ASSESSMENT OF THE NUTRITIONAL STATUS OF PRIMARY SCHOOL CHILDREN WHO ARE THE BENEFICIARIES OF MID-DAY MEAL SCHEME: A CROSS-SECTIONAL STUDY IN KANJIRAPPALLY BLOCK PANCHAYATH, KOTTAYAM

Ms. JAYALAKSHMI RAJEEV

Dissertation submitted in partial fulfilment of the requirement for the award of the degree of Master of Public Health

ACHUTHA MENON CENTRE FOR HEALTH SCIENCE STUDIES
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY
Thiruvananthapuram, Kerala

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CERTIFICATE

Certified that the dissertation entitled "Assessment of the nutritional status of primary school children who are the beneficiaries of Mid-Day Meal Scheme: A cross-sectional study in Kanjirappally Block panchayath, Kottayam" is a record of the research work undertaken by Ms.Jayalakshmi Rajeev, in partial fulfilment of the requirements for the award of the degree of Master of Public Health, under my and guidance and supervision.

Guide

Ms. JISSA V T,

Scientist B,

Achutha Menon Centre for Health Science Studies

Sree Chitra Tirunal Institute for Medical Sciences and Technology

Thiruvananthapuram, Kerala, India

October 2014

DECLARATION

I hereby declare that the dissertation titled "Assessment of the nutritional status of primary school children who are the beneficiaries of Mid-Day Meal Scheme: A cross-sectional study in Kanjirappally Block panchayath, Kottayam" is the bonafide record of my original field research. It has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Ms. JAYALAKSHMI RAJEEV

Achutha Menon Centre for Health Science Studies

Sree Chitra Tirunal Institute for Medical Sciences and Technology

Thiruvananthapuram, Kerala, India

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ABBREVIATIONS

APL : Above Poverty Line

BPL : Below Poverty Line

CARE : Cooperate American Relief Everywhere

HDI : Human Development Index

NFHS : National Family Health Survey

NNMB : National Nutrition Monitoring Bureau

MDM : Mid- Day Meal

OBC : Other Backward Communities

OEC : Other Eligible Communities

SC : Scheduled Caste

ST : Sceduled Tribe

UNO : United Nations Organization

WHO : World Health Organization

ABSTRACT

Introduction: One of the major objectives of the Mid-Day Meal Scheme is to improve the nutritional status of school children, but we do not have enough evidence to say whether the scheme is successful in terms of ensuring optimum nutritional status for its beneficiaries. The purpose of this study was to estimate the prevalence of malnutrition among primary school children who are the beneficiaries of Mid-Day Meal Scheme, and to identify the factors associated with their nutritional status and utilization of Mid-Day Meal.

Methods: Cross-sectional survey was conducted among 322 children (171 boys and 151 girls) from government and aided schools in Kanjirappally Block panchayath, Kottayam using multi-stage random sampling. The information collected from children as well as their parents, and the anthropometric measurements of the children were observed. Data entry and analysis were done using SPSS software. Composite Index of Anthropometric Failure (CIAF) and conventional Indices were used to estimate under nutrition. Statistical inferences were drawn using Chi squared test and logistic regression analysis.

Results: The prevalence of CIAF was 45.7% and that of stunting, underweight and wasting were 13.4%, 38.8% and 30.7% respectively. Prevalence of over nutrition was only 1.5%. Birth weight of the child was the strongest determinant of CIAF and children's preference to have lunch from school (like/dislike) was the strongest predictor of Mid-Day Meal utilization.

Conclusion: The prevalence of under nutrition is high among school age children. The estimate in terms of CIAF is a valuable indicator for policy makers. Mid-Day Meal scheme is beneficial to the children, yet it has to be strengthened to provide more nutritional food to ensure optimum growth and development among school children.

CHAPTER-1

INTRODUCTION

1.1 Background of the study

Public health is a discipline, which aims to protect the health of the entire population. Broadly, public health research and activities address the problems affecting the health of the community and try to find pragmatic solutions for them. However, an unresolved challenge after decades of multiple interventions is malnutrition, specifically under nutrition among children.

Today's children are tomorrow's citizens. Article Six of United Nations Convention on the Rights of the Child states, "Every child has the right to life. Governments must do all they can to ensure that children survive and grow up healthy".[1] It implies every child has the right to be healthy with adequate facilities for clean water, nutritious food and medical care.[1]

United Nations Organization (UNO) defines "a child means every human being below the age of 18 years unless under the law applicable to the child, majority is attained earlier".[1] With this definition, a newborn child grows through six stages when he/she reaches 18 years of life. They are infancy (from birth to one year), toddler (1-3 years), early-childhood/ pre-school (3-6 years), middle-childhood/school age (6-10 years), late child hood (10-12 years) and adolescence (12-18 years).[2]

School age (6-10 years of age) is a crucial period in the development process with rapid growth and development.[2,3] Optimum growth and development of school age children is largely affected by the nutritional status.[3] Malnutrition in this age group has serious physical, psychological, academic and social consequences in their life.[3]

Ensuring optimum growth and development for school age children is essential for the better future of a nation.

There is a 'nutritional transition' in many developing countries like India and Brazil. Though the problem of under nutrition still exists, the propensity of over nutrition and obesity has been increasing over the years due to the changing life styles and dietary habits of citizens, as a result of the recent economic growth.[4] Such changes are more evident among school age children as they get easily attracted to the so called 'junk foods', pushing them to be morbid and unhealthy at an earlier stage of life and the future victims of various non-communicable diseases.[5] So any nutritional education or interventional programme initiated at this age will be more effective to establish healthy behaviours than any intervention in adulthood.[6] However such programmes should precede careful assessment of nutritional status and predisposing factors of malnutrition in this age group to provide an adequate data for taking the appropriate action.

1.2 Review of Literature

1.2.1 Definitions

1.2.1.1 Nutrition: World Health Organization (WHO) defines nutrition as "the intake of food, considered in relation to the body's dietary needs".[7] It also states that good nutrition is a cornerstone for survival, physical growth, mental development, performance, productivity, health and well-being across the entire life-span.[7]

1.2.1.2 Malnutrition: UNICEF defines that **"**Malnutrition is a broad term commonly used as an alternative to under-nutrition but technically it also refers to over-nutrition. People are malnourished if their diet does not provide adequate calories and protein

for growth and maintenance or they are unable to fully utilize the food they eat due to illness (under nutrition). They are also malnourished if they consume too many calories (over nutrition)**".**[8]

1.2.2 School age period/ middle childhood (6-10 years of age)

School age (6-10 years) is the fourth developmental stage in one's life span commonly known as middle childhood.[2,9] This period is a transition phase between childhood and adolescence marked by active growth (physical maturation :- increase in the size of body and body parts with uniform gain in height and weight) and development (functional maturation:- acquiring skills).[10] During middle childhood, children start to think independently, develop a sense of self-identity and start to compare themselves with their peers.[9,10] They acquire sophisticated cognitive, mental and emotional skills from their first exposure to an external environment i.e. school.[9,10] These skills make them capable to face the challenges in school as well as life in future.[10] But this is a neglected stage of development compared to other stages as just an implementation stage of skills that the children attained from birth to six years of rapid growth.[10] The growth and development of a school age child is affected by many factors such as hereditary factors, nutritional factors, history of any illness, environmental and socioeconomic factors.[9]

1.2.3 Nutrition and middle childhood

Nutrition is a vital determinant of ensuring the optimum growth and development in all stages.[9] Assessment of nutritional status is crucial in determining the health and well being of all individuals especially children.[3] Adequate nutritional status can be defined as "maintenance of a normal pattern of growth and a normal body composition by consumption of appropriate amount and types of food".[11]

Nutritional imbalance in the school age children can cause serious health implications throughout their life.[11,12] In addition, school age acts as the preparatory period with adequate nutritional reserves for the rapid growth and development in adolescence.[11] Studies have shown that early childhood under nutrition can continue to school age also; affecting the physical, mental and cognitive development of the child.[13,14] This may be manifested as poor performance in schools, frequent illnesses, absenteeism etc.[13]

Optimal and balanced nutrition promotes health and well-being, prevent illness and treat diseases.[15] Nutritional health is a state of equilibrium between nutritional intake and nutritional requirements.[15] Malnutrition is the result of either the net nutrient intake is less (under nutrition) or more (over nutrition) than the required.[15] Both under nutrition and over nutrition have immediate and long term consequences on health.[15] Recent studies show that the early malnutrition is associated with development of chronic diseases in later ages.[16]

Emergence of 'Double burden of nutrition': Along with persistent under nutrition, obesity also poses a great public health burden in India and other middle and low income countries.[17] Undernourished, stunted children are at greater risk of being obese in adulthood and they are at risk for developing non-communicable diseases in future.[16,17,18]

1.2.4 Relationship between Health and Malnutrition

Table1.1 describes the levels of nutrition and its impact on health status.

Table:1.1 Effects of nutrition on health

Nutritional situation		*Health consequences and outcomes*
Optimum nutrition:- Food-secure individuals with adequate, balanced and prudent diets.	→	Health, well-being, normal development, High quality of life
Under nutrition: Hunger Food-insecure individuals living in poverty, ignorance, politically unstable environments, disrupted societies, war.	→	Decreased physical and mental development, Compromised immune systems, Increased infectious diseases, Vicious circle of under nutrition, under development and poverty.
Over nutrition Over consumption of food, especially macronutrients plus: • Low physical activity • Smoking, stress, alcohol abuse	→	Obesity, metabolic syndrome, cardiovascular diseases, type: 2 diabetes mellitus, certain cancers, chronic non-communicable diseases (NCDs), characterized by over nutrition of macronutrients and under nutrition of micronutrients.
Nutrition Transition: Individual and communities previously food insecure→confronted with abundance of palatable foods→some undernourished, others too many macronutrients and too few micronutrients.	→	Double burden of infectious diseases plus NCDs,

Source: Vorster HH. Introduction to Human Nutrition: A global perspective on food and nutrition. 2nd Ed. Introduction to human nutrition.[15]

1.2.5 Pathogenesis of malnutrition

Malnutrition can be primary or secondary.[19] The Primary malnutrition is caused by inadequate intake of food in quantity or quality (less or in excess). The secondary malnutrition is the result of any illness or factors that affect the intake and metabolism

of food in child's body.[19] Both primary and secondary malnutrition interacts with each other. Inadequate nutritional intake weakens a child and put him under the threat of being ill and vice versa.[19]

1.2.6 Types of malnutrition

Broadly, under nutrition is classified into macro and micronutrient deficiencies.[20] Macronutrient deficiency occurs when the child deprives carbohydrates, proteins and/or fat resulting in growth failures. The excess of macronutrients also can cause growth failures causing overweight and obesity. Micronutrient deficiency occurs due to the deprivation of vitamins and minerals resulting in anaemia, blurred vision, goitre etc. The different types of growth failures and micronutrient deficiencies are listed.[21]

Growth failure	**Micronutrient deficiencies**
• Acute(Wasting/thinness/ nutritional oedema) • Chronic(stunting/ poor cognitive development) • Acute/ chronic(underweight) • overweight • obesity	• Iron deficiency • Vitamin A deficiency • Iodine deficiency • Other micronutrient deficiencies (Zinc, cobalt, vitamin D etc)

Source: 1.Types of undernutrition. Nutrition in emergencies. Available from: http://www.unicef.org/nutrition/training/2.3/2.html.[20] 2. World Health Organization. Country profile indicators- Interpretation Guide. Nutrition Landscape Information System (NLIS.[21]

1.2.7 Burden of Malnutrition

Most of the health and nutritional surveys at global, national and regional levels focus on nutritional status of children under five years of age and adolescent groups. No upto-date definitive data is available on the health and nutritional status of school age children across the world.[14]

1.2.7.1 At Global level

Best C et al (2010) conducted a meta-analysis to provide a global data on the nutritional status of school age children. In this study, the prevalence of underweight and thinness were found to be prevailing in South-East Asia followed by Africa. However, in Latin America, the prevalence of underweight or thinness was generally below 10 percent whereas the prevalence of obesity was the highest in Latin America (20%-35%). The prevalence of overweight in Asia and Africa were less than 15 percent.[14]

A Nigerian study conducted among urban primary school children showed 48.8 percent and 38.5 percent of underweight respectively for boys and girls. The prevalence of stunting also was high with 56.8 percent for girls and 48.4 percent for boys. A total of 31.3 percent were suffering from severe malnutrition.[22]

The findings of a cross sectional study done in Nepal to identify the determinants of nutritional status of school children revealed that 26 percent of the students were undernourished, 13 percent stunted, 12 percent wasted and 1 percent both stunted and wasted.[23]

A study conducted in southern Brazil estimated prevalence of 36.2 percent and 32.7 percent obesity among boys and girls respectively. It also identified a significant association between parents nutritional status and children's obesity.[24]

1.2.7.2 At National level

India is home to greater number of malnourished children in the world. One in every third malnourished child lives in India.[25] Despite all the interventions after independence to reduce malnutrition, it is still a prevailing health burden in India resulting in 2 to 3 percent reduction in Gross Domestic Product (GDP) apart from direct health effects.[26] According to the National Family Health Survey-3(2005-06), the prevalence of underweight, stunting and wasting among children under 3 years were 40 percent, 45 percent and 23 percent respectively.[27] The latest National Nutrition Monitoring Bureau (NNMB) survey in 2012 reported 36.6 percent and 31 percent of under nutrition respectively among boys and girls of 5-9 years of age from rural area and the overall prevalence of obesity was 0.6 percent and 0.1 percent respectively.[28] The survey also reported a prevalence of 8 percent of morbidities like fever, acute respiratory tract infections and diarrhoea. The prevalence of dental caries was 19 percent and 17.3 percent respectively for boys and girls in the survey.[28]

Every 6th undernourished child in India lives in Uttar Pradesh.[29] One study conducted in Bareilley district of Uttar Pradesh (2011) assessed nutritional status of primary school children in rural and urban areas and found that urban children have better nutritional outcomes compared to the rural children.[29] Osei et al (2010) assessed the nutritional status of school age children in Himalayan villages of India and studied the relationships between their nutritional status, intestinal helminths infection, and socio-demographic characteristics. The study was done among 499 children and the

prevalence of stunting, wasting and underweight were 50.1 percent, 12.2 percent and 60.9 percent respectively.[30]

Srihari et al (2007) assessed the nutritional status of school children from middle and high income families in five cities of India and found wide variation in anaemia (19-88 percent) and the prevalence of overweight and obesity were 8.5 percent to 29 percent and 1.5 percent to 7.4 percent respectively.[31]

1.2.7.3 In Kerala

Kerala ranks first in the developmental index among all Indian states and its Human Development Index (HDI) is comparable to the developed countries.[32] The prevalence of under nutrition among school age children according to the latest NNMB report (2012) was 26.6 percent and 22 percent respectively for boys and girls (5-9 years) in Kerala. The prevalence of over nutrition was 2.3 percent. 0.7 percent respectively.[28]

1.2.8 Factors affecting nutritional status of school age children

Different studies conducted across the world revealed that the following factors could affect the nutritional status of school age children positively or negatively.

