The Challenging Nutritional problems in Schoolchildren

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BACKGROUND

At present there are more children of school age, and more school going children than ever before. Ill health and nutrition compromise both the quality of life of school-age children and the potential to benefit fully from their education, which might be the only education, they receive in their whole life (ACC/SCN 1998).

Sri Lanka had a school-going population (5-14 years) of nearly 3.2 million in 1999. Of them about 3.1 million are attending schools and only 3% are not attending schools (Dept of population, 2001). Schooling starts at Grade 1 on completion of 5 years of age. Approximately 95% of all Sri Lankan children are enrolled in school at this age and there is no sex difference on enrolment (male: female ratio – 1.03:1.0). Children are legally required to remain in school until 14 years of age. Still the dropout rate is around 5 –10% (Ministry of Education, 1998).

The Ministry of Education runs over 10,000 schools island-wide. Table 1 shows the functional numbers of schools of different categories within this system, with the total student enrolment as of 1998.

Table 1: Categories and numbers of functioning state schools

School type	Description	Number of schools	Enrolment in 1998
1AB	Classes from Grade 1 to GCE A/L, including science stream classes	513	1,082,003
1C	Classes from Grade 1 to GCE A/L, Arts or Commerce stream classes only	1,798	1,396,974
2	Classes from Grade 1 to GCE O/L only	3,844	1,125,095
3	Classes from Grades 1 – 5 or 1 – 8 only	3,933	531,957
	Total	**10,088**	**4,136,029**

Source – Ministry of Education, 1998

Poor nutrition in schoolchildren seriously compromises their health and learning capacity. It creates a disastrous trend towards damaging dietary patterns, which make people subjected to various diseases when they become adults. However, there are current radical changes in lifestyle among both the poor and the well-off population. It means that they have their personal preferences regarding foods, fashion, physical activity levels and the media. The nutritional

patterns of schoolchildren are determined more by these personal preferences than by the availability of food itself.

As a result of rapid socio-economic development in Sri Lanka after the implementation of market liberalisation policies in the 1977, the country is confronting both extremes of malnutrition, that is under nutrition coexists with over nutrition problems. Some of the nutritional deficiencies are slowly being reduced or eradicated in many part of the country, i.e. Vitamin C, B deficiencies etc. On the other hand, coronary heart disease, cancer and diabetes have now become major health problems, particularly in urban areas.

Addressing the nutrition of schoolchildren probably helps at preventing adult diseases (SCN 1998). Schoolchildren can be used as messengers to promote good health within their families and communities. In addition, the infrastructure of the school system provides an opportunity for health services to reach children in a cost-efficient way.
Once Gabrial Mysterl said:

Historical review

Sri Lanka has decades of experience in improving the health and learning of schoolchildren through school based health and nutrition pogrammes. School medical inspections and food supplementations are not new concepts in Sri Lanka. To improve the nutritional status of schoolchildren different sectors, ministries carry out a wide variety of programmes. The Ministry of Health initiated the school medical inspection from 1926 by establishing the school medical office. Since independence malnutrition of schoolchildren has been relieved by a wide variety of intervention programmes by the Ministry of Education, e.g. School biscuits, Buns, Milk, school lunch etc. In addition to that the home gardening and school gardening was initiated in collaboration with the Ministry of Agriculture. Though the interventions are not assessed properly to see the real effect, some benefits to the schoolchildren would have been there.

All these programmes in the past remind me the major conclusions from ACC/SCN (1998) "Nutrition is everybody's business and nobody's responsibility".

Hence this study was carried out with the following objectives.

Objectives:

1. Assess the prevalence of nutritional problems among schoolchildren in selected districts.
    a. Under nutrition
    b. Over nutrition
    c. Vitamin A deficiency
    d. Anaemia
2. Describe the geographical distribution of the above nutritional problems.
3. Study selected risk factors that could lead to priorities the effective interventions.
    a. Food consumption
    b. Physical activity

Methods

The presentation in this paper is mainly concerned with the growth pattern of children 9500 aged 5-14 years in 10 districts of Sri Lanka i.e. Anuradhapura, Polonnaruwa, Badulla, Moneragala, Colombo (urban), Hambantota, Kurunagala, Vavuniya, Ampara and Rathnapura.

