2017 Nutritional Status, Dietary Practices and Pattern of Physical Activity Among School Children Aged 6-12 Years

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NUTRITIONAL STATUS, DIETARY PRACTICES AND PATTERN OF PHYSICAL ACTIVITY AMONG SCHOOL CHILDREN AGED 6-12 YEARS 2016

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Medical Research Institute
In collaboration with UNICEF and World Food Programme
Ministry of Health, Nutrition and Indigenous Medicine

Message from Secretary - Ministry of Health, Nutrition & Indigenous Medicine

The survey on Nutritional status, dietary practices and pattern of physical activity among school children aged 6-12 years was carried out by the Nutrition Department of Medical Research Institute in collaboration with UNICEF and World Food Programme.

This is a comprehensive study to assess nutritional status among school children aged 6 – 12 years in Sri Lanka. Findings of this survey will be beneficial to future policy makers in their effort to improve the nutritional status of school children in the country and implement several new interventions to improve the nutrition of present and future younger generations.

I highly appreciate the efforts taken by the staffs of the Medical Research Institute, for successfully conducting this study. I am grateful to UNICEF & WFP for assisting to uplift the nutrition status of nation and investing on a very important venture of this nature.

Mr. Anura Jayawickrama
Secretary
Ministry of Health, Nutrition and Indigenous Medicine

Message from Deputy Director General (Education, Training and Research) Ministry of Health, Nutrition & Indigenous Medicine

This study conducted among school children aged 6-12 years, has provided us with valuable information regarding the nutritional status, dietary habits and physical activity pattern. This survey has assessed 8100 school children ages 6-12 years, representing all nine provinces of the country to yield information on their current nutritional status.

Findings of this survey can be used to assess the effectiveness of current interventions, and new interventions to be introduced to improve the nutritional status of school children, at national as well as community level.

The Department of Nutrition of Medical Research Institute has carried out many vital national surveys. I would like to take this opportunity to congratulate the survey team of Department of Nutrition at Medical Research Institute for this great piece of work. UNICEF and World Food Programme have been major contributors in the improvement of nutrition status of Sri Lanka and I would like to thank both these organizations for their continuous support.

I sincerely hope that findings of this survey will be used to achieve the targets implemented by the government. It is a privilege to lead such a team

Dr. Sunil De Alwis
Deputy Director General (ET&R)
Ministry of Health, Nutrition and Indigenous Medicine

Message from the Director - Medical Research Institute

The Department of Nutrition of Medical Research Institute has successfully completed the survey on Nutritional status, dietary practices and pattern of physical activity among school children aged 6-12 in 2016. This study will be useful to identify the current issues regarding the nutritional status of school children in Sri Lanka.

I highly appreciate the staff of the Nutrition Department for their effort and devotion for successfully completing this study. I also would like to extend my gratitude towards UNICEF and World Food Programme for their interest and support to accomplish this study.

I hope this survey will assist to strengthen and monitor the overall nutrition of school children in Sri Lanka.

Dr. W.L.U.C Kumarathilake
Director
Medical Research Institute

Message from the Country Director - World Food Programme

Nutrition is central to the social and economic development of a nation. Malnutrition, in all its forms, and especially amongst children and young people, is a major public health concern. It has significant socio-economic implications, which carry over into adulthood, raising the risk of developing chronic diseases in later life. The 2017 National Strategic Review of Food Security and Nutrition towards Zero Hunger led by SAPRI in consultation with key stakeholders recommended that innovative and integrated strategies are required to address stagnant levels of undernutrition, and trends of overnutrition linked to diet-related chronic diseases.

According to the findings of the survey "Nutritional status, dietary practices and pattern of physical activity amongst school children aged 6-12 years", the first ever survey carried out amongst this age group, by the Medical Research Institute (MRI) in 2016, one in three school children in Sri Lanka aged 6-12 years were found to be too thin and one in ten children of the same age group were too short for their age. In a country with universal access to healthcare, more than 90% literacy rate and achieving the status of Middle Income Country since 2010, these alarming rates are unacceptable.

WFP has been supporting the Government of Sri Lanka to provide nutritious school meals to 160,000 primary school children in all 5 districts in the Northern Province and remains committed to promote optimum nutrition in schools through nutrition-sensitive school meal programmes. Based on more than 50 years of global experience, we believe that healthy, well-fed children learn better and thus stand a much better chance of reaching their full potential in life. The Cost-Benefit Analysis carried out by WFP and MasterCard in 2015 found that every dollar invested in the school meals programme brings an economic return of USD 8.32 over the lifetime of a child in Sri Lanka.

WFP would like to congratulate Dr. Renuka Jayatissa and her team from MRI for carrying out this timely survey as it will provide key stakeholders with much-needed information on the nutrition status of primary school-aged children, and will thus inform the national agenda to end hunger, achieve food security and improve nutrition. Importantly, it will serve as a critical baseline to better measure the impact of our joint efforts towards achieving SDG 2.

WFP is very pleased to have supported the Government of Sri Lanka and MRI, through the generous financial support of the United Nations Sustainable Development Goal Fund (SDG-F), to undertake this survey, which will go a long way to better understand the nutrition situation amongst school aged children in Sri Lanka. The SDG-F is an international multi-agency and multi-donor development mechanism created in 2014 by UNDP with an initial contribution from

the Government of Spain to support sustainable development activities through integrated and multidimensional joint programmes. The main objective of the SDG-F is to bring together UN agencies, national governments, academia, civil society and business to address the challenges of poverty. The SDG-F Joint Programme for "Scaling Up Nutrition through a Multi-Sector Approach" is implemented by WFP and the Food and Agriculture Organization of the United Nations together with the Government in Sri Lanka.

It is clear from the results of the survey that more work is yet to be done, including needed collaboration and coordination between sectors to improve the nutrition situation in Sri Lanka. It is against this landscape that WFP extends our commitment to support the Government of Sri Lanka on its journey to address these issues and to achieve Zero Hunger by 2030.

Brenda Barton
Country Director, World Food Programme

Message from the UNICEF Country Representative

Good nutrition is the foundation of child survival and development and plays an important role in keeping children strong, healthy and free of disease.

The effects of poor nutrition begin in the womb, continue well into adulthood and can trap generations of children in a cycle of poverty. UNICEF's lifecycle approach for nutrition programming recognizes the key stages starting from pregnancy through to infancy including the crucial window of the first thousand days of a child's life; and thereafter the period of childhood transitioning into adolescence and adulthood.

In Sri Lanka, UNICEF is committed to support national efforts to advance child health and nutrition particularly, in advancing the nutritional status of children. Evidence based approaches to understanding the nutrition paradox is crucial for decision making and policy planning. This is especially relevant from an equity perspective, to better understand the causes and consequences of malnutrition.

In 2016 UNICEF and WFP collaborated with the Ministry of Health to conduct a national survey on the nutritional status, dietary practices and pattern of physical activity among school children aged 6 to 12 years. The study highlights the need for more concerted efforts in addressing the wide regional disparities in the nutritional status of children in the country including food consumption and physical activity levels among provinces.

Investing in nutrition is a key priority. Children who are well nourished, are better able to grow, learn and thrive. Evidence suggests that an increasing number of children can become either overweight, obese or anaemic, placing them at greater risk for non-communicable diseases and disability, which can persist into adulthood. Swift and sustainable actions is now required to ensure the healthy development of our future generations. We thank the Ministry of Health and the World Food Programme for collaborating with UNICEF on this research study.

Tim Sutton
Country Representative, UNICEF

Acknowledgements

We wish to thank everyone for their contribution to this project; It is however impossible to name them all.

