA. The mean intake of fat was almost 17 which were found to meet 106.6 per cent of the RDA. Intake of iron was 25.1 percent, which was found to meet 89.6 per cent of RDA. It can be seen that the mean percentage deficit was seen only for iron which was 10.4 per cent.

Table 13: Mean nutrient intake of the respondents (girls).

Nutrients	Mean intake	RDA*	Percentage met	Percentage deficit
Energy (kcal)	1005	1950	51.5	-
Protein(g)	15	55	27.27	-
Fat(g)	18	15	113.3	-
Iron(mg)	18.92	20	94.6	5.4

*Source: NIN 1984 Figures in parenthesis indicate per cent.

From Table 13, it can be observed that the mean energy intake of girls was 1005 kcals, which was found to meet about 51.5 per cent of the recommended allowances. Mean protein intake was 15g, which met only 27.27 per cent of RDA. The mean intake of fat was almost 18 which were found to meet 113.3 per cent of the RDA. Intake of iron was 18.92 per cent, which was found to meet 94.6 per cent of RDA. It can be seen that the mean percentage deficit was seen only for iron which was 5.4 per cent.

4.4.1.5 Clinical Examination

Examination of the respondents for the incidence of clinical signs and symptoms of deficiency diseases indicated that about twenty eight percent did not show any clinical symptoms of any of the deficiency diseases. Table 15 depicts the clinical symptoms of deficiency diseases found among the respondents.

Table 14: Distributions of respondents based on the incidence of clinical symptoms

Clinical symptoms	Number (n=50)	Percentage (n=100)
Emaciation	12	24
Tongue and red law	2	4
Anaemia	13	26
Pigmentation	7	14
Koilonychia	1	2
Gums spongy bleeding	3	6
Dental carries	7	14
Mottled enamel	5	10

It can be seen from Table 14 that twenty six per cent of the respondents were found to be anaemic. In twenty four per cent of the participants, emaciation was seen and six per cent of the respondents had spongy bleeding gums. Fourteen per cent of the participants had dental carries and skin pigmentation. Ten per cent of the participants had mottled enamel. Four per cent had red raw tongue, while two per cent of the participants had koilonychia. Twenty eight per cent of the respondents did not have any clinical symptoms of nutrient deficiency.

4.4.1.6 Biochemical assessment (Haemoglobin level)

The biochemical assessment of nutritional status of the respondents was conducted by estimating the haemoglobin level. Table 15 shows the distribution of respondents based on their haemoglobin level.

Table15: Distribution of respondents based on their haemoglobin level

Haemoglobin level (gm/d) *	Number	Percent (n=100)
<7.9 (Severe)	-	-
8.0-9.9 (Moderate)	3	6
10.0-10.9 (Mild)	10	20
11-11.9 (Marginal	17	34
>12 (Non Marginal)	21	42
Total	50	100

*Source NIN, 1984**.** Figures in parenthesis indicate per cent.

From Table 15, it can be seen that forty two per cent of the respondents had haemoglobin level of >12 and hence came in the non marginal category. Thirty four per cent of the respondents were marginally anemic. Twenty per cent of the respondents were mildly anaemic and six per cent of the respondents were moderately anaemic. None of the respondents were found to be severely anaemic.

4. 4.1.7 Nutritional status index

Nutritional status index (NSI) of the respondents was assessed using the parameters such as weight, height, mid upper arm circumferences and heamoglobin level of the respondents. The formula NSI developed for the i^{th} sample was

$$NSI = \frac{\Sigma_{j=1} X_{ij} W_j}{\Sigma W_j}$$

Where $W_j = \frac{1}{Var (X_{ij})}$

X_{ij}= observation

i=1, 2, 3….n= Number of the respondents.

j=1, 2, 3….k= Number of the variables.

It was found that the NSI values for the respondents ranged between 14.08 to 17.13. The NSI values of the respondents are given in Appendix VIII

The mean values of NSI of the respondents were 16.13 and the S.D was 14.37.

Table 16: Distribution of respondents based on their NSI

NSI	Number	Percentage	Mean±S.D
High	9	18	16.13±14.37
Medium	32	64	16.13±14.37
Low	9	18	16.13±14.37

Figures in parenthesis indicate per cent.

Based on the mean and standard deviation of the NSI the respondents were classified as having high, medium and low NSI.

Table 17, depicts that sixty four per cent of the respondents had a medium NSI, while eighteen per cent of the respondents had high NSI and eighteen per cent had low NSI.

4.5 DEVELOPMENT OF LOW COST NUTRIENT RICH AND TASTY MEAL FOR INCLUSION IN THE NUTRITION COMMUNICATION INTERVENTION

4.5.1 Preparation of Nutri meal

As part of the intervention programme, a nutritive meal which could be adopted for the school mid day meal programme was planned and standardized in the laboratory. The meal thus prepared was named as 'Nutri Meal'. The preparation of nutri meal was demonstrated before the students and staff members in the school as well as for the cook and helper.

Ingredients for one serving

- Rice - 60g
- Roasted green gram - 30g
- Pumpkin - 25g
- Plantain (raw) - 25g
- Drumstick leaves - 25g
- Coconut - 25g
- Chilli powder - ½ tsp
- Jeera - ¼ tsp
- Turmeric - ¼ tsp
- Water - 6 glass
- Salt - To taste

Method

Boil water, add rice. After 15 minutes, add green gram .When rice and green gram half cooked, add the vegetables, drumstick leaves and salt. When done add ground coconut and spices and mix well. Remove from fire and serve hot.

(One serving)

Table 17: Nutritive value of the nutri meal (one serving)

Ingredients	Amount (g)	Energy (kcal)	Protein (g)	Iron(mg)	Beta carotene(mg)	Vit-C (mg)
Rice	60	207.6	3.84	0.6	-	-
Green gram	30	100.2	7.2	1.32	28.2	-
Pumpkin	25	6.25	0.35	0.11	12.5	0.5
Plantain(raw)	25	16	0.35	1.57	7.5	6
Drumstick leaves	25	13.8	1.005	0.124	1017	33
Coconut	25	111	1.125	0.425	-	0.25
	Total	454.85	13.87	4.15	1065.2	39.75

4.5.2 Organoleptic assessment of the nutri meal

The acceptability parameters like appearance, colour, flavor, texture and taste of the nutri meal were assessed by a selected panels and judges using a score card.

Table 18: Rank means of organoleptic parameters of nutri meal

Parameters	Nutri meal	
	Mean score	Maximum score
Appearance	4.6	5
Colour	4.7	5
Taste	4.3	5
Texture	4.8	5
Flavor	4.4	5
Over all acceptability	4.6	5

Table 18 shows that rank means of organoleptic parameters of nutri meal. The overall acceptability of the nutri meal worked out to 4.6 out of a maximum of 5.

4.5.3 Impact of nutrition communication intervention programme on knowledge and attitude of the respondents

A pre and post experimental design was used to study the impact of nutrition communication intervention programme on the knowledge and attitude of the respondents. Table 20 shows the pre and post intervention knowledge scores of the respondents.

Table 19: Comparison of the knowledge scores among the respondents

Knowledge	Mean score	S.D	Estimated t'value
Pre test	10.4	1.39	
Post test	13.5	1.18	22.801**
Gain (%)	20.66		

**Significant at 1% level. Figures in parenthesis indicate per cent.

It can be seen from the table that the difference in knowledge scores of the participants is statistically significant. The per cent gain in knowledge score was 20.66.

Table 20: Distribution of the respondents based on the knowledge score

Knowledge level	Distribution of participants in percentage			
	Pre test	Per cent	Post test	Per cent
Low	4	8	-	-
Medium	25	50	12	24
High	21	42	38	76

Figures in parenthesis indicate per cent.

Table 20 shows the distribution of the respondents based on their pre and post test knowledge. Based on the mean and standard deviation of the knowledge scores of the respondents for pre and post test they were classified as having low, medium and high knowledge level.

It can be seen that eight per cent of the subject came under low category with regard to knowledge in the pre intervention phase while none of the participants came in the low category in the post intervention phase. Fifty per cent of the participants came in the medium category in pre intervention phase while twenty four per cent came in the medium category in the post intervention phase. It can be seen that only forty two per cent of the participants came in the high knowledge category in the pre intervention phase while seventy six per cent of the subjects came in the high knowledge category in the post intervention phase.

CHANGE IN ATTITUDE OF THE PARTICIPANTS WAS ASSESSED BY THE DIFFERENCE BETWEEN THE SCORES BEFORE AND AFTER THE EDUCATION PROGRAMME.

Table 21: Comparison of the attitude scores of the participants

Attitude	Mean score	S.D	Estimated t'value
Pre test	47.66	4.1	
Post test	55	3.03	16.59**
Change (%)	12.23		

**Significant at 1% level

Table 21 shows the pre and post intervention attitude scores of the respondents. It can be seen that the difference in attitude scores is statistically significant.

Table 22: Distribution of the respondents based on the attitude score

Attitude level	Distribution of participants in percentage			
	Pre test	Per cent	Post test	Per cent
Low	5	10	-	-
Medium	31	62	9	18
High	14	28	41	82

Table 22 shows the distribution of the respondents based on their pre and post test attitude score. It can be seen that ten per cent of the subject came under low category with regard to attitude in the pre intervention phase while none of the respondents came in the low level in the post intervention phase. Sixty two per cent of the respondents came in the medium category in pre intervention while eighteen per cent came in the medium category in the post intervention phase. It can be seen that only twenty eight per cent of the respondents came in the high attitude category in the pre intervention phase while eighty two per cent of the respondents came in the high attitude category in the post intervention phase.

In order to ascertain whether the socio economic variables like religion, family types, familysize, educational status of father and mother and family income had any association with the knowledge and attitude of the respondents correlation was computed and the results are as follows.

Table 23: Association of knowledge and attitude of the respondents with socio economic variables.

Socio economic variables	Knowledge	Attitude
Religion	0.08	0.06
Family types	0.05	0.093
Family size	0.18	1.63
Educational status of father	0.87	0.011
Educational status of mother	2.45	3.569
Family income	4.43	1.76

No significant association was found between knowledge and attitude of respondents with the various socio economic variables.

Discussion

5. DISCUSSION

The results presented in the previous chapter are discussed in this session with relevant empirical evidences, under the following headings.

5.1 Assessment of quality of mid day meal programme in the selected schools

5.2 Personal and socio economic characteristics of the respondents

5.3 Food consumption pattern of the respondents

5.4 Nutritional status of the respondents

5.5 Preparation of nutri meal, calculation of nutritive value and its organoleptic assessment

5.6 Impact of nutrition communication intervention on knowledge and attitude of respondents and quality of mid day meal supplied.

5.1 ASSESSMENT OF QUALITY OF MID DAY MEAL PROGRAMME IN THE SELECTED SCHOOLS

The conduct of the midday meal programme in the selected schools was studied so as to gain an insight into the general quality of the programme's implementation and to select the school having poor performance with regard to the conduct of midday meal programme for conducting further study. The schools selected were Upper Primary Schools namely Govt. U P school Punkulam, Govt. U P School Bhagavathinada, Ambalathara Govt U P School from urban, rural and coastal area respectively. The different parameters studied regarding the implementation of the midday meal programme were as follows.

1. Infrastructure and space available in the school for cooking and serving meals.

2. Total quantity of food cooked and served in relation to number of children partaking the meal.
3. The menu followed for the mid day meal programme for a week.
4. Inclusion of vegetables and green leafy vegetables and fruits in the mid day meal.
5. Nutritional quality of meal per serve.
6. Hygienic practices followed in the preparation of the mid day meal.
7. Availability of drinking water in the school.
8. Waste disposal measures followed.

Scores were allotted for each of the above parameters and the schools were evaluated by the investigator though observation as well as interviewing the personnel concerned with the implementation of the programme including the Headmaster/Headmistress of the schools, the concerned teachers, as well as the cooks engaged for the preparation of the meals. The manner of cooking the meals, the cooking sheds and their maintenance, the menu followed for a week, inclusion of vegetables waste disposal measures followed etc, were all observed in the three schools. With regard to infrastructure and space availability, the three schools had just adequate space and facilities for conducting the programme. Regarding quality of food supplied, it was found that in two of the schools, i.e. Ambalathara and Punkulam, the schools were under the jurisdiction of the city corporation, and hence, the children were supplied daily with breakfast and a sumptuous lunch with the help of the corporation, while, Bhagavatinada school had the help only from the regular Government scheme of noon meal feeding ie rice and greengram or cowpea, which was supplied to them through the state owned Maveli stores.

Cooking in all the schools was done in a separate cooking shed and the fuel used was firewood. Cooking was hygienically done in the kitchen; however there was the problem of smoke from the firewood causing discomfort to the children in all the three schools. The school authorities also mentioned about the difficulty in

getting firewood and also labour for cutting the firewood into small pieces for burning. They expressed the wish for a community gas stove so that the cooking could be done easily and without any smoke or soot. The problem of getting adequate workers for cooking and cleaning and other works like cutting of firewood was also mentioned by the school authorities. The meals were served in the verandah or corridor of the schools which were later cleaned after the meals were taken by the children. All the schools had plates for the children to have their meals which were washed and stored after use. The utensils used for cooking the midday meals were also observed by the investigator to be hygienically maintained in all the three schools. This may be also due to the interest shown by the teachers and Headmistresses of these schools in the conduct of the programme. According to a study on MDMS (termed as noon-meal scheme in Kerala) the physical facilities for MDMS are available only in 50 per cent schools; 94 per cent schools depend on firewood for cooking; separate building for kitchen outside class rooms are rare; adequate space is not there in 50 per cent schools. And School verandah is the main venue for serving food (Gangadharan 2006). With regard to inclusion of vegetables and leafy vegetables, it was found that Ambalathara School and Punkulam School had a kitchen garden and they included vegetables or leafy vegetables, papaya etc occasionally in the midday meal. However, this was absent in the Bhagavatinada School where there was no kitchen garden. The nutritional quality of the meals served was also studied. In this case also, the food served at Bhagavatinada was found to have the least nutritive value among the three, since the food served consisted only of rice and green gram with no other additions unlike the other two schools where they served curries out of vegetables along with the regular rice and green gram.

Based on the total scores obtained by the three schools with respect to the different parameters studied, the school having the least score, i.e. Govt UP School, Bhagavatinada was selected for conduct of the intervention programme.

5.2 PERSONAL AND SOCIO ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

Fifty students who were regular respondents of the midday meal programme in the school studying in classes V and VI were chosen as the study sample. The personal and socio economic characteristics of the respondents selected for the conduct of the intervention were studied.

Socio economic and personal variables such as age, religion, family size, type of family, ordinal position, educational status of the parents, employment status of parent and family income were taken into consideration. Among the respondents, majority i.e. seventy four percent of the participants were of the twelve years age group whereas twenty six percent belonged to eleven years age group.

Children are one of the most important groups of any society as they have an influential effect on the future socio economic and cultural status of the society (Pourmugham and Aminpour, 2003). A recent research revealed that socio economic and demographic factors play an important role in the food consumption pattern (Rahman and Rao, 2002). Other research studies done earlier also indicated that the effect of nutrition can be understood only in terms of family and social environment and also the kinds of economic and educational resources of the children (Riccuiti, 1993).

On assessing the social background of the participants, it was found that eighty two per cent belonged to Hindu community. This agrees with the findings of Statistical Institute (2000) that vast majority of the population of the Thiruvananthapuram district is predominated by Hindu religion. The rest of sixteen percent are Christian and two percent Muslim community.