The schools were selected from a list of all schools in Sri Lanka that was provided by the Department of Education. A multi-stage stratified probability proportion sampling technique was used to identify the sample. During the first stage the proportionate stratification was done to identify the number of schools in the urban and rural areas in each district according to the population of children in selected age group. In the second stage, types of schools were considered. During the third stage, required numbers of schools were identified using population proportion to sampling technique. During the fourth stage of sampling, all classes of grade 1, 4 and 7 were listed out and one class from each grade was randomly selected from each school. Grade 1,4 and 7 was selected to study by considering the school health programme in the country.

All children in each selected class were included in the assessment of nutritional status. All the children in the selected classes 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 in the selected classes. The information was obtained from the attendance register and marked on the format by a member of the study team.

The height and weight of all the children in selected classes were measured. Measurements were taken by the trained field investigators. Height was recorded to the nearest centimetre by using an anthropometric rod. The children were weighted with the use of an electronic balance to the nearest 0.5kg after removal of shoes and socks. Instruments were checked daily by using a standard weight. The observer variation was assessed by taking duplicate measurements of 10% of sub sample representing all districts, by one specially trained investigator. All fieldwork was completed during, November 2001 - June 2002. Ethical approval was obtained from the institution ethical committee.

Results

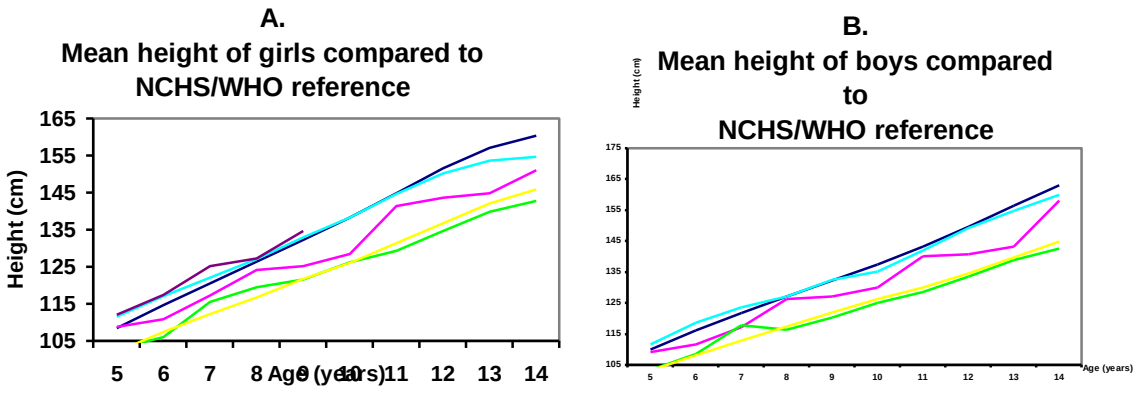
Comparison with NCHS reference population

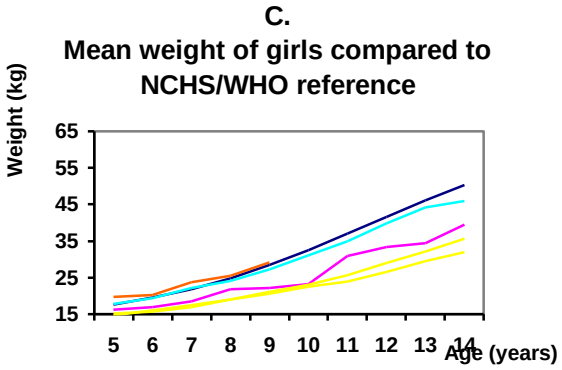
The mean weight and height data of children were assessed with the National Center for Health Statistics (NCHS) reference population, which is recommended by WHO for use in all developing countries.

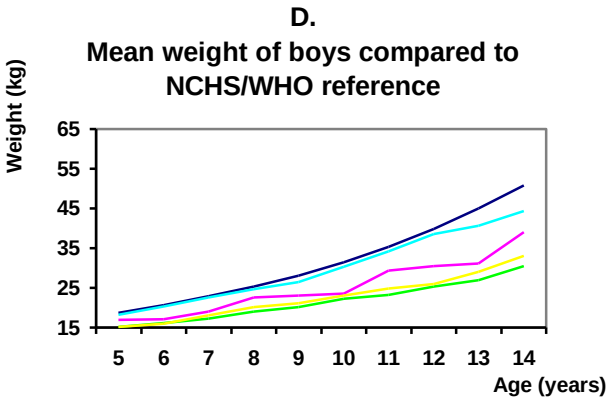
The weight and height data of the well nourished well to do Elite urban Colombo children were assessed within the time span to fall in line with the NCHS reference population.