We are grateful to Mr. Anura Jayawickrama, Secretary, Ministry of Health, Nutrition and Indigenous Medicine for providing support continuously. We would like to thank Dr. L. Siyambalagoda, acting Additional Secretary, Dr. P.G. Mahipala, Director General of health services and Dr. Sunil De Alwis, Deputy Director General, education, training and research for their leadership.

We would also like to thank Dr. Sumith Ananda, former Director of MRI and Dr. W.L.U.C. Kumarathilake, current director of MRI for their support and direction.

We deeply appreciate UNICEF and WFP for the motivation to begin and complete this study and their generous contribution.

Last but foremost in mind are the pivotal operators: The Provincial Directors of Health, Regional Directors of Health, public health staff, the principals of the schools, teachers, parents and children. To one and all we wish to say we are deeply indebted to you for having been partners in this study.

Dr. Renuka Jayatissa
Principal Investigator
Head, Department of Nutrition
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1 Introduction

Provision of a free education system to all children is a key welfare measure that was in existence in Sri Lanka even prior to independence. This measure along with the legal requirement for school attendance for all children in the age group 5 – 14 years ensured that most of the Sri Lankan children in this age group attended school.

At present, a majority of the schools in the country belong to the government sector with a limited number of private schools. Currently there are approximately 10,000 schools under the state sector[1]. Available data shows that of a total of 1,717,092 children are attending state sector schools in 2015, of whom, 143,330 (41.8 percent) are considered as primary school children, belonging to the age group 5 – 12 years.

In Sri Lanka, several studies have been carried out among primary school children that show nutritional problems are important among this group[2,3,4]. There are many studies both in Sri Lanka and elsewhere that show the effects of under nutrition on school performance with poor nutritional status being associated with poor school performance[5,6,7].

Responding to the identified important of nutritional problems among schoolchildren and their association with school performance, several interventions have been in place aimed at improving their nutritional status. They include: annual school medical inspection of children in grade 1 and 4, weekly iron/folic supplementation, Vitamin A mega dose annually, mid-day meal programme, home gardening programme and many others that focus on improving health and nutrition of school children such a school health clubs.

However, in spite of implementation of several interventions to improve the nutrition of the school child, there is a concern that expected improvements may not have taken place amongst school children. Further, it was recognized that gaps in information pertaining to this age group exists with the last survey amongst school children having taken place in 2013. Although regular assessment of children takes place at school medical inspections using BMI for age, there has not been a representative survey conducted to inform the situation.

Hence this study was undertaken with the following objective:

Objectives

1. To assess the nutritional status, dietary patterns and physical activity among school children aged 6-12 years.

2 Methods

2.1. Study design

This study used a cross sectional study design among school children 6-12 years of age. A nationally representative sample of school children aged 6-12 years were identified to be included in the study. This study included the following activities:

- Selection of subjects and obtaining information on age, sex and other identifying information
- Obtaining information on dietary practices and physical activity from the parent/ guardian of the participants using a self-administered questionnaire
- Anthropometry to assess nutritional status of children
- Estimation of haemoglobin level in a sub sample to assess anaemia

2.2. Sample size

Calculated sample size was 900 per province to represent the provincial level. From each province, 30 clusters (schools) were included and 30 participants were selected from each cluster, thus including 8100 students as the sample size (30x30x9).

2.3 Selection of subjects

Multistage stratified cluster sampling technique was used. From a list of schools obtained from the Ministry of Education, all schools having grades 2-7 were identified. As the first stage of sampling, 30 schools were selected from each province, using 'population proportion to sampling (PPS)' technique. Within each selected school, lots were drawn to select the grade in which the study sample was to be identified.

From each school, one class was randomly selected for the study from the selected grade. All children in the selected class were included in the study (Given that most classes had more than the targeted 30 students, this led to the inclusion of a higher number of participants compared to the calculated sample size).

Informed written consent was obtained from the parents through a letter from the investigator forwarded through the class teacher.

2.4 Method of data collection

All children who had obtained the consent of their parents and were present on the day of the study were identified as participants. A structured format was developed to obtain identification data, age and sex of children. Trained interviewers collected data.

A self-administered questionnaire was sent to the mother/guardian through the child to obtain information on the pattern of food consumption of the chid, in relation to the practices as relevant to the child's during school days. The pattern of consumption of selected food items by the child during the previous day while at home, was obtained from the mother/ guardian from responses to the questions on the foods consumed from the time the child woke up in the morning until the time he/she went to bed at night. These data were limited to responses 'yes' or "no' and no quantitative estimates were sought for.

2.5 Anthropometry

Height and weight measurements were measured on all children. Children's age was assessed based on date of birth from the class attendance register.

Anthropometric indicators of height-for-age and BMI-for-age-sex were determined using WHO growth reference (2007).

Measurers were specially trained in conducting anthropometry using standardized procedure. They have experience in taking measurements in several nutrition surveys conducted by the MRI for last 10 years. Weight was measured using Seca electronic scale (minimum 100g) and height was measured using stadiometers (minimum 0.1 cm). Weighing instruments were calibrated before taking measurements, using standard weights. Standard WHO protocol for measuring height and weight of children were used.

2.6 Collection of blood samples

Finger prick blood samples were obtained by MRI survey team for assessment of haemoglobin using HemoCue method in randomly selected sub sample (five schools) from each province. Twenty children were randomly selected from the class already selected for the study amounting to 100 children for Hb assessment in each province. Control cuvette was used for quality control. All high and low samples were measured in duplicate and mean was taken.

2.7 Data Entry

Data were entered by the 4 data entry operators supervised by the Principle Investigator. A unique ID number was used for each child. Data were entered in the EPINFO-6 software package.

2.8 Data Analysis

Descriptive statistics:

Distribution of categorical variables was computed and frequencies and percentages were reported along with the means and standard deviations of quantitative variables. For variables with multiple responses, percentage rankings of the most frequent responses were presented. The data analysis was carried out using the software, Statistical Package for Social Sciences (SPSS version 21).

Bivariate analysis:

In the bivariate analysis, the association of nutritional status and anaemia with each dependent variable were assessed. Variables were categorized into biologically and socially meaningful categories, wherever required. Weighted data (using province populations) was utilised for making assessments on national level prevalence.

2.9 Ethical Issues

Informed written consent was obtained from parents of all the participants of the study. The consent form explicitly outlines the aims and objectives of the study along with the strict confidentiality of the participants. Approval was obtained from the ethical review committee of the MRI, Ministry of Health.

The investigators obtained informed consent from all representatives of the communities involved in this study. In the beginning, all aspects of the study were discussed with the Provincial and District Directors of Health Services and their approval obtained.

2.10 Definitions

2.10.1 Nutritional status

The following diagnostic criteria were used to categorize nutritional status according to WHO criteria.

Stunting: Children whose height was < -2SDS for height-for-age of WHO reference were classified as "stunting".

Severe thinness: Children whose BMI was < -3SDS for BMI-for-age of WHO reference were classified as "severely thin".

Thinness: Children whose BMI was < -2SDS for BMI-for-age of WHO reference were classified as "thin".

Normal: Children whose BMI-for-age SDS was between < -2SDS and + 1 SDS for of WHO reference were classified as "normal".

Overweight

Overweight was defined as a BMI for age > +1 SDS

Obesity

Obesity was defined as a BMI for age > +2 SDS

2.10.2 Classification of anaemia

Classification of anaemia was based on WHO 2011 criteria in diagnosis of anaemia[8].

Mild anaemia - Children with Hb 11.0 – 11.4 g/dl
Moderate anaemia - Children with Hb 8.0 – 10.9 g/dl
Severe anaemia - Children with Hb < 8.0 g/dl

3 Results

3.1 Description of the study population

A total of 8,405 children aged 6-12 years from nine provinces were identified as the study population. Of them, 4,151 (49.4 percent) were males and 4,254 (50.6 percent) were females (Table 1).