1.2.8.1 Child- related factors

Studies have proved that factors such as; age, sex, birth order and low birth weight greatly influence the nutritional status of children. Under-five children, especially infants are more vulnerable to nutritional failures compared to other age groups. Sex interferes with nutritional status of children in countries like India where sex selection is prevailing.[33,34] One study conducted in West Bengal (2008) showed that more female children are undernourished (55.9%) than male children(46.6%), and the birth order is associated with the vulnerability of females to be malnourished.[35]

As birth order increases, the incidence of under nutrition also increases.[36] Children born with low birth weight are more susceptible to retarded growth and development in future.[33]

*Dietary pattern of children**:*** The changing life styles and behavioural patterns of modern era reflect in the food habits of children also. The emergence of childhood obesity is mostly contributed by the frequent consumption of fast food items and sedentary life style of children watching TV or playing video games.[37] Chitra et al (2007) conducted a study to identify the role of breakfast in maintaining the energy intake of school going children in Andhra Pradesh and found that only 42.8 percent of children had breakfast regularly and children who missed it never compensate the energy requirement in further meals of the day.[38] Another study found that the regular intake of breakfast can improve children's attention, concentration, memory and achievements in school.[39]

History of illness: Malnutrition and illness are related in such a way that one can contribute to another. A malnourished child has poor immune status and more susceptible to frequent illnesses like acute respiratory tract infections, diarrhoea etc. In addition, a child with any of such acute or chronic illness is more likely to be malnourished. [40]

1.2.8.2 Socio- demographic and economic status of the family

The under-nutrition is always considered as a result of poverty especially in middle and low income countries. Socio-economic status determine the type of house, place of residence (rural, urban, slum), number of members in the family, availability of adequate food, safe water, personal and environmental hygiene and all these factors are invariably related to the incidence of malnutrition.[41,42] Studies have shown that the

under nutrition is more predominant among children from poor families whereas obesity is more prevalent among children from affluent families.[33] Many studies have found stronger association between multiple anthropometric failures among children and poor socio-economic status of the family.[43,44]

1.2.8.3 Mothers' education

Mother's education strongly reflects on the health status of their children. As mother's education level increases, the awareness about the proper care and feeding practice of their children, immunization etc increases and make family decisions in a more rational way that will make their children healthy.[34,44,45]

1.2.9 Assessment of Nutritional Status

There is no tool available to measure the nutritional status ideally. Also as malnutrition is a multi-faceted problem, no single type of measurement can exactly predict the actual status.[15] The different measurements used to evaluate nutritional status are the following:-

1.2.9.1 Anthropometry

Assessment of growth by anthropometrical measurements is the best mean to define the nutritional and health status of children and indirectly gives clues to the quality of life they live.[16] Anthropometry is the single most universally applicable, inexpensive and non-invasive method available to assess the size, proportion and composition of human body.[43,46,47]

Measurements, Indices and Indicators

Basic anthropometric measurements include height and weight. Anthropometric indices constitute height/length for age, weight for age and weight for height. These indices are represented as Z-scores, percentiles, percent of median etc and then compared to a standard reference population.[48] Indices in terms of Z-score (widely used method to determine nutritional status) of one child is compared with the measurements of a similar child in healthy reference population and determines the deviation from expected growth standards. This method is advantageous in population-based studies as it gives a mean and standard deviation for a group of Z-scores.[46,47]

Table: 1.2 Indicators of nutritional status

Anthropometric indicator	Process	Explanation
Low height for age	Stunting	Long term malnutrition and poor health
Low weight for height	Wasting/ thinness	Recent or continuing severe weight loss
Low weight for age	Underweight	Implies stunting or wasting
High weight for height/ high body mass index	Overweight	Implies obesity
High weight for age	Overweight	Obesity

The Harmonised Training Package (HTP): Resource Material for Training on Nutrition in Emergencies, Version 2 (2011). Nutrition Works, Emergency Nutrition Network, Global Nutrition Cluster. [49]

Table :1.3 Z-score interpretation according to WHO reference standards

Z-score	**Growth Indicators**			
	Length/height-for-age	Weight- for-age	Weight-for-length/height	BMI-for-age
Above 3	See note 1	See note 2	Obese	Obese
Above 2			Overweight	Overweight
Above 1			Possible risk of overweight (see note 3)	Possible risk of overweight (see note 3)
0 (Median)				
Below -1				
Below -2	Stunted (see note 4)	Under weight	Wasted	Wasted
Below -3	Severely stunted (See note 4)	Severely underweight (see note 5)	Severely wasted	Severely wasted

"Notes:

1. A child in this range is very tall. Tallness is rarely a problem, unless it is so excessive that it may indicate an endocrine disorder such as a growth-hormone-producing tumor. Refer a child in this range for assessment if you suspect an endocrine disorder (e.g. if parents of normal height have a child who is excessively tall for his or her age).

2. A child whose weight-for-age falls in this range may have a growth problem, but this is better assessed from weight-for-length/height or BMI-for-age.

3. A plotted point above 1 shows possible risk. A trend towards the 2 z-score line shows definite risk.

4. It is possible for a stunted or severely stunted child to become overweight.

5. This is referred to as very low weight in IMCI training modules. (Integrated Management of Childhood Illness, In-service training. WHO, Geneva, 1997)."

Source: World Health organization. Interpreting indicators. Training course on child growth assessment: WHO child growth standards. Geneva: WHO; 2008.[50]

The latest growth standards were published by WHO in 2007.[21]

1.2.9.2 Biochemical and haematological variables

The laboratory examination of specific components of blood and urine is used to assess the micronutrient status of an individual. This can be expensive depending on the component we measure and not a feasible method for studies at population level.

In addition, this method is time consuming and cannot be applied in an emergency. For example, haemoglobin level in blood and serum retinol test for Vitamin A.[15,51]

1.2.9.3 Clinical and physical assessment

In this method, the child is examined by a physician for the signs and symptoms of malnutrition. Signs like bilateral pedal oedema, thin 'old man's faces, etc indicate severe wasting among children. Pallor, shortness of breath, clubbing of nails, general malaise etc are the symptoms of anaemia.[15]

1.2.9.4 Dietary intake

Assessment of overall food intake of individuals for a specified interval (24hrs, 7days) and compare it with daily allowances. This method cannot be used in emergencies. Proxy indicators of quantity and quality are used in such situations.[15]

1.2.10 Composite Index of Anthropometric Failure

There is a debate on the efficiency of conventional anthropometric indices (stunting, wasting and underweight) to measure the actual extent of the problem of under nutrition. Development economist Peter Svedberg commented that the indices such as height for age, weight for age, height for weight and BMI are not enough to measure the overall prevalence of under nutrition among children as they underestimate or miss out multiple growth failures. For example, a child can be both stunted and wasted at the same time, but this is not measured.[43,52,53]

Svedberg proposed a new aggregate indicator, which incorporates all undernourished children whether they are stunted and/or wasted and/or underweight. He suggested constructing a Composite Index of Anthropometric Failure (CIAF).[43] This model classifies children into six groups from A to F based on the anthropometric indices.

However, this model excluded children who are of underweight only. Therefore, a study conducted by Nandy et al (2005) using the available data of NFHS-2, added a new sub-group 'Y'to this model.[43] Many studies proved that CIAF is more efficient in determining the overall estimate of the problem and a disaggregated analysis of the data identifies multiple failures (C, D, E sub-groups). This cannot be done by the conventional indices.[43,54] The application of CIAF comes as a tool for policy and monitoring of nutritional interventions.[43]

Table:1.4 Classification of children with anthropometric failure*

Group Name	Description	Wasting	Stunting	Under-weight
A	No failure: Children whose height and weight are above the age-specific norm (i.e. above -2 Z-scores) and do not suffer from any anthropometric failure.	No	No	No
B	Wasting only: Children with acceptable weight and height for their age but who have subnormal weight for height	Yes	No	No
C	Wasting and underweight: Children with above-norm heights but whose weight for height and weight for age are too low	Yes	No	Yes
D	Wasting, stunting and underweight: Children who suffer from anthropometric failures on all three measures	Yes	Yes	Yes
E	Stunting and underweight: Children with low height for age and low weight for age but who have acceptable weight for their height	No	Yes	Yes
F	Stunting only :Children with low weight for age, but who have acceptable weight, both for their age and for their short height.	No	Yes	No
Y	Underweight only: Children who are only underweight.	No	No	Yes

**Another theoretical combination would be 'wasted and stunted', but this is not physically possible since a child cannot simultaneously experience stunting and wasting, but not be underweight.*

Source:Nandy S, Irving M, Gordon D, Subramanian S V, Smith GD. Poverty, child undernutrition and morbidity : New evidence from India. Policy and Practice.[43]

The above mentioned study conducted by Nandy et al (2005) showed that the prevalence of some form of anthropometric failure is 60 percent compared to the prevalence of stunting (45 %), underweight (47%) and wasting (16 %).[43]

Sen et al (2012) conducted a cross-sectional study to compare the appropriateness of conventional indices and CIAF among school children of 5-11years in North Bengal. The study showed a prevalence of 17.4 percent, 38.5 percent, 47 percent of wasting, stunting and underweight respectively whereas prevalence based on CIAF was much higher (57.6%). The study concluded that the CIAF gives a comprehensive data on under nutrition.[55]

A study conducted by Seetharaman et al (2007) among children less than five years of age from urban and slum areas came with a result of 49.6 percent of underweight using Z-score and 68.6 percent with CIAF. The study concluded that CIAF be incorporated in the present growth monitoring activities to identify the multiple anthropometric failures.[56]

Another study conducted in Pakistan (2011) to assess the malnutrition in primary school children using CIAF also showed that the findings can support, policy makers and social activists for human development programs aimed at betterment of the children.[41]

1.2.11 Supplemental Nutritional Assistance Programme (Mid-Day Meal Scheme)

The primary aim of all school based nutritional schemes is to increase the children's enrolment and retention in school, and improve the nutritional status of all children.[57] The school lunch program in India has a long history since 1925. The Madras

Municipal Corporation started such a program in India for the disadvantaged children in 1925. After independence, it was restarted in 1960s by K Kamaraj, Chief Minister of Tamil Nadu and expanded by MG Ramachandran in 1982. In 1984, the states of Kerala and Gujarat also started state government sponsored school lunch programme.[58]

1.2.11.1 Mid-Day Meal Scheme in India

'The National Programme for Nutritional Support to primary Education'; popularly known as Mid-Day Meal (MDM) school programme in India started on 15th August 1995 which is the largest school based nutritional programme in the world covering 120 million children across the country. [57,59]

The objectives of the programme where the following:

- Increase enrolment, improve school attendance as well as retention
- Promote social integration
- Improve nutritional status of the primary school children and
- Inculcate good food habits in children.

The programme aimed to provide cooked meals of calorific value equivalent to 100 grams of wheat or rice to the primary school children in all government, and aided schools free of cost.

Mid-Day Meal scheme has the following components:-

1. "Supply of free food grains at 100 grams per child per school day.
2. Reimbursement of transportation cost incurred up to a limit.
3. Providing cooking cost assistance

4. Assistance for cooked Mid-day meal during summer vacations to school children in drought- affected areas declared by state governments.[59]"

In 2007, the policy revised to include all children in lower and upper primary schools. The programme covers 113.6 million children with 79.7 million from lower primary and 33.9 million from upper primary schools through 1,263,000 institutions across the country during 2010-11.[59] This is the largest nutritional support scheme in the world.[58]

1.2.11.2 School lunch programme in Kerala

The programme was first implemented in a pilot manner with the fund from an organization called CARE (Cooperate American Relief Everywhere) under US assistance from 1960-1983.[60] The government of Kerala started the 'Kanji Feeding' programme in 1984; covering the government and aided primary schools in the 222 fishermen villages and tribal belts. Subsequently, the programme was extended to cover all the poor children in first to fourth standards of primary schools (government and aided). During 1987-88, the scheme revised to include all upper primary schools and upper primary sections in high schools. From 1995 onwards, it came under central government sponsored Mid-Day Meal scheme. In Kerala, at present, the programme covers all the children from first standard to 8th standard who are studying in government schools, aided schools and Education Guarantee Scheme (EGS) centres.[61]

For the financial year 2013-14, the allotted fund for MDM scheme in Kerala was 3,320 million INR. Apart from school lunch, the school also provides egg (once in week) and milk (twice in a week). During the current year, there are 2,581,316 beneficiaries across the state including children from special schools. The beneficiaries from primary schools alone include 1,042,500 children. The number of

beneficiaries in Kottayam district constitute 45,295 children in primary schools and 109,785 in total.[62]

1.2.11.3 Evaluation of Mid-day meal scheme

We do not have enough evidence to say whether the scheme is successful in terms of nutritional aspect. Its capability to meet nutritional requirements of the child is an all time debatable issue.[63] In an evaluation study by National Nutrition Foundation of India on Mid-Day Meal programme the acceptability of meal provided was 'fair' for 70.9 percent school children and 'poor' for 29.1 percent children.[58] This study was done in Delhi and it considered the likes and dislikes of children. 86 percent of the children reported that they prefer poori and aloo instead of rice items. Almost 75 percent of the children take MDM on a regular basis per class. The children who didn't take MDM were giving reasons like the food was not tasty, they were not allowed by parents or they didn't bring utensils etc. Another study conducted in Punjab found that most of the schools keep a continuous provision even though if there are any issues of funding or food grain availability. The study says that the scheme did not meet Millenium Development Goal of ensuring elementary education for all.[64] As malnutrition is complex web of many factors, all nutritional interventions need to be carefully planned to improve their operational capacity.[65]

One study conducted by Dr. Gracious James (2013) on achievements of MDM reported that the scheme was successful in addressing the 'classroom hunger' in beneficiary schools particularly in tribal areas with endemic poverty and hunger. The study also reported poor quality and hygiene of the food as a major problem. But the study did not address the nutritional status of the children.[66]

1.3 Rationale of the study

Malnutrition is still an untracked challenge in all states of India. School age is a relatively neglected stage of development compared to under five children and adolescents.[67,68] There are no studies or health surveys, which actually track the burden of malnutrition among school age children in India. MDM programme has a history of three decades, to the best our knowledge there are no studies that systematically assess whether the scheme is successful in terms of nutritional aspect of its beneficiaries. It is important to identify the extent of anthropometric failures among the beneficiaries of the scheme as they predict the gaps in the implementation of nutritional programme. Present study tried to estimate the burden of malnutrition among the beneficiaries of this scheme. Apart from this, the study will identify the factors affecting their nutritional status as well as factors affecting the utilization of MDM Scheme.

1.4 Research Questions

1. Whether the nutritional statuses of primary school children who are the beneficiaries of Mid-day meal scheme satisfactory?
2. What are the factors affecting the nutritional status of these children?
3. What are the factors affecting the utilization of Mid-Day Meal Scheme?

1.5 Objectives of the study

1.5.1 Primary Objective

- To assess the nutritional status of primary school children who are the beneficiaries of Mid-day meal scheme.

1.5.2 Secondary Objectives

- To identify the factors affecting the nutritional status of school children who are the beneficiaries of Mid-Day Meal scheme.
- To identify the factors affecting the utilization of Mid-Day Meal Scheme.