Figure 1 shows that, on average, the weights and heights of school children of 5-9 years were close to the international/WHO-NCHS growth standard, whereas those of above 9 years were far below the international standard. There is a trend towards improving physical stature of the schoolchildren born in later years. Growths of the boys were better than girls.

Figure 1
Mean height of girls (A) and boys (B), and mean weight of girls (C) and boys (D), compared with WHO reference and study values





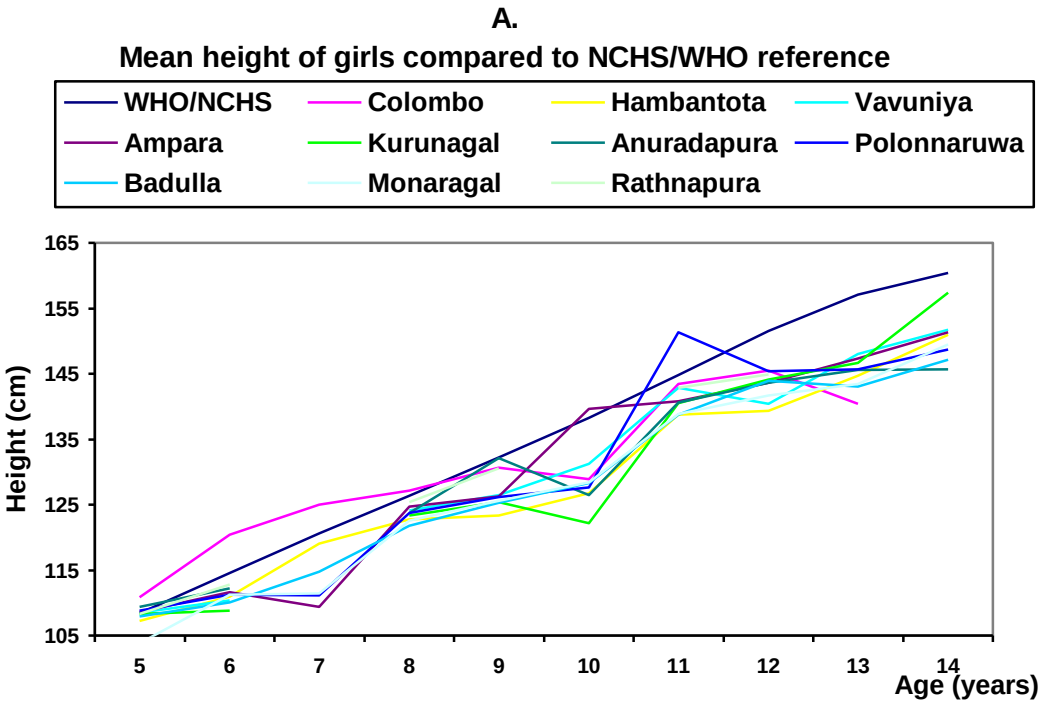


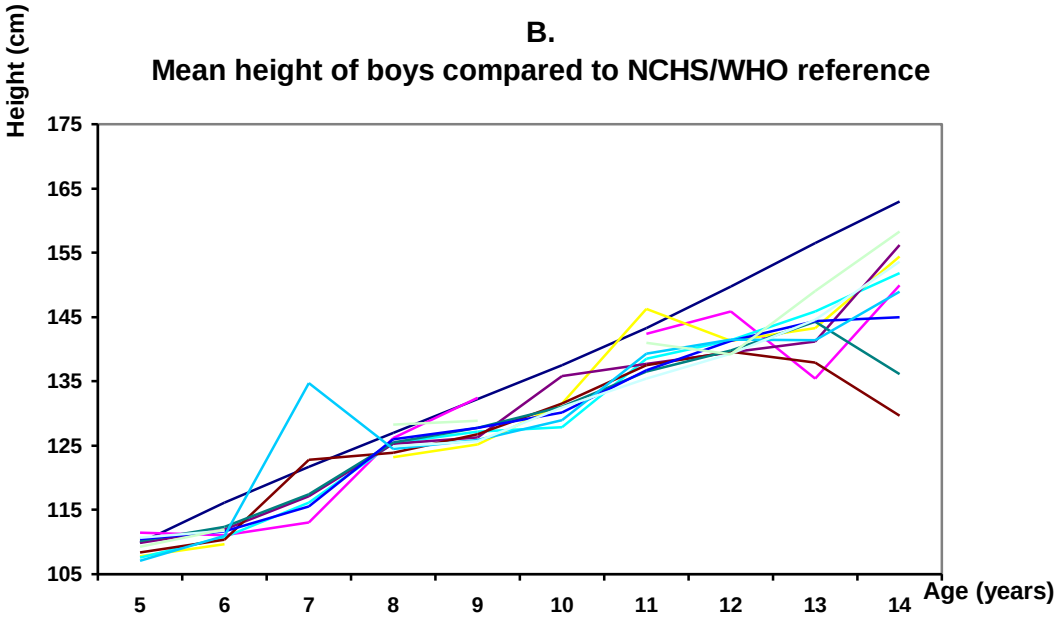
The comparisons were made with the studies carried in 1925,1936 and 1988. The growth pattern is better throughout the age in this study.

There are inter-district variations in mean heights and weights of girls and boys when comparisons are made with NCHS/WHO reference. Colombo district data indicates: children were on average taller and heavier than those from other