Table 1: Distribution of study population by selected socio-demographic characteristics

Basic characteristics	Number of Children	Percentage
Age of the child in years		
6	597	7.1
7	1179	14.0
8	1448	17.2
9	1490	17.7
10	1459	17.4
11	1421	16.9
12	811	9.6
Sex of the child		
Female	4254	50.6
Male	4151	49.4
Educational level of mother		
No schooling	259	3.1
Grade 1-5	663	7.9
Grade 6-11	2288	27.2
Passed O/L	1887	22.5
Passed A/L	1449	17.2
Diploma/Degree/Higher	443	5.3
No mother	38	0.5
Not recorded	1378	16.4
Total	**8405**	**100.0**

Age distribution showed that approximately 17 percent of children belonged to each of the ages 8, 9, 10 and 11 years with the lowest percentage being in the age group 6 years (7.1 percent). Inquiry as to the educational level of the mothers, showed that such information was not available from 16.4 percent of the mothers and 0.5 percent of the children, where the mother was not available. Among the mothers of children in whom data on educational status was available, 27.2 percent had studied up to grades 6-11 with another 22.5 percent and 17.2 percent of them having passed GCE (Ordinary Level) and GCE (Advanced level) examinations, respectively.

3.2 Nutritional status

Prevalence of stunting, low BMI (thinness), overweight and obesity were assessed using anthropometric data and prevalence of anaemia was assessed with haemoglobin estimation.

3.2.1 Stunting

All children who had low height for age (< -2SD height-for-age of WHO reference) were identified as being stunted. Of the children included in the study, 11.5 percent were stunted and 1.6 percent were severely stunted (Table 2).

Table 2: Prevalence of stunting among children aged 6-12 by selected characteristics

Background Characteristics	Stunted (%)		Number of children
	Severe	Global	
Age in years			
6	1.0	9.9	597
7	1.4	8.2	1179
8	0.8	7.7	1448
9	1.1	9.1	1490
10	0.9	12.0	1459
11	2.5	15.2	1421
12	4.6	21.1	811
Sex of the child			
Female	1.8	12.6	4254
Male	1.4	10.3	4151
Mother's education*			
No schooling	2.7	20.5	259
Grade 1-5	2.1	17.2	663
Grade 6-11	2.2	13.8	2288
Passed O/L	1.1	11.0	1887
Passed A/L	1.0	6.6	1449
Diploma/Degree/Higher	0.7	5.0	443
No mother	5.3	10.5	38
Not recorded	1.7	11.2	1378
Province*			
Western	0.8	8.0	893
Central	2.0	13.9	951
Southern	1.6	13.1	807
Northern	2.1	14.1	994
Eastern	2.2	11.5	1049
North Western	1.1	9.8	1020
North Central	1.2	10.6	912
Uva	2.1	11.7	863
Sabaragamuwa	1.3	10.6	916
Sri Lanka	**1.6**	**11.5**	**8405**

(* significant at 1% level)

It is shown that prevalence of stunting increased with increasing age, with the percentages of stunted children varying from 9.9 percent among the 6 year old group to 21.1 percent among those who were 12 years old. Considering the mothers of children among whom information on educational level was available, prevalence of stunting decreased with increasing levels of education.

A wide inter provincial variation was seen, with the prevalence ranging from a low value of 8.0 percent in Western Province to 14.1 percent in Northern Province. Severe stunting varied from 0.8 percent in Western Province to 2.2 percent in Eastern Province.

3.2.2. Prevalence of thinness, overweight and obesity

Using the indicator body mass index (BMI) for age and sex, those who had BMI <-3SD of WHO reference were considered as severely thin children, BMI <-2SD of WHO reference were considered as thin children, BMI between +1SD and +2SD of WHO reference were considered as overweight children and >+2SD of WHO reference were considered as obese children.

Prevalence of thinness for the total sample was 30.2 percent and severe thinness was 9.7 percent (Table 3). Among these children, 6.1 percent were identified as being overweight and 2.9 percent to be obese.

Prevalence of thin children was highest among the 6 years old with this value showing a decline with increasing age with the exception of the percentage among 10 years old children which shows the highest percentage of 33.9 percent. Highest severe thinness is reported among 10year old children (12.1 percent).

Male children showed a higher prevalence of thinness (34.6 percent) and severe thinness (11.7 percent) compared to the females (25.9 and 7.7 percent respectively).

Among the children whom information on mother's educational level was available showed that prevalence of thinness decreased with increasing levels of education. Children whose mother was not available, had highest level of severe thinness (12.1 percent).

Highest prevalence of severe thinness was seen Central province (12.5 percent). A wide inter provincial variation was seen with the prevalence of thinness ranging from a low value of 21.4 percent in Western province and highest in Central province (34.8 percent).

Prevalence of overweight children was highest among the 11 years old with this value showing an increase with increasing age with the exception of the percentage among 12 years old children. Highest obesity is reported among 12year old children (4.1 percent).

Female children showed a higher prevalence of overweight (6.7 percent) compared to the males (5.4 percent). Male children showed a higher prevalence of obesity (3.4 percent) compared to the females (2.4 percent). Among the children whom information on mother's educational level was available showed that prevalence of obesity increased with the increasing level of mother's education up to A/L.

Prevalence of obesity is highest in Western province (4.9 percent) and lowest in Uva province (1.7 percent). Overweight prevalence varied from 10.9 percent in Western Province to 4.0 percent in Central Province.

Table 3: Distribution of study population by BMI categories and by background characteristics

Background characteristic	BMI categories (%)					Number of children Investigated
	Severe thinness <-3SD	Thin -3SD to -2SD	Normal -2SD to 1SD	Overweight 1SD to 2SD	Obese >2SD	
Age in years						
6	9.0	31.5	55.2	2.5	1.8	597
7	8.5	31.1	54.0	3.9	2.5	1179
8	8.1	28.5	55.8	5.1	2.5	1448
9	8.7	28.7	52.6	6.8	3.2	1490
10	12.1	33.9	44.5	6.5	3.0	1459
11	10.3	29.6	49.4	8.0	2.7	1421
12	11.1	28.0	48.9	7.9	4.1	811
Sex of the child						
Female	7.7	25.9	57.3	6.7	2.4	4254
Male	11.7	34.6	44.9	5.4	3.4	4151
Mother's education						
No schooling	10.4	36.3	49.4	3.5	0.4	663
Grade 1-5	10.4	35.0	47.5	5.4	1.7	2288
Grade 6-11	11.1	31.5	50.4	4.9	2.4	1887
Passed O/L	9.8	29.8	50.8	6.4	3.2	1449
Passed A/L	7.8	26.2	54.9	7.5	3.6	443
Diploma/Degree/Higher	7.4	24.4	55.5	9.5	3.2	38
No mother	13.2	28.9	44.7	7.9	5.3	1378
Not recorded	9.4	31.1	50.4	5.7	3.4	259
Province						
Western	6.5	21.4	56.3	10.9	4.9	893
Central	10.8	33.2	48.0	5.6	2.4	951
Southern	12.5	34.8	46.7	4.0	2.0	807
Northern	9.3	31.6	51.4	5.1	2.6	994
Eastern	8.8	30.0	53.4	4.7	3.1	1049
North Western	12.0	31.7	48.6	5.1	2.6	1020
North Central	8.3	26.0	53.3	8.7	3.7	912
Uva	8.7	28.9	55.4	5.3	1.7	863
Sabaragamuwa	10.4	34.0	47.6	5.5	2.5	916
Sri Lanka (95% CI)	**9.7 (9.1-10.3)**	**30.2 (29.2-31.2)**	**51.1 (50.0-52.2)**	**6.1 (5.6-6.6)**	**2.9 (2.6-3.3)**	**8405**

3.2.3. Prevalence of anaemia

All children who had haemoglobin levels <11.5 g/dl after adjusting for altitude was identified as being anaemic. Severe, moderate and mild anaemia were defined as haemoglobin level < 8.0, 8.0-10.9 and 11.0-11.5 g/dl respectively.