CHAPTER: 2

METHODOLOGY

2.1 Study design

The present study was a cross-sectional survey among primary school children. The information collected from children as well as their parents, and the anthropometric measurements of the children were observed.

2.1.1 Study setting

The study was conducted in selected Government and Aided Lower Primary Schools in Kanjirappally Block panchayath, Kottayam District, Kerala, India.

2.1.2 Study population:

Six to ten year old Primary school children in Government and Aided Lower Primary schools in Kanjirappally Block panchayath.

2.1.3 Sample size

Sample size was calculated using online software Open Epi version 3.01.

The prevalence of under nutrition among schoolchildren of age 6-10 years as per the National Nutrition Monitoring Bureau survey 2012 was 26.6% which is rounded to 27% to calculate sample size.[28] With an assumed precision of seven and design effect of two, and with a 25% non-response rate, the calculated sample size was 387.5 which was rounded to 400 as the final sample size.

2.1.4 Sample selection

This study used Multi-stage random sampling technique.

There were 21 government schools and 33 aided schools in Kanjirappally Block panchayath. Total number of students was 4,883 from both sectors (746 from government and 4137 from aided schools) in a 1:5.5 Ratio. The study excluded unaided schools, as the MDM Scheme does not cover them. Out of seven panchayaths in Kanjirappalli Block, following three panchayaths namely Erumeli, Mundakayam and Kanjirappalli were selected randomly by using Open Epi software (3.01). Four schools from government sector and eight schools from Aided sector were selected randomly. The sample selection was done on the first day of visit to each school. The list of students in each class obtained from the attendance registers was the sampling frame. The list of randomly selected government and aided schools is given below.

Government schools

1. Government LPS, Chenappadi

2. Government Tribal LPS, Bhadramadam

3. Government LPS, Thambalakkadu

4.Government LPS, Murikkumvayal.

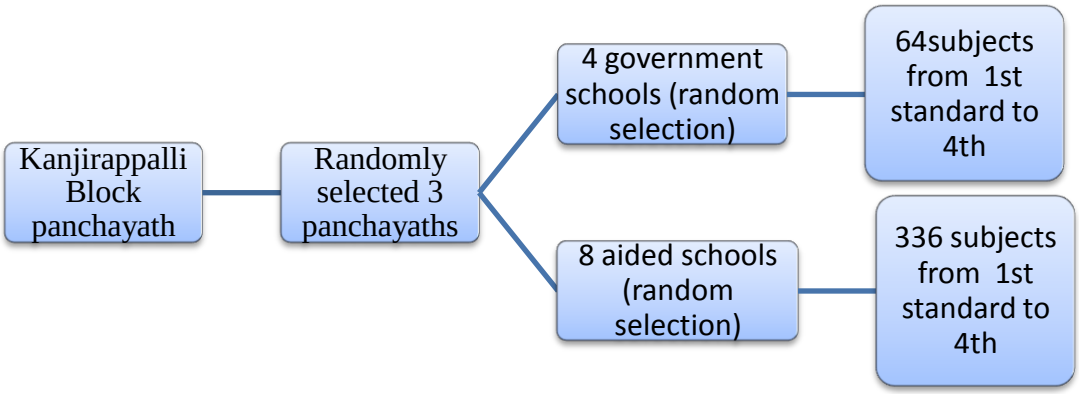
Aided schools

1. St.Thomas LPS, Erumeli.
2. CMS LPS, Mundakayam
3. NM LPS, Kanakappalam
4. CR LPS, Manippuzha
5. CMS LPS, Mylathadikal
6. St.Paul's LPS, Vandanpathal
7. St. James UPS, Kanimala
8. NHA UPS, Kanjirappally

These schools come under the Educational Sub-district of Kanjirappalli. The Director of Public Instruction (DPI), Trivandrum and the Assistant Educational Officer (AEO) of Kanjirappalli Educational sub district gave permission to conduct the study in these schools. AEO informed the respective headmasters and headmistress of selected

schools in a meeting held in June 2014. The copies of permission letter from both DPI and AEO were submitted to all school authorities.

Figure:2.1 Multistage Random sampling



2.1.5 Inclusion and Exclusion criteria

Inclusion criteria

- Primary school children between the ages of 6-10 years in selected Government and Aided LP schools
- All children whose parents consented to participate in the study

Exclusion criteria

- Children who were severely sick.
- Children who were absent on the days of data collection
- Children who were differentially abled (e.g. Children with autism).
- Children from I – IVth standard who were out of the age limit of 6-10 years (< 6 years / more than 10 years).

2.1.6 Selection of study participants

The following table depicts the sample selection from both government and aided schools, the participation rate from each school and the number of children not participated in the study due to various reasons.

Table: 2.1 Sample selection – An overview

Name of the school	Total number of students	No.of students selected	No. of participants n(%)	Missing	Non-response	Students absent on the day
Government schools						
Govt. LPS, Bhadramad-om	59	18	16(88.9%)	1	0	1
Govt LPS, Murikkumv-ayl	80	23	18(78.3%)	2	2	1
Govt.LPS, Chenappadi	48	15	11(73.3%)	2	1	1
Govt.LPS, Thabalakka-du	39	8	6(75.0%)	2	0	0
Total	**226**	**64**	**51(79.7%)**	**7**	**3**	**3**
Aided schools						
CMS LPS, Mundakaya m	395	102	71(69.6%)	21	4	6
CMS LPS, Mylathadic kal	60	14	12(85.7%)	0	1	1
NHA UPS, Kanjirappall y	238	55	38(69.1%)	11	3	3
St.Pauls LPS, Vandanpath al	46	14	11(78.6%)	1	1	1
CRLPS, Manippuzha	29	8	5(62.5%)	2	1	0
NMLPS, Kanakappal am	83	25	23(92.0%)	1	1	0
St.James UPS, Kannimala	149	20	18(90.0%)	1	0	1
St. Thomas LPS, Erumeli	356	98	93(94.9%)	2	2	1
Total	**1356**	**336**	**271(80.6%)**	**39**	**13**	**13**
Grand Total	**1582**	**400**	**322(80.5%)**	**46**	**16**	**16**

2.2 Data collection

Principal investigator alone did the data collection. The methods used for data collection were:

1. Structured questionnaire for parents

2. Anthropometric measurements of the children

3. Structured interview schedule for children

The data collection period was from 15th June to 31st August 2014. The informed consent and the questionnaire for parents were given to the randomly selected children on the first day of visit to each school. The schools were again visited after a planned interval time of three to five days. Anthropometric measurements and interview of the children had taken, if the parent agreed to participate and the children brought back the completed questionnaire along with the signed consent form.

2.2.1 Study tools

2.2.1.1 Structured questionnaire for parents

A structured questionnaire along with the informed consent form was given to the randomly selected children to take home and their parents were requested to complete the questionnaire if they agreed to participate. The filled questionnaires were collected by the class teachers and given back to the investigator on her next visit. The information on socio-demographic and economic conditions of children along with the individual factors such as birth weight, birth order, dietary habits, and history of illnesses were collected from parents through the questionnaire. It also collected data regarding the MDM consumption pattern of their children and the opinions or views about the lunch provided in schools.

2.2.1.2 Anthropometric measurements

SECA:813 Electronic Flat weighing scale and SECA:213 stadiometer were used to measure weight and height of the children. These instruments are highly reliable with a measurement sensitivity of 100 grams and 0.1 centimetre respectively for weight and height in an upright position with barefoot. Measurements were taken following the WHO guidelines. The weight and height measured next to each other to save time and to make children comfortable. The measurements had taken in a closed room with adequate lighting and under the supervision of a teacher in the school as the children were supposed to wear minimal clothes while weighing.

2.2.1.3 Structured interview schedule for children

After taking the anthropometric measurements, the interview conducted in the same room. The information on date of birth and caste of the children were obtained from the attendance register. Then the interviewer asked questions to capture data on dietary habits and mid-day meal consumption.

2.3 Data validation and Data storage

The principal investigator contacted the parents by phone in case of any clarification is needed based on the filled questionnaire. The collected data kept safely with the principal investigator who is responsible for all safekeeping and any breach of confidentiality of the participants.

2.4 Data analysis and statistical inferences

The data entry and analysis were done using statistical software SPSS version 16 (International Business Machines Corporation- IBM).

The prevalence of both under nutrition and over nutrition was estimated in terms of both CIAF and conventional indices (stunting, under weight and overweight). The association of malnutrition with various socio-demographic and economic factors and Mid-day meal consumption were analysed. The factors related to the mid-day meal utilization were also analysed. The associations were tested using Pearson chi-square test and odds ratios were derived using logistic regression. A p-value of less than 0.05 was considered as statistically significant.

2.5 Outcome variables and predictor variables

Outcome variables

1. The prevalence of Composite Index of Anthropometric Failure
2. Frequency of Mid-Day Meal intake

Predictor variables (for both outcome variables)

1. Socio–demographic and economic characteristics: Religion, caste, family income.
2. Family background: Strength of the family, living status of parents, education and occupation of parents, members who need special attention in the family.

Predictor variables for CIAF only

3. Child related factors: Age, sex, history of acute illness in the last two weeks , history of chronic illness, history of medication, and history of missing meal in the last two days.
4. Frequency of Mid-Day Meal Intake

Predictor variables for frequency of Mid-Day Meal intake only

5. Perceptions of both parents and children regarding Mid-day meal: Child's preference (likes or dislikes), parents' perception about quantity and quality of food provided.

2.6 Ethical Considerations

Benefits: There were no direct benefits for the children participated in the study. Children with severe malnourishment were informed to the parents and teachers.

Risks: There were no risks or harm involved at any stage of the study.

Privacy and Confidentiality: A unique identification code was given to all children and all personal details had been kept confidential. The privacy and comfort of the children were given utmost importance while taking measurements and interviewing. No sensitive questions were asked to children. The principal investigator clarified all the doubts and concerns expressed by parents ensured their privacy throughout the study.

Freedom of decision: The participation in the study was voluntary; no coercion was there at any stage of decision making.

Informed consent: Children whose parents gave permission to participate in the study only were included in the study.

Institute Ethical Committee (IEC) clearance was obtained to conduct the study on 11th June 2014.

CHAPTER:3

RESULTS

Out of 400, sixty-two children did not bring the consent form and completed questionnaire back to school due to various reasons. Among them 46 children reported that they forgot to fill the form or they lost forms and 16 children said their parents did not want to participate in the study. Finally, 338 children have returned the signed consent form and filled questionnaire. Among them 16 children were absent on the days of further data collection. From the government schools, 64 students were selected and 51 participated (79.7%), and from the aided schools 271 out of 336 were participated (80.7%). Overall, 322 out of 400 were participated and the response rate is 80.5 percent. Therefore, the final effective sample size was 322.

3.1 Sample details

The study subjects were children from 1st to 4th standards, almost uniformly distributed within four classes. Majority of the informants (those who gave consent and filled the questionnaire) were either father (48.7%) or mother (49.7%). There were three children from an orphanage and the Mother Superior filled the consent form and the questionnaire.

Table: 3.1 Distribution of Children according to class

	Total number of students(N=322)	**Percentage**
Study participants according to class		
1st Standard	75	23.29%
2nd Standard	82	25.46%
3rd Standard	81	25.15%
4th Standard	84	26.09%

Table:3.2 Informant Details

Informant	Frequency	Percentage
Mother	160	49.7%
Father	157	48.7%
Others *	5	1.6%
Total	**322**	**100%**

*****Others: Grand Mother of the child:1, Aunt:1, Guardian(Head of the Balika bhavan) for 3 children.

3.2 Socio-economic details and family background of the children

The following table describes the socio-economic characteristics of the children

Table 3.3: Distribution of children according to religion, caste and monthly income

Category	Number of children(N=322)	Percentage
Religion		
Hindu	171	53.1%
Christian	84	26.1%
Muslim	66	20.5%
No religion	1	0.3%
Caste		
General	70	21.7%
OBC	141	43.8%
OEC	31	9.6%
SC	65	20.2%
ST	15	4.7%
Type of Ration Card		
APL	168	52.2%
BPL	144	44.7%
No ration card	10	3.1%
Monthly Income		
<5000	201	62.4%
5000-10000	68	21.1%
>10000	38	11.8%
Not informed	15	4.7%

Majority of the children came from Hindu families (53.1%) followed by Christian (26.1%) and Muslim families (20.5%). Children from other backward communities (OBC) were about 44 percent followed by General, Scheduled Caste (SC), Other Eligible Classes (OEC) and Scheduled Tribes (ST). The total sample included 52.2 percent APL households as well as 44.7 percent BPL households. Nevertheless, when considering the monthly income, 62.4 percent households have a monthly income of less than 5,000 INR. Only 11.8 percent reported a monthly income of more than 10,000 INR.

Table:3.4 Family background of children

Category	Frequency (N=322)	Percentage
No.of Members in the Family		
<=4 members	122	37.9%
5-6 members	163	50.6%
>= 7members*	37	11.5%
Members who needs special attention		
Absent	211	65.52%
Present	111	34.47%
Child less than five years only	60	18.63%
Members aged more than 70 years only	6	1.86%
Members who are bedridden	32	9.93%
Child and elderly	10	3.10%
Child and bedridden member	2	0.62%
Bedridden member and elderly	1	0.31%
Living Status of parents		
Living together	285	88.5%
Not living together	37	11.5%
Father/ mother away from home	18	5.59%
Divorced	10	3.10%
Father/mother passed away	9	2.79%

*Three children were coming from a Balikabhavan where the strength is 70. Percentages have taken from total number of participants.

The above table depicts the family background of the study participants. Half of the children came from households with strength of 5-6 members. Most of the parents

were living together, but for 11.7 percent of children, their parents were not living together. A child less than five years of age was present in 72 households (22.3%), followed by bedridden members in 35 households (11%) and elderly in 17 households (5%) together contributes a 34.5 percent households with at least one member who needs special attention.

Table: 3.5 Educational and occupational background of the parents

Category	Frequency (N=322)	Percentage
Mothers education		
Upto 7th standard	24	7.5%
8 to 10th standard	206	64%
11-12th	70	21.7%
Degree/ Diploma and above	22	6.8%
Father's Education		
Upto 7th standard	49	15.2%
8 to 10th standard	198	61.5%
11-12th	42	13.0%
Degree/ Diploma and above	27	10.3%
Not Informed	6	1.9%
Mother's Occupation		
Unemployed	231	71.7%
Employed	47	14.6%
NREGA/manual labourers	42	13%
Not informed	2	0.6%
Father's Occupation		
Unemployed #	4	1.2%
Employed**	96	29.9%
Manual labourers##	213	66.1%
Missing	9	2.8%

*Mother's occupation: Unemployed represents housewives

**Employed- Temporary government/private employees, self-employed (tailors, shop ownners), working abroad

#Father's occupation: Unemployed- Out of four two reported that they do all type of jobs and two were sick.