districts (Figure 2). This observation was true for both boys and girls and for all ages. Comparison with the NCHS median showed the Colombo district children to be taller than the NCHS population till age 8 years for girls and age 5 years for boys. Thereafter the curve diverged, the NCHS population being taller. Mean weight of Colombo district girls' starts above the NCHS median at 5 years then go on the NCHS median till 8 years and go down after that. The mean weight of the Colombo district boys were below the NCHS median till the age of 8 years and go with the reference till 10 years and divulged down after that.

Nicholls study of a representative sample in Colombo urban well to do sample carried out 70 years earlier shows a similar growth pattern.

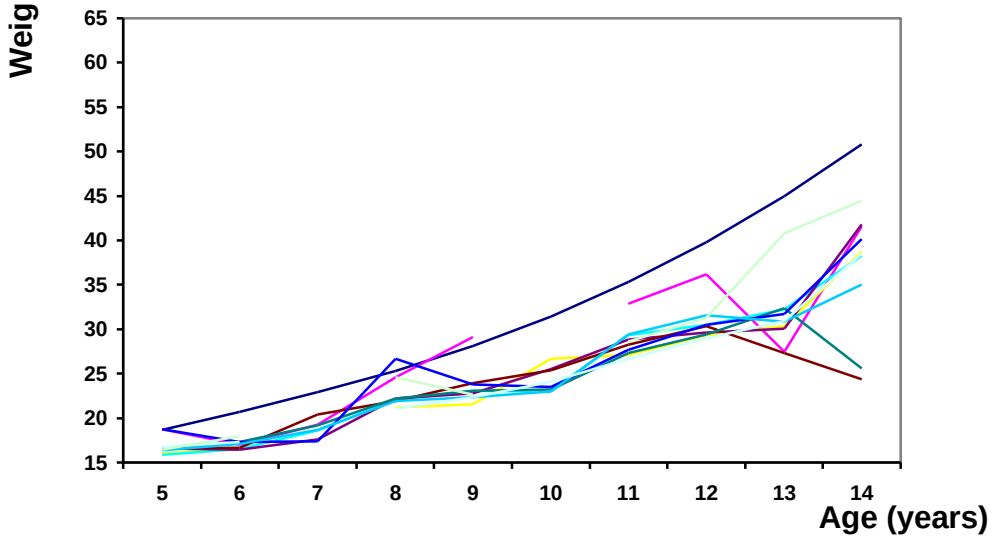
Figure 2
Mean height of girls (A) and boys (B), and mean weight of boys (C) and girls (D), compared with WHO reference and district study values