Table 4: Prevalence of anaemia by background characteristics

Background characteristics	Anaemia (%)			Total Number of Children
	Mild	Moderate	All forms	
Age category				
6 – 9 years	8.1	5.4	13.5	482
10 – 12 years	5.6	2.6	8.2	390
Sex of the child				
Female	8.6	4.5	13.1	421
Male	5.5	3.8	9.3	451
Educational status of the Mother				
No schooling	3.2	12.9	19.4	31
1-5	2.3	5.8	8.1	86
6-11	3.7	11.2	14.9	269
Passed O/L	4.0	7.5	11.6	199
Passed A/L	2.3	3.0	5.3	132
Diploma/Degree/Higher	3.1	3.1	6.3	32
No mother	33.3	0.0	33.3	3
Not recorded	8.3	8.3	16.7	120
Province				
Western	5.1	3.0	8.1	99
Central	5.6	7.9	13.5	89
Southern	6.0	0.0	6.0	100
Northern	10.0	2.0	12.0	100
Eastern	1.0	5.0	6.0	100
North Western	8.2	2.1	10.3	97
North Central	6.2	8.2	14.4	97
Uva	6.4	6.4	12.8	94
Sabaragamuwa	18.8	3.1	21.9	96
Sri Lanka (95% CI)	**7.0 (6.2-9.9)**	**4.1 (2.9-5.7)**	**11.1 (10.1-14.5)**	**872**

Of the total sample, 11.1 percent were identified as being anaemic. Prevalence of moderate and mild anaemia were 4.1 and 7.0 percent respectively. Table 4 shows the prevalence of anaemia by selected background characteristics.

As shown in table 4, prevalence of anaemia was higher among the 6-9 year age group (13.5 percent) compared to 10-12 year age group (8.2 percent). Prevalence was higher among the females. No clear pattern is seen in relation to the mother's educational status.

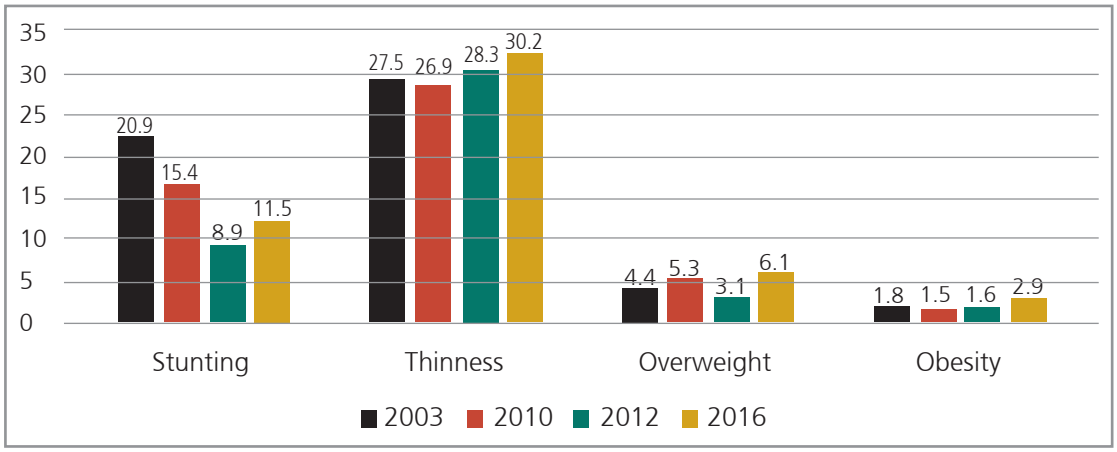
Wide inter provincial variation in the prevalence of anaemia was seen and highest prevalence was seen in the Sabaragamuwa province (21.9 percent).

3.2.4 Trends in nutritional status

Comparison of prevalence data on nutritional status indicators between the four surveys carried out by MRI in 2003, 2010, 2012 and 2016 are presented in figure 1.

Prevalence of stunting show a decline from 2003 to 2012 with an increase in 2016. Data for prevalence of thinness is higher comparatively and show that the values have not declined but has shown an increase, the highest value of 30.2 percent in 2016. The prevalence of overweight and obesity though low, does show an upward trend.

Figure 1: Trends of nutritional status in schoolchildren from 2003-2012 (Source: MRI 2003, 2010, 2012, 2016)



3.3. Food consumption

School Meal Programme of the Ministry of Education provides nutritious meals daily to 2800 schools in the country. Information on the food consumption pattern on the day prior to that on which the self-administered questionnaire was completed by the mother/guardian was obtained. It included:

i. Food intake pattern in relation to school attendance
ii. Consumption pattern of selected food items on a given day (the day prior to that on which the parent/ guardian completed the questionnaire)

The self-administered questionnaire sent to be completed by parents was not returned in respect of 13.5 percent of the children. Among the children who provided information, 62.1 percent of the children consumed breakfast before going to school (Table 5). Among the total group, 74.0 percent took a food item from home for consumption during the school interval with 35 percent of them receiving a mid-day meal from the school.

3.3.1 Breakfast

For the total group of children, 62.1 percent were taking breakfast before going to school with a marginally higher proportion of females doing so. This percentage increased with increasing levels of education of the mother. Wide inter province variations in the percentage of children taking breakfast before going to school was seen, this value ranging from 54.8 percent in Southern province to 83.8 percent in Northern province.

3.3.2. Mid-day meal from home

Among the children who took a mid-day meal from home, there were more females and the percentage increased with increasing levels of educational status of the mother. Inter province variations in the percentage of children who took mid-day meal from home ranged widely from a low value of 54.9 percent in Eastern province to 84.3 percent in Western province.

3.3.3. Mid-day meal from school

Among the 35 percent of children who received mid-day meal from school, there were more males. This percentage decreased with increasing levels of education of mother. Wide inter provincial variations show the beneficiaries to be low in the Western province (20.0 percent) and highest percentage (85.1 percent) from Sabaragamuwa province.

Among the 35 percent of the children who received the mid day meal from school, 40.7 percent had breakfast at home prior to going to school (Table 6.I) and 35.2 percent of the children had taken a food item from home to be consumed during the morning break (Table 6.II).

Table 5: Food intake pattern among children during school days by selected background characteristics

Background characteristic	Percentage of children taking		
	Breakfast before going to school	Mid-day meal from home	Mid-day meal from school
Age in years			
6	54.9	75.2	50.4
7	61.6	74.3	42.8
8	59.7	73.4	40.3
9	60.6	71.9	43.0
10	66.9	76.6	31.5
11	63.5	74.9	18.5
12	64.1	71.3	23.4
Sex of the child			
Female	63.0	75.0	33.9
Male	61.2	72.9	36.2
Mother's education			
Not recorded	12.2	11.8	8.3
No schooling	69.1	78.0	49.0
Grade 1-5	69.7	77.1	46.9
Grade 6-11	70.9	82.4	44.5
Passed O/L	70.1	90.0	41.2
Passed A/L	74.8	90.5	31.3
Diploma/Degree/Higher	80.4	93.9	27.5
No mother	68.4	78.9	52.6
Province			
Western	55.0	84.3	20.0
Central	63.6	81.5	21.0
Southern	54.8	69.5	20.1
Northern	83.8	60.3	85.1
Eastern	61.3	54.9	41.6
North Western	56.1	76.0	23.8
North Central	58.2	76.9	31.4
Uva	61.5	83.7	33.0
Sabaragamuwa	62.6	82.5	33.4
Overall	**62.1**	**74.0**	**35.0**