The familial back ground of the respondents was also studied in detail to understand the socioeconomic conditions. Arora (1991) opined that socio economic level such as social, economic, religious and the family background in general, have a very distinct part to play in determining in the attitudes and food behavior pattern of an individual. Concerning the family type, it is observed that sixty four per cent of the respondents are from nuclear families. In Kerala joint family system is not very common now a day, thirty two per cent of the respondents were found to be joined family. Two per cent of the respondents were found to be from extended family. It is observed by many that the concept of nuclear family is becoming more and more common in our society and joint family system is fast disappearing. Similar reports are given by Krishnaroopa (2003) and Renjini (2008) in their studies done in Thiruvananthapuram district.

Regarding the family size it could be seen that fifty six per cent of the participants hailed from small families (one to four members), comprising of father, mother and one or two children. Kerala is a state with high literacy and people are exposed to the benefit of having small family. Regarding the family size, Park (1997) had reported that average family size in India is four. When the rest 42 per cent belonged to medium sized families with five to seven members only two per cent were from large sized families with eight members or move in the family.

Most of the respondents were middle born i.e. fifty two per cent. When forty per cent of the respondents were first born eight percent of the respondents of had at least one sibling in the family. This is in line with the previous study done by Chandran (2001) in which sample selected from Thiruvananthapuram district consisted mainly of first born from small and nuclear families with one or two children.

When employment status is considered, majority of mothers of the sample (80 per cent) were employed. In terms of main occupation, seventy percent were casual labourer and twenty two percentages were self employed. Four percent were private and government employees. The employment status of the population is an important determining factor with respect to health and nutritional status as reported by Reddy et al (1993). The present study also agrees with the earlier observation and census data available which indicated that the work participation rate of females has not increased as much as that of males in the last decades in Kerala particularly in Thiruvananthapuram district (Tapm, 2000).

In case of economic profile, with regards to monthly income, it could be observed that where fourteen percent of the families had an income ranging from 2500-3500. Twenty six per cent had an income from 3501-4500, and forty six percent 450 had an income of ranging from Rs 4501-6000. Ten per cent had a monthly income of 6001-8500 and six per cent alone above Rs 8501. Thus it could be inferred that majority of respondents came from lower to middle income families. The study was done on government school where the majority of the respondents were from middle income families. In Kerala usually the children from middle and lower income groups attend government schools.

In this study, it was found that majority of the respondents parents were educated up to high school level. While only (Table 2) two percent of the parents were found to be illiterate. In Kerala, most of the studies indicate that the people are educated up to high school level. This study also reveals the same with regard to educational level of the parents.

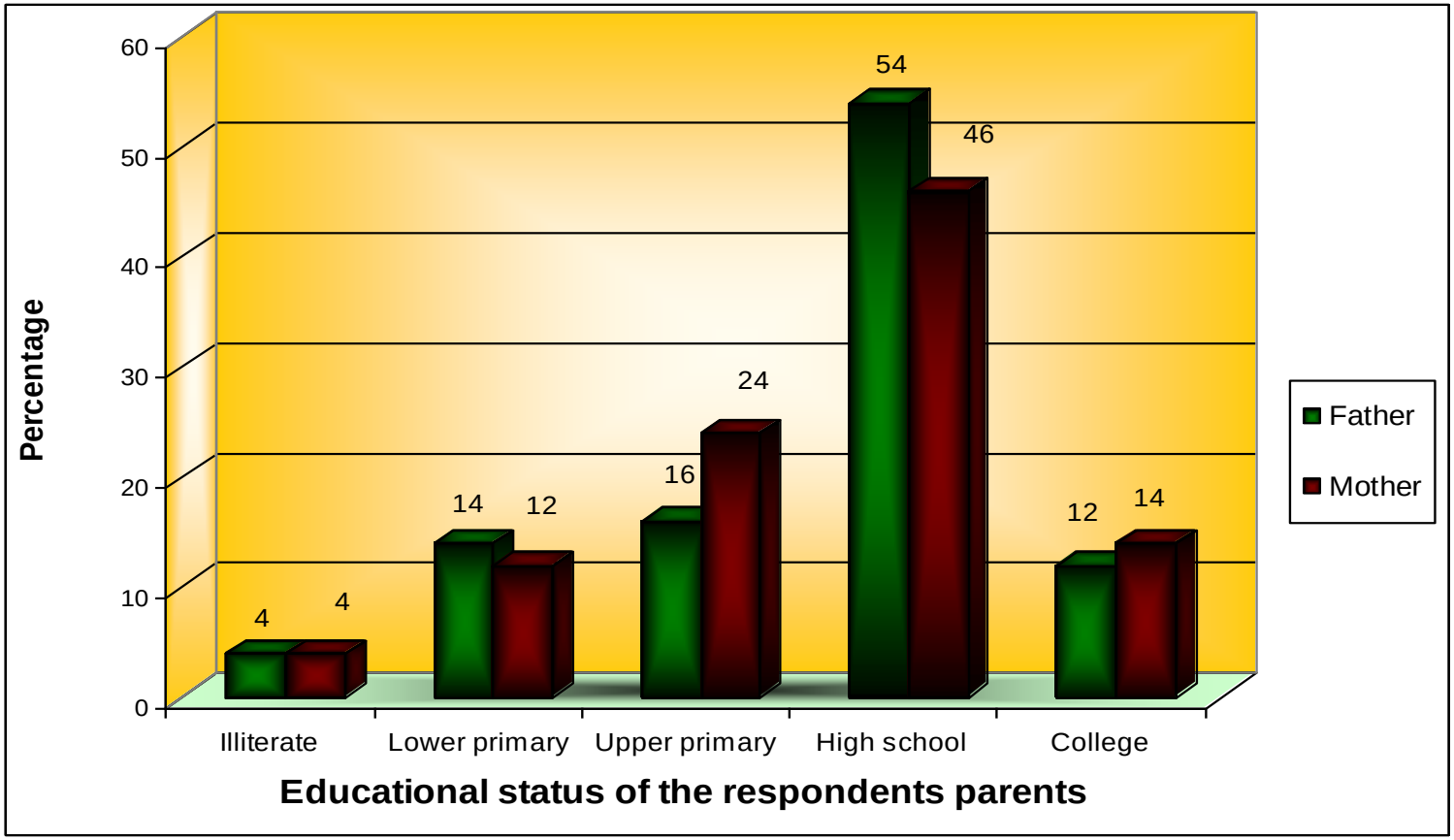

Figure: 1 Educational status of the respondent's parents

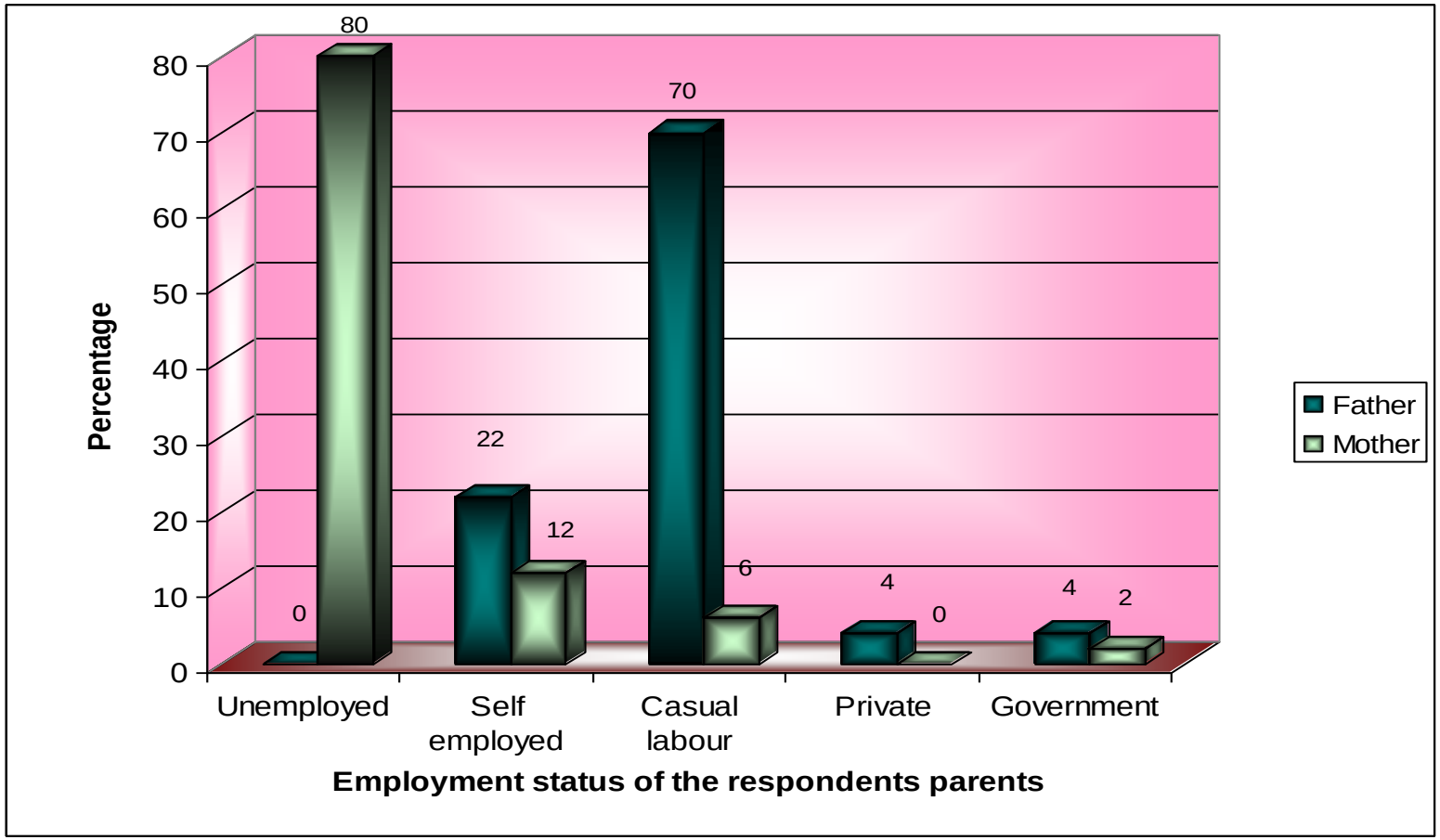

Figure: 2 Employment status of the respondents parents

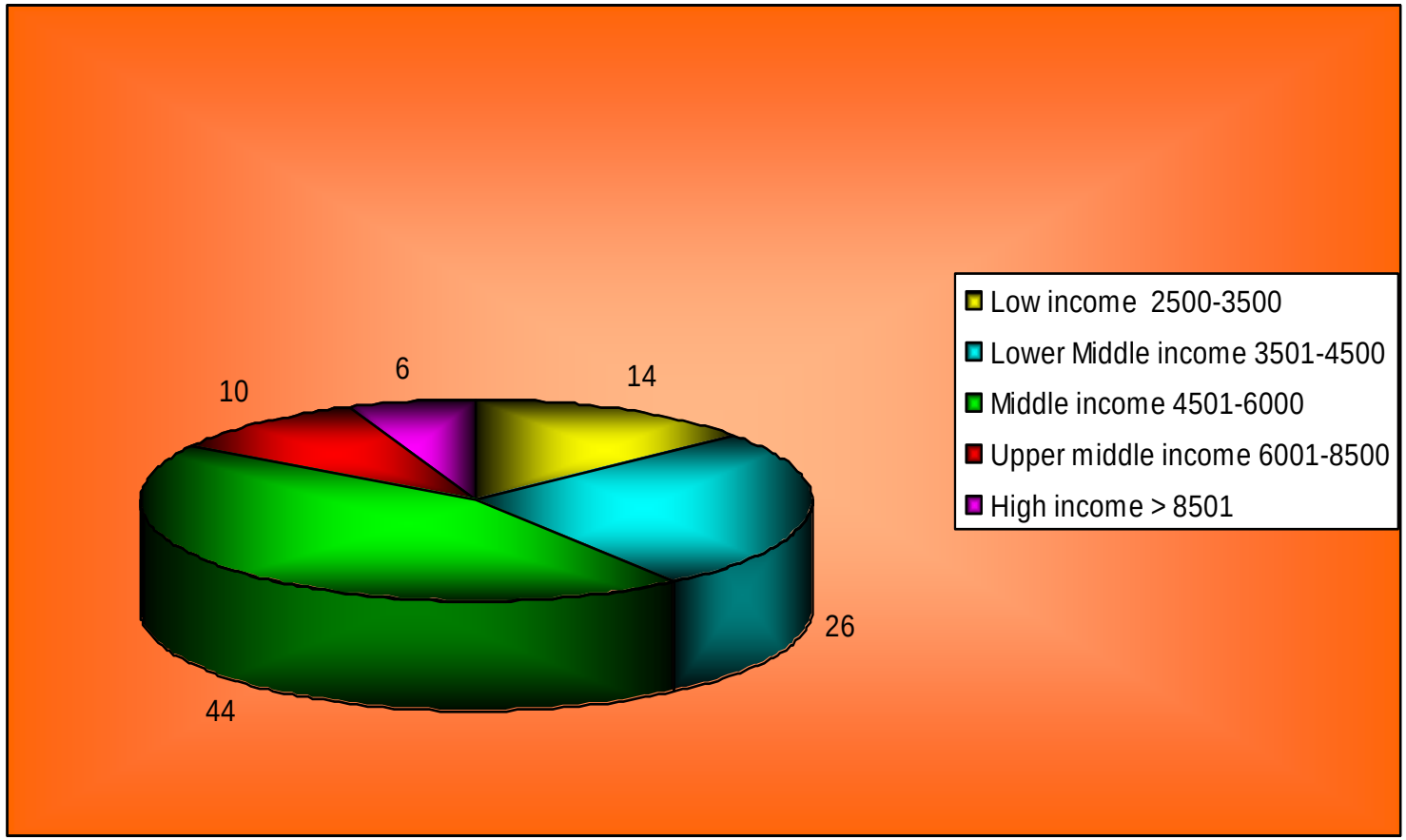

Figure: 3 Monthly income of the respondents parents

5.3 FOOD CONSUMPTION PATTERN OF THE PARTICIPANTS

According to Gift et al (1972) food habits of an individual are the characteristic repetitive acts that he performs under the impetus of the need to provide himself with nourishment and simultaneously to meet social and emotional goals. In the present study it was found that 100 percent of the subjects were non vegetarians. Similar results were observed by Reshmi (2007) Krishnaroopa (2003), Renjini (2008) Seethal (2011) and Beatrice (1999) in their studies under taken in Thiruvananthapuram district where majority of adolescents were noted to be non vegetarians. Consumption pattern of Keralites as reported by Kerala Statistical Institute (2000) also revealed that ninety eight per cent of the Keralites are habituated to non vegetarian foods. In this study also, the participants were all non vegetarians.

On assessing the frequency of use of food items by the respondents it was found that cereals were consumed daily. Cereal is the staple food of India and among the cereals, rice is consumed daily by Keralites. In addition to this, milk and milk products, nuts and oil seeds, sugar, beverages were found to be used daily by the respondents. Coconut was used daily since in Kerala it is an integral part of the dishes based on vegetable or fish. A study done by Vibha and Sibal (2003) among senior secondary students in Delhi schools also revealed the same that cereals, fats and oils and sugar were consumed daily by adolescents. Fish was found to be consumed daily by eighty per cent of the respondents in this daily. Consumption of fish is high in Kerala as reported by Nirmala (2002).