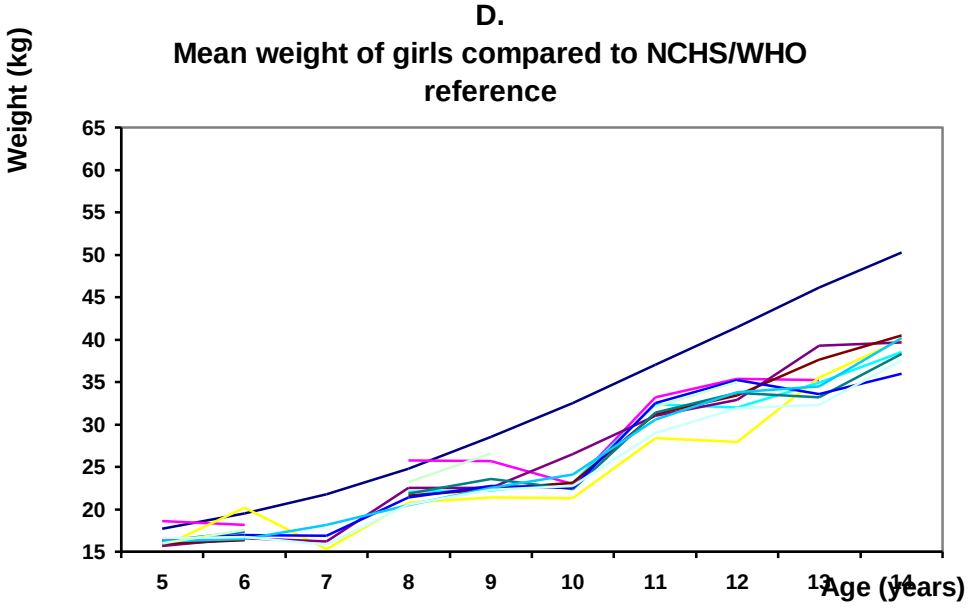
C.

Mean weight of boys compared to NCHS/WHO reference



D.

Mean weight of girls compared to NCHS/WHO reference



Report

AGE	SEX	HT	WT	BMI

10	1	Mean	131.442	24.727	14.26726
		N	226	226	226
		Std. Deviation	6.056	3.383	1.21285
	2	Mean	130.563	25.057	14.61255
		N	231	231	231
		Std. Deviation	7.158	4.664	1.82251
	Total	Mean	130.998	24.894	14.44179
		N	457	457	457
		Std. Deviation	6.643	4.080	1.55918
11	1	Mean	138.378	29.026	15.05363
		N	688	688	688
		Std. Deviation	6.948	5.727	1.96942
	2	Mean	140.132	30.508	15.40253
		N	673	673	673
		Std. Deviation	7.575	6.551	2.23239
	Total	Mean	139.245	29.759	15.22616
		N	1361	1361	1361
		Std. Deviation	7.315	6.190	2.11002
12	1	Mean	140.734	30.418	15.25262
		N	802	802	802
		Std. Deviation	6.955	5.952	1.98366
	2	Mean	143.473	33.383	16.08721
		N	907	907	907
		Std. Deviation	7.088	7.311	2.57053
	Total	Mean	142.188	31.992	15.69555
		N	1709	1709	1709
		Std. Deviation	7.155	6.867	2.35030
13	1	Mean	144.313	31.967	15.20876
		N	251	251	251
		Std. Deviation	9.116	6.246	1.52968
	2	Mean	146.117	35.845	16.69608
		N	204	204	204
		Std. Deviation	6.408	6.958	2.48042
	Total	Mean	145.122	33.706	15.87560
		N	455	455	455
		Std. Deviation	8.058	6.845	2.14192
14	1	Mean	152.511	37.877	16.11210
		N	281	281	281
		Std. Deviation	9.941	8.193	2.06562
	2	Mean	150.852	39.662	17.36630
		N	273	273	273
		Std. Deviation	5.895	6.824	2.44843

	Total	Mean	151.693	38.757	16.73014
		N	554	554	554
		Std. Deviation	8.235	7.595	2.34583
Total	1	Mean	140.950	30.525	15.19520
		N	2248	2248	2248
		Std. Deviation	9.292	6.897	1.93053
	2	Mean	142.303	32.666	15.94384
		N	2288	2288	2288
		Std. Deviation	8.693	7.744	2.49810
	Total	Mean	141.633	31.605	15.57282
		N	4536	4536	4536
		Std. Deviation	9.019	7.414	2.26580

In Hambantota and Monaragala districts the mean heights and weights of children are below the NCHS standard compared to the other districts. Vavuniya district children are far below the NCHS median. The girls in Vavunya district are heavier and taller than boys.