##Father's occupation: Others-.taxy/autodrivers, carpenters etc

In this study, majority of the parents (both father and mother) had at least high school education (8-10th standard). Among mothers 7.5 percent had low level of education (i.e. educational level up to 7th standard) while among fathers it is 15 percent. Parents

having degree or diploma were very less with 6.8 percent mothers and 10.3 percent fathers. Most of the mothers were homemakers (71.7%) whereas 66.1 percent fathers were manual labourers.

3.3 Individual factors related to children

Table:3.6 Demographic details of the children

Category	Frequency (N=322)	Percentage
Age in completed years		
6 years	102	31.7%
7 years	90	28.0%
8 years	81	25.2%
9 years*	49	15.2%
Sex		
Male	171	53.1%
Female	151	46.9%
Birth Order		
1st child	137	42.55%
2ndChild	130	40.37%
>=3rd child#	55	17.08%
Birth Weight		
<2.5 Kilograms	68	21.12%
2.5-3.5 Kilograms	216	67.08%
>3.5 Kilograms	16	4.97%
Not informed	22	6.83%

*One child completed 10 years of age,

#For 3 children, birth order is four.

Out of 322, 53.1 percent children were males and 46.9% percent were females. Most of the children were either first or second child in their family. About 21.1% of children were of low birth weight.

Table: 3.7 History of any acute or chronic illness

History of illness in the last two weeks		
Absent	183	56.8%
Present	139	43.2%
Fever only	65	20.2%
Cough only	28	8.7%
Breathing difficulty only	2	0.6%
Diarrhoea only	2	0.6%
Others[#]	8	2.5%
Fever and cough	26	8.1%
Fever and breathing difficulty	1	0.3%
Fever and others[#]	2	0.6%
Cough and breathing difficulty	2	0.6%
Fever, cough and breathing difficulty	2	0.6%
Cough and others	1	0.3%
History of recurrent illness		
Absent	309	96%
Present	13	4%
Allergy	2	0.6%
Headache	3	0.9%
Fever, cold, ear infection and tonsillitis	3	0.9%
Mouth ulcers	1	0.3
Leg pain	1	0.3%
Blurred vision	1	0.3%
Breathing difficulty	2	0.6%

Others: Vomiting, head ache, dental ache, leg pain, abdominal pain etc

In this study, 139 (43.2%) children reported a history of illness in the last two weeks. Fever was predominant among all illnesses (105 children). No children reported of having any chronic illness like haemophilia. But, four percent (13) reported as they were suffering from illnesses like fever, headache or breathing difficulty for long time.

Table: 3.8 Dietary habits of the child

Diet preference of the child		
Vegetarian	145	45%
Non-vegetarian	163	50.6%
Both	13	4%
Not informed	1	0.3%
Missed meal in last two days		
No	242	75.2%
Yes	80	24.8%
Breakfast	28	8.7%
Lunch	5	1.5%
Dinner	47	14.6%
***Breakfast everyday**		
Never miss breakfast	274	85.1%
Miss breakfast	48	14.9%

*Information provided by the child.

Though all study participants consumes a mixed diet, 50.6 percent of children prefer non-vegetarian items and 45 percent prefer vegetarian items. Parents reported that out of 322, eighty (24.8%) children missed meals (of any time) in the last two days. Dinner is the most missed meal (14.6%) followed by breakfast (8.7%) and lunch (1.5%). During the interview, 14.9 percent children reported that they missed breakfast in the last two days.

3.3.1 Other factors

History of hospitalization and medication

Only three children reported with the history of hospitalization in the last two weeks. One child had admitted due to jaundice, one due to giddiness and the third child with fever and vomiting. Only one chid reported taking medications for breathing difficulty (Esiflo-125 OD).

3.4 Mid-Day Meal in schools: Perceptions of respondents and children

3.4.1 Respondent's perception

Table: 3.9 Respondent's information on Mid-Day Meal

Category	Government schools (N=51)	Aided schools (N=271)	Total
Frequency of taking Mid-day meal			
All school days	50(98.0%)	165(60.9%)	215(66.8%)
Most of the school days	1(2.0%)	52(19.2%)	53(16.5%)
Occasionally	0	35(12.9%)	35(10.9%)
Never	0	19(7%)	19(5.9%)
Awareness about items provided			
Yes	45(88.2%)	237(87.5%)	282(87.6%)
No	6 (11.8%)	31 (11.4%)	37(11.5%)
Not informed	0	3(1.1%)	3(.9%)
Observation of mid-day meal			
Observed	26(51.0%)	123(45.4%)	149(46.2%)
Not observed	23(45.1%	144(53.1%)	167(51.9%)
Not informed	2(3.9%)	4(1.5%)	6(1.9%)
Satisfaction about quantity of Mid-day meal			
Satisfied	38(74.5%)	199(73.4%)	237(73.6%)
Not satisfied	8(15.7%)	52(19.2%)	60(18.6%)
Don't know	3(5.9%)	9(3.3%)	12(3.7%)
Not informed	2(3.9%)	11(4.1)	13(4.0%)
Satisfaction about quality of Mid-day meal			
Satisfied	46(90.2%)	245(90.4%)	291(90.4%)
Not satisfied	3 (5.9%)	13(4.8%)	16(5.0%)
Don't know	0	3(1.1%)	3(.9%)
Missing	2(3.9%)	10(3.7%)	12(3.7%)

The information on factors affecting the intake of Mid-day meal collected from both parents and children. There is some discrepancy in the information about frequency of having Mid-day meal. According to parents, 66.8 percent of the children take lunch provided in school daily whereas 58.3 percent of the children reported that they take lunch from school every day. Majority of the parents (87.6%) are aware of items provided as part of the mid-day meals, 90 percent of them were satisfied with the

quality, and 73.6 percent were satisfied with quantity. Only 46.2 percent parents reported that they have observed serving lunch in school at least once.

3.4.1.1 Perceptions and suggestions regarding Mid-Day Meal

The questionnaire for parents includes an open-ended question to express their comments on the provision of Mid-day meal from school or suggestions for improvement. Out of 322, only 76 informants (23.6%) gave any opinion. Among them 60.5 percent opined that the food provided at schools is nutritious and healthy and they wanted to continue it in the same way. 10.5 percent of parents wrote that good arrangements are there to provide lunch.

Two negative comments raised by parents were that food is too hot (2.6%) and children may lose interest due to same curries every day. Many parents suggested that food should be nutritious enough to complement children's growth (6.6%). In addition, they opined that the quality of the rice should be improved and the food should include more millets and leafy vegetables (18.4%). Two parents suggested that food should be served as per the need of children and should not be wasted. Other suggestions were to avoid plastic boxes to serve food and provide government approved menu.

3.4.2 Children's perception about Mid-Day Meal

Table: 3.10 Children's information on Mid-Day Meal

Category	Government schools n (%)	Aided schools n (%)	Total n (%)
Frequency of mid-day meal			
All school days	51(100%)	158(58.3%)	209(64.9%)
Most of the days	0	42(15.5%)	42(13.0%)
Occasionally	0	35(12.9%)	35(10.9%)
Never	0	36(13.3%)	36(11.2%)
Quantity of Mid-day meal			
Sufficient	51(100%)	231(85.2%)	282(87.6%)
Not sufficient	0	4(1.5%)	4(1.2%)
Not informed	0	36(13.3%)	36(11.2%)
Preference for mid-day meal			
Likes	51(100%)	204(75.3%)	**255(79.2%)**
Dislikes	0	31(11.4%)	31 (9.6%)
Not informed	0	36(13.3%)	36(11.2%)
Reasons for preferring Mid-day meal (n=134)			
Reasons		**Frequency**	**Percentage**
Hot and tasty meals and curries		110	43.1%
Like to have food with all friends		9	3.5%
Mother told to take from school		6	2.3%
Reasons for not preferring Mid-day meal (n=31)			
Don't like curries		6	19.3%
Food from home is more tasty		14	45.2%
Bad smell for rice		2	6.4%

All children from government schools were taking MDM every day and the proportion was 58.3 percent for aided schools. Most of the children (79.2%) like to have lunch from school and 87.6 percent were satisfied with the quantity. Thirty-one children (9.6%) reported that they do not like food from school.

3.5 Prevalence of malnutrition

The prevalence estimated for CIAF, conventional indices and obesity are given in the following table.

Table: 3.11 Prevalence of malnutrition

Indicator	Frequency (N=322)
Under nutrition – Composite Index of Anthropometric Failure (CIAF)	
No failure (A)	175(54.3%)
Wasting only(B)	21(6.5%)
Wasting and underweight (C)	58(18.0%)
Wasting, stunting and underweight (D)	20(6.2%)
Stunting and underweight (E)	22(6.8%)
Stunting only (F)	1(0.3%)
Underweight only (Y)	25(7.8%)
CIAF=B+C+D+E+F+Y	**147(45.7%)**
Under nutrition-Conventional indices	
Stunting	43(13.4%)
Underweight	125(38.8%)
Wasting	99 (30.7%)
Over nutrition	
Overweight	4(1.2%)
Obesity	1(0.3%)

The primary objective of this study was to assess the nutritional status of the children of age 6-10 years in terms of Composite Index of Anthropometric Failure (CIAF). The estimated prevalence of CIAF was 45.7 percent, but according to the conventional indices, the prevalence of stunting, underweight and wasting were 13.4 percent, 38.8 percent and 30.7 percent respectively.

3.5.1 Grading of malnutrition

The CIAF is graded as single and multiple anthropometric failure and conventional indices in terms of moderate and severe.

Table: 3.12 Malnutrition- Grading

	Indicators	Frequency	Percentage%
CIAF (n=147)	Single anthropometric failure	47	32.0%
	Multiple anthropometric failure	100	68.0%
Stunting (n=43)	Moderate	40	93%
	Severe	3	7%
Underweight (n=125)	Moderate	95	76%
	Severe	30	24%
Wasting (n=99)	Moderate	70	70.7%
	Severe	29	29.3%
Over nutrition (n=5)	Overweight	4	80%
	Obesity	1	20%

In total, 47 had single anthropometric failure (47/322 = 14.6%), and 100 children had multiple anthropometric failure (100/322 =31.1%). The prevalence of severe stunting underweight and wasting were 1%, 9.3% and 9% respectively in the total sample (N=322).

Since the prevalence of over nutrition was very less in the sample, the further analysis was done with the prevalence of under nutrition in terms of CIAF excluding over nutrition.

3.6 Factors affecting nutritional status (CIAF)

The second objective of the study was to identify the factors affecting the nutritional status of the children. Table-1 depicts the child related factors affecting the CIAF.

3.6.1 Child-related factors affecting CIAF

Table: 3.13 Child related factors affecting the CIAF

Category	Numberof subjects (N)	Prevalence of CIAF n (%)	p-value
Age in completed years			
6 years	102	42 (41.2%)	
7 years	90	51(56.7%)	
8 years	81	28(34.6%)	
9 years	49	26 (53.1%)	**0.016**
Sex			
Male	171	80 (46.8%)	
Female	151	67 (44.4%)	0.374
Birth order of the child			
1st child	137	59 (43.1%)	
2nd child	129	68(52.7%)	
>= 3rd child	56	20(35.7%)	0.075
Birth weight of the child			
>=2.5 Kilograms (Normal)	232	100 (43.1%)	
<2.5 Kilograms (Low)	68	39 (57.4%)	**0.038**
History of any acute illness			
Present	139	68 (48.9%)	
Absent	183	79 (43.2%)	0.312
History of any recurrent illness			
Absent	309	141(45.6%)	
Present	13	6(46.2%)	0.594

The prevalence of CIAF was high among the age group seven years followed by nine years and the association between age group and CIAF was statistically significant. The prevalence was almost same between both sexes. The CIAF was high among children of birth order two followed by one and it was less among children whose birth order is more than or equal to three. Birth weight of the child showed a significant association with CIAF.

History of any acute illness was high in the study, but did not show significant association with CIAF though the prevalence of CIAF was slightly high (48.9%) for those who had any cute illness compared to those who did not have any acute illness in

the last two weeks (40%). The CIAF almost equally distributed among children with a history of recurrent/ long-term illnesses and without recurrent illnesses.

Table: 3.14 Association between CIAF and history of missing meal

Category	Numberof subjects (N)	Prevalence of CIAF n (%)	p-value
History of missed meal in last two days (Respondent's information)			
Missed meal	80	32(40.0%)	
Never missed	242	115(47.5%)	0.248
Breakfast	28	12 (42.9%)	
Lunch	5	4 (80.0%)	
Dinner	47	15 (31.9%)	0.088
History of missing breakfast in the last two days as reported by child			
Missed breakfast	48	14(29.2%)	
Not missed	274	133(48.5%)	0.018

Among children who missed breakfast in the last two days reported a negative finding. The prevalence of CIAF was less among children who missed breakfast compared to those who did not miss breakfast in the last two days.

The prevalence of CIAF among children who missed meal was only 40 percent whereas it was 48 percent among children who never missed meal in the last two days. However there were five children who missed lunch in last two weeks and the prevalence of CIAF was 80 percent among them although the finding was not statistically significant.

3.6.1.1 Children with multiple vulnerabilities

The prevalence of CIAF among children with combination of any two of the three variables (Birth weight, history of illness and history of missing meal**)** is given in the following table.

Table: 3.15 Nutritional status of children with multiple vulnerabilities

Category	Number of subjects (N)	Prevalence of CIAF n (%)	Odds ratio	95% confidence interval
Birth weight and history of illness in the last two weeks				
Normal birth weight & no illness	136	60 (44.1%)	0.866	0.552– 1.361
Normal birth weight & history of illness	96	40 (41.7%)	0.783	0.482– 1.272
Low birth weight & no illness	33	14 (42.4%)	0.846	0.408– 1.756
Low birth weight & history of illness	35	**25 (71.4%)**	3.361	1.555- 7.265
Birth weight and history of missing meal in the last two days				
Normal birth weight and never missed meal	175	80 (45.7%)	0.980	0.623- 1.542
Normal birth weight and missed meal	57	20 (35.1%)	0.575	0.317– 1.044
Low birth weight and never missed meal	52	29 (55.8%)	1.610	0.883– 2.935
Low birth weight and missed meal	16	**10 (62.5%)**	2.025	0.717– 5.714
History of any acute illness and history of missing breakfast				
No illness and never missed meals	149	68(45.6%)	0.999	0.643– 1.551
No illness & missed meals	34	11 (32.4%)	0.535	0.251- 1.137
History of illness and never missed meals	93	47 (50.5%)	1.318	0.813– 2.137
History of illness and missed meals	46	21 (45.7%)	1.000	0.534– 1.871

Children who born as low birth weight and reported any illness in the last two weeks are 3.361 times more likely to have anthropometric failure compared to children with normal birth weight and no history of illness. Children with low birth weight and history of missing breakfast also showed higher prevalence of CIAF though it was not significant.