Table 6.I: Pattern of participation in the school mid-day meal programme, by children who took breakfast at home prior to going to school

Taking school mid-day meal	Breakfast before going to school (%)		Total
	Yes (%)	No (%)	
Yes	2124 (40.7)	819 (25.7)	2943 (35.0)
No	3097 (59.3)	2365 (74.3)	5462 (65.0)
Total	**5221**	**3184**	**8405**

Table 6.II: Pattern of participation in the school mid-day meal programme, by children those who took a mid-day meal from home

Taking school mid-day meal	Taking mid day meal from home		Total
	Yes %	No%	
Yes	2190 (35.2)	753 (34.4)	2943 (35.0)
No	4028 (64.8)	1424 (65.6)	5462 (65.0)
Total	**6218**	**2187**	**8405**

3.3.4 Nutritional status of children in relation to food consumption pattern

As shown in Table 7, prevalence of anaemia was lower among the children who consumed breakfast prior to attending school and those taking the mid-day meal from home. Conversely, the prevalence was higher among those children who took the mid-day meals from school.

The percentage of stunted children was marginally higher among those who took breakfast before going to school and those who took the mid-day meal from school.

Considering the BMI groupings, children who were thin were more among those who took breakfast before going to school and those who took the mid–day meal from school.

Percentage of children belonging to the overweight group was lower among those who took breakfast before going to school and those who took the mid-day meal from school. Among the children identified as being 'obese', the percentage was marginally lower among those who did not have breakfast before going to school and was marginally higher among those who did not take a mid day meal from home.

Table 7: Nutritional status of children in relation to the food intake pattern during school days (n=8405)

Nutritional Status	Breakfast before going to school (%)		Midday meal from home (%)		School midday meal (%)	
	Yes	No	Yes	No	Yes	No
Anaemia						
Yes	10.7	14.7	11.7	13.7	13.6	11.2
No	89.3	85.3	88.8	86.3	86.4	88.8
p value		p=0.05		p=0.2		p=0.2
Stunting						
Yes	12.0	10.7	11.2	12.3	12.7	10.8
No	88.0	89.3	88.8	87.7	87.3	89.2
p value		p=0.04		p=0.08		p<0.001
BMI group						
Thin	32.0	30.5	29.6	31.9	32.7	28.8
Normal	61.2	60.5	61.2	59.9	60.1	61.3
Overweight	6.0	6.2	6.4	5.0	4.9	6.7
Obese	2.8	2.9	2.8	3.2	2.3	3.1
p value		p=0.9		p=0.02		p<0.001

3.3.5 Food consumption pattern on the day prior to the interview (reported by the mother)

This information was obtained based on the responses to the question as to 'whether the child consumed the given food items during the time that he/she woke up in the morning and the time he/she went to bed', provided by the mother/ guardian. No quantifiable information was available from this assessment. Tables 8A and 8B present the data obtained.

Perusing the overall pattern of consumption of the food items, it is seen that the most frequently consumed foods were cereals and vegetables other than yellow vegetables. This is to be expected as the main meal of most Sri Lankans include 'rice and curry' (vegetables). Two third had consumed 'other fruits' and milk or milk products. Among the protein rich foods, most frequently consumed item is fish, with a lower consumption of eggs and meat. Among the least consumed items were other yams and yellow fruits.

Consumption of snacks and soft drinks are at a lower level (a positive feature) while that of oily foods and sugary foods, biscuits/cakes are at a relatively high level.

Consumption by the males and females do not show a clear pattern and the variation is marginal. Educational status of the mother/ guardian seem to influence the pattern of consumption of cereal, fruits, fish products and milk products showing an increase, with increasing levels of education, with the reverse being seen in the consumption of short eats and soft drinks.

An important observation is the wide inter provincial variation in the consumption pattern of the different food items.

Table 8 I: Percentage of children who consumed the food groups by selected background characteristics (N= 8405)

Characteristics	Cereals	Bread products	Pulses	Yellow vegetable	Other yams	1Other vegetable	2Green vegetable	Yellow fruits	3Other fruits	Eggs
Age in years										
6	76.9	52.3	63.3	33.2	47.7	72.9	53.8	39.4	63.7	44.1
7	77.6	51.9	62.5	32.9	46.7	71.8	51.7	36.5	64.1	43.5
8	75.7	51.5	60.4	32.9	44.6	68.6	49.5	36.8	61.7	45.5
9	72.1	51.8	57.7	30.5	45.3	67.7	49.7	37.4	58.6	45.7
10	73.7	52.1	62.0	33.0	50.9	72.1	53.4	43.1	61.9	46.0
11	72.9	50.1	58.1	32.1	42.0	71.4	50.8	38.2	60.5	41.1
12	75.6	52.3	56.6	28.2	45.0	71.3	51.2	36.3	62.5	40.6
Sex of the child										
Female	75.0	51.2	60.7	53.4	32.8	72.1	53.4	38.7	62.6	44.6
Male	74.2	52.0	59.2	48.9	31.0	68.8	48.9	37.9	60.5	43.4
Mother's education										
No schooling	78.0	64.1	64.5	56.0	33.6	77.2	56.0	49.8	66.8	59.1
Grade 1-5	79.3	60.9	60.2	53.2	35.0	74.2	53.2	47.2	62.4	50.5
Grade 6-11	86.3	59.7	64.3	55.3	32.7	79.4	55.3	45.5	67.7	46.5
Passed O/L	88.5	57.8	70.7	61.8	37.3	82.6	61.8	43.5	73.6	51.2
Passed A/L	90.3	59.8	77.9	65.8	42.2	87.9	65.8	42.4	78.1	54.0
Diploma/Degree/Higher	90.1	61.9	84.4	64.1	45.4	88.5	64.1	40.2	79.7	60.3
No mother	81.6	71.1	60.5	52.6	47.4	73.7	52.6	50.0	78.9	57.9
Not recorded	11.6	10.4	10.1	8.3	5.8	11.9	8.3	7.8	9.5	8.0
Province										
Western	76.8	56.1	68.6	39.2	43.3	75.5	59.1	27.3	66.1	45.1
Central	75.5	55.1	60.9	33.2	44.5	74.0	50.5	38.1	63.1	46.2
Southern	69.0	37.9	57.7	28.1	35.6	65.2	50.4	30.7	58.3	37.7
Northern	83.5	79.2	61.7	38.2	63.6	70.3	50.9	46.1	60.0	49.0
Eastern	70.3	54.1	43.5	28.8	47.5	55.9	41.6	44.7	50.8	43.3
North Western	70.8	44.0	558	28.4	42.7	68.6	50.0	30.1	59.7	41.7
North Central	72.5	42.3	61.3	27.2	47.6	72.6	49.7	43.2	59.4	42.4
Uva	75.7	44.0	65.6	31.6	45.7	77.2	53.8	49.6	66.0	43.2
Sabaragamuwa	77.1	47.8	67.2	32.3	48.3	77.3	56.7	34.0	72.3	46.6
Overall	**74.6**	**51.6**	**59.9**	**31.9**	**46.8**	**70.5**	**51.2**	**38.3**	**61.5**	**44.0**

[1] All vegetables except yellow coloured e.g. bean, okra, brinjol etc.

[2] Green vegetables: green leaves, salads etc.

[3] Other fruits mean except yellow coloured e.g. melon, plantain, grapes, apple etc.