Prevalence of undernutrition

Table 2
Prevalence of under nutrition in relation to the age and sex

Age	Sex	Stunting	Wasting	Underweight	Total
10	Male	87	139	126	230
		37.8%	61.5%	54.8%	100.0%
	Female	100	111	132	234
		42.7%	48.1%	56.4%	100.0%
	Total	187	250	258	464
		40.3%	54.7%	55.6%	100.0%
11	Male	230	381	349	690
		33.3%	55.3%	50.6%	100.0%
	Female	250	272	309	673
		37.1%	40.4%	45.9%	100.0%
	Total	480	653	658	1363
		35.2%	47.9%	48.3%	100.0%
12	Male	346	472	470	801
		43.2%	58.9%	58.7%	100.0%
	Female	397	312	367	907
		43.8%	34.4%	40.5%	100.0%
	Total	743	784	837	1708
		43.5%	45.9%	49.0%	100.0%
13	Male	141	171	184	251
		56.2%	68.1%	73.3%	100.0%
	Female	118	61	97	204
		57.8%	29.9%	47.5%	100.0%
	Total	259	232	281	455
		56.9%	51.0%	61.8%	100.0%
14	Male	141	158	185	281
		50.2%	56.2%	65.8%	100.0%
	Female	131	59	135	273
		48.0%	21.6%	49.5%	100.0%

	Total	272	217	320	554
		49.1%	39.2%	57.8%	100.0%
Total	Male	945	1321	1314	2253
		41.9%	58.8%	58.3%	100.0%
	Female	996	815	1040	2291
		43.5%	35.6%	45.4%	100.0%
	Total	1941	2136	2354	4544
		42.7%	47.1%	51.8%	100.0%

The prevalence of under nutrition was assessed on the stunting and wasting among primary school children (5-9.9 years) and thinness among adolescents (10-14 years). Children were considered wasted and stunted if their Z scores were less than -2SD of the NCHS/WHO median for weight for height and height-for-age respectively. Cut-off points proposed by WHO (1995) for BMI-for-age table to assess thinness (less than 5th percentile) was applied to assess thinness among adolescents.

Stunting which is indicative of previous or long standing undernutrition, affected 17.8% of the primary school children. Boys appeared to be at greater risk of suffering from undernutrition than girls (Table 1).

"As linear growth is a good proxy for general development constraints, trends in height-for-age provide information on long term changes in the environment and their nutritional consequences."

Table 1

Prevalence of under nutrition in school children by sex

Sex	**5-9.9 years**				**10-14.9 years**	
	Sample size	**Stunting**	**Wasting**	**Underweight**	**Sample size**	**Thinness**
Male	3580	714	613	1196	1158	687
		19.9%	17.1%	33.4%		59.3%
Female	3549	558	464	913	1801	658
		15.7%	13.1%	25.7%		36.5%
Total	**7129**	**1272**	**1077**	**2109**	**2595**	**1345**
		17.8%	**15.1%**	**29.6%**		**45.5%**

Prevalence of wasting which is indicative of acute under nutrition is 15.1% and more prevalent in boys than girls.

Undernutrition was more prevalent among adolescents than primary schoolchildren and more than half of boys were thin.

Geographical distribution of nutritional status among primary schoolchildren

Table
Comparison of prevalence of stunting, wasting, underweight and overweight among primary schoolchildren (5-9.9 years) in relation to districts and sex

District	Sex	No.	Stunting (%)	Wasting (%)	Underweight (%)	Overweight (%)
Colombo	Male	267	13.1	11.6	17.6	7.9
	Female	197	2.5	11.2	10.2	6.6
	Total	464	8.6	11.4	14.4	7.3
Kalutara	Male	283	10.2	20.8	23.3	1.4
	Female	245	10.6	18.4	20.8	1.2
	Total	528	10.4	19.7	22.2	1.3
NuwaraEliya	Male	457	27.4	16.4	40.3	0.2
	Female	420	24.0	9.0	32.4	0.5
	Total	877	25.8	12.9	36.5	0.3
Hambantota	Male	297	17.8	19.5	33.0	0.3
	Female	295	16.6	13.6	27.5	0.3
	Total	592	17.2	16.6	30.2	0.3
Vavuniya	Male	153	17.0	18.3	31.4	0.0
	Female	108	9.3	14.8	21.3	0.0
	Total	261	13.8	16.9	27.2	0.0
Ampara	Male	167	13.2	24.6	37.1	1.2
	Female	205	14.6	20.0	29.3	0.0
	Total	372	14.0	22.0	32.8	0.5
Kurunagala	Male	369	18.2	17.9	33.3	0.8
	Female	460	10.2	15.2	21.5	0.7
	Total	829	13.8	16.4	26.8	0.7
Anuradapura	Male	390	19.5	16.2	34.9	0.0