3.6.2 Socioeconomic factors affecting CIAF

Table :3.16 Association between socioeconomic factors and the CIAF

Category	Number of subjects (N)	Prevalence of CIAF n (%)	p-value
Religion			
Hindu	171	78(45.6%)	
Christian	84	43(51.2%)	
Muslim	66	25(37.9%)	0.280
Caste			
General	70	30(42.9%)	
OBC	141	58(41.1%)	
OEC	31	16(51.6%)	
SC	65	34(52.3%)	
ST	15	9(60.0%)	0.376
Monthly income			
<5000	201	91(45.3%)	
5001-10000	68	33(48.5%)	
>10000	38	17(44.7%)	0.926

In this study, almost half of the Christian children were under nourished (51.2%) which is quite high compared to the prevalence of CIAF among Muslim Children (37.9%), but the results were not statistically significant. Children who belong to scheduled tribes and scheduled castes reported a higher prevalence of CIAF even though it is predominant in all groups. The CIAF was more or less same across all classes of income.

3.6.3 The association between CIAF and family background of the children

Table:3.17 Family background of the children and the prevalence of CIAF

Category	Number of subjects (N)	Prevalence of CIAF N (%)	p-value
Strength of the family			
<=4 members	122	50(41.0%)	
5-6 members	163	81(49.7%)	
>=7members	37	16(43.2%)	0.328
Living Status of parents			
Living together	285	129(45.3%)	0.414
Living not together	37	18(48.6%)	

Category	Number of subjects (N)	Prevalence of CIAF N (%)	p-value
Members who need special attention			
Present	111	53(47.7%)	
Absent	211	94(44.5%)	0.333

The prevalence of CIAF was more or less same across the categories of strength of the family, living status of parents and presence of a member who needs special attention. These findings were not statistically significant**.**

3.6.3.1 CIAF and educational and occupational background of parents

Table:3.18 Association of CIAF with education and occupation of parents

Category	Number of subjects(N)	Prevalence of CIAF N (%)	p-value
Mother's Education			
Upto 7th standard	24	7(29.2%)	0.139
8 to 10th standard	206	91(44.2%)	
11-12th standard	70	40(57.1%)	
Degree / Diploma and above	22	9(40.9%)	
Father's Education			
Upto 7th standard	49	22(44.9%)	0.252
8 to 10th standard	198	87(43.9%)	
11-12th	42	24(57.1%)	
Degree/ Diploma and above	27	13(48.1%)	
Mother's occupation			
Unemployed	231	110(47.6%)	0.776
Employed	45	20(44.4%)	
NREGA/manual labourers	42	15(35.7%)	
Father's occupation			
Employed	108	55(50.9%)	0.331
Manual labourers and others	201	87(43.3%)	

The prevalence of CIAF did not significantly vary with family background. But we observed that the prevalence of CIAF was only 29 percent if the mother had a lower

level of education (i.e. up to 7th standard), and the prevalence was only 36 percent if the mothers are NRGEA/manual workers. The prevalence of CIAF was slightly higher among children from households with at least one member who needs special attention.

3.6.4 The association between child's nutritional status and MDM consumption

The prevalence of CIAF was more or less same in all categories, with a slightly higher prevalence among children who never takes or occasionally takes lunch from school. The summary is given below:

Table:3.19 Mid-day meal intake and child's nutritional status

Category	Number of subjects (N)	Prevalence of CIAF n (%)	p-value
Frequency of mid-day meal – as per child			
All school days	209	96(45.9%)	
Most of the days	42	17(40.5%)	
Occasionally	35	17(48.6%)	
Never	36	17(47.2%)	0.893
Frequency of mid-day meal as per parents			
All school days	215	97(45.1%)	
Most of the days	53	23 (43.4%)	
Occasionally	35	17 (48.6%)	
Never	19	10 (52.6%)	0.890

Prevalence of CIAF was more or less same in all classes, with a slightly higher prevalence among children who never take or occasionally take lunch from school.

3.7 Logistic regression analysis

Logistic regression analysis was done for factors significantly associated with CIAF. The results are summarized in the following table.

Table:3.20 Results of Logistic regression analysis

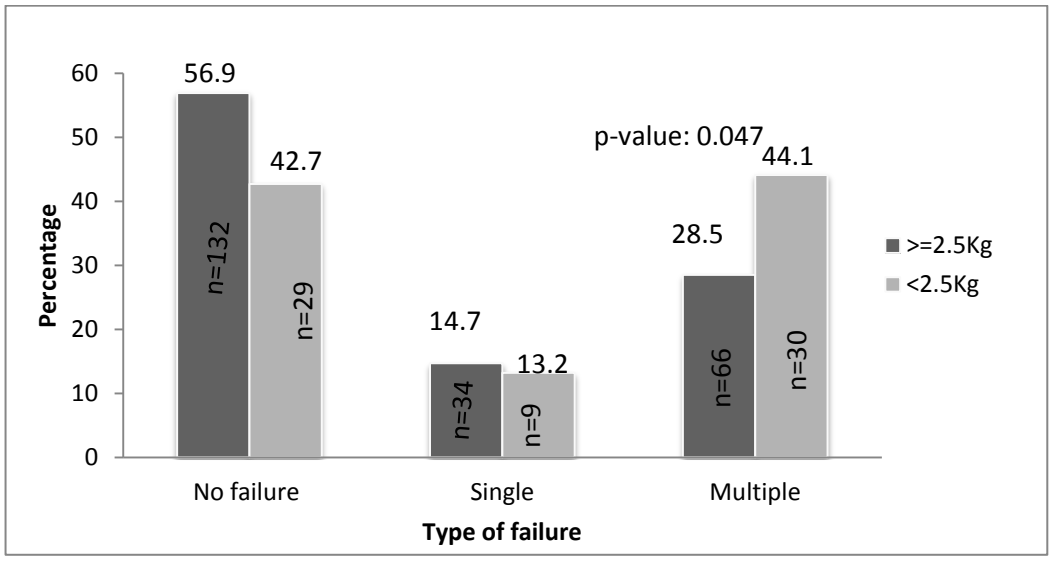
Category	Odds ratio (unadjusted)	95% Confidence Interval	Odds Ratio (adjusted)*	95% Confidence Interval
Age of the child				
6 years	1		1	
7 years	1.87	1.05-3.32	1.78	0.98-3.28
8 years	0.76	0.41-1.38	0.84	0.45-1.58
9 years	1.61	0.82-3.21	2.01	0.95-4.24
Birth weight of the child				
>= 2.5Kilograms	1		1	
<2.5 Kilograms	1.78	1.03-3.07	1.78	1.02-3.11
History of missing breakfast in the last two days				
Never missed	1			
Missed	0.44	0.22-0.85	0.43	0.21 - .88

*All variables are adjusted for each other

Seven and nine years old children showed nearly a twofold risk of CIAF when six year old children are the reference. Children of low birth weight showed 1.8 times higher odds for having CIAF during school age compared to children with normal birth weight. Children who missed meal showed 57 percent less risk for CIAF than those who did not miss meal.

3.8 Single or multiple anthropometric failures related to birth weight

Figure:3.1 Prevalence of single or multiple anthropometric failures



The prevalence of single anthropometric failure did not vary with respect to birth weight but there was a 16 percent higher prevalence of multiple anthropometric failures among low birth weight children compared to children with normal birth weight.

As birth weight has found to be a strong predictor, multinomial logistic regression analysis was done with 'no failure' as the base outcome to find the individual effect on single and multiple anthropometric failures.

Children with low birth weight showed two times higher odds of having multiple anthropometric failure compared with normal birth weight [unadjusted OR= 2.07, 95% CI of 1.14-3.73)]. Nevertheless, children from both groups have almost similar risk of single anthropometric failure [unadjusted OR= 1.2, 95% CI of 0.52-2.78)].

3.9 Factors affecting utilization of Mid-day meal

The third objective of the study was to identify the factors affecting the utilization of Mid-day meal from school.

Table:3.21 Factors affecting utilization of Mid-Day Meal

Category	**Number of Subjects (N)**	**Intake of Mid-Day Meal**		**p-value**
		All school-days n (%)	**Occasionally or never n (%)**	
Type of school				
Government	51	51(100%)	0	
Aided	271	217 (80.1%)	54 (19.9%)	**<0.001***
Sex of the child				
Male	171	140 (81.9%)	31(18.1%)	
Female	151	128 (84.9)	23 (15.2%)	0.551
Preference of children to take Mid-Day Meal				
Likes	255	245 (96.1%)	10 (3.9%)	
Dislikes	31	17 (54.8%)	14 (45.2%)	
Not informed	36	6 (16.7%)	30 (83.3%)	**<0.001**

*Fisher's exact test used to derive p-value

Type of school whether government or aided significantly influence the utilization of mid-day meal. Children from aided schools are less likely to utilize the scheme compared to children from government schools. There is no much difference in the utilization between boys and girls. The preference of children whether they like or dislike food from school has significant influence on the utilization.

Table: 3.22 Socio-economic characteristics affecting the Mid-Day Meal consumption

Category	Number of subjects (N)	Intake of Mid-Day Meal		p-value
		All school-days n (%)	Occasionally or never n (%)	
Caste of the child				
General	70	58 (82.9%)	12 (17.1%)	
OBC & OEC	172	138 (80.2%)	34 (19.8%)	
SC & ST	80	72 (90%)	8 (10.0%)	0.154
Monthly income of the household				
<5000	201	167(83.1%)	34 (16.9%)	1.000
>5000	91	76 (83.5%)	15 (16.5%)	
Education of mother				
Up to high school	230	203 (88.3%)	27 (11.7%)	**<0.001**
Higher secondary and above	92	65 (70.7%)	27 (29.3%)	
Education of father				
Up to high school	247	210 (85.0%)	37 (15.0%)	
Higher secondary and above	69	55 (79.7%)	14 (20.3%)	0.354
Occupation of mother				
Unemployed	231	198 (85.7%)	33(14.3%)	
Employed	47	32 (68.1%)	15 (31.9%)	
Manual labourers/NREG	42	36 (85.7%)	6 (14.3%)	**0.012**
Occupation of father				
Employed	108	76 (70.4%)	32 (29.6%)	**<0.001**
Labourers	201	182 (90.5%)	19 (9.5%)	
Parent's satisfaction about quality of the Mid-Day Meal				
Satisfied	291	250 (85.9%)	41 (14.1%)	
Not satisfied	16	13 (81.2%)	3 (18.8%)	
Don't know	3	1 (33.3%)	2 (66.7%)	**0.035**
Parent's satisfaction about quantity of the Mid-Day Meal				
Satisfied	237	206 (86.9%)	31 (13.1%)	
Not satisfied	60	50 (83.3%)	10 (16.7%)	
Don't know	12	8 (66.7%)	4 (33.3%)	**0.133**

The utilization of MDM is about 80 percent for children coming from general, OBC and OEC categories whereas it is 90 percent among SC/ST. More than 80 percent of the families utilize the scheme irrespective of their monthly income status. Education of mother has significant effect on the intake of mid-day meal whereas education of father has no much influence. Occupation of both father and mother significantly influence the family's decision to utilize the scheme for their children. Out of 201 children, whose fathers are manual labourers, 90.5 percent take lunch from school on a daily basis. Out of 291 parents who are satisfied with the quality of Mid-day meal, almost 86 percent let their children to take lunch from school and out of 237 parents who are satisfied with the quantity, 87 percent encourage their children to take lunch from school. Out of 16 children whose parents are not satisfied with the quality, 81.2 percent consume mid-day meal and out of 60 children whose parents are not satisfied with the quantity, 83.3 percent children have lunch from school regularly.

Child's preference is the only variable, which showed a strong association with intake of MDM after doing the multiple logistic regression analysis (Table 3.23). Children who like the lunch provided in schools have 11 times higher odds for having MDM in all school days when all other factors kept constant. Mothers with secondary school education and above are 42 percent less likely to let their children to take MDM, but it is not statistically significant. Mothers who are unemployed and manual labourers/NREGA workers have equal odds of using the MDM scheme whereas fathers who are labourers have two times higher odds for utilizing MDM scheme for their children compared to fathers doing other kinds of work.

Table: 3.23 Logistic regression analyses of factors significantly associated with utilization of Mid-Day Meal

Category	Odds ratio (unadjusted)	95% Confidence Interval	Odds Ratio (adjusted)*	95% Confidence Interval
Preference of children to take MDM				
Dislikes	1		1	
Likes	20.18	7.81- 52.11	11.06	3.68 - 33.30
Not informed	0.16	0.05 – 0.51	0.12	0.03 – 0.44
Education of mother				
Up to high school	1		1	
Higher secondary and above	0.32	0.18 - 0.58	0.58	0.21-1.58
Occupation of mother				
Unemployed	1		1	
Employed	0.36	0.17- 0.73	1.70	0.46 – 6.26
Manual labourers/NREGA	1.00	0.39 – 2.56	1.25	0.26-5.92
Occupation of father				
Employed	1		1	
Labourers	4.03	2.15-7.56	2.03	0.76 – 5.42
Parent's satisfaction about quality of the Mid-Day Meal				
Not satisfied	1		1	
Satisfied	1.41	0.38 - 5.15	2.52	0.26 - 22.30
Don't know	0.12	0.008 – 1.73	9.77	0.40 – 235.86

*****All variables are adjusted for each other.

CHAPTER:4

DISCUSSION

Education system in Kerala comprises government, private aided and private unaided schools. In Kottayam district, out of 227,266 children enrolled in schools in the academic year 2009-10, 77 percent of the children went to aided schools, 15.2 percent to government schools and the remaining children to unaided schools.[68] Children from affluent families usually goes to private schools whereas others prefer aided and government schools. The Mid-Day Meal Scheme is implemented in aided and government schools only and the ratio of children in aided and government schools is 5:1. In the present study, 84 percent of the children were selected from aided schools and 16 percent from government schools to get a proportionate sample of the MDM beneficiaries in Kottayam district.

4.1 Prevalence of malnutrition among school age children

The major finding of the present study was the higher prevalence of malnutrition (47.2%) in which under nutrition constitutes the most (45.7%) whereas over nutrition is only minimal (1.5%). This is the first study conducted in Kerala to estimate the nutritional status of mid day meal beneficiaries using CIAF as the indicator of under nutrition. The estimated prevalence of under nutrition (45.7%) is very high compared to the overall under nutrition among school children reported by NNMB in 2012 (26.6%), in spite of the better development indexes of Kerala.[28] Stunting is the result of chronic deprivation and the estimated prevalence of stunting in this study was 13.4 percent. This estimate is similar to the proportion of stunting among school children reported by a study conducted in Kannur about 10 years ago (2004).[69] This finding reveals the inadequacies of the existing system to deal with under nutrition. However,

when comparing to the studies conducted in other parts of the country using CIAF as the indicator, present study shows a lower prevalence, which may be because of the better nutritional outcomes of children in Kerala compared to other states of India.[28,32,70] The prevalence of CIAF in a study conducted in West Bengal was 57.6 percent, which is higher than that of the present study (45.7%).[55] The disaggregated analysis of CIAF in this study shows 14.6 percent single anthropometric failures and 31percent multiple anthropometric failures. It is also less compared to a the estimates reported by the above mentioned study (18% and 39.5 percent respectively).[55] The prevalence of severe under nutrition in terms of stunting, underweight and wasting is 1 percent, 9.3 percent and 9 percent respectively among the sample population and it was 6 percent in the NNMB report.[28]

CIAF is a better indicator of under nutrition, which gives a clear picture of the type of under nutrition (stunting, wasting and/or underweight) from which the child suffers from and it clearly identifies the overlapping between each type.[41,71-73] Prevalence of children with wasting only was 6.5% in this study which contradict the criticism by Bhattacharya AK (2006) as wasting only (group B) is not likely to occur anthropometrically.[74] The estimated prevalence of under nutrition using CIAF has serious policy implications as the existing policies take into account either underweight or wasting and ignore the severe multiple anthropometric failures among children.