Next to fish, other vegetables, roots and tubers, pulses, processed foods were found to be consumed almost daily. Supreet (2005) reported that the consumption of processed foods and fast food is increasing among children. The consumption of other vegetables were found to be low (59.2) among the respondents. This is an indicator of the current trend in Kerala among children that consumption of

vegetables is decreasing several. Studies in Kerala conducted among children also revealed this trend.

In this study, leafy vegetables, fruits, bakery foods, egg, meat are found to be included daily only by a small percent of the participants. A study done by Raja et al (2003) on school girls revealed that green leafy vegetables were consumed daily or on alternate days by 36 per cent of the respondents. A study done by Kumari and Singh (2001) on secondary school children in Samstipur District of Bihar, reported that green leafy vegetables, other vegetables and fruits are inadequate in adolescent diet. In this study also, the consumption of fruits and vegetables was inadequate. The mid day meal programme supplied in the school also does not provide any leafy vegetables or other vegetables along with the rice and pulse supplied.

Hence the mid day meal pattern in the school should be so planned as to include leafy vegetables like drumstick leaves, cabbage, amaranths, etc and also other locally available cheap vegetables so that the requirements of micronutrients for children can be met from the school lunch. Supply of fruits which are in expensive and, nutritious should also be made through the mid day meal programme.

5.4 ASSESSMENT OF NUTRITIONAL STATUS

Children form significant part of our population and the assessment of their nutritional status is relevant as healthy children are a pre- requisite to healthy adult life and healthy future generation.

Nutritional anthropometry is the measurement of the human body at various ages and it is based on the concept that on appropriate amount should reflect any morphological variation due to significant functional and physiological change (Rao, 1996).

Anthropometric measurement viz, heights, weight, mid upper arm circumference (MUAC) were taken in to account for assessing the nutritional status of the respondents.

When the weights and of the respondents were assessed, it was seen that fifty per cent of boys and sixty per cent of girls of the age group 11 years were normal. With regard to the weights of the 12 years old, it was seen that eighty two per cent of boys and sixty seven percent girls had normal weights. Weight for age is generally considered as an indicator of nutritional status (Khader, 1994). Here, the weights were somewhat low for boys and girls of 11 years, but it were higher for both boys and girls of 12 year age group with Table are 9. Weight for age was found to be better for the 12 year age group. The height of an intended is said to be a reflection of past nutritional status or a long term consequence of nutrition. Here the heights when studied showed that above sixty per cent of boys and girls of both 11 and 12 year old groups were having normal height. So majority of the respondents can be considered as having height above normal which may be a reflection of their past nutritional status.

Mid Upper Arm Circumferences of the respondents of 11 and 12 years when assessed showed that with regard to 11 year olds, seventy five of boys had normal MUAC while seat per cent of the girls had normal MUAC. In the case of 12 year olds, fifty five and sixty seven percent of boys and girls respectively had normal MUAC. Here the 12 years old groups were found to have lesser MUAC than the 11 year old respondents. Even then the data does not point to any serious nutritional deprivation, and it may be inferred that the respondents had somewhat better nutritional status.

Body Mass Index (BMI) is an indicator of body's energy stores as reported by Choudhary and Solaski (1999). It is found from this study that fifty percent of the respondents were normal. The prevalence of overweight was found to be two per cent among the respondents. In a study done by Ramachandran (2002) on 13-18 year old children in India showed that the prevalence of under nutrition was found to be 48 percent. None of the respondents were found to be obese. All the respondents were from lower middle class families and their parents were engaged in causal labour without any permanent fixed income, and they were all partaking in the school lunch or the mid day meal.

Haemoglobin level is another indicator of an individual's health and nutritional status. The present study revealed that majority were non anaemic and also found that none of the respondents were severely anaemic. Among the respondents 6 percent were moderately anaemic 20 percent mildly anaemic and thirty four percent marginally anaemic.

Gawarikar et al. (2002) opined that during growth spurt in adolescent period, the risk of iron deficiency anaemia appears to be more for boys and in girls this remain as such during their reproductive life.

In school children anaemia impairs scholastic performance and in young woman, the reproductive performance (Thirumani and Uma, 2005). An important finding of the study is that twenty four percentages of school children were moderately and mildly anaemic. This is in line with the findings of various studies conducted among school children in Kerala where there is prevalence of anaemia among school children. The reason can be attributed to low level intake of iron rich foods, as seen earlier and also, worm infestation which is common among school children.

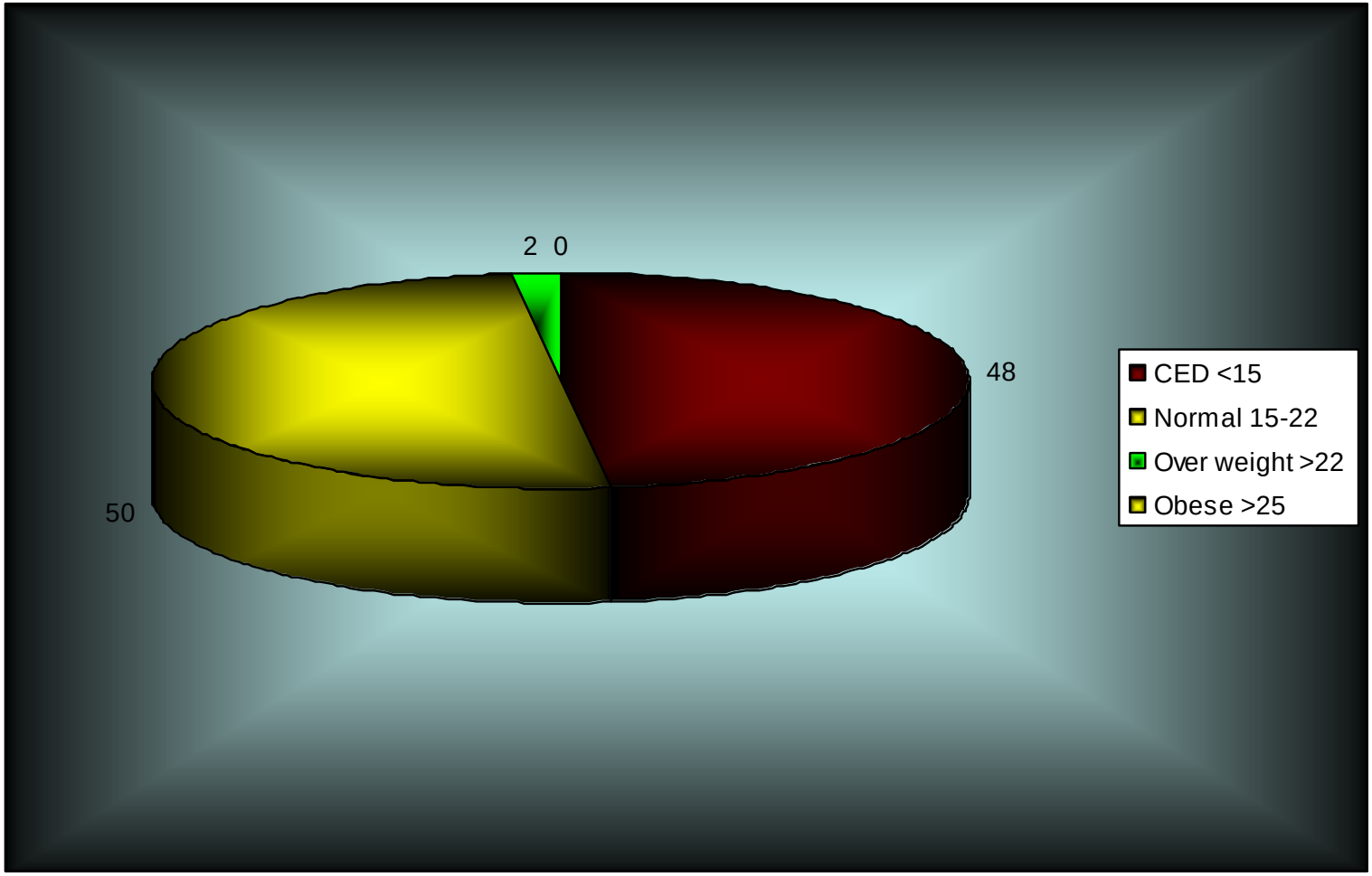

Figure: 4 Distribution of respondents based on their BMI

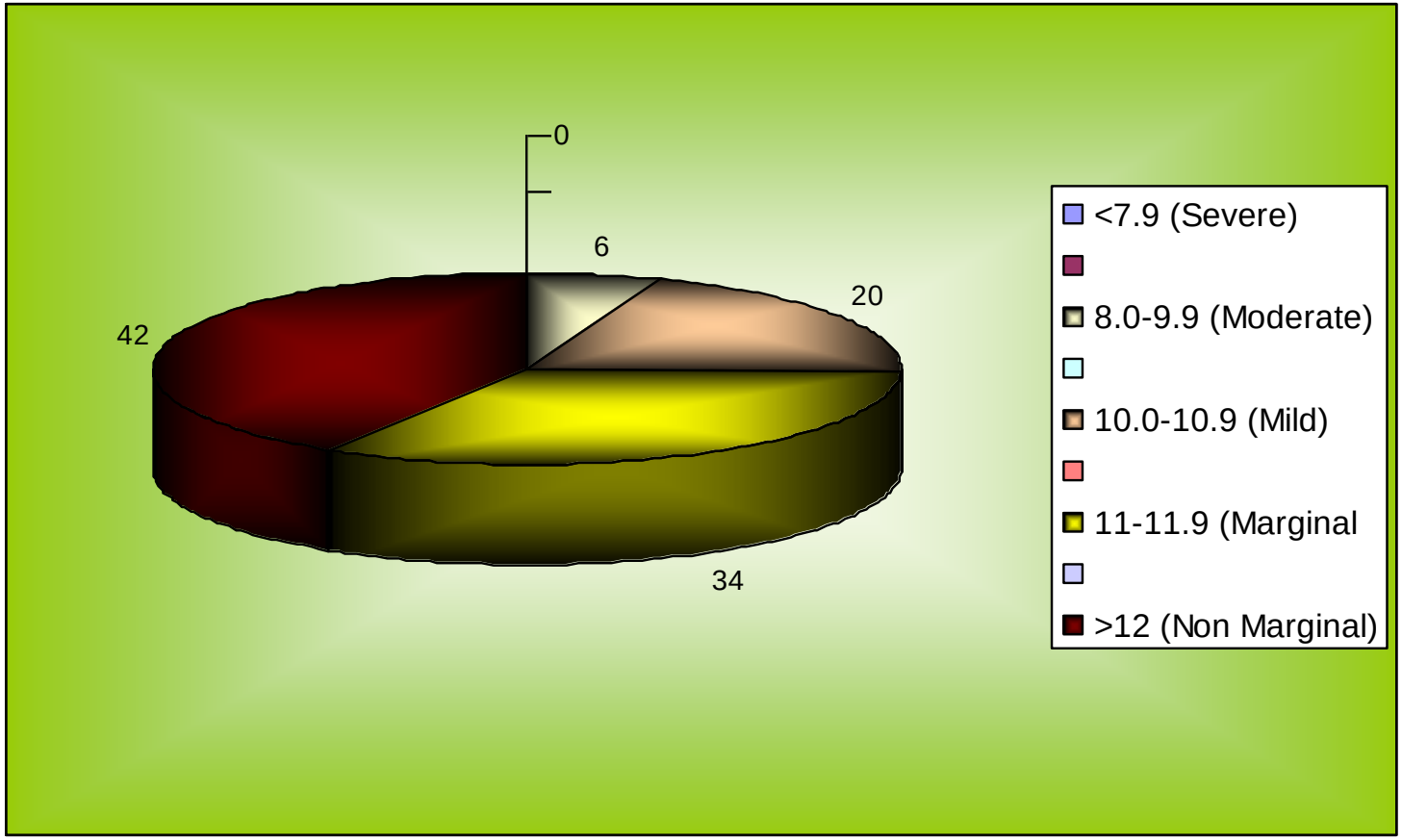

Figure: 6 Haemoglobin level of the respondents

From the clinical examination it was seen that anaemia is the most common nutritional deficiency symptom noted. In school children anaemia impaires scholastic performance and in young woman, the reproductive performance (Thirumani and Uma, 2005). It was found were emaciation among twenty four per cent of the respondents. Mild symptoms of gum mainly spongy bleeding, dental carries, pigmentation, molted enamel, koilonyechia were also found among the respondents. Similar finding also has been found by Reshmi 2007 in her study done among school girls in Thiruvananthapuram district.

Nutritional status index of (NSI) of the respondents was computed based on the various parameters assessed by determining the nutritional status like height, weight, mid upper arm circumference and heamoglobin level. Nutritional status index computed indicated that the mean value for the respondents was 16.13 and nutritional status index of the respondents ranged between 14.08 to 17.13.Majority (64 per cent) of the respondents had medium nutritional status index and 18 per cent had low nutritional status index and another 18 per cent had high nutritional status index. The medium nutritional status obtained by sixty four percent of the respondents could be due to their intake of the mid day meal in the school regularly.

The nutrient intake of the selected respondents calculated based on the 24 hour recall method showed that there was deficit only in the case of iron intake, both for boys as well as girls. Energy, protein and fat were found to be almost equal to the recommended for the school age groups. The recall method was done taking into consideration the food taken for the mid day meal at school also. As seen earlier, green leafy vegetables, meat, egg, fruits were used least frequently by the participants. With regard to the school lunch also, it was found to be lacking in leafy vegetables, other vegetables and fruits. This may be the reason for their low intake of iron with almost adequate consumption of energy, protein and fat.