	Female	348	14.9	10.3	23.9	0.3
	Total	738	17.3	13.4	29.7	0.1
Polonnaruwa	Male	333	20.7	13.2	28.5	1.2
	Female	378	17.7	12.2	27.0	0.8
	Total	711	19.1	12.7	27.7	1.0
Badulla	Male	367	28.9	14.2	39.8	0.3
	Female	378	23.8	6.6	28.8	0.0
	Total	745	26.3	10.3	34.2	0.1
Monaragala	Male	351	24.2	18.2	39.3	0.3
	Female	347	15.3	15.0	28.5	0.0
	Total	698	19.8	16.6	34.0	0.1
Rathnapura	Male	146	14.4	21.9	36.3	0.0
	Female	168	16.7	19.6	29.8	1.2
	Total	314	15.6	20.7	32.8	0.6
Overall	**Male**	**3580**	**19.9**	**17.1**	**33.4**	**1.1**
	Female	**3549**	**15.7**	**13.1**	**25.7**	**0.8**
	Total	**7129**	**17.8**	**15.1**	**29.6**	**0.9**

Table
Comparison of prevalence of stunting, wasting and underweight among primary schoolchildren (5-9.9 years) in relation to the age

Age (yr)	No.	Stunting (%)	Wasting (%)	Underweight (%)	Overweight (%)
5	1219	164 (13.5)	184 (15.1)	339 (27.8)	19 (1.6)
6	1865	357 (19.1)	273 (14.6)	609 (32.7)	9 (0.5)
7	406	85 (20.9)	72 (17.7)	134 (33.0)	3 (0.7)
8	1685	254 (15.1)	267 (15.8)	439 (26.1)	22 (1.3)
9	1954	412 (21.1)	281 (14.4)	588 (30.1)	13 (0.7)
Total	**7129**	**1272 (17.8)**	**1077 (15.1)**	**2109 (29.6)**	**66 (0.9)**

Prevalence of wasting and stunting was graded according to WHO classification (WHO Global Database) to assess the severity of the problem as follows: wasting (<5% - low, 5-9% - moderate, 10-14% - high and >=15 – very high) and stunting (<20% - low, 20-29% - moderate, 30-39% - high and >=40 – very high). In general, the severity of prevalence of wasting and stunting was compared by districts and geographical distribution was illustrated in the Figure 3 and 4.

Figure 3 and 4
Prevalence of stunting and wasting among schoolchildren aged 5-9.9 years by district, 2002

The highest prevalence of stunting was reported in this study was in Badulla district which has 'moderate' degree of stunting. All other districts surveyed have mild degree of stunting. Figure 4 shows the wasting prevalence in the surveyed districts.

A 'very high' grade of wasting was found in Kurunagala, Monaragala, Vavuniya, Ampara, Rathnapura and Hambantota districts according to the population prevalence. All the other districts, which were studied, also have a high degree of wasting.

Figure 5
Prevalence of thinness among schoolchildren aged 10-14.9 years by district, 2002

District	Sex	No.	Stunting (%)	Thinness (%)	Overweight (%)
Colombo	Male	267	14.4%	41.2%	8.2%
	Female	197	25.0%	31.5%	3.3%
	Total	464	17.8%	38.1%	6.6%
Kalutara	Male	283	33.2%	65.0%	.5%
	Female	245	31.9%	33.1%	1.3%
	Total	528	32.6%	50.7%	.8%
NuwaraEliya	Male	457	44.2%	57.2%	.4%
	Female	420	53.5%	34.3%	2.6%
	Total	877	48.7%	46.0%	1.4%
Hambantota	Male	297	41.7%	68.9%	1.1%
	Female	295	44.3%	49.5%	1.9%
	Total	592	43.1%	58.4%	1.5%
Vavuniya	Male	153	44.6%	56.4%	0.0%
	Female	108	39.3%	32.8%	1.6%
	Total	261	42.6%	47.5%	.6%
Ampara	Male	167	43.8%	54.5%	1.7%
	Female	205	43.0%	39.2%	1.9%