4.2 Factors affecting nutritional status of school age children

4.2.1 Child-related factors

This study analysed various factors that are supposed to be affecting nutritional status of children according to the previous studies. Among them, birth weight showed a

strong association with the present nutritional status of the children. The prevalence of CIAF among children born with low weight was high (57.4%) compared to the children born with normal weight (43.1%). Similar findings were observed in a study conducted among school children in Nigeria (2010).[75] Birth weight is a factor most often applied to malnutrition among younger children (less than five years of age), but this study gives evidence for its continuous effect in a deprived social scenario. Only 43 percent of children who born as low birth weight regained an optimum nutritional status during their growth up to current age and others are continuing in the same deprivation. In addition, 43 percent of the children who were of normal birth weight became undernourished during their growth. This clearly indicates the gaps in the existing systems to tackle malnutrition and the need for continuous surveillance on malnutrition. Birth weight is also found to be strongly associated with multiple anthropometric failures, which is a major concern requiring special attention from all stakeholders who address the problem of under nutrition.

The age of the children also showed a significant association with the CIAF, with a higher prevalence among the age group of seven years followed by nine years. Two studies conducted respectively in West Bengal (2011) and Uttar Pradesh (2012) observed higher prevalence of under nutrition among 9 year- old children even though the highest prevalence was reported among older children (11 years).[55,76] The exact reason for these variations across each age group is unknown, however the difference in the dietary intake of these children can be one reason for such differences.[77]

The current study did not show any variation in under nutrition between boys and girls. This finding is similar to a study conducted in Kannur district which also did not show any difference in the nutritional status of boys and girls.[70] But stunting was

more among girls (17.2%) than boys (10%) in this study. Prevalence of acute illnesses reported by parents(49%) was very high in the study compared to the NNMB report (8%).[28] Children with multiple vulnerabilities [children of low birth weight and with a history of acute illness in the last two weeks (CIAF=71.4%), children with low birth weight and history of missing meal in the last two days (CIAF=60.5%)] showed higher chance to be malnourished than the normal children. Childhood morbidities and malnutrition mutually contribute each other and that can be the reason for this higher prevalence.[78]

Present study came up with two contradictory findings with birth order and missing meal in the last two days. Children with birth order two showed higher prevalence of CIAF and those who were in third or fourth position showed least prevalence. In addition, children who missed any meal in last two days had a better nutritional outcome than those who did not miss meal (in which missing breakfast showed a significant association). The plausible explanation for this may be these children had a comparatively better nutritional status. Most of them had normal birth weight and a few of them reported any history of acute illness. Moreover, other factors especially dietary intake of these children can have greater influence, which was not dealt in this study. Therefore, the information regarding whether they were compensating the missed meal with the further meals of the day is not available. In addition, participants were asked to recall only two days' history of missing meal, which can also be a reason for the lower prevalence of CIAF among those who missed meal.

4.2.2 Socio-economic status and Family background of the children

The children belonged to Christian religion had higher prevalence of CIAF (51.2%) and Muslim children showed lower prevalence (37.9%), which was not statistically

significant. This finding is contradicting the NFHS-3 report (2005-06) in which children from Hindu and Muslim families were equally under nourished and those from Christian and Sikh families had better nutritional outcome.[27] A higher prevalence of CIAF among SC and ST children was observed in this study which is similar to a study conducted in Kannur by Dr. Gangadharan in 2011.[79] The prevalence is also high among children from OEC class (52%), which can be explained by their poor socio-economic status similar to those of children from SC and ST families. It can also be related to the higher prevalence of CIAF among Christian children as all of them belong to Christian religion. The family income and occupation of the father (head of the family in most of the households) or mother and strength of the family are not found to be associated with the poor nutritional status of the child. More or less similar SES of these children might be masking the effect of these variables as reported in a study done in Bankura, West Bengal (2012).[80]

Other family related factors such as living status of parents, education of father, presence of members who needs special attention were not found to predict child's nutritional status in this study, which is similar to different studies conducted by Mehrotra et al (2010) and Suryanarayana et al(2009).[30,33]

4.2.3 The prevalence of CIAF and MDM utilization

Children who take MDM in all schooldays may be from a poorer socio-economic background compared to that of children occasionally or never take MDM. The prevalence of CIAF was almost similar in both groups with a five percent higher prevalence in the second group. It means the MDM scheme is contributing to the nutritional health of the children from poor socio-economic classes or the scheme helps them to maintain a nutritional status at a level equal to children from somewhat

better SES. Otherwise, it could have been worst among them. However, the estimated higher prevalence of under nutrition indicates the gaps in the implementation of the scheme demanding the special attention from policy makers.

4.3 Factors affecting utilization of Mid-Day Meal

The present study tried to identify the factors affecting the utilization of MDM scheme in schools. Among all factors analysed, children's preference (whether they like or dislike) to have lunch from school is turned as the strongest determinant affecting the MDM utilization. Type of school also showed a strong association, and all children from government schools reported that they like to have lunch from school. Most often children from government schools are poorer than children from other schools. They may not have an option even if they do not like lunch from school and that may be one reason for 100% like in government schools.

Mother's education was found to be a strong predictor of MDM intake. About 88 percent of the children whose mothers had low level of education take MDM in all school days compared to 71 percent of the children whose mothers had higher level of education. Occupation of parents showed a significant association with MDM utilization. More than 85 percent of the children whose parents are manual labourers take MDM in all school days. Most of the parents think that MDM Scheme is a good programme and beneficial to their children.[69] MDM is primarily aimed to reduce 'classroom hunger' and the scheme is successful in this aspect. During the interview one child told that he did not eat breakfast because there was no rice in the house. Such children from the poorest socio-economic strata highly depend on MDM Scheme.[67]

From the observations made by the principal investigator during data collection, it is found that the MDM Scheme promotes the social integration among children, which was one of the objectives of the scheme. Children from third and fourth standards help teachers while serving mid-day meal and help children from lower classes to take the food safely. In all schools, the cooking area is in a separate building or shed except one aided school where the cooking place is next to the classrooms. Smoke produced during cooking is spreading to the classrooms which can have serious effect on children's health status as wood is the main fuel used for cooking. The utensils were kept clean in all schools. No one who prepares lunch had seen to be wearing aprons or caps while cooking. Teachers also take the same food for their lunch in most of the schools. All schools have a menu for each day and they try to follow it regularly. Some schools provided at least two curries with rice whereas other schools provide only one curry. It was also observed that, most often children bring curries from their home. The teachers have the complete responsibility of MDM, and a major problem that they encounter is usually the administrative delay in granting the fund for MDM so that the teachers have to spend money from their pocket. There is a committee of MDM in all schools with representatives of teachers and parents as members. To sum up, MDM Scheme contributes to the health status of its beneficiaries even though it is not successful to ensure adequate growth and development among children.

4.4 Strengths and limitations of the study

4.4.1 Strengths

To the best of our knowledge, this is the first study in Kerala, which assessed nutritional status of MDM beneficiaries using CIAF as the indicator. The study sample is a good representative of MDM beneficiaries in Kerala as it included children from

government and aided schools proportionately. Response rate was more than expected (80.5%). No inter-observer variability as the principal investigator alone did the data collection.

4.4.2 Limitations

The complete dietary pattern of the children was not surveyed in this study even though it is a salient factor affecting the nutritional status. However, it was beyond the limit of this study as the standard methods to measure dietary intake requires much time and effort. This study does not address micronutrient deficiencies like anaemia and vitamin A deficiency and other morbidities (for example, dental caries), that are observed to be highly prevalent among children. They are equally important as protein-energy malnutrition, but it is very costly and time consuming. Further studies are required to explore the micronutrient deficiencies among school children. Also the response was very less for the open-ended question for suggestions regarding MDM.

4.5 Conclusion

The prevalence of under nutrition among school age children is very high which calls for immediate attention. The birth weight is a strong predictor of nutritional status. This study gives evidence for the gaps and inadequacies of existing nutritional interventional programmes in the country The Composite Index of Anthropometric Failure is a valuable tool to assess the nutritional status of children as it provide a single and precise estimate as well as disaggregated estimates of exact condition Each Mid-Day Meal Scheme is advantageous to the children from low socioeconomic classes, yet it has to be strengthened to provide quality nutritional food in order to ensure good health and optimum growth of the children.

Kerala is hub of various life-style diseases, with an incidence at an earlier stage of life (~30years).[27] The under nutrition among school age children can be reverted to overweight and obesity when they reach adulthood.[16] So the improvement in the existing system does not mean overfeeding of the children, rather, it should come with good quality of food provided. Moreover, school age is the correct age for inculcating good dietary habits through nutrition education, and MDM scheme can perform as a better platform for implementing such interventions.

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Annexure 1

INFORMED CONSENT

Ref No:

Title of the study: Assessment of the Nutritional status of Primary school children who are the beneficiaries of Mid-day Meal scheme: A Cross-sectional study in Kanjirappally educational sub-district.

My name is Jayalakshmi Rajeev, doing Masters Degree in Public Health at Achutha Menon Centre for Health Science Studies (AMCHSS), Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram. As part of my course, I have to conduct a research study of having public health relevance. The title of the study is given above.

The aim of the study is to assess the nutritional status of children of age 6-10 years who are the beneficiaries of Mid-day meal scheme, the factors affecting their nutritional status and also the factors affecting the utilization of mid-day meal scheme.

I will select 400 children using some predetermined criteria and methods. As children in the age group 6-10 years are minors according to our constitution, I need their parents' permission to include them into the study. The selected children will be given one form (same as the one with you) to take into home to get permission from the parents. Although this is a study among children, you are also indirectly participating in the study to give valuable information about your child. If you decide to participate in the study, you are requested to sign the consent and fill the form given in the next pages. The consent form includes a part to give permission to contact you in person directly or by phone in case of any clarification of information is needed.

Benefits of participating in the study

There are no direct benefits for you or your child if you participate in the study. I will measure height and weight of your child. If your child is found to be mal-nourished, you will be informed about that and will be given further directions to deal with it.

Harms of participating in the study

The investigator will ensure that the child is comfortable throughout the time of taking measurements (height and weight). The interview schedule for the children and parents does not include any sensitive questions that may hurt the child.

Confidentiality: The study results are intended to be published in any scientific journal, but the name and other personal details will be kept confidential.

Your decision is completely voluntary and no pressure on you to let your child participate in the study. If you have any doubts or want any further clarifications, you are free to ask at any time. I assure you that I shall do it at best of my ability. I am giving the contact details below.

Principal investigator: Jayalakshmi Rajeev (Mob: 9400474930)

If you need any more clarifications regarding the integrity of the study, you can call Institute Ethical Committee Secretary Dr. Mala Ramanathan

Institute Ethical Committee secretary: Dr. Mala Ramanathan

Phone: (0471-2425234).

Email: mala@sctimst.ac.in

If you are willing to take part in the study, kindly fill the form completely and return it with the child as early as possible.

Consent form

I ----------, father/mother of ---------- studying in class ---------- at ---------- school; hereby state that I have read the information provided to me regarding the study: *Assessment of the Nutritional status of Primary school children who are the beneficiaries of Mid-day Meal scheme: A Cross-sectional study in Kanjirappally Block Panchayath.*

I understand that participation of my child into the study is entirely based on my consent, it is completely voluntary. Also I realize that I can withdraw my child's participation from the study at any time if I want. I realise that the study will do no harm to my child and no direct benefits also.

Also I understand that identity of my child and his/her other personal information will be kept confidential. I agree that the principal investigator can contact me in person directly or by phone if any clarification is required on the given information.

I voluntarily give permission to include my child into the study. I received a copy of the signed consent form

Place: Name:

Date: Signature:

Phone number:

Annexure: 2

ASSENT FORM FOR CHILDREN (ORAL CONSENT FORM)

Unique identification code:

Title of the study: Assessment of the Nutritional status of Primary school children who are the beneficiaries of Mid-day Meal scheme: A Cross-sectional study in Kanjirappally Block panchayath.

My name is Jayalakshmi Rajeev. I am studying in a college at Thiruvananthapuram. I am going to do a study to assess whether your nutritional status is adequate or not. You will be asked to answer some simple questions. Your height and weight will be measured as part of the study. Your teacher will be present at all the time. You do not have to be in this study if you don't want to be. If you decide to stop after we begin, that's okay too. Your parents know about the study.

If you decide you want to be in this study, please sign your name.

I, ---------- am ready to participate in this research study.

[ ] Yes [ ] No

Annexure 3

QUESTIONNAIRE FOR PARENTS

Unique identification code:

Type of school class division serial number

Government/Aided	**1/2/3/4**	**A/B/C/D**	

(This number will be given by the principal investigator)

Name of the child: ---------- Date of birth: ----------

1. Name of the respondent : ----------
2. Relationship with the child :

   [ ] Mother [ ] Father [ ] Others (specify ----------)
3. Which is the religion, your family belongs to?: ----------
4. What is the type of ration card you have?

   [ ] APL [ ] BPL [ ] No ration card
5. What is the average monthly income of your household?

   [ ]< Rs 5000/- [ ] 5000-10000 [ ]10001-15000 [ ] >15000
6. What is the source of water in your household?

   [ ] Own well [ ] Public well [ ] Panchayath pipes

   [ ] Pipe with house connection [ ] Private supply
7. How many members are there in your household including the children? ----------
8. What is the living pattern of child's parents?

   [ ] Living together in the same home

   [ ] Living together, but one of the couple away from home

[ ] Widowed [ ] Separated/ Divorced [ ] Any other (specify----------)

9. What is the educational status of child's mother?

[ ] Primary level (1-7 years) [ ] High school level (8-10years)

[ ] Higher secondary (11-12 years) [ ] Degree/ diploma

[ ] Post graduation [ ] Others (specify ----------)

10. What is the occupational status of child's mother?

[ ] Unemployed [ ] Self -employed [ ] Private field [ ]Govt employee

[ ] Manual labours [ ] NREGA [ ]Gulf/abroad [ ]Others(----------)

11. What is the educational status of child's father?

[ ] Primary level (1-7 years) [ ] High school level (8-10years)

[ ] Higher secondary (11-12 years) [ ] Degree/ diploma

[ ] Post graduation [ ] Others (specify ----------)

12. What is the occupational status of child's father?

[ ] Unemployed [ ] Self-employed [ ] Private field [ ] Government employee [ ] Manual labours [ ]Gulf/abroad [ ]Others(----------)

13. What is the birth order of this child? ----------

14. What is the birth weight of this child in kilograms?----------Kg

15. Whether there is any member in your family who need special attention (you can choose more than one options)?

Less than five year old children [ ] Yes [ ] No

Bed- ridden member [ ] Yes [ ] No

Elderly [ ] Yes [ ] No

16. Whether the child has any of the following illness in the last two weeks (you can choose one more options)?

[ ] Fever [ ] Cough [ ] Diarrhoea [ ] Breathing difficulty [ ] Any other(----------)

17. Whether the child has hospitalized in the last two weeks?

[ ] Yes [ ] No

17.1If yes for (17), for what illness the child get hospitalized? ----------

18. Has the child ever had any of the following chronic illness? (You can choose more than one if any)

[ ] Epilepsy [ ] Haemophilia [ ] Heart diseases [ ] others (----------)

19. Does the child take any medications for a long time? [ ] Yes [ ] No

20. If yes for (Qn. 19),

20.1 For what disease the child take that medication? ----------

20.2 What is the name of the medicine? ----------

21. What is the diet preference of the child?

[ ] Vegetarian [ ] Non-vegetarian.