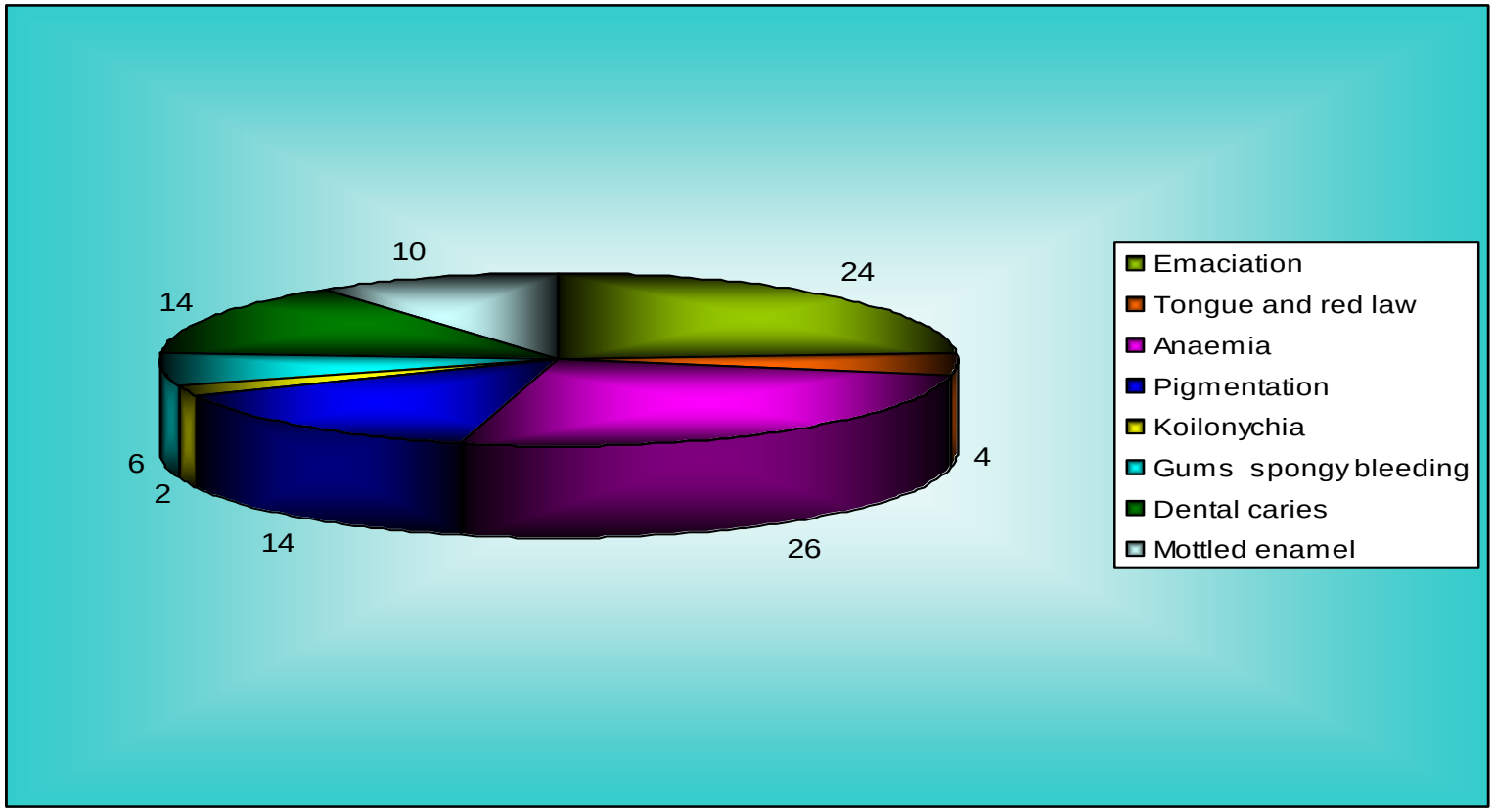

Figure: 5 Clinical examination of the respondent

5.5 PREPARATION OF NUTRI MEAL, CALCULATION OF NUTRITIVE VALUE AND ITS ORGANOLEPTIC ASSESSMENT.

As part of the intervention programme, a nutritive meal which could be adopted for the school mid day meal programme was planned and standardized in the laboratory. The meal thus prepared was named as 'Nutri Meal'. The nutri meal was planned incorporating the raw materials included in the school mid day meal programme namely rice and green gram along with locally available vegetables like pumpkin and banana. The nutritive value of the nutri meal standardized was also calculated. The daily ration per child per day as per the midday meal programme is 60 grams of rice and 30 grams of pulse, mostly green gram, and 10 gm of coconut oil/ palmolein per child and aiming to provide450 calories and 12 grams of protein. One serving the nutri meal was found to be 300 grams.

The organoleptic assessment of the nutri meal conducted among the selected panel of judges showed that the nutria meal was highly acceptable. The preparation of nutri meal was there for selected for inclusion in the intervention programme, as a method demonstration so that it could be adopted by the school authorities in future.

5.6 IMPACT OF THE NUTRITION COMMUNICATION INTERVENTION.

The impact of the programme was assessed in two ways.

1. By ascertaining the change in the existing menu of the mid day meal programme in the selected school

After the intervention programmes as a follow up the school was visited again to ascertain whether there was any change in the mid day meal menu. The school authorities said that the parent teacher meeting

was conducted and steps were taken to incorporate vegetables and leafy vegetables in the during menu also it was decided to introduce nutri meal as a substitute to the present menu.

2. By ascertaining the change in the knowledge and attitude of the participants

In order to assess the impact of the nutrition communication intervention a pre and post experimental design was followed. After the intervention programme, the post test was conducted. It was found that there was significant change in the knowledge and attitude of the respondents showing a positive impact of the programme on the respondents.

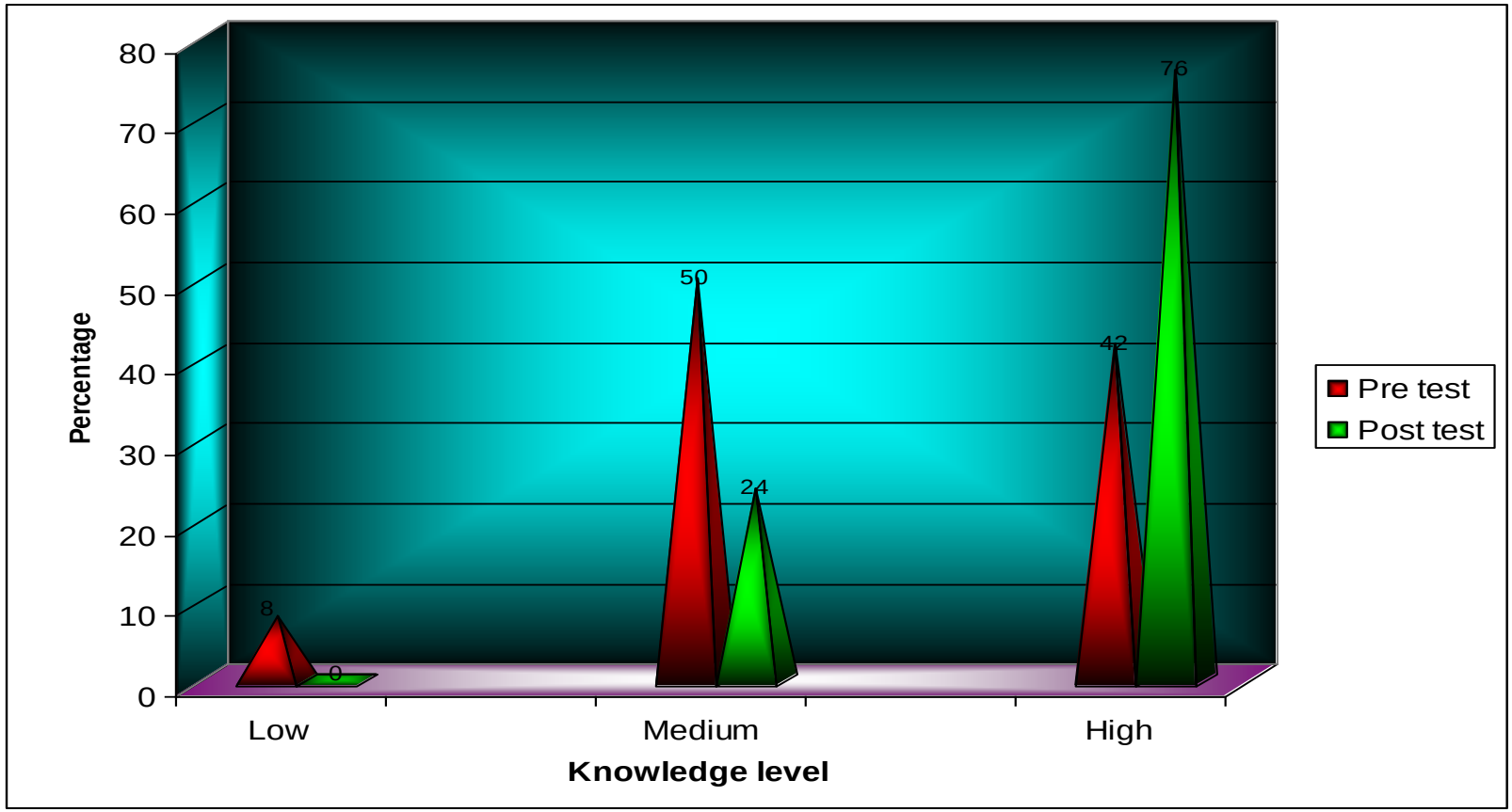

Figure: 7 Distribution of respondents based on knowledge score

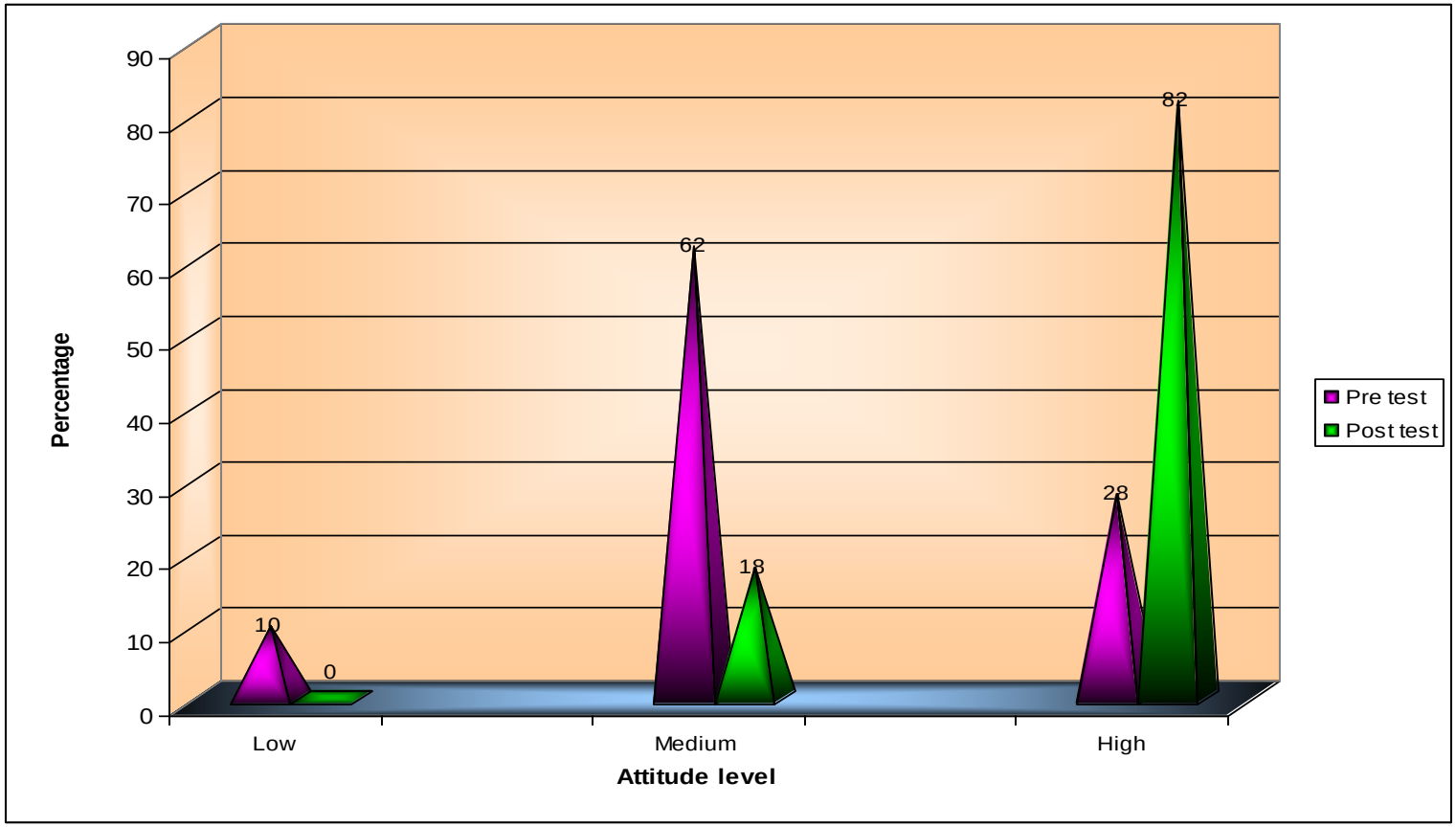

Figure: 8 Distribution of respondents based on attitude score

Summary

6. Summary

The presented study entitled "Impact of nutrition communication intervention on the quality of mid day meal programme" was conducted with the objective of imparting nutrition communication as an intervention programme in order to improve the quality of mid day meals and to assess its impact. Three schools namely, Govt UP School, Ambalathara, Govt UP School, Punkulam, and Govt UP School, Bhagavathinada were chosen for the study. The conduct of the midday meal programme in the selected schools was studied so as to gain an insight into the general quality of the programme's implementation and to select the school having poor performance with regard to the conduct of midday meal programme for conducting further study. The different parameters studied regarding the implementation of the midday meal programme were as follows. Infrastructure and space available in the school for cooking and serving meals, total quantity of food cooked and served in relation to number of children partaking the meal, the menu followed for the mid day meal programme for a week, inclusion of vegetables and green leafy vegetables and fruits in the mid day meal, nutritional quality of meal per serve, hygienic practices followed in the preparation of the mid day meal, availability of drinking water in the school, waste disposal measures followed.

Scores were allotted for each of the above parameters and the schools were evaluated by the investigator by observing as well as interviewing the personnel concerned with the implementation of the programme including the Headmaster/Headmistress of the schools, the concerned teachers, as well as the cooks engaged for the preparation of the meals. The UP School Ambalathara scored the highest with regard to the different quality parameters regarding the implementation of the midday meal programme. The UP School at Punkulam scored one less than UP School, Ambalathara. The UP School at Bhagavatinada scored the least among

the three schools with regard to the various parameters selected for ascertaining the performance of the schools with respect to the midday meal programme. The nutritional quality of the meals served was also studied. In this case also, the food served at Bhagavatinada was found to have the least nutritive value among the three, since the food served consisted only of rice and green gram with no other additions unlike the other two schools where they served curries out of vegetables along with the regular rice and green gram.

Hence, this school was selected for the conduct of the communication intervention programme and to assess the impact of the programme on the quality of the midday meal programme.

The sample comprised of fifty students selected at random from classes 6th and 7th of the school.

The children belonged to the age group of 12-13 years. The majority of the respondents belonged to Hindu religion (about eighty two percent). Analysis of family structure revealed that the majority of the respondents belonged to nuclear type of families and had small families with four members.

Regarding educational status it was found that the majority of fathers and mothers had education up to upper primary level. The occupational status of the fathers showed that the majority of them were casual labourers and among mothers most of them were house wives.

The nutritional status index of majority of the participants computed was found to be medium in the majority when the parameters like weight, height, mid upper arm circumferences and haemoglobin level were taken in to account. The

classification of the respondents according to BMI based on Eliz health path for adolescents (2005) showed that fifty percent of the participants came in the normal category but 48 percent of the participants came in the chronic energy deficient category showing the need for the continued implementation of the midday meal programme with more nutritious meals.

Assessment of clinical status of the respondents revealed that, the majority were suffering from varying degrees of aneamia. Other symptoms like pigmentation, spongy bleeding gums, mottled enamel and dental caries were also found among the respondents.

Other symptoms like pigmentation, gums spongy bleeding, molted enamel and dental carriers were also found among the respondents.

Haemoglobin status of the respondents revealed that about forty two per cent of the respondents were non aneamic but thirty four percent were marginally aneamic and twenty percent were mildly aneamic,while six percent were moderately aneamic.

Dietary habits of the respondents indicated that all of them were habitual non vegetarians. Among the respondents cereals, sugars, milk and milk products, nuts and oil seeds, fish, beverages and other vegetables were the food items most frequently used. Meat, egg, other vegetables and green leafy vegetables were the food items used less frequently.