Table 8 II: Percentage of children who consumed the food item by selected background characteristics (N= 8405)

Characteristics	Meat	Fish products	Milk products	Oily foods	Sugar products	Snacks	Soft drinks	Biscuits/ Cakes	Candy/ Chocolates
Age in years									
6	31.5	67.7	60.5	70.4	70.4	28.1	21.4	68.2	50.6
7	31.7	64.4	58.9	70.6	67.3	24.1	22.7	64.4	44.2
8	35.4	63.7	58.6	67.4	68.4	28.5	26.0	64.6	46.0
9	37.4	60.7	56.8	65.0	66.2	28.2	24.4	62.1	44.3
10	36.6	67.0	58.3	73.0	72.4	30.0	28.1	66.9	49.3
11	36.2	62.5	55.4	69.5	68.3	27.3	27.9	62.6	43.9
12	32.6	65.8	53.9	72.1	70.5	36.7	29.3	64.1	46.0
Sex of the child									
Female	34.6	65.2	57.5	70.0	68.5	27.8	25.5	65.0	47.0
Male	35.5	63.0	57.3	68.8	69.3	28.3	26.4	63.4	44.9
Mother's education									
No schooling	57.1	70.3	55.2	75.7	82.6	44.8	40.9	80.3	58.3
Grade 1-5	41.8	74.1	60.5	78.4	78.1	36.3	37.3	73.6	57.8
Grade 6-11	38.2	73.2	62.2	79.8	80.2	31.5	33.8	72.7	54.7
Passed O/L	42.2	74.4	66.5	81.0	79.8	31.6	28.1	75.8	51.4
Passed A/L	36.6	76.1	74.9	82.3	80.1	30.8	22.5	75.8	50.8
Diploma/Degree/Higher	42.7	80.8	81.3	83.5	81.0	29.8	21.9	72.9	46.7
No mother	50.0	84.2	73.7	81.6	89.5	50.0	47.4	76.3	81.6
Not recorded	8.1	10.6	9.4	12.3	11.9	6.2	5.9	12.3	9.9
Province									
Western	38.3	71.2	63.7	71.1	66.1	29.2	25.5	69.9	44.6
Central	37.9	60.3	62.1	67.8	70.6	27.9	21.1	67.6	48.7
Southern	23.5	65.1	51.9	62.7	57.1	21.3	19.1	59.5	30.6
Northern	37.9	59.8	62.7	76.7	84.3	33.6	43.0	69.4	60.7
Eastern	40.4	52.3	50.7	62.0	62.6	35.0	33.7	59.2	52.8
North Western	34.2	66.1	51.0	65.0	65.5	25.5	21.0	59.6	41.2
North Central	37.0	67.4	52.6	71.2	68.2	25.3	25.2	60.3	45.7
Uva	32.1	61.2	62.8	73.3	71.2	23.4	21.9	67.3	44.3
Sabaragamuwa	31.6	71.2	59.9	75.4	73.3	28.6	20.0	67.1	41.6
Overall	**35.0**	**64.1**	**57.4**	**69.4**	**68.9**	**28.1**	**25.9**	**64.4**	**46.0**

3.3.6 Nutritional status by consumption of selected food items

3.3.6.1 Consumption of food items and prevalence of anaemia

Prevalence of anaemia among those who consumed each of the food group on which information was available and those who did not do so was attempted. In respect of several food items, the difference in the prevalence of anaemia between those who consumed the food item and those who did not do so, was approximately 2 percentage points more or less.

However, it is seen that the prevalence of anaemia was more than 2 percentage points higher among those among whom the intake of cereals, bread and bread products, green leafy vegetables, other fruits, eggs and toffees or chocolates was low (Table 9).

3.3.6.2 Consumption of food items and prevalence of stunting, thinness, overweight and obesity

In respect of several food items, the difference in the prevalence of stunting and thinness between those who consumed the food items and those who did not do so, was approximately 2 percentage points more or less. Comparing the prevalence of stunting between those who consumed a given food item and those who did not do so showed that the difference was marked only in respect of soft drinks in that the stunting prevalence among those who consumed soft drinks was more than 2 percentage points higher (Table 9).

3.3.6.3 Consumption of food items and prevalence of overweight and obesity

No major differences were seen in the pattern of consumption of the selected food items among the overweight and obese children.

Table 9: Prevalence of anaemia, stunting, thinness, overweight and obesity among children by pattern of food consumption

Food item		Anaemic (%)	Stunted (%)	BMI category (%)			
				Thin	Normal	Overweight	Obese
Cereal products	Yes	11.1	11.4	29.7	61.3	6.3	2.7
	No	15.1	11.6	31.5	59.8	5.4	3.3
Bread or Bakery products	Yes	11.2	11.9	29.9	61.3	6.2	2.6
	No	13.3	11.0	30.5	60.4	5.9	3.2
Pulses	Yes	12.7	11.2	29.7	61.4	6.3	2.6
	No	11.3	11.9	30.9	60.1	5.7	3.3
Yellow vegetables	Yes	11.6	11.8	29.6	60.9	6.7	2.8
	No	12.4	11.3	30.5	60.9	5.7	2.9
Other yams	Yes	12.2	11.4	30.2	61.4	6.0	2.5
	No	12.1	11.5	30.2	60.5	6.1	3.2
Other vegetables	Yes	11.9	11.0	29.6	61.1	6.5	2.8
	No	12.9	12.5	31.7	60.3	5.0	3.0
Green leafy vegetables	Yes	10.9	10.9	29.6	61.7	6.2	2,5
	No	13.4	12.1	30.8	60.0	5.9	3.2
Yellow fruits	Yes	11.5	12.2	29.3	61.7	6.1	2.8
	No	12.6	11.0	30.7	60.4	6.0	2.9
Other fruits	Yes	10.1	11.3	30.0	60.9	6.3	2.8
	No	15.7	11.8	30.5	60.9	5.7	3.0
Egg	Yes	10.7	11.4	29.8	61.3	6.2	2.7
	No	13.3	11.6	30.5	60.6	5.9	3.0
Meats	Yes	11.1	11.6	28.4	62.1	6.8	2.8
	No	12.8	11.4	31.2	60.3	5.7	2.9
Fish products	Yes	12.6	11.4	29.9	61.1	6.1	2.8
	No	11.3	11.7	30.6	60.5	5.9	3.0
Milk products	Yes	11.8	11.0	29.4	61.8	5.9	2.8
	No	12.7	12.2	31.3	59.6	6.2	2.9
Oily foods	Yes	12.0	11.3	30.2	61.2	6.1	2.7
	No	12.4	12.0	30.2	60.2	6.0	2.3
Sugar products	Yes	10.6	11.8	11.8	61.2	6.2	2.5
	No	15.6	10.7	10.7	60.3	5.8	3.7
Short eats	Yes	13.1	11.4	30.8	60.6	6.1	2.4
	No	11.8	11.5	29.9	61.0	6.0	3.0
Soft drinks	Yes	11.3	13.4	28.4	62.2	6.6	2.8
	No	12.5	10.8	30.8	60.4	5.9	2.9
Biscuits, Cakes	Yes	10.3	11.7	30.5	60.7	6.2	2.7
	No	15.9	11.1	29.7	61.2	5.9	3.2
Toffee, Chocolates	Yes	9.8	12.3	30.2	61.3	6.1	2.4
	No	14.3	10.7	30.1	60.6	6.0	3.3

3.4 Physical activity

Limited information was collected on physical activity among these children; the mode of travel to school and the mean time duration that the children spent on selected activities carried out by them. For the total group, distance from home to school varied widely with a mean value of 3.0 (SD=17.3) km.

As shown in Table 10, this information was not available for 16.6 percent of children and of those in whom the information was available, a majority 28.3 percent walked to school with another 19.3 percent of them using a school van or a school bus.