22. Whether the child missed any meal in the last two days?

[ ] Yes [ ] No

23. If yes, which of the following meals the child has missed?

[ ] Breakfast [ ] Lunch [ ] Dinner

24. Whether the child takes Mid-day meal from schools?

[ ] Yes [No]

If yes, please choose the appropriate one.

24.1) How often does your child take lunch provided in school?

[ ] All school days [ ] Most of the school days [ ] Occasionally [ ] Never

24.2) Are you aware of the food items provided with the school lunch?

[ ] Yes [ ] No

24.3) Have you ever observed the provision of school lunch in school?

[ ] Yes [ ] No

24.4) Do you think that the quantity of food your child gets from school is sufficient for your child? [ ] Yes [ ] No

24.5) Do you think that the quality of food your child gets from school is adequate?

[ ] Yes [ ] No

25. Do you have any suggestions regarding the lunch provided in schools?

Annexure 4

STRUCTURED INTERVIEW SCHEDULE FOR THE CHILD

Type of school	Class	Division	Serial number
Government/Aided	1/2/3/4	A/B/C/D	

Name of the child: : ----------

Date of birth (as per school register) : ----------

Sex of the child : [ ] male [ ] female

Caste(as per school register) : [ ] General [ ]OBC [ ]OEC [ ]SC [ ]ST

Height of the child(in centimeters) : ----------

Weight of the child(in kilograms) : ----------

1. What did you have for breakfast today? ----------
2. Do you eat breakfast every day? [ ] Yes [ ] No
3. Have you brought food for today's lunch? [ ] Yes [ ]No
4. If no, are you having today's lunch from school? [ ] Yes [ ]No
5. How often do you take lunch from school?

   [ ] All school days [ ] Most of the days [ ] occasionally [ ] Never
6. Is the quantity of the food you get for lunch at school is sufficient for you?

   [ ] Yes [ ] No
7. Would you like to eat lunch provided in the school? [ ] Yes [ ] No
8. If 'no' for (7), what is the reason behind that? ----------
9. If 'yes' for (6), what is the reason behind that?----------

Annexure: 5

പഠനവിവരണം

എന്റെ പേര് ജയലക്ഷ്മി രാജീവ് . ഞാൻ ശ്രീചിത്ര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് മെഡിക്കൽ സയൻസ് ആൻഡ് ടെക്നോളജിയിൽ Public Health അഥവാ പൊതുജനാരോഗ്യം എന്ന വിഷയത്തിൽ ബിരുദാനന്തരബിരുദത്തിനു പഠിക്കുന്നു.

എന്റെ പഠനത്തിന്റെ ഭാഗമായി പൊതുജനാരോഗ്യവുമായി ബന്ധപ്പെട്ടു പ്രാധാന്യമർഹിക്കുന്ന ഒരു വിഷയത്തിൽ പഠനം നടത്തേണ്ടതായിട്ടുണ്ട്. അതിനായി താഴെ പറയുന്ന വിഷയമാണ് ഞാൻ തെരഞ്ഞെടുത്തിരിക്കുന്നത്. "കാഞ്ഞിരപ്പള്ളി ബ്ലോക്ക് പഞ്ചായത്തിൽ ഉൾപ്പെടുന്ന പ്രൈമറി സ്കൂളുകളിലെ ഉച്ചഭക്ഷണ പദ്ധതിയുടെ ഗുണഭോക്താക്കൾ ആയിട്ടുള്ള കുട്ടികളിലെ പോഷകാഹാരനിലവാരത്തെക്കുറിച്ചുള്ള പഠനം".

ഈ പഠനം ആറുവയസ്സിനും പത്തുവയസ്സിനും ഇടയിൽ പ്രായമുള്ള കുട്ടികളുടെ പോഷകാഹാരനില തൃപ്തികരമാണോ അല്ലയോ എന്ന് പരിശോധിക്കുന്നതിനും അതിനെ സ്വാധീനിക്കുന്ന ഘടകങ്ങളെക്കുറിച്ച് മനസ്സിലാക്കുന്നതിനും ഉദ്ദേശിച്ചുള്ളതാണ്. കൂടാതെ ഗവണ്മെന്റ് ഉച്ചഭക്ഷണ പദ്ധതിയുടെ സുഗമമായ ഉപയോഗത്തെ സ്വാധീനിക്കുന്ന ഘടകങ്ങളെക്കുറിച്ചും പഠിക്കുവാൻ ലക്ഷ്യമിടുന്നു. ഈ പഠനത്തിലേക്കായി മുൻകൂട്ടി തീരുമാനിക്കപ്പെട്ട ചില മാനദണ്ഡങ്ങൾ അനുസരിച്ച് 400 പ്രൈമറി സ്കൂൾ കുട്ടികളെ തെരഞ്ഞെടുക്കാൻ ഉദ്ദേശിക്കുന്നു. നമ്മുടെ ഭരണഘടനപ്രകാരം ഈ കുട്ടികൾക്ക് പ്രായപൂർത്തിയാകാത്തതിനാൽ അവരെ ഗവേഷണത്തിൽ ഉൾപ്പെടുത്താൻ രക്ഷിതാക്കളുടെ സമ്മതം അത്യാവശ്യമാണ്. തെരഞ്ഞെടുക്കപ്പെട്ട കുട്ടികളുടെ കൈയിൽ കൊടുത്തുവിടുന്ന സമ്മതപത്രത്തിൽ രക്ഷിതാക്കൾ തീരുമാനം രേഖപ്പെടുത്തേണ്ടതാണ്. ഇത് കുട്ടികളുടെ ഇടയിലുള്ള പഠനമാണെങ്കിലും കുട്ടികളെ കുറിച്ചുള്ള വിലപ്പെട്ട വിവരങ്ങൾ നൽകുന്നതിലൂടെ രക്ഷിതാക്കളും ഈ പഠനത്തിന്റെ ഭാഗമാകുന്നു.

കുട്ടികളുടെ പൊക്കവും തൂക്കവും പഠനത്തിന്റെ ഭാഗമായി അളക്കുന്നുണ്ട്. താങ്കളുടെ കുട്ടിക്ക് പോഷകാഹാരക്കുറവ് കണ്ടെത്തിയാൽ താങ്കളെ അറിയിക്കുന്നതും വേണ്ട നിർദ്ദേശങ്ങൾ നൽകുന്നതുമാണ്. താങ്കളെയും കുട്ടിയേയും കുറിച്ചുള്ള വ്യക്തിപരമായ വിവരങ്ങൾ തികച്ചും സ്വകാര്യമായി സൂക്ഷിക്കുന്നതാണ്.

താങ്കൾക്ക് ഉചിതമായ തീരുമാനമെടുക്കുന്നതിനുള്ള പൂർണസ്വാതന്ത്ര്യം ഉണ്ട്.

ഈ പഠനത്തിൽ പങ്കെടുക്കാൻ തീരുമാനിക്കുന്ന പക്ഷം ദയവായി ഈ സമ്മതപത്രത്തിനൊപ്പമുള്ള ചോദ്യാവലി പൂരിപ്പിച്ച് കുട്ടിയുടെ കൈയിൽ എത്രയും വേഗം കൊടുത്തുവിടണമെന്ന് അപേക്ഷിക്കുന്നു. കൂടുതലായി എന്തെങ്കിലും അറിയുന്നതിനോ, സംശയനിവാരണത്തിനോ വേണ്ടി താങ്കൾക്ക് എന്നെ നേരിട്ടോ ഫോണ് വഴിയോ ബന്ധപ്പെടാവുന്നതാണ്. അതിനായി എന്റെ ഫോണ് നമ്പർ ഇതിനൊപ്പം വയ്ക്കുന്നു. പ്രധാന ഗവേഷക : ജയലക്ഷ്മി രാജീവ് (മൊബൈൽ നമ്പർ: 9400474930). പഠനത്തിന്റെ വിശ്വാസ്യതയെക്കുറിച്ച് എന്തെങ്കിലും കൂടുതലായി അറിയുന്നതിന് ഇൻസ്റ്റിറ്റ്യൂട്ടിലെ നീതിനിർവാഹകസമിതി സെക്രട്ടറി ആയ Dr. മാല രാമനാഥനെ ഫോണിൽ ബന്ധപ്പെടാവുന്നതാണ്. അദ്ദേഹത്തിന്റെ നമ്പർ ചുവടെ കൊടുക്കുന്നു.

IEC സെക്രട്ടറി : Dr. മാല രാമനാഥൻ (ഫോണ് നമ്പർ: 0471-2524234)

(ഇ- മെയിൽ : mala@sctimst.ac.in)

<u>സമ്മതപത്രം</u>

എന്റെ പേര് ശ്രീ/ശ്രീമതി ---------- . ഞാൻ ----------

----------സ്കൂളിൽ ---------- ക്ലാസ്സിൽ പഠിക്കുന്ന ----------

എന്ന വിദ്യാർത്ഥി /വിദ്യാർത്ഥിനി-യുടെ മാതാവ്/പിതാവ് ആണ്. ഈ പഠനത്തിന്റെ പ്രാധാന്യത്തെക്കുറിച്ചും ചെയ്യാനുദ്ദേശിക്കുന്ന രീതിയെക്കുറിച്ചും ഞാൻ വായിച്ചു മനസ്സിലാക്കി. എന്റെയും എന്റെ മകന്റെ/ മകളുടെ-യും പങ്കാളിത്തം പൂർണമായും എന്റെ തീരുമാനത്തിലധിഷ്ഠിതമാണെന്നു ഞാൻ മനസിലാക്കുന്നു. ഞങ്ങളെ സംബന്ധിച്ചുള്ള വ്യക്തിപരമായ വിവരങ്ങൾ തികച്ചും സ്വകാര്യമായിരിക്കുമെന്ന് എനിക്ക് ബോധ്യമായിട്ടുണ്ട്. എല്ലാ വസ്തുതകളും മനസ്സിലാക്കിക്കൊണ്ട് എന്റെ മകനെ/ മകളെ ഈ പഠനത്തിൽ ഉൾപ്പെടുത്താൻ എനിക്ക് പൂർണസമ്മതമാണ്. പ്രധാന ഗവേഷകക്ക് ആവശ്യമെങ്കിൽ സംശയനിവാരണാർത്ഥം എന്നെ നേരിട്ടോ ഫോണിലോ ബന്ധപ്പെടുന്നതിന് എനിക്ക് സമ്മതമാണ്. സമ്മതപത്രത്തിന്റെ ഒരു പകർപ്പ് എനിക്ക് കിട്ടിയിട്ടുണ്ട്.

സ്ഥലം ഒപ്പ്

തീയതി പേര്

ഫോണ് നമ്പർ:

Annexure :6

കുട്ടികളുടെ സമ്മതപത്രം

എന്റെ പേര് ജയലക്ഷ്മി രാജീവ്. ഞാൻ തിരുവനന്തപുരത്തുള്ള ഒരു കോളേജിലാണ് പഠിക്കുന്നത്. നിങ്ങളുടെ പ്രായത്തിലുള്ള കുട്ടികളിലെ പോഷകാഹാരനില തൃപ്തികരമാണോ അല്ലയോ എന്നറിയുന്നതിനുള്ള ഒരു പഠനം നടത്തുന്നുണ്ട്. അതിനായി ഞാൻ നിങ്ങളോട് ചില ചോദ്യങ്ങൾ ചോദിക്കുന്നതാണ്. ഒപ്പം നിങ്ങളുടെ പൊക്കവും തൂക്കവും അളക്കുകയും ചെയ്യും. നിങ്ങളുടെ ടീച്ചർ എപ്പോഴും കൂടെ തന്നെയുണ്ടാവുന്നതാണ്. നിങ്ങൾക്ക് ഈ പഠനത്തിൽ പങ്കെടുക്കാൻ താല്പര്യമില്ലെങ്കിൽ എപ്പോൾ വേണമെങ്കിലും പിന്മാറാവുന്നതാണ് . നിങ്ങളുടെ അച്ഛനും അമ്മയ്ക്കും ഞാൻ ഈ പഠനത്തിന്റെ വിവരങ്ങൾ നല്കിയിട്ടുണ്ട്.

എനിക്ക് ഈ പഠനത്തിൽ പങ്കെടുക്കാൻ സമ്മതമാണ്. [ ] അതെ [ ] അല്ല

പേര്:

തീയതി:

Annexure: 7

രക്ഷിതാക്കൾക്കുള്ള ചോദ്യാവലി

പ്രത്യേക ക്രമനമ്പർ :

സ്കൂൾ	ക്ലാസ്സ്	ഡിവിഷൻ	ക്രമനമ്പർ

(ഈ നമ്പർ പ്രധാന ഗവേഷകയാണ് നൽകുന്നത്)

കുട്ടിയുടെ പേര്:---------- ജനനതീയതി: ----------

1. താങ്കളുടെ പേര് എന്താണ്? ----------

2. എന്താണ് താങ്കൾക്ക് കുട്ടിയുമായുള്ള ബന്ധം?

[ ] മാതാവ് [ ] പിതാവ് [ ] മറ്റുള്ളവർ (വ്യക്തമാക്കുക----------)

3. താങ്കളുടെ കുടുംബം ഏതു മതവിഭാഗത്തിലാണ് ഉൾപ്പെടുന്നത്?----------

4. കുടുംബത്തിന്റെ റേഷൻ കാർഡ് ഏതാണ്?

[ ]എ പി എൽ [ ]ബി പി എൽ [ ]റേഷൻ കാർഡ് ഇല്ല

5.കുടുംബത്തിലെ ശരാശരി മാസവരുമാനം എത്രയാണ് (എല്ലാ അംഗങ്ങളുടെയും ഉൾപ്പെടെ)?

[ ]5000രൂപയിൽ താഴെ [ ]5000-10000 [ ]10001-15000 [ ]15000 രൂപയ്ക്കു മുകളിൽ

6. താങ്കളുടെ വീട്ടില് വെള്ളത്തിന്റെ സ്രോതസ്സ് ഏതാണ്?

[ ]സ്വന്തം കിണർ [ ]പൊതുകിണർ [ ]പഞ്ചായത്ത് പൈപ്പ്

[ ] വീട്ടിൽ പൈപ്പ് കണക്ഷൻ ഉണ്ട് [ ] സ്വകാര്യ വിതരണം

[ ] മറ്റുള്ളവ (വ്യക്തമാക്കുക----------)

7. വീട്ടിലെ ആകെ കുടുംബംഗങ്ങളുടെ എണ്ണം എത്രയാണ് (കുട്ടികൾ ഉൾപ്പെടെ?)? ---

8. കുട്ടിയുടെ മാതാപിതാക്കൾ ഒരുമിച്ചാണോ താമസിക്കുന്നത് ?