The nutrient intake of the selected participants, calculated based on the 24 hour recall method showed that there was deficit only in the case of iron intake, both for boys as well as girls. The mean intake of energy, protein and fat were found to meet more than the recommended allowances for the school age groups. The recall

method was done taking into consideration the food taken for the mid day meal at school also. As seen earlier, green leafy vegetables, meat, egg, fruits were used least frequently by the participants. With regard to the school lunch also, it was found to be lacking in leafy vegetables, other vegetables and fruits. This may be the reason for their low intake of iron with almost adequate consumption of energy, protein and fat.

The pre test on the knowledge of the participants on nutrition of the school child and mid day meal programme showed that the mean knowledge score was 10.4 out of 15and the attitude study showed the mean score as 48 out of 60.

The intervention programme consisted of nutrition education with the help of visual aids like charts and leaflets.

As part of the intervention programme, a nutritive meal which could be adopted for the school mid day meal programme was planned and standardized in the laboratory. The meal thus prepared was named as 'nutri meal'. The preparation of nutri meal was demonstrated to the students and staff members in the school as well as the cooks and helpers. The demonstration of the specially formulated and standardized nutri meal was conducted in the school and it was highly relished by the school authorities as well as the participants. The calorific value of the nutrimeal was about 455 calories and the protein content was 4.15grams.

The impact of the nutrition communication intervention was assessed after a month by observing the general conduct of the mid day meals with regard to selected parameters as to find out improvement if any in the mid day meal programme in the school.

After the intervention programme, it was seen that the school authorities were taking much interest in the conduct of the midday meal than they took earlier. They said that a parent teacher meeting was convened to bring about a change in the existing midday meal with a view to making it more nutritious and said that they would adopt the nutri meal in the midday meal programme. They also said that steps were taken to incorporate vegetables and leafy vegetables in the menu.

A pre post experimental design was used to study the impact of nutrition communication intervention programme on the knowledge and attitude of the participants. The post test conducted revealed a significant change in the knowledge and attitude of the participants thus pointing out the positive impact of the intervention programme.

The study points out the need for continuance of the mid day meal programme since it is necessary to improve the nutritional status of school children. It also stresses the need for supplying tasty and nutritious noon meals particularly rich in micronutrients.

The scope of nutrition communication programmes for bringing about positive change in dietary patterns is also evident from this study. Hence, nutrition communication should be incorporated in the mid day meal programme for the authorities concerned with the implementation of the programme as well as the respondents.

References

7. REFERENCES

Afridy, F. 2005. 'Mid –Day Meals in Two States: comparing the Financial and Institutional organization of the Programme', Economic and Political Weekly , April 9.

Arora, A. 1991. The Women Elite in India. Snagam Books Ltd. London. P40

Bamji, M. S. Rao, P. N. and Reddy. V. 2003. Text book on human nutrition. Oxford and IBh publishing co.pvt.Ltd. New Delhi, p:507.

Bharati, S., Pal .M., and Bharati. P. 2008. Determinants of nutritional status of pre-school children in India. Journal of Biosocial Science, 2008 ;:(14) p.102-104.

Beatrice, P. J. 1999. Nutritiona adequacy of diets in selected hostel messes.M.Sc. (FS&N) thesis, Kerala Agricultural University, Vellanikkara, Thrissure.

Blue, J. 2005. The Government Primary School Mid Day Meal Scheme: An Assessment of Programme Implementation and Impact in Udaipur District , Sewa Mandir, Udaipur.

Chandran, S. 2001. Learning disabilities in malnourished children. . M.Sc. thesis Kerala Agricultural University, Thrissur. P: 204.

Choudhary, M., and Solanki, H. 1999. Body Mass Index (BMI) an indicator of energy store and body proportions in females' laborer. Daring Fd. Home Science. 18(2):109 -112

Dreze, J. 2004. Mid Day Meals and Children's Rights. Economic and Political Weekly, May8.

Dreze, J., Deaton, S., Angus.2003. 'School Participation in Rural India'. Review of Development Economics. (5)1-2

Dreze,J and Goyal 2003. The Future of Mid Day Meals ', Economic and Political Weekly ,November1, pp4673-82.

Eapen, M., Chathopathyry, s. and Elamaon , J.2000.Development Perspective. First step in formulation of district plan. People'splan campaign, A., State Planning Board, Kerala. P:492.

Elizabeth, K. E., 2001.Adolescent Nutrition.Teens. J. Teenage care pre- marital counseling. 1:1-5

Gangadharan, V. 2006. 'Noon Meal Scheme in Kerala: New Management Proposal for the School Lunch Programme' .State Institute of Educational Management and Training, Government of Kerala.

Gawarikar, R. S., Gawarikar,S.B. and Tripathi, B.2002.Prevalence of Anaemia in adolescent girls of Ujjain is Western Madhya Pradesh. Indian.J. Nutr. Dietet., 39:493-497.

Gift, H.H Washbon , M.B.and Haronson, G.G. 1972. Nutrition in adolescence, nutrition behavior and change, Englowood Clifts, N.J. Prentice Hail, London, p.155

Gopalan ,C. 2006. Nurirtional Status of School Children .Medical. J .of Islamic Academic of Science.14:3,94-99.

Gopalan, C. 2003. 'Mid-Day Meal Programmes in School India –The Way Forward' .Nutrition Foundation of India.

Gopalan, C. 2007. 'Health and Nutrition Education of the Community :Choosing the Appropriate Channels. NFI Bulletin. Vol.28.No.4.

Gopaldas and Sheshadri, S. 1987.nutritional Monitoring and Assessment. Oxford University Press, Delhi., p.140.

Gopaldas, T. 2006. 'Hidden Hunger', Economic and Political Weekly ,August 26.

Govt of India 1996. Repeat of the Task Force on Micronutrients (vitamin A and Iron). New Delhi: Ministry of Human Resource Development of Women and Child Development.

Guptha, A.K., Bhartia, V., Swam, I.H.M. and Bhatia, p. s. 2005. An Epidemiological study of Obesity and elderly in Chandigarh. Indian. J. Community Medicine, 30:No.1, Jan-Mar.

ICMR, 1994. Energy Nutrient Requerment and Reccommended Dietary Allowences for Indians. A report of the expert- Group of the ICMR. Indian Council of Medical Research . Hydrabad, p.103.

James, W.P.T., Ferro-Luizzi and Waterlow, J.C. 1988. Definition of Chronic Energy Deficiency in adults – Report of working party of the intervention dietary energy consultation group. Am. J. Clin.Nutri.42.969-981.

Jelliffe, D.B. 1976. The Assessment of the Nutritional Status of the Community. World Health Organisation , Geneva, p.242.

Josephine., Vettukuri P.S. and Raju (2008) a study of test practices in the implementation of mid day meals programme in Andhra Pradesh National University of Education Planning and Administration. New Delhi.110016.

Jukes, L. J., Drake.and Bundy,D.P. 2007.School health nutrition and education. CABI Publishing,Wallingford.

Kamath 1986.Health Assessment.Third edition. Moshy company Publishers London, p-250.

Kerala Statistical Institute 2001. Socio-economic change in Kerala. A study based on selected localities. Thiruvananthapuram.

Khader 2001. Anthropometric meassrements in in rural school children. J R Soc Health , 11:184-186.

Krishnaroopa, 2003. Determinants of dietary profile of Higher Secondary Children M.Sc. (FS&N) thesis. Kerala Agricultural University, Vellanikkara.Thrissur.

Kumary and Singh. 2001. Nutritioan status of Adolescent girls of slum community of varanasai. Indian. J. of Pubilc Health, 45.4:128-134.

http://www.education.nic/plan/XI_plan_document.pdf

Lakshimaiah , M., Rana, K.,ans Menon,P.1999. Assessment of Nutritional Status of Basic School Children .. Abdel Magied, Ahmed. malieh, Fatima, Kamal, Nahle School Health of Science, Ahfad University.

Manjula, A., and Aravindan,K.P. bNutritional status of children in different types of schools. http://www.krpcds.org/report/Aravindanpd/.

Meer, D.M., Bajaj, S. and Kaur, S. 1995. Impact of death of sibling. The Ind. J. Nutr. Dietet . , 34:294-302.

Muhammad S.Akhthar, Nighat Bhatty , Maria Sattar , Muhammad T. Javed . 2001. Comparison of Nutritional Status in Children of different Socio economic Satuses: Medical Journal of Islamic Academy of Sciences 14:3, 97-102,2001.

Mourya, S. P. and Jaya. N.1997. Prevalence of malnutrition among tribal children. Indian J. Nutr. Dietet ., 34:214-219.

Mony, E. P. 1993 Food preference and dietary habits of Adolescents among Agricultural laborers. M.Sc. thesis Kerala Agricultural University, Thrissur. P: 80

National Nutritional Monitoring Bureau (NNMB).2002. Nutritional Institute of Nutrition . Hydrabad . India.

Nirmala, C. 2002. Impact of soya extracted food supplement on the nutritional status of the women beneficierirs of ICDS. Phd thesis Kerala Agricultural University, Vellanikkara, Thrissure p.172.

Park, K. 1997. Park's Text book of preventive and social medicine. M/S Banarsidas Bhanot Publiser.Jabelpur. P: 629

Pourmoghim, M. and Aminpour, A. 2003. Comprehencive study on energy and nutrients intake of Iranion adolescent girls.1X Asian Congress of Nutrition. Nutrition goals for Asia, 2020. 23-27 February 2003. Nutritional Foundation of India, Abstract:15.

Rajammal, Rajasree, S.and Soman ,C.R.1994. Nutritional status of Kerala . Ind. Pediatr., 31:651-655.

Ramachandrn, A., Snehalatha, C., Vinitha, R., Thayiil, M., Kumar, C.K., and Sheeba, L., 2002.Prevalance of over weight in urban India adolescent school children. Diabetes Res. Clin. Pract., 57:185 – 190

Raja, L. R., Rajwade, L., Kenje, K., Gogare, P., and Uplipi, S.A.2003. Food habits, nutritional intake and health of school girls in sub - urban Mumbai. IX Asian Congress of Nutrition. Nutrition goals for Asia, 23 – 27. February 2003. Nutrition Foundation of Indian, New Delhi. Abstract: p: 223.

Rajivan , and Anuradha 2005.History of Direct Nutrition Schemes in Tamil Nadu, available online at www.righttofoodindia.org.

Raju, L. R., Rajwad, L.,Gogare,p.and uplipi,S.A.2003. Food habits Nutritional intake and health of school girls in sub- urban Mumbai. IX Asian Congress of Nutrition. Nutrition goals for Asia 23-27 February 2003. Nutrition Foundation of India, New Delhi. Abstract 239.

Rao, K.V.1996. An evaluation of relationship between nutritional status and anthropometric measurements. Am.J. Clin. Nutr.23:83 -93.

Rao, S. G. M., Vijayapushpam. T., Raghunatha Rao, D., and Vinod Pavarala 2007. Nutrition Education for adolescents in class room settings. Different approaches and lesson learnt, Nutrition News. Vol. 28(2):1

Rao and Vijayaraghavan. 1986. Protien Energy Malnutrition in South India. Bulletin No. 89. World Health Organization. Geneva, p.605.

Rahmath, A., Rajaiah , S. Rao, N.P and Grims, P.1993. 'Factors affecting nutritional status. Indian J.Nutr. Dietect.30:159-163.

Reaburn, J.A., Krondle, M., and Lau, D., 1979.Social determinants in Food Selection.J. Am. Dietet.

Reddy, V., Rao, N.P., Sastry, J.G. and Kashinath, K., 1993. Nutrition trends in India. Indian Council of Medical Research, Hyderabad. P: 45

Reetika Khera.2006. Mi-Day Meals in Primary schools. Economic and Political Weekly Nov. 18.

Renjini, R., 2008. Diet, life style pattern and health profile of professionals in software industry., M.Sc. (Home Science) thesis Kerala Agricultural University, Thrissur.

Reshmi, R. 2007. Age of Menarche and nutritional Status of urban School girls. M.Sc. (Home Science) thesis Kerala Agricultural University, Thrissur.

Riccuiti ,N.H. 1993. Interaction of adverse environment and nutritional influence on mental development. Baroda .J. Nutr . , 20:237-242.

Seethal , k.c.. 2011 Promoting fruits and vegetables consumption among school children through nutrition intervention programme. Msc (FSN) thesis Kerala Agricultural University, Thrissur.

Sreedhar Seetharaman.2002. Impact of Mid Day Meal on the nutritional status of school going children www.educationfor all india.com.

Srilakshmi , b.1997.Nutrition Science. New Age international (p) Limited Publishers. New delhi.

Srilakshmi, B. 1997. Dietetics. New Age International (p) Ltd. New Delhi,13-15.

Srilakshmi,B.2003. Nutrition Science. New Age International (P) Limited Publishers. New Delhi.

Srilakshmi, B. 2004. Vegetables and Fruits. Food Science ed. Third New. Age. International (P) Ltd. Publication. 171 – 200.

Sulabha,V.1990 .Anaemia and Pregnency.J.Diet and Nutr.,26(6):25-29.

Supreet Kaur, Umesh, K.and Preeti Singh.2005.Pattern Chronic deseasesamong adolescent obese children in developing countries. Curr. Sci., 88(7):1052-1056.

Swaminathan, M.1993 .Handbook of Food and Nutrition .The Bangalore Printing and Publishing .Co.Ltd., Banglore560018.

Swaminathan, P. J., Jayaranjan ,R., sreenivasan, K.,and Jayashree .2004. 'Tamil Nadu's Mid Day meal Scheme; Where Assumed Benifits Score Over hard Data', Economic and Political Weekly, October 30.

Subapriya,M., and Mahalekshmi ., N. 2006. Evaluation of noon meal programme in Coimbatore city. Proceeding of the 39th National Conference of Nutrition Society of India, NIN Hyderabad .Nov.15-16.

Thirumani Devi, A., and Uma, K.R. 2005.Effect of Supplementation of Spirulina on Anemic adolescent girls.Indian.j.Nutri.Dietet., 42:534-541.

Umadevi, P., Parvatham, R.,and Mohan,R.2006. Prevalence of iodine and iron deficiencies among selected school children and the effect of supplementation of double fortified salt. The Ind. J. Nutr. Dietet., p420-428.

Ushadevi, C.Nath, K.G.2003.A comparative study on profile of urban adolescent girls. Asian Congress of Nutrition, September 20-25, 2003. Ntrition Society of India, New Delhi,87p.

Vibha and Sibal, B. 2003. Dietary perceptions and practices of Senior Secondary School boys in Delhi Schools IX Asian Congress of Nutrition. Nutrition goals for Asia, 23-27. February 2003. Nutrition foundation of India. New Delhi. Abstract :186

Vijayaraghavan. K. 1997. Home gardening for combating vitamin A deficiency. Food and nutrition bulletin, 18: 337-343.

World Health Organization. 1995.Physical Status. The use and interpretation of anthropometry. Technical Report Series 854. Geneva World Health Organization. p.263-308.

Willians, M.1980.Nutrition for the growing years. Third Ed, New York,P.255.

Yamini, R. 2004. Prevalence of overweight and obesity among School and College going adolescents in rural and urban Thiruvananthapuram District, Kerala India working paper series No.7 Achuthamenon Centre for Health Science Studies Institute of Medical Science and Technology.

Thimmayamma. and Rao. 2003. Text Book of Human Nutrition. Bamji, M.S., Prahlad Rao., Vindini Reddy (eds) . Oxfod and IBH Publishing co. Pvt. Ltd. New Delhi, p.535.