Table 10: Percentage of children in relation to mode of travel to school by selected background characteristics (N= 7204 *)

Characteristics	Walking	Bicycle	Motor bicycle	Bus	Private vehicle	School van/bus	Other	No. of children
Age in years**								
6	28.0	8.5	21.8	6.0	6.0	29.5	0.2	532
7	30.6	7.8	15.2	6.5	6.6	32.6	0.6	1025
8	33.1	8.7	16.3	8.4	6.1	26.4	0.9	1212
9	34.0	10.7	14.1	11.0	5.3	24.2	0.8	1232
10	36.5	15.2	13.1	13.2	3.7	18.0	0.4	1278
11	37.1	12.5	8.8	17.1	3.9	20.3	0.2	1220
12	35.5	17.7	7.1	14.9	4.1	20.3	0.4	705
Sex of the child**								
Female	35.5	9.8	13.5	10.5	5.1	25.1	0.6	3656
Male	32.5	13.5	13.4	12.3	4.9	22.9	0.5	3548
Mother's education**								
No schooling	64.8	11.1	3.6	9.5	1.2	9.5	0.4	253
Grade 1-5	53.7	11.9	7.3	11.0	1.1	13.7	1.2	655
Grade 6-11	41.4	15.0	10.5	13.2	2.6	16.8	0.5	2775
Passed O/L	28.4	12.1	14.9	12.4	4.7	27.1	0.4	1877
Passed A/L	20.4	7.1	17.8	9.5	8.4	36.4	0.4	1445
Diploma/Degree/Higher	11.5	4.5	24.0	5.2	17.6	36.7	0.5	442
No mother	42.1	21.1	13.2	10.5	2.6	10.5	0.0	38
Not recorded	45.7	14.2	11.4	11.9	1.8	14.6	0.5	219
Province**								
Western	24.2	5.1	13.7	11.1	10.9	33.8	1.2	781
Central	42.0	3.2	4.0	9.7	4.5	35.7	1.0	805
Southern	26.1	5.0	19.1	11.5	5.4	32.8	0.2	635
Northern	41.9	29.6	16.6	4.1	2.2	5.5	0.0	938
Eastern	52.0	17.2	8.8	7.7	1.7	12.1	0.6	832
North Western	22.2	12.5	22.3	10.0	5.4	27.1	0.4	848
North Central	27.5	19.6	22.3	11.6	4.9	13.8	0.4	777
Uva	38.6	4.8	7.8	18.1	5.6	24.7	0.4	769
Sabaragamuwa	28.4	2.6	7.0	20.1	5.7	35.4	0.7	819
Overall	**34.0**	**11.6**	**13.4**	**11.4**	**5.0**	**24.0**	**0.5**	**7204**

(*1201 missing data – 14.3%); (**statistically significance at 1%)

Commonest mode to travel to school was by walking (34 percent) with the next common mode being, travel by school van/ bus (24 percent). More of the younger children (under 9 years) used the school van / bus, with the percentage of children walking to school being marginally less in this age group. More of the female walked to school and this percentage decreased with increasing levels of education of the mother.

A wide variation was seen between the provinces. In the Northern, Eastern, Central and Uva provinces, more children walked to school compared to the percentage of children who did so, in the Western and Southern provinces.

Average time taken to travel to school was 18.9 (SD 17.2) minutes with a wide variation. Though the pattern is not consistent, the time taken for the child to travel to school seem to be higher among the children aged 11 and 12 years and among females. The inter provincial differences were seen with the time varying between a low value of 14.5 minutes in the Eastern province to 23.2 minutes in Sabaragamuwa province(Table 11).

Daily average time spent on extra classes was 1.6 hours per week and was lowest among the 6 year old children, with the time being only marginally higher among the males. No clear pattern is seen in the time spent on extra classes among children in relation to the educational status of the mother. A relatively wide variation was seen among the provinces with a low value of 0.9 hours in Sabaragamuwa and 3.8 hours in Uva.

Table 11: Mean (SD) time utilization for major activities carried out by children in relation to selected variables (n=7204)

Variable	Mean (SD) time spent on		
	Travel to school daily in minutes	Extra classes weekly in hours	Watch TV,video, play games and work in the computer on the previous day in minutes
Age in years			
6	17.5 (14.9)	0.8 (2.2)	66.7 69.4)
7	18.6 (14.8)	1.4 (3.2)	64.7 (60.4)
8	17.5 (16.9)	1.8 (3.7)	67.1 (62.1)
9	17.4 (20.1)	1.8 (3.8)	65.9 (65.9)
10	18.7 (14.2)	1.6 (3.9)	62.8 (66.3)
11	21.6 (16.7)	1.4 (3.8)	69.9 (76.7)
12	20.9 (21.3)	1.5 (4.2)	72.4 (79.0)
Sex			
Females	11.1 (15.3)	1.5 (3.6)	62.7 (64.3)
Males	18.7 (18.9)	1.6 (3.7)	70.9 (71.9)
Mother's education			
No schooling	20.3 (16.4)	1.2 (4.2)	49.1 (74.1)
Grade 1-5	20.0 (15.7)	1.5 (3.8)	55.9 (67.9)
Grade 6-11	18.7 (13.2)	1.1 (2.8)	64.7 (67.6)
Passed O/L	18.7 (17.1)	1.7 (3.7)	70.4 (68.2)
Passed A/L	18.7 (17.1)	1.8 (3.7)	73.2 (66.7)
Diploma/Degree/Higher	20.3 (32.3)	1.9 (3.9)	76.0 (68.0)
No mother	17.6 (8.8)	0.4 (1.4)	72.9 (75.4)
Not recorded	16.1 (12.8)	0.8 (3.1)	47.0 (67.6)
Province			
Western	21.2 (17.3)	0.2 (1.6)	61.5 (61.7)
Central	23.0 (20.2)	0.1 (0.4)	58.2 (60.7)
Southern	17.9 (11.8)	1.4 (2.8)	69.1 (63.7)
Northern	16.2 (19.4)	4.6 (6.5)	77.2 (77.1)
Eastern	14.5 (10.1)	0.6 (2.1)	46.6 (62.1)
North Western	16.9 (11.6)	0.1 (0.1)	59.5 (63.5)
North Central	15.4 (23.4)	1.8 (3.5)	69.4 (68.6)
Uva	22.0 (15.0)	3.8 (4.5)	88.9 (74.7)
Sabaragamuwa	23.2 (17.6)	0.9 (2.1)	70.9 (69.5)
Overall	**18.9 (17.2)**	**1.6 (3.7)**	**66.7 (68.3)**

An attempt was made to identify the mean time spent in hours in sedentary activities and the mean time spent in spent in 'active work'(time spent on playing, riding bicycles, physical activities, dancing, and gardening were considered as active hours. Distribution of this information by selected variables are presented in Table 12. Sedentary time of the children in respect of two major activities, going for extra classes (per week in hours) and watching TV, video (daily) were assessed.