[ ] ഒരുമിച്ചാണ് **[ ]** ഒരുമിച്ചല്ല

8.1 ഒരുമിച്ചല്ല എങ്കിൽ, താഴെ പറയുന്നവയിലൊന്നു തെരഞ്ഞെടുക്കുക?

[ ] അച്ഛൻ/ അമ്മ ജോലിസംബന്ധമായി മറ്റൊരിടത്താണ്

[ ]മാതാപിതാക്കൾ പരസ്പരം വേർപിരിഞ്ഞു

[ ] അച്ഛൻ/ അമ്മ മരണപ്പെട്ടു.

[ ] മറ്റെന്തെങ്കിലും (വ്യക്തമാക്കുക----------)

10. കുട്ടിയുടെ മാതാവിന്റെ വിദ്യാഭ്യാസ യോഗ്യത എന്താണ്?

[ ]പ്രൈമറി സ്കൂൾ (1-7 വരെ) **[ ]** ഹൈ സ്കൂൾ (8-10 വരെ)

[ ]ഹയർ സെക്കന്ററി(11-12 വരെ) **[ ]** ബിരുദം/ ഡിപ്ലോമ **[ ]** ബിരുദാനന്തരബിരുദം **[ ]** മറ്റുള്ളവ (വ്യക്തമാക്കുക----------)

11. കുട്ടിയുടെ മാതാവിന്റെ തൊഴിൽ എന്താണ്?

[ ]തൊഴിലില്ല **[ ]**സ്വയം തൊഴിൽ **[ ]**സർക്കാർ മേഖലയിൽ **[ ]** സ്വകാര്യ മേഖലയിൽ

[ ]കൂലിപ്പണി **[ ]**തൊഴിലുറപ്പ്

[ ] വിദേശത്ത് **[ ]** മറ്റുള്ളവ (വ്യക്തമാക്കുക----------)

12. കുട്ടിയുടെ പിതാവിന്റെ വിദ്യാഭ്യാസ യോഗ്യത എന്താണ്?

[ ]പ്രൈമറി സ്കൂൾ (1-7 വരെ) **[ ]**ഹൈ സ്കൂൾ (8-10 വരെ)

[ ]ഹയർ സെക്കന്ററി(11-12 വരെ) **[ ]**ബിരുദം/ ഡിപ്ലോമ

[ ] ബിരുദാനന്തരബിരുദം **[ ]** മറ്റുള്ളവ (വ്യക്തമാക്കുക----------)

13.കുട്ടിയുടെ പിതാവിന്റെ തൊഴിൽ എന്താണ്?

[ ]തൊഴിലില്ല **[ ]**സ്വയം തൊഴിൽ **[ ]**സർക്കാർ മേഖലയിൽ

[ ]സ്വകാര്യമേഖലയിൽ **[ ]** കൂലിപ്പണി **[ ]** വിദേശത്ത്

[ ] മറ്റുള്ളവ (വ്യക്തമാക്കുക)

14. ഇത് താങ്കളുടെ എത്രാമത്തെ കുട്ടിയാണ്?----------

15. കുട്ടിയുടെ ജനനസമയത്തെ തൂക്കം എത്രയായിരുന്നു? ----------

16.നിങ്ങളുടെ വീട്ടിൽ പ്രത്യേക പരിഗണന ആവശ്യമുള്ള ഏതെങ്കിലും അംഗങ്ങൾ ഉണ്ടോ? (ഒന്നിൽ കൂടുതൽ ഉത്തരം തെരഞ്ഞെടുക്കാവുന്നതാണ്)

a. 5 വയസ്സിൽ താഴെ പ്രായമുള്ള കുട്ടികൾ **[ ]** ഉണ്ട് **[ ]** ഇല്ല

b. കിടപ്പിലായിപ്പോയ അംഗം **[ ]** ഉണ്ട് **[ ]** ഇല്ല

c. പ്രായമായവർ (70 വയസ്സിനു മുകളിൽ) **[ ]** ഉണ്ട് **[ ]** ഇല്ല

17.കുട്ടിക്ക് കഴിഞ്ഞ രണ്ടാഴ്ചക്കിടെ താഴെ പറയുന്ന ഏതെങ്കിലും അസുഖം വന്നിട്ടുണ്ടോ?(ഒന്നിൽ കൂടുതൽ ഉത്തരം തെരഞ്ഞെടുക്കാവുന്നതാണ്)

[ ] പനി **[ ]**ചുമ **[ ]** വയറിളക്കം

[ ] ശ്വാസംമുട്ട് **[ ]** മറ്റുള്ളവ (വ്യക്തമാക്കുക----------)

18. കുട്ടിക്ക് കഴിഞ്ഞ രണ്ടാഴ്ചക്കിടെ എപ്പോഴെങ്കിലും ആശുപത്രിയിൽ കിടക്കേണ്ടി വന്നിട്ടുണ്ടോ? **[ ]** ഉണ്ട് **[ ]** ഇല്ല

18.1 ഉണ്ടെങ്കിൽ ഏതസുഖം മൂലമാണ് ആശുപത്രിയിൽ പ്രവേശിപ്പിച്ചത്?

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19. കുട്ടിക്ക് സ്ഥിരമായി വിട്ടുമാറാത്ത എന്തെങ്കിലും അസുഖമുണ്ടോ?

[ ]ചുഴലി [ ]ഹൃദയസംബന്ധമായ അസുഖങ്ങൾ

[ ] ഹീമോഫീലിയ [ ] മറ്റെന്തെങ്കിലും (വ്യക്തമാക്കുക----------)

20. കുട്ടി ദീർഘകാലമായി എന്തെങ്കിലും മരുന്ന് കഴിക്കുന്നുണ്ടോ?

[ ] ഉണ്ട് [ ] ഇല്ല

ഉണ്ടെങ്കിൽ

20.1 ഏതസുഖത്തിനു വേണ്ടിയാണു കഴിക്കുന്നത്?----------

20.2 മരുന്നിന്റെ പേരെന്താണ്?----------

21. കുട്ടി എന്ത് തരം ഭക്ഷണമാണ് കൂടുതൽ കഴിക്കാനിഷ്ടപ്പെടുന്നത്?

[ ] സസ്യാഹാരം [ ] മാംസാഹാരം

22.കഴിഞ്ഞ രണ്ടു ദിവസങ്ങൾക്കിടയിൽ കുട്ടി ഏതെങ്കിലും സമയത്ത് ഭക്ഷണം കഴിക്കാതിരുന്നിട്ടുണ്ടോ?

[ ] ഉണ്ട് [ ] ഇല്ല

23. ഉണ്ടെങ്കിൽ താഴെ പറയുന്നവയിൽ ഏതാണ് കുട്ടി കഴിക്കാതെ പോയത്?

[ ]പ്രഭാതഭക്ഷണം [ ] ഉച്ചഭക്ഷണം [ ] അത്താഴം

24. കുട്ടി സ്കൂളിൽ നിന്ന് ഉച്ചഭക്ഷണം കഴിക്കാറുണ്ടോ? [ ] ഉണ്ട് [ ] ഇല്ല

24.1) ഉണ്ടെങ്കിൽ താഴെ പറയുന്നവയിൽ അനുയോജ്യമായത് തെരഞ്ഞെടുക്കുക

[ ] എല്ലാ സ്കൂൾ ദിവസങ്ങളിലും കഴിക്കും [ ] മിക്കവാറും ദിവസങ്ങളിൽ

[ ] വല്ലപ്പോഴും [ ] ഒരിക്കലും കഴിക്കാറില്ല

24.2) സ്കൂളിൽ ഉച്ചഭക്ഷണത്തിന്റെ ഭാഗമായി എന്തൊക്കെ വിഭവങ്ങളാണ് കൊടുക്കുന്നത് എന്ന് നിങ്ങൾക്ക് അറിയാമോ?

[ ] അറിയാം [ ] അറിയില്ല

24.3) താങ്കൾ എപ്പോഴെങ്കിലും സ്കൂളിൽ ഉച്ചഭക്ഷണം വിതരണം ചെയ്യുന്നത് നിരീക്ഷിച്ചിട്ടുണ്ടോ? **[ ]** ഉണ്ട് **[ ]** ഇല്ല

24.4) സ്കൂളിൽ കുട്ടിക്ക് കിട്ടുന്ന ഉച്ചഭക്ഷണത്തിന്റെ അളവ് പര്യാപ്തമാണ് എന്ന് തോന്നുന്നുണ്ടോ? **[ ]** ഉണ്ട് **[ ]** ഇല്ല

24.5) സ്കൂളിലെ ഉച്ചഭക്ഷണത്തിന്റെ ഗുണനിലവാരം തൃപ്തികരമാണ് എന്ന് തോന്നുന്നുണ്ടോ? **[ ]** ഉണ്ട് **[ ]** ഇല്ല

24.6 സ്കൂളിലെ ഉച്ചഭക്ഷണത്തെ സംബന്ധിച്ച് എന്തെങ്കിലും നിർദ്ദേശങ്ങൾ ഉണ്ടോ?

Annexure 8

കുട്ടിക്കുള്ള ചോദ്യാവലി

പ്രത്യേക ക്രമനമ്പർ :

സ്കൂൾ	ക്ലാസ്സ്	ഡിവിഷൻ	ക്രമനമ്പർ

(ഈ നമ്പർ പ്രധാന ഗവേഷകയാണ് നൽകുന്നത്)

[പ്രധാന ഗവേഷക സ്വയം പൂരിപ്പിക്കുന്നത്]

കുട്ടിയുടെ പേര് : ----------

ജനനതീയതി (സ്കൂൾ രജിസ്റ്ററിൽ നിന്ന്): ----------

ആണ്കുട്ടി / പെണ്കുട്ടി :----------

ജാതി (സ്കൂൾ രജിസ്റ്ററിൽ നിന്ന്): ജനറൽ / OBC / OEC / SC/ ST

കുട്ടിയുടെ പൊക്കം (സെന്റിമീറ്ററിൽ): ----------

കുട്ടിയുടെ തൂക്കം (കിലോഗ്രാമിൽ): ----------

അഭിമുഖത്തിനുള്ള ചോദ്യങ്ങൾ

1. ഇന്ന് രാവിലെ എന്ത് ഭക്ഷണമാണ് മോൻ/മോൾ കഴിച്ചത്?

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2. എന്നും രാവിലെ ഭക്ഷണം കഴിച്ചിട്ടാണോ സ്കൂളിൽ വരുന്നത്?

[ ] അതെ [ ] അല്ല

3. ഇന്ന് ഉച്ചക്ക് കഴിക്കാൻ ഭക്ഷണം കൊണ്ടുവന്നിട്ടുണ്ടോ?

[ ] ഉണ്ട് [ ] ഇല്ല

4. 'ഇല്ല' എങ്കിൽ ഇന്ന് സ്കൂളിൽ നിന്നാണോ ഉച്ചഭക്ഷണം കഴിക്കുന്നത്?

[ ] അതെ [ ] അല്ല

5. എപ്പോഴൊക്കെ സ്കൂളിൽ നിന്ന് കഴിക്കാറുണ്ട്?

[ ] എല്ലാ സ്കൂൾ ദിവസങ്ങളിലും [ ] മിക്കവാറും സ്കൂൾ ദിവസങ്ങളിൽ

[ ] വല്ലപ്പോഴും [ ] ഒരിക്കലും കഴിക്കാറില്ല

6. സ്കൂളിൽ നിന്ന് കിട്ടുന്ന ഉച്ചഭക്ഷണം ആവശ്യത്തിനു തികയാറൊണ്ടോ?

[ ] ഉണ്ട് [ ] ഇല്ല

7. സ്കൂളിൽ നിന്ന് ഉച്ചഭക്ഷണം കഴിക്കാൻ ഇഷ്ടമാണോ?

[ ] അതെ [ ] അല്ല

7.1 'അതെ' എങ്കിൽ എന്തുകൊണ്ടാണ് ഇഷ്ടമുള്ളത്?

7.2 'അല്ല' എങ്കിൽ എന്തുകൊണ്ടാണ് ഇഷ്ടമല്ലാത്തത്?

Annexure 9

श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान
तिरुवनन्तपुरम - 695 011, केरल, इंडिया
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY
THIRUVANANTHAPURAM - 695 011, INDIA
(An Institute of National importance under Govt. of India)

Institutional Ethics Committee
(IEC Regn No. ECR/189/Inst/KL/2013)

SCT/IEC/613/JUNE -2014 11-06-2014

Ms. Jayalakshmi Rajeev
MPH Student
AMCHSS, SCTIMST.

Dear Ms. Jayalakshmi Rajeev,

The Institutional Ethics Committee reviewed and discussed your application to conduct the study entitled "ASSESSMENT OF THE NUTRITIONAL STATUS OF PRIMARY SCHOOL CHILDREN WHO ARE THE BENEFICIARIES OF MID- DAY MEAL SCHEME : A CROSS-SECTIONAL STUDY IN KANJIRAPPALLY BLOCK PANCHAYATH""(IEC/613) on 7th June, 2014.

The following documents were reviewed:

1) *Cover Page.*
2) *Curriculum Vitae.*
3) *Thesis proposal.*
4) *Informed consent (English).*
5) *Informed consent (Malayalam).*
6) *Questionnaire for parents (English).*
7) *Questionnaire for parents (Malayalam).*
8) *Interview schedule for children (English).*
9) *Interview schedule for children (Malayalam).*
10) *Permission letter from AEO, Kanjirappally.*

Page 1 of 2

तार : चित्रमैट Grams : Chitramet
फोन Phone : 2443152
फाक्स Fax : (91)471-2446433 2550728
ई-मेइल E-mail : sct. @sctimst.ker.nic.in

The following members of the Ethics Committee were present at the meeting held on 7th June, 2014 at G. Parthasarathi Board Room, AMCHSS, SCTIMST.

SL. No.	Member Name	Highest Degree	Gender	Scientific /Non Scientific	Affiliation with Institution(s)
1.	Justice Gopinathan. P.S	BSc. LLB	Male	Legal Expert (Chairperson)	*No*
2.	Dr. Meenu Hariharan	DM	Female	Clinician (Gastro Enterologist)	*No*
3.	Dr. M.D. Gupte	MD, DPH	Male	Public Health	No
4.	Dr. R.V.G. Menon	PhD	Male	Lay Person	No
5.	Dr. Mala Ramanathan	MSc, PhD, MA	Female	Ethicist/Social Scientist (Member Secretary)	Yes

IEC Decision

The IEC approved the conduct of the study in the present form.

Remarks:

The Institutional Ethics Committee expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information/informed consent and asks to be provided a copy of the final report.

There was no member of the study team /guide who participated in voting / decision making process. The ethics committee is organized and operated according to the requirements of Good Clinical Practice and the requirements of the Indian Council of Medical Research (ICMR).

Sincerely,

Mala Ramanathan
Member Secretary, IEC