Abstract

IMAPCT OF NUTRITION COMMUNICATION INTERVENTION ON THE QUALITY OF MID DAY MERAL PROGRAMME

SHEELAKUMARY J

The abstract of the

thesis submitted in partial fulfillment of the requirement for the degree of

Master of Science in Home Science
(Food Science and Nutrition)

Faculty of Agriculture
Kerala Agricultural University, Thrissur

Department of Home Science
COLLEGE OF AGRICULTURE
VELLAYANI, THIRUVANANTHAPURAM 695522
2011

8. ABSTRACT

The presented study entitled "Impact of nutrition communication intervention on the quality of mid day meal programme" was conducted with the objective of imparting nutrition communication as an intervention programme in order to improve the quality of mid day meals and to assess its impact.

Locale of the study selected was Govt upper primary school Bhagavathinada, Thiruvananthapuram District. The survey was the criteria followed for the selection of the respondents. A checklist specially designed for the purpose was used to identify the respondents. The sample comprised of fifty students.

The conduct of the midday meal programme in the selected schools was studied so as to gain an insight into the general quality of the programme's implementation and to select the school having poor performance with regard to the conduct of midday meal programme for conducting further study. The different parameters studied regarding the implementation of the midday meal programme were as follows. Infrastructure and space available in the school for cooking and serving meals, total quantity of food cooked and served in relation to number of children partaking the meal, the menu followed for the mid day meal programme for a week, inclusion of vegetables and green leafy vegetables and fruits in the mid day meal, nutritional quality of meal per serve, hygienic practices followed in the preparation of the mid day meal, availability of drinking water in the school, waste disposal measures followed.

Scores were allotted for each of the above parameters and the schools were evaluated by the investigator by observing as well as interviewing the personnel concerned with the implementation of the programme including the

Headmaster/Headmistress of the schools, the concerned teachers, as well as the cooks engaged for the preparation of the meals.

Assessment of social status of the respondents revealed that among the age group of 12-13 years. The majority of the respondents belonged to Hindu religion and about eighty two percent. Analysis of family structure revealed that the majority of the respondents belonged to nuclear type of families and had a small family size with four members.

Regarding educational status it was found that the majority of fathers and mothers had educational up to upper primary level. The occupational status of the fathers showed that the majority of them were casual labourers and among mothers most of them were house wives.

The nutritional status index of majority of the participants computed was found to be medium when the parameters like weight, height, mid upper arm circumferences and haemoglobin level were taken in to account. The classification of the respondents according to BMI based on Eliz health path for adolescents (2005) showed that 48 percent of the participants came in the chronic energy deficient category.

Assessment of clinical status of the respondents revealed that the majority of had aneamic. Other symptoms like pigmentation, gums spongy bleeding, molted enamel and dental carriers were also found to among the respondents.

Haemoglobin level of the respondents revealed that about forty two per cent of the respondents were non aneamic. Thirty four percent were marginally and twenty percent were mildly aneamic, while six percent were moderately aneamic.

Dietary habits of the respondents indicated that all of them were habitual non vegetarians. Among the respondents cereals, sugars, milk and milk products, nuts and oil seeds, fish, beverages and other vegetables were the food items most frequently used. Meat, egg, other vegetables and green leafy vegetables were the food items used less frequently.

Mean nutrient intake of the respondents showed that energy, protein and fat intake were found to be in par with Recommended Dietary Intake (RDA) where as iron intake was found to be low.

The pre test on the knowledge of the participants on nutrition of the school child and mid day meal programme showed that the mean knowledge score was 10.4 out of 15and the attitude study showed the mean value as 48 out of 60.

The intervention programme consisted of nutrition education with the help of visual aids like charts and leaflets. The demonstration of the specially formulated and standardized nutri meal was very acceptable to the school authorities as well as the participants.

The post test conducted revealed a significant change in the knowledge and attitude of the participants.

The study points out the need for continuance of the mid day meal programme since it is necessary to improve the nutritional status of school children. It also stresses the need for supplying tasty and nutritious noon meals.

The scope of nutrition communication programmes for bringing about positive change in dietary patterns is also evident from this study. Hence, nutrition communication should be incorporated in the mid day meal programme for the

authorities concerned with the implementation of the programme as well as the participants.

Appendices

APPENDIX I

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

INTERVIEW SCHEDULE USED TO ELICIT INFORMATION ON QUALITY OF MID DAY MEAL PROGRAMME IN THE SELECTED SCHOOLS

1. School name :
2. Strength of students
3. How many students are included in midday meal programme
4. Age of students

Class	Number	
	Boys	Girls

5. What are the food items given in midday meal programme
6. Is lunch given every day?
7. What is the quantity of food cooked per day?
8. Quantity given for each child?
9. Whether these quantities satisfy child's need?
10. If not whether more quantity is given or not?
11. Whether all children take this food without wasting?
12. Where is the waste of food dumped?
13. Is there any programme to change the way of food given now?
14. If yes what is the advantage for children?

15. Who is taking the responsibility of conducting midday meal programme in the school?
16. How are food materials for midday meal programme supplied?
17. From where do you collect food materials?
18. What is the amount spent for this?
19. What will be the transportation change to bring the food materials here?
20. How is the central government providing fund for the midday meal programme?
21. How much money do the central government and state government provide per head for midday meal programme?

Central government	State government

22. Additional fund for midday meal programme is got from government or PTA fund?
23. What is the fuel used for cooking
24. How the expense for fuel met?
25. What is the expense of fuel in a month?
26. Is the amount given sufficient for meeting the fuel charges
27. How PTA helps in midday meal programme or what help does PTA provide for midday meal programme?
28. Is weight of children taken or not?
29. If not why?
30. Whether leafy vegetables or vegetables are included in midday meal programme?
31. If not why?
32. Which are the leafy vegetables included?
33. Which are the vegetables included?
34. For how many days leafy vegetables are included in a week?

35. For how many days vegetables are included in a week?
36. What are the other food materials used in midday meal programme?
37. What is the quantity of other food materials given?
38. When it is given?
39. Whether there is any provision to store raw materials?
40. Whether there is any kitchen garden in the school?
41. If yes what are the vegetables grown there?
42. Who is in charge of the kitchen garden?
43. What do you do with the vegetables obtained from kitchen garden?
44. Are vegetables obtained from vegetable garden enough for midday meal programme?
45. From where do you collect vegetables?
46. Whether there is any health programme conducted in the school?
47. If no, why?
48. If yes, what they have done?
    - Health practices of parents and children
    - Weight and height measurement of children
    - Distribution of vitamins and mineral tablets
    - Deworming medicines
    - Any other

APPENDIX II

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

QUSETIONNARIE TO ELICIT THE INFORMATION ON THE SOCIO ECONOMIC AND PERSONAL PROFILE OF THE SUBJECTS

1. Name of the student :
2. Name of school :
3. Sex :
4. Date of birth :
5. Age :
6. Religion : Hindu/ Muslim/ Christian
7. Type of family : Nuclear/ Joint/ Extended
8. Family size : Small/ Median/ Large
9. Ordinal position : First/ Middle/ Last
10. Households members and their demographic particulars:

Sl. No.	Name of members	Relationship with respondents	Sex	Education	Employment	Monthly income

11. Other family income :

Others	Income

12. Total monthly income :

APPENDIX III

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

SCHEDULE USED FOR COLLECTING DATA PERTAINING TO THE FREQUENCY OF USE OF FOODS

1. Name of the student :
2. Sex :
3. Age :

4. Frequency of using different fruits and vegetables

Food items	Daily	Weekly	Fortnightly	Monthly	Occasionally	Never

APPENDIX IV

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

SCHEDULE TO ASSESS INDIVIDUAL DIETARY CONSUMPTION OF THE SUBJECTS

1. Name of the respondent :
2. Age :
3. Sex :
4. Class :

Actual food intake of the respondent (24 hour recall method

Meal pattern	**Menu**	**Raw quantity of each ingredients**	**Individual intake**
Break fast			
Lunch			
Tea time			
Dinner			

APPENDIX V

KERALA AGRICULTURAL UNIVERSITY

COLLEGET OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

SCHEDULE TO ELICIT INFORMATION ON THE ANTHROPOMETRIC STATUS OF THE SUBJECTS

1. Name of the student :
2. Age :
3. Sex :
4. Class :
5. Body weight (kg) :
6. Height (cm) :
7. Body Mass Index (BMI) :

APPENDIX VI

KERALA AGRICULTURAL UNIVERSITY

COLLEGET OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

SCHEDULE TO ELICIT INFORMATION REGARDING BIOCHEMICAL EXAMINATION OF THE SUBJECTS

SL.NO.	Haemoglobin level
1	10.4
2	9
3	10.8
4	10.1
5	9.4
6	10.1
7	10.4
8	8.7
9	10
10	10.7
11	10.9
12	11.3
13	12.6
14	11.4
15	12.1
16	12
17	11.5
18	10.3
19	12.3
20	13
21	12.1
22	12.6
23	12.3
24	11.9
25	11.4
26	13.3
27	13
28	12.9

29	12
30	12
31	12.4
32	12.1
33	12.4
34	12.5
35	12.9
36	12
37	11
38	11.3
39	11.6
40	11
41	11.5
42	13
43	13.4
44	11.6
45	11.2
46	11
47	11.3
48	11.6
49	11.2
50	10.4

APPENDIX VII

KERALA AGRICULTURAL UNIVERSITY

COLLEGET OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

SCHEDULE TO ELICIT INFORMATION REGARDING CLINICAL EXAMINATION OF THE SUBJECTS

1. Name of the student :
2. Age :
3. Sex :
4. Class :

Clinical examination

1. Parotid enlargement
2. Oedema
3. Emaciation
4. Marasmus
5. Conjunctival xerosis
6. Bitot's spot
7. Corneal xerosis/ keratomalacia
8. Night Blindness
9. Photophobia

10. Aneamia
11. Tongue red and raw
12. Abropic lingcial papillae
13. Pellagra
14. Crazy pavement dermatitis
15. Pigmentation
16. Phrynoderma
17. Koilonyelna
18. Gums-spongy, bleeding
19. Teeth caries
20. Mottled caries
21. Thyroid enlargement
22. Knock-knees or bow legs
23. Frontal and parietal bossing

APPENDIX VIII

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

NSI VALUE OF THE RESPONDENTS

SL.NO.	NSI VALUES
1	16.14
2	16.99
3	15.68
4	14.94
5	17.54
6	14.21
7	14.99
8	17.38
9	14.98
10	15.59
11	15.28
12	14.02
13	15.11
14	16.32
15	13.97
16	13.24
17	14.86
18	15.46
19	14.67
20	16.02
21	18.23
22	16.02
23	15.68
24	18.44
25	12.89
26	14.08
27	14.39
28	15.29
29	15.44
30	16.01

31	13.28
32	15.39
33	12.04
34	14.87
35	15.74
36	14.69
37	15.33
38	14.39
39	15.38
40	14.67
41	16.08
42	13.99
43	16.29
44	15.78
45	15.28
46	15.67
47	15.47
48	15.86
49	17.69
50	14.84

APPENDIX IX

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

INTERVIEW SCHEDULE USED TO ELICIT INFORMATION OF KNOWELEDGE OF THE RESPONDENTS

Name of the respondents:

Gender:

Age:

Sl.no		Yes	No
1	Mal nutritional foods increase to health and growth of our body		
2	Intake of nutritious foods helps to increase our IQ		
3	We must include cereals, pulses, and leafy vegetables daily in our food.		
4	Insufficient intake of nutritious foods causes health problems.		
5	Cereals and pulses are rich in carbohydrates and protein and they are necessary for health.		
6	Leafy vegetables are not given to children frequently since it causes diarrhea.		
7	Protein present in such egg, milk, pulses are necessary for the growth of children.		
8	Loss of blood in the body causes weakness and numbness.		

9	Deficiency of iron causes anemia.		
10	Energy from food gives strength to children (for playing and studying)		
11	Students must take leafy vegetables 2-3 days in a week.		
12	Students taking school lunch are very active and study well.		
13	Mid day meal programme is implemented in the school with the help of central government.		
14	Mid day meal programme provides 60 g rice and 30 g pulses for a child.		
15	Mid day meal programme also helps to increases the social values of children other than their health.		

APPENDIX X

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

INTERVIEW SCHEDULE USED TO ELICIT INFORMATION ON ATTITUDE OF THE RESPONDENTS

Name of the respondents:

Gender:

Age:

Sl.no		Agree	Fully Agree	No Comments	Disagree	Fully Disagree
1	Mid day meal programme is conducted to ensure nutritious food to all children.					
2	School children must take nutritious food.					
3	It is not necessary (there is no need) to add leafy vegetables and vegetables in mid day meal programme.					
4	Mid day meal programme must be improved.					
5	Mid day meal programme attracts the children to school					
6	Children like to take the same food every day					
7	Children face difficulty in					

	obtaining mid day meal on holidays					
8	Mid day meal is not cooked in hygienic places.					
9	The way of serving food in the midday meal programme must be improved.					
10	Children hesitate to consume same type of kanji and pulses.					
11	Quantity given in MDMP is enough for a child					
12	MDMP helps to improve rapport between the children.					

APPENDIX XI

KERALA AGRICULTURAL UNIVERSITY

COLLEGE OF AGRICULTURE

VELLAYANI

DEPARTMENT OF HOME SCICENCE

SCHEDULE USED FOR COLLECTING DATA PERTAINING TO THE FREQUENCY OF USE OF FOODS

1. Name of the respondent:
2. Food habit: Vegetarian/Non vegetarian
3. Frequency of using different food items;

Food Items	Daily	Weakly Thrice	Once in a week	Once in a Month	Occasionally	Never
Cereals						
Rice						
Rice flour						
Wheat						
Wheat flour						
Rava						
Maida						
Oats						
Pulses						
Black gram dhal						
Bengal gram (whole)						
Bengal gram dhal						
Green gram (Whole)						
Green gram dhal						

Peas Red gram dhal Soya bean Cowpea **<u>Green Leafy Vegetables</u>** Agathi Amaranth Cabbage Chekrumanis Colocasia leaves Coriander Curry leaves Fenugreek leaves Lettuce Mint Spinach Others(Specify) **<u>Other vegetables</u>** Ash gourd Bitter gourd Brinjal Cauli flower Cucumber Drumstick Ladies finger Mango green Papaya green Peas						

Plantain green (small)						
Nendran (green)						
Pumpkin						
Snake gourd						
Tomato green						
Fruits and Tubers						
Beetroot						
Carrot						
Colocasia						
Onion Big						
Onion Small						
Potato						
Sweet potato						
Tapioca						
Yam Elephant						
Yam ordinary						
Fruits						
Amla						
Apple						
Banana ripe						
Plantain ripe						
Cashew ripe						
Red Cherries						
Dates dried						
Grapes blue						
Grapes green						
Guava						
Lime						
Musambi						

Mango ripe Orange Papaya ripe Pineapple **Milk &Milk Products** Curd Cow milk Butter milk Cheese **Meat** **Egg** **Fish** **Nuts & Oil Seeds** Sesame Ground nut Cashew nut Coconut Sugar Processed foods Pickles Jam Noodles **Bakery items** Cake Ice creams Sweets						

Beverages Tea Coffee Fruit juices Cola Pepsi						

APPENDIX XI
KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE
VELLAYANI
DEPARTMENT OF HOME SCICENCE

PREPARATION OF NUTRITION COMMUNICATION MODULE

ആരോഗ്യം എന്നാലെന്ത് ?