Table 12: Mean (SD) time spend on sedentary and active life by children in relation to selected variables (n=7204)

Variable	Time spent in hours - Mean (SD)	
	Sedentary activities	Active time
Age in years		
6	1.1 (1.2)	2.1 (1.7)
7	1.1 (0.9)	1.9 (1.5)
8	1.1 (1.0)	1.9 (1.7)
9	1.1 (1.1)	1.7 (1.6)
10	1.0 (1.1)	1.6 (1.5)
11	1.2 (1.3)	1.8 (1.7)
12	1.2 (1.3)	1.8 (1.6)
Sex		
Females	1.0 (1.6)	1.6 (1.5)
Males	1.2 (1.2)	2.0 (1.7)
Mother's education		
No schooling	0.8 (1.2)	1.6 (1.8)
Grade 1-5	0.9 (1.1)	1.8 (1.7)
Grade 6-11	1.1 (1.1)	1.8 (1.6)
Passed O/L	1.2 (1.1)	1.8 (1.5)
Passed A/L	1.2 (1.1)	1.9 (1.6)
Diploma/Degree/Higher	1.3 (1.1)	2.0 (1.6)
No mother	1.2 (1.3)	2.1 (1.5)
Not recorded	0.8 (1.1)	1.6 (1.9)
Province		
Western	1.0 (1.0)	2.0 (1.9)
Central	1.0 (1.0)	1.9 (1.8)
Southern	1.2 (1.1)	1.7 (1.5)
Northern	1.3 (1.6)	1.6 (1.4)
Eastern	0.8 (1.0)	1.6 (1.5)
North Western	1.0 (1.1)	1.9 (1.6)
North Central	1.2 (1.1)	1.8 (1.6)
Uva	1.5 (1.2)	1.7 (1.5)
Sabaragamuwa	1.2 (1.2)	1.8 (1.6)
Overall	**1.1 (1.1)**	**1.8 (1.6)**

On an average, 66.7 minutes re spent by the children to watch TV, video, playing computer games and working using computer. These activities were considered as sedentary activities. There was no clear pattern observed in relation to age of the child in the amount of time spent on these activities, even though the older children (11 and 12 years olds) seem to spend more time on these activities, with a marginal difference between the males and females. Educational status of the mother is seen to influence the time spent by the children on these activities in that the time used for sedentary activities increases with increasing educational level of the mother. For the total group mean time spent on sedentary activities was 1.1 hours per day and amount of time spent on non-sedentary activities was 1.8 hours.

Comparison daily mean time spent in sedentary activities showed only marginal differences between the different age groups with the younger age groups showing marginally more tome on 'active items'. There was no clear pattern of the time spent on sedentary activities, in relation to the educational status of the mother, even though there are marginal variations in 'active time' in respect of different educational status of the mother and between provinces.

Table 13 presents data on the nutritional status of the children in relation to the mean time spent of the different types of activities (sedentary/active). Among stunted children, there was a higher percentage of 'active time' spent by children. However, among the children who were not stunted, the difference between time spent on sedentary activities were higher.

Time taken to travel to school by children who were not anaemic was lower than the anaemic children. Comparison between the percentage of children in the different BMI groups, also showed that the percentage belonging to the 'thin' group spent less time in sedentary activities (e.g watching TV etc.) compared to the 'normal' BMI group. The converse was seen among the overweight and obese groups in that they spent comparatively more time on sedentary activities.

Table 13: Nutritional status of children in relation to the mean (SD) time utilization for major activities by children (n=7204)

Nutritional Status	Time spent - Mean (SD)		
	Travel to school daily (in minutes)	Extra classes weekly (in hours)	Watch TV, video, play games and work in the computer on the previous day (in minutes)
Stunting			
Yes	20.0 (21.7)	1.2 (3.0)	59.9 (67.5)
No	18.7 (16.5)	1.6 (3.8)	67.6 (68.3)
Anaemia			
Yes	15.7 (11.5)	1.7 (3.6)	61.8 (69.0)
No	18.6 (14.2)	1.7 (3.6)	71.2 (67.7)
BMI category			
Thin	18.7 (14.2)	1.5 (3.6)	64.4 (68.0)
Normal	19.2 (18.9)	1.6 (3.7)	67.0 (67.6)
Overweight	17.3 (11.8)	1.6 (3.7)	73.8 (76.5)
Obese	18.9 (15.5)	1.8 (4.5)	70.6 (65.9)

Table 14 presents data on the mean time spent by the children on sedentary activities and those that have been categorised as 'active time'. The prevalence data of stunting, anaemia and BMI categories do not show differences between the two groups.

Table 14: Nutritional status of children in relation to the mean (SD) time spend on sedentary activities and physical activity by children (n=7204)

Nutritional Status	Mean (SD) time spent (hours)	
	Sedentary activities	Physical activity
Stunting		
Yes	1.0 (1.1)	1.7 (1.7)
No	1.1 (1.1)	1.8 (1.6)
Anaemia		
Yes	1.0 (1.2)	1.7 (1.9)
No	1.2 (1.1)	1.9 (1.7)
BMI group		
Thin	1.1 (1.1)	1.8 (1.6)
Normal	1.1 (1.7)	1.8 (1.6)
Overweight	1.2 (1.3)	1.9 (1.8)
Obese	1.2 (1.1)	1.9 (1.6)

4 Conclusions & Recommendations

Conclusions

1. Of all children 11.5 percent were stunted and 1.6 percent were severely stunted. Prevalence of stunting increased with increasing age and decreased with increasing levels of maternal education. A wide inter provincial variation is seen.
2. Prevalence of thinness was 30.2 percent and severe thinness, 9.7 percent, 6.1 percent were overweight and 2.9 percent were obese. Prevalence of thin children was highest among the 6 years old and in general, showed a decline with increasing age. Male children showed a higher prevalence of thinness.
3. Prevalence of thinness decreased with increasing levels of education of mother and obesity increased with the increasing level of mother's education.
4. Of the total sample, 12.2 percent were anaemic. Prevalence of anaemia was highest among the 6 year old showing a decline with increasing age up to the 11 year old.
5. Trends in the prevalence of nutritional status indicators from 2003 to 2016 show a decline in the prevalence of stunting and thinness with an increase in 2016. The prevalence of overweight and obesity though low, does show an upward trend, though marginal.
6. Most frequently consumed foods were cereals and other vegetables than yellow coloured. Among the protein rich foods, most frequently consumed item is fish, with a lower consumption of eggs and meat. Milk products are consumed at a moderate level. Among the least consumed items were other yams and yellow fruits. Consumption of short eats and soft drinks are at a lower level (a positive feature) while that of oily foods and sugary foods, biscuits/cakes are at a relatively high level.
7. A wide inter province variation was observed in the food consumption pattern.
8. Among 35 percent of the children who received the mid-day meal from school, 40.7 percent had breakfast at home prior to going to school and 35.2 percent had taken a food item from home to be consumed in school.
9. Time spend on extra classes was 1.6 hours per week and an average of , 66.7 minutes were spent by the children on sedentary activities e.g. watching TV etc. Mean time spent on different activities was related to the nutritional status in that children who were not stunted, those who were 'thin; spent more time on sedentary activities.
10. Differences in the pattern of physical activity of the children was shown among the provinces.

Recommendations

1. Nutritional problems exist among the primary school children, in spite of several interventions (school meal programme, micronutrient programme, routine school medical inspections, deworming programme etc.) that have been implemented, hence monitoring of the nutritional status among the primary school children needs to be considered a priority in the school health programme.

2. Increasing level of overweight and obesity need to be controlled urgently. Early detection and management of them as well as prevention of overweight and obesity need to be addressed within the school health programme.

3. Persistence of anaemia among this group in spite of iron supplementation required detailed studies on the aetiology of anaemia.

4. Impact of school meal programme on the nutritional status of this group need to be studied in depth, to improve its influence as an intervention.

5. Marked differences between provinces needs to be paid attention, in such studies and also in developing effective interventions.

6. Available information of dietary practices, though limited, has identified practices that needs to be reviewed and modified. Hence, more detailed studies on consumption patterns of food items need to be undertaken. Better to address the high consumption pattern of sugary food, biscuits etc. through awareness programmes.

7. Wide difference between the provinces in the prevalence of the nutritional status indicators as well as the pattern of consumption of food items focus the need for developing appropriate interventions taking into consideration at provincial level.

8. Pattern of physical activities is another area that needs particular attention, especially with the tendency for the children to be focusing more on sedentary activities within the age of 9 to 10 years, most probably around the scholarship examination. After obtaining in depth information of the physical activities of this group, school based interventions, especially educational activities commencing from grade I children need to be developed and implemented.

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