ലോകാരോഗ്യ സംഘടനയുടെ നിർവ്വചനപ്രകാരം ആരോഗ്യം എന്നത് രോഗങ്ങളുടെ അഭാവം മാത്രമല്ല മറിച്ച് ശാരീരികമായും മാനസികമായും സാമൂഹികമായും ഒരു വ്യക്തിയുടെ സമ്പൂർണ്ണ ക്ഷേമമാണ്. ആയതിനാൽ ഇന്ത്യയുടെ ശിശു രോഗവിദഗ്ദരുടെ ദേശീയ സംഘടനയായ സംയോജിത ശിശു വികാസന വകുപ്പ് വഴിയും, ആരോഗ്യ കേന്ദ്രങ്ങൾ വഴിയും, സ്കൂൾ ഹെൽത്ത് ക്ലബുകൾ വഴിയും, 10 മുതൽ 19 വയസ്സ് വരെ പ്രായമുള്ള കുട്ടികളെ പ്രത്യേക പരിഗണനയ്ക്ക് അർഹരാക്കണം എന്ന തീരുമാനം എടുക്കുകയുണ്ടായി.

ആരോഗ്യ പ്രശ്നങ്ങൾ	കാരണങ്ങൾ
1. ആസ്ത്മ	അമിതമായ കളികളും, വ്യായാമവും വൈകാരിക സമ്മർദ്ദവും
2. ശ്വാസകോശ രോഗങ്ങൾ	രോഗമുള്ള ഒരാളിനോടൊപ്പമുള്ള സഹവർത്തിത്വം
3. ക്ഷയം	കുട്ടിക്കാലത്തുണ്ടായിരുന്ന ക്ഷയരോഗത്തിന്റെ അണുബാധ പുനരുജ്ജീവിക്കുന്നതുകൊണ്ട്
4. കൗമാരപ്രായത്തിലെ ഗോയിറ്റർ	അയഡിൻ അടങ്ങിയ ആഹാര സാധനങ്ങളുടെ ഉപയോഗക്കുറവ്
5. ത്വക്കിലെ പാടുകൾ	അമിതമായി വിയർക്കുക, പാരമ്പര്യം
6. അമിതവണ്ണം	വ്യായാമക്കുറവ്, അമിതാഹാരം, പ്രത്യേകിച്ച് മധുര പലഹാരങ്ങളുടെയും കൊഴുപ്പിന്റെയും ഉപയോഗം, പാരമ്പര്യം
7. തൂക്കക്കുറവ്	ക്രമരഹിതമായ ഭക്ഷണരീതി, വീട്ടിന് പുറത്തുള്ള ഭക്ഷണം ഉദാ: ഫാസ്റ്റ് ഫുഡ്, ശീതള പാനീയങ്ങൾ തുടങ്ങിയവ

ആരോഗ്യസംരക്ഷണം പലവിധത്തിലുണ്ട് എന്നാൽ ആരോഗ്യസംരക്ഷണത്തിന് ഏറ്റവും ആവശ്യം വ്യക്തി ശുചിത്വമാണ്.

1) നേത്രസംരക്ഷണം
2) നാസികാസംരക്ഷണം
3) കർണസംരക്ഷണം
4) കേശസംരക്ഷണം
5) ദന്ത സംരക്ഷണം
6) ആർത്തവശുചിത്വം ഇവയൊക്കെയാണ്

പോഷണം എന്നാലെന്ത്?

ശരീരത്തിലെ കോശങ്ങളുടെയെല്ലാം ശരിയായ പ്രവർത്തനത്തിനാവശ്യമായ ഘടകങ്ങൾ പോഷണത്തിൽകൂടി നൽകി ശരീരത്തെ പോഷിപ്പിക്കുന്ന കലയെയാണ് പോഷണം എന്നുപറയുന്നത്. ശരീരത്തിലെ എല്ലാ അവയവങ്ങൾക്കും ആവശ്യമുള്ള ഘടകങ്ങൾ ഭക്ഷണത്തിൽകൂടി ലഭ്യമാകുകയും അവയെ രൂപാന്തരപ്പെടുത്തി വളർച്ചയും ആരോഗ്യസംരക്ഷണവും നടത്തുന്ന പ്രക്രിയയാണ് പോഷണം. ശരീരത്തിന്റെ വളർച്ചയ്ക്കും ആരോഗ്യസംരക്ഷണത്തിനും പറ്റിയ തോതിൽ എല്ലാ പോഷകങ്ങളും ക്രമീകരിച്ചിട്ടുള്ള ഭക്ഷണക്രമത്തിന് പോഷകാഹാരം എന്നു പറയുന്നു. അന്നജം, മാംസ്യം, കൊഴുപ്പ്, ധാതുലവണങ്ങൾ, ജീവകങ്ങൾ, ജലം എന്നീ പോഷകങ്ങൾ ശരീരത്തിൽ ആവശ്യാനുസരണം ലഭിക്കണമെന്ന് മാത്രമല്ല അവ ശരിയായ വിധത്തിൽ ശരീരത്തിന് ആഗീരണം ചെയ്യപ്പെടുകയും ഉപയോഗിക്കുകയും വേണം. അവ ചെയ്യുന്ന പ്രവൃത്തികൾ അനുസരിച്ച് അവയെ മൂന്നായി തരം തിരിക്കാം.

1. ഊർജ്ജം പ്രദാനം ചെയ്യുന്ന ഭക്ഷണങ്ങൾ
2. വളർച്ചയ്ക്കും പേശികളും കേടുപാടുകൾ തീർക്കുന്നതിനും
3. ശരീരപ്രക്രിയകൾ ക്രമീകരിക്കുന്ന ഭക്ഷണങ്ങൾ

അതുപോലെ തന്നെ പോഷക സമൃദ്ധമായ ആഹാരം എല്ലായ്പ്പോഴും നമുക്കിടയിൽ ചർച്ച ചെയ്യപ്പെടുന്ന ഒരു വിഷയമാണ്. എന്തെല്ലാമാണ് പോഷകാഹാരം, എന്തുകൊണ്ട് പോഷകാഹാരം അനിവാര്യമാകുന്നു, എങ്ങനെയെല്ലാം പോഷകാഹാരം, ഉറപ്പിക്കാം, പോഷകാഹാരത്തിന്റെ വില ഉയർന്നതാണോ എന്നിങ്ങനെ നിരവധി ചോദ്യങ്ങൾ ഉന്നയിക്കപ്പെടുന്നതാണ്.

സ്കൂൾ കുട്ടികളുടെ പ്രായത്തിൽ പോഷകാഹാരം ഒരു പ്രധാന പങ്കു വഹിക്കുന്നുണ്ട്. ഇതിന്റെ ലക്ഷ്യം എന്നു പറയുന്നത് പോഷകാഹാരം കുട്ടികളുടെ വളർച്ചയ്ക്ക് അത്യന്തികവും പരമപ്രധാനവുമായ ഒരു ഘടകം ആണ്. അതിന് പോഷകാഹാരങ്ങൾ അടങ്ങിയ ഭക്ഷ്യവസ്തുക്കൾ ആവശ്യമായ അളവിലും തോതിലും കഴിക്കേണ്ടത് ആവശ്യമാണ്. കൂടാതെ കുട്ടികളിൽ ബുദ്ധിവികാസത്തിന് പോഷകാഹാരം ഒരു വലിയ പങ്കു വഹിക്കുന്നു. നന്നായി ഭക്ഷണം കഴിച്ച ഒരു കുട്ടിക്ക് മാത്രമേ പഠിത്തത്തിലും, കായിക പ്രവർത്തനങ്ങളിലും മറ്റും വേണ്ടത്ര ശ്രദ്ധ ചെലുത്തുവാൻ സാധിക്കുകയുള്ളു. സ്കൂൾ കുട്ടികളുടെ പോഷകാഹാര ആവശ്യകത മനസ്സിലാക്കിക്കൊണ്ടും, അവയുടെ ന്യൂനത പരിഹരിക്കുവാനും വേണ്ടിയത് സർക്കാർ ഉച്ച ഭക്ഷണം.

സമീകൃതാഹാരം

ശാരിരികാവശ്യങ്ങൾ നിറവേറ്റാൻ എല്ലാ അവശ്യ പോഷക മൂല്യങ്ങളും കൃത്യമായ അനുപാതത്തിലും അളവിലും ലഭ്യമാകുന്ന ആഹാരത്തെയാണ് സമീകൃതാഹാരം എന്നു പറയുന്നത്. അതായത് ഒരു സമീകൃതാഹാരം അളവിലും ഗുണത്തിലും സമീകൃതവും വളർച്ചയ്ക്കും പുഷ്ടിയ്ക്കും ആരോഗ്യം നിലനിർത്തുന്നതിനും ശാരിരിക ധർമ്മങ്ങൾ ക്രമീകരിക്കുന്നതിനും ഉതകുന്നതാണ്. നിത്യജീവിതത്തിൽ സമീകൃതാഹാരം ഒരു പ്രധാന പങ്കു വഹിക്കുന്നുണ്ട്. സമീകൃതാഹാരത്തിൽ ഉൾപ്പെടുന്ന ഘടകങ്ങൾ ധാന്യങ്ങൾ, പയർ വർഗ്ഗങ്ങൾ, കിഴങ്ങു വർഗ്ഗങ്ങൾ, പച്ചക്കറികൾ, ഇലക്കറികൾ, പാലും പാലുൽപ്പന്നങ്ങളും, മത്സ്യം, മുട്ട, കൊഴുപ്പും എണ്ണക്കുരുവും, പഞ്ചസാര, ജലാംശം എന്നിവ ആവശ്യമായ അളവിൽ ഉൾപ്പെടുന്നതാണ് സമീകൃതാഹാരം.

നിത്യേന കഴിക്കേണ്ട ഭക്ഷണങ്ങളുടെ അളവ്

മത്സ്യ മാംസാദികൾ ഉപയോഗിക്കാത്തവർ കൂടുതൽ പാലുൽപ്പന്നങ്ങളും പയർ വർഗ്ഗങ്ങളും ആഹാരത്തിൽ ഉൾപ്പെടുത്തണം. സമീകൃതാഹാരം എന്നു കേട്ടാൽ പലർക്കും തോന്നും ഇതു വിലകൂടിയ ആഹാരം ആണ് എന്ന് എന്നാൽ പോഷകഗുണനിലവാരം ഉറപ്പുള്ള ആഹാരമാണ് സമീകൃതാഹാരം.

സമീകൃതാഹാരത്തിൽ നിന്നും ലഭ്യമാകുന്ന പോഷകഗുണങ്ങൾ

അന്നജം (Carbohydrate)

മാംസം (Protein)

കൊഴുപ്പ് (fat)

ജീവകങ്ങൾ (Vitamins)

ധാതുലവണങ്ങൾ (Minerals)

സമീകൃതാഹാരത്തിൽ നിന്നു ലഭിക്കുന്ന പോഷകഘടകങ്ങൾ	ഓരോ പോഷകഘടകങ്ങളിൽ നിന്നും ലഭിക്കുന്ന പോഷകമൂല്യങ്ങൾ
അന്നജം, കൊഴുപ്പ്	പഠിക്കാനും കളിക്കാനും ജോലിചെയ്യാനും വേണ്ട ഊർജ്ജം.
മാംസം	വളർച്ചയ്ക്കും ശരീര കോശനിർമ്മാണത്തിനും വേണ്ട ഘടകങ്ങൾ
ജീവകങ്ങൾ, ധാതു ലവണങ്ങൾ	രോഗപ്രതിരോധ ശേഷിക്കും രക്തഘടകങ്ങളുടെ നിർമ്മിതിക്കും കാഴ്ച ശേഷി വർദ്ധിപ്പിക്കാനും വേണ്ട സംരക്ഷകാഹാരം

സ്ക്കൂൾ കുട്ടികൾക്കു വേണ്ട ഒരു ദിവസത്തെ പോഷകാഹാരം

ഭക്ഷ്യ ഇനങ്ങൾ	10 മുതൽ 12 വയസ്സുവരെ	
	വെജിറ്റേറിയൻ	നോൺ വെജിറ്റേറിയൻ
	ഗ്രാം	ഗ്രാം
ധാന്യങ്ങൾ	290	290
പയർ വർഗ്ഗങ്ങൾ	70	50
കിഴങ്ങു വർഗ്ഗങ്ങൾ	100	100
മറ്റു പച്ചക്കറികൾ	75	75
പഴ വർഗ്ഗങ്ങൾ	100	100
പാൽ	600	600
ഇറച്ചി, മീൻ, മുട്ട	30	30
കൊഴുപ്പ്, എണ്ണ	30	60
പഞ്ചസാര / ശർക്കര	30	30
വറുത്ത നിലക്കടല	30	-

ജീവൻ നിലനിർത്താൻ ഏറ്റവും അത്യാവശ്യമായ ഒന്നാണ് ആഹാരം. നാം കഴിക്കുന്ന ആഹാരത്തിൽ അടങ്ങിയിരിക്കുന്ന വിവിധ പോഷകഘടകങ്ങളാണ് ശരീര ധർമ്മം നിറവേറ്റാൻ നമ്മെ സഹായിക്കുന്നത്. അന്നജം, മാംസം, കൊഴുപ്പ്, ജീവകങ്ങൾ, ലവണങ്ങൾ എന്നിവയാണ് ഈ പോഷകഘടകങ്ങൾ. ഭക്ഷണത്തിന്റെ ധർമ്മങ്ങൾ നമ്മുടെ ശരീര പ്രവർത്തനങ്ങൾക്കാവശ്യമായ ഊർജ്ജം പ്രദാനം ചെയ്യുന്നു. ശരീര കോശങ്ങളുടെ നിർമ്മാണത്തിനും തേയ്മാനം നികത്തുന്നതിനും ആവശ്യമായ

മാംസ്യം (പ്രോട്ടീൻ) നൽകുന്നു. രോഗപ്രതിരോധ ശക്തി നൽകുന്നതിനും ശാരീരിക പ്രവർത്തനങ്ങൾ ക്രമീകരിക്കുന്നതിനും വേണ്ട ജീവകങ്ങളും ലവണങ്ങളും നൽകുന്നു.

ശരീരത്തിന് ഊർജ്ജം പ്രദാനം ചെയ്യുന്ന പ്രധാനപ്പെട്ട പോഷകഘടകം അന്നജമാണ്. കൊഴുപ്പുകളും ഊർജ്ജത്തിന്റെ ഉറവിടങ്ങളാണ്. ഒരു ഗ്രാം അന്നജത്തിൽ നിന്നും ലഭിക്കുന്നതിന്റെ ഇരട്ടി ഊർജ്ജം ഒരു ഗ്രാം കൊഴുപ്പിൽ നിന്നും ലഭിക്കുന്നു. ഭക്ഷണത്തിൽ ആവശ്യത്തിലധികം അന്നജവും കോഴുപ്പും ഉണ്ടായിരുന്നാൽ മിച്ചമുള്ളത് തൊലിക്കടിയിൽ കോഴുപ്പായി സംരഭിക്കപ്പെടുന്നു. ഇതിനു പുറമേ കൊഴുപ്പുകൾ ചില ജീവകങ്ങളുടെ ആഗിരണത്തെ സഹായിക്കുന്നു. ശരീര വളർച്ചയ്ക്കും ശരീര കോശങ്ങളുടെ നിർമ്മാണത്തിനും അവയുടെ കേടുപാടുകൾ തീർക്കുന്നതിനും മാംസ്യം ഏറ്റവും അത്യാവശ്യമായ പോഷകഘടകമാണ്. രക്തം, വിവിധ ഹോർമോണുകളുടെ ചയാപചയത്തിനും ദഹനത്തിനും സഹായിക്കുന്ന എൻസൈമുകൾ എന്നിവയുടെ ഉൽപാദനത്തിനും മാംസ്യം കൂടിയേ തീരൂ. മാംസത്തിന്റെ പോഷണമേന്മ അവയിലടങ്ങിയിരിക്കുന്ന അമിനോ അമ്ലങ്ങളുടെ തോതിനെ ആശ്രയിച്ചാണിരിക്കുന്നത്. ഊർജ്ജത്തിന്റെയും മാംസ്യത്തിന്റെയും കുറവ് കുട്ടികളുടെ വളർച്ച മുരടിക്കുകയും കാഷിയോർക്കർ, മരാസ്മസ് എന്നീ രോഗങ്ങൾ പിടിപെടുന്നതിനിടയാക്കുകയും ചെയ്യുന്നു. ദേഹം മുഴുവൻ നീര് വരുക, തലമുടി ചെമ്പിക്കുക, തൊലിക്കു നിറഭേദമുണ്ടാകുക ഇവയൊക്കെയാണ് കാഷിയോർക്കറിന്റെ ലക്ഷണങ്ങൾ. ദേഹം തീരെ ശോഷിച്ച് എല്ലും തോലുമാകുക, തൊലി ചുക്കിച്ചുളിയുക ഇവയൊക്കെയാണ് മരാസ്മസിന്റെ ലക്ഷണങ്ങൾ. അതുപോലെ തന്നെ ശരീര പോഷണത്തിൽ ധാതു ലവണങ്ങൾ

പ്രധാന പങ്കു വഹിക്കുന്നുണ്ട്. കാത്സ്യം, ഫോസ്ഫറസ്, ഇരുമ്പ് ഇവയൊക്കെയാണ് പ്രധാനപ്പെട്ട ധാതുലവണങ്ങൾ.

കാത്സ്യം, ഫോസ്ഫറസ് ഇവ എല്ലിന്റെയും പല്ലിന്റെയും ശരിയായ രൂപീകരണത്തിന് ആവശ്യമായ ഘടകങ്ങളാണ്. ഇവ കൂടാതെ രക്തം കട്ട പിടിക്കുന്നതിനും മാംസ പേശികളുടെ പ്രവർത്തനതിനും കാത്സ്യം ആവശ്യമാണ്. ഇരുമ്പ് രക്തത്തിന് ചുവപ്പു നിറം നൽകുന്ന വർണ്ണവസ്തുവായ ഹീമോഗ്ലോബിന്റെ ഉൽപാദനത്തിന് ആവശ്യമാണ്. ഭക്ഷണത്തിൽ നിന്ന് വേണ്ടത്ര ഇരുമ്പ് ലഭിക്കുന്നില്ലെങ്കിൽ അത് വിളർച്ചയ്ക്ക് കാരണമാകുന്നു. ജീവകങ്ങൾ ചെറിയ അളവിൽ മാത്രമേ ശരീരത്തിനാവശ്യമുള്ളു എങ്കിലും ശരീര സംരക്ഷണത്തിന് ഇവ കഴിച്ചു കൂടാൻ പാടില്ലാത്തവയാണ്. പ്രധാനപ്പെട്ട ജീവകങ്ങൾ ജീവകം A, ജീവകം B, B_2, B_{12}, ഫോളിക് ആസിഡ്, നിക്കോട്ടിക് ആസിഡ്, ജീവകം C & D എന്നിവയാണ്.

നല്ല കാഴ്ചശക്തിക്കും ത്വക്കിന്റെ ആരോഗ്യ സംരക്ഷണത്തിനും ജീവകംA ഒരു പ്രധാന പങ്കു വഹിക്കുന്നു. തുടർച്ചയായി ഭക്ഷണത്തിന് ജീവകത്തിന്റെ കുറവ് ഉണ്ടായിരുന്നാൽ മാലക്കണ്ണ്, ബീറ്റോസ്സ്പോട്ട്, കെരറ്റോമലേഷ്യ തുടങ്ങിയ കണ്ണിന്റെ കാഴ്ചശക്തിക്കു തകരാറുണ്ടാകുന്ന രോഗങ്ങൾ പിടിപെടുന്നു. അതുകൊണ്ട് ജീവകങ്ങൾ അടങ്ങിയിട്ടുള്ള ഭക്ഷണ പദാർത്ഥത്തിൽ ആഹാരത്തിൽ ഉൾപ്പെടുത്തണം.

ജീവകം D- കാത്സ്യത്തിന്റെയും, ഫോസ്ഫറസിന്റെയും ആഗിരണം ത്വരിതപ്പെടുത്തുന്നതിനും രക്തത്തിൽ അവയുടെ സാന്ദ്രത ക്രമീകരിക്കുന്നതിനും സഹായിക്കുന്നു. കൂടാതെ എല്ലുകളുടെയും പല്ലുകളുടെയും ക്രമമായ വളർച്ചയെയും ആരോഗ്യത്തെയും ഇവ പോഷിപ്പിക്കുന്നുണ്ട്. ഇതിന്റെ കുറവു

മൂലം കുട്ടികളിൽ കണരോഗവും മുതിർന്നവരിൽ ഓസ്റ്റിയോമലേഷ്യ എന്ന രോഗവും ഉണ്ടാകാനിടയുണ്ട്.

ജലത്തിൽ ലയിക്കുന്ന ജീവകങ്ങളാണ് ജീവകം ബി (തയാമിൻ) ജീവകം B_2 (റൈബോഫ്ളേവിൻ) നിക്കോട്ടിക ആസിഡ്, ഫോളിക് ആസിഡ്, ജീവകം B_{12}, ജീവകം C.

ജീവകം B_{11} – അന്നജത്തിൽ നിന്ന് ഊർജ്ജം വിമുക്തമാക്കുന്ന ഒരു പ്രധാന പങ്കു വഹിക്കുന്നത്. നല്ല വിശപ്പ്, ദഹനം ഇവ ഉണ്ടാകുന്നതിനും നാഡീവ്യൂഹത്തിന്റെ ശരിയായ പ്രവർത്തനത്തിനും ആവശ്യമാണ്. ഇതിന്റെ ചെറിയ അളവിലുള്ള അഭാവം പോലും വിശപ്പില്ലായ്മയ്ക്കും ദഹനക്കേടിനും കാരണമാകുന്നു. ദീർഘകാല അഭാവം മൂലം ബെറിബെറി എന്ന രോഗം ഉണ്ടാകുന്നു.

ജീവകം B_2 (റൈബോ ഫ്ളേവിൻ):- ഇതിന്റെ കുറവുമൂലം വായ്പുണ്ണ് ഉണ്ടാകുന്നു.

നിക്കോട്ടനിക് ആസിഡ് :- ഭക്ഷണത്തിൽ ഇതിന്റെ കുറവുമൂലം പെല്ലാഗ്ര എന്ന രോഗം ഉണ്ടാകുന്നു.

സ്ക്കൂൾ കുട്ടികൾക്ക് ദിവസേന വേണ്ടുന്ന പോഷകങ്ങളുടെ അളവ്

പോഷകങ്ങൾ	ആൺകുട്ടി	പെൺകുട്ടി
	വയസ്സ് 10-12	വയസ്സ് 10-12
ശരാശരി	35.4	31.5
ശരാശരി തൂക്കം (kg)	21.90	1970
ഊർജ്ജം	54	57
മാംസ്യം	22	22
കൊഴുപ്പ്	600	600
കാൽസ്യം	34	19
ഇരുമ്പ്	600	600
റെറ്റിനോൾ	2400	2400
ബീറ്റാകരോട്ടിൻ	1.1	1.0
തയമിൻ	1.3	1.2
റൈബോഫ്ളേവിൻ	40	40
ജീവകം C	70	70
ഫോളിക് ആസിഡ്	0.2-1	0.2-1
വൈറ്റമിൻB_{12}	200	200

ഉച്ചഭക്ഷണ പരിപാടി

ഉച്ചഭക്ഷണ പരിപാടി നമ്മുടെ രാജ്യത്തിൽ തുടങ്ങിയത് തന്നെ രാജ്യത്തിന്റെ സാമൂഹികവും സാമ്പത്തീകവുമായ പുരോഗമനത്തിനുവേണ്ടിയാണ്. വ്യവസായവത്ക്കരണവും ഉദ്യോഗവുമുള്ള സ്ത്രീകളുടെയും അമ്മമാരുടെയും എണ്ണം കൂടിയതും കുട്ടികളുടെ വിദ്യാഭ്യാസ ദിനങ്ങൾ കൂടാൻ ഇടയാക്കി. ഇത് കുട്ടികൾക്ക് വീടുകളിൽ തന്നെ ഭക്ഷണശല്യം കുറയ്ക്കുകയും ചെയ്യുന്നു. അതുകൊണ്ട് വിദ്യാലയങ്ങളിൽ തന്നെ ഭക്ഷണ സൗകര്യം ഒരുക്കേണ്ടതായും വന്നു. ഇതിന് വേണ്ടിയാണ് ഗവൺമെന്റ് അതോറിറ്റീസ് ഭക്ഷണത്തിനുള്ള സൗകര്യം. ഉച്ചഭക്ഷണ പരിപാടി തുടങ്ങിയതിന്റെ ഉദ്ദേശ്യം തന്നെ ആരോഗ്യം കുറഞ്ഞ കുട്ടികൾക്കു വേണ്ടിയാണ് (പ്രത്യേകിച്ചും 6-11 വയസ്സുള്ള). സ്കൂൾ ഉച്ചഭക്ഷണ പരിപാടിയുടെ തന്നതായ ഉദ്ദേശ്യം കുട്ടികളുടെ എണ്ണം വർദ്ധിപ്പിക്കാനും അറിവ് വർദ്ധിപ്പിക്കാനും, അവരുടെ പോഷണ നിലവാരം മെച്ചപ്പെടുത്തുവനും വേണ്ടിയാണ്.

ഉച്ചഭക്ഷണം നൽകുന്നതിന്റെ പ്രധാന ലക്ഷ്യങ്ങൾ

1. **സ്കൂൾ കുട്ടികളുടെ പോഷക നിലവാരം വർദ്ധിപ്പിക്കുക.**

പോഷക നിലവാരം അറിയാൻ സ്കൂൾ കുട്ടികളുടെ പൊക്കവും തൂക്കവും മാസം തോറും എടുക്കുകയും അത് രേഖപ്പെടുത്തുകയും ചെയ്യുന്നു. അതിന് ശേഷം ആരോഗ്യം കുറഞ്ഞ കുട്ടികൾക്ക് നൽകുകയും അവരുടെ പോഷക നിലവാരം വർദ്ധിപ്പിക്കുകയും ചെയ്യുക.

2. സ്കൂൾ കുട്ടികളുടെ ഹാജർ വർദ്ധിപ്പിക്കുക.

ആരോഗ്യം കുറഞ്ഞതും വീടുകളിൽ വേണ്ടത്ര ഭക്ഷണം ലഭിക്കാത്തതുമായ കുട്ടികൾ സ്കൂളിൽ ദിവസവും ഹാജർ ആകേണ്ടതായി വരുന്നു.

3. കുട്ടികളുടെ വിദ്യാഭ്യാസ നിലവാരം മെച്ചപ്പെടുത്തുക

ഉച്ചഭക്ഷണം കഴിക്കാത്ത കുട്ടികൾക്ക് സ്കൂളിൽ ഇരുന്ന് പഠിക്കുവാനോ, ശ്രദ്ധിക്കുവാനോ കഴിയില്ല. അവർക്ക് ഉറക്കം, ക്ഷീണം എന്നിവ അനുഭവപ്പെടുകയും ചെയ്യുന്നു. എന്നാൽ ഉച്ചഭക്ഷണം കഴിച്ച കുട്ടികൾ പഠിത്തത്തിൽ കൂടുതൽ ശ്രദ്ധ കേന്ദ്രീകരിക്കുകയും മറ്റു പരിപാടികളിൽ പങ്കെടുക്കുകയും ചെയ്യുന്നു. അതുകൊണ്ട് ഉച്ചഭക്ഷണത്തിന് ശേഷം കുട്ടികൾ കൂടുതൽ പഠിത്തത്തിൽ ശ്രദ്ധിക്കുന്നുണ്ടോ എന്നും സ്കൂൾ പരിപാടിയിൽ കൂടുതൽ താൽപര്യം കാണിക്കുന്നുണ്ടോ എന്നും അദ്ധ്യാപകർ ശ്രദ്ധിക്കുകയും അത് രേഖപ്പെടുത്തുകയും ചെയ്യണം.

4. ഉച്ചഭക്ഷണ പരിപാടിയിൽ സമൂഹ പങ്കാളിത്തം വർദ്ധിപ്പിക്കുക.

ഉച്ചഭക്ഷണ പരിപാടിയിൽ സമൂഹത്തിന്റെ പങ്കാളിത്തം വളരെയധികം പ്രാധാന്യം അർഹിക്കുന്നവയാണ്. ഇതിൽ അദ്ധ്യാപകരുടെയും, രക്ഷിതാക്കളുടെയും സാധാരണ ജനങ്ങളുടെ പങ്കാളിത്തം ആവശ്യമാണ്. ഈ ഉച്ചഭക്ഷണ പരിപാടിയ്ക്ക് ആവശ്യമായ ചില ഉപകരണങ്ങളോ സാധനങ്ങളോ ഗ്രാമവാസികൾ കൊടുത്തു സഹായിക്കുന്നു. ഉച്ചഭക്ഷണത്തിന്റെ പോഷകമൂല്യം വർദ്ധിപ്പിക്കാനായിട്ട് കുട്ടികളുടെ രക്ഷിതാക്കളുടെയും അദ്ധ്യാപകരുടെയും കൂട്ട് ഉത്തരവാദിത്ത്വത്തിൽ നടപടി എടുക്കുന്നതാണ് നല്ലത്. സ്കൂൾ പരിസരത്ത് ഒരു

നല്ല പോഷക തോട്ടം നിർമ്മിച്ച് അതിൽ നിന്നും ഉള്ള പച്ചക്കറികൾ ഉച്ചഭക്ഷണത്തിൽ ഉൾപ്പെടുത്തുന്ന പതിവ് ചില സ്കൂളുകളിൽ നടത്തിവരുന്നുണ്ട്. കേരളത്തിൽ നടത്തി വരുന്ന ഉച്ചഭക്ഷണ പരിപാടിയിൽ ഒരു കുട്ടിയ്ക്ക് 60 ഗ്രാം അരിയും 30 ഗ്രാം പയറും നൽകി വരുന്നു. ഇതിനോടൊപ്പം കുറച്ച് പച്ചക്കറികളും ചേർത്തു നൽകുന്നതായും കണ്ടുവരുന്നു. കൂടാതെ ഓണക്കാലത്ത് സ്കൂളിൽ കിറ്റ് കൊടുക്കുകയും അതു കൂടാതെ സ്കൂളിൽ മുട്ടയും പാലും കൊടുക്കുകയും ചെയ്യുന്നു.