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Anuradapura	Male	390	50.8%	63.9%	.5%
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	Total	738	48.8%	49.9%	1.4%
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Monaragala	Male	351	56.5%	65.9%	.4%
	Female	347	56.0%	38.1%	.8%
	Total	698	56.2%	51.4%	.6%
Rathnapura	Male	146	41.5%	70.7%	2.4%
	Female	168	38.0%	36.4%	3.3%
	Total	314	39.4%	50.2%	3.0%
Overall	**Male**	**3580**	**19.9**	**17.1**	**1.1**
	Female	**3549**	**15.7**	**13.1**	**0.8**
	Total	**7129**	**17.8**	**15.1**	**0.9**

The proportion of the population with thinness was classified by WHO (1995) was used to classify the severity of the thinness as low (5-9%), medium (10-19%), high (20-39%) and very high (>=40%) prevalence. Prevalence of the thinness was calculated among adolescents and the geographical distribution by districts is shown in Figure 5.

Hambantota district has shown a 'very high' level of thinness and all the other districts studied have indicated high level. It is interesting to note that this observation is comparable with the pattern observed among primary school children except in Monaragala and Kurunagala districts. In these districts there is an improvement from very high level to high level from primary school to adolescents. This finding could be due to the possibility of children 'catching up' in their growth, as they become older.

"Failure of the growth of the individual may be a symptom of an underlying diet on health problem warranting intervention. It can also be seen as a marker of a high risk environment."(ACC/SCN 1990)

Prevalence of over nutrition

Primary school children whose Wt/Ht is >2SD in the NCHS/WHO reference and the adolescents whose BMI>=85th percentile in WHO 1995 reference, were classified as overweight children. The prevalence of overweight was considered in two broad age groups , i.e. 5-9.9 years and 10-14.9 years and the prevalence had increased in 1% in 10-14.9 years group compared to the 5-9.9 years group.

The prevalence of overweight among males was higher than females in 5-9.9 years aged group but the prevalence among females in the adolescents group was more than males. This pattern was consistently shown in all studied 12 districts. When the prevalence of overweight is compared with the prevalence of wasting and thinness among the same group of children the prevalence of overweight is negligible.

Table 2

Prevalence of over nutrition in school children by sex

	5-9.9 years		10-14.9 years	
Sex	**Sample size**	**Over weight**	**Sample size**	**Over weight**
Male	3580	38	1158	22
		1.1%		1.9
Female	3549	28	1801	43
		.8%		2.4
Total	**7129**	**66**	**2959**	**65**
		0.9%		**2.2**

Geographical distribution of overnutrition

The proportion of the school children with overweight was classified by taking arbitrary cut-off points to reflect the severity of the problem among children as follows: <1% - very low, 1-4% -low, 5-9% - medium and >=10% - high prevalence and geographical distribution is shown in Figure 6 and 7.

Figure 6 and 7
Prevalence of overweight among schoolchildren aged 5-9.9 years and 10-14.9 years by district in year 2002

In this study it was found that there is 'very low' and 'low' prevalence of over weight among primary schoolchildren in all the districts studied except in Colombo district. Colombo district has a medium level of overweight prevalence among adolescents' children and it showed a medium prevalence with primary schoolchildren also as shown in Figure 7. Even in other districts there is an increasing trend from 'very low' to 'low' prevalence. Rathnapura districts also shows the prevalence of overnutrition among adolescents to be 'medium'.

SECGROUP * THIN Crosstabulation

			THIN			Total
			1	2	3	
SECGROUP	1.00	Count	531	716	55	1302
		% within SECGROUP	40.8%	55.0%	4.2%	100.0%
		% within THIN	24.9%	31.0%	59.1%	28.7%
	2.00	Count	1605	1591	38	3234
		% within SECGROUP	49.6%	49.2%	1.2%	100.0%
		% within THIN	75.1%	69.0%	40.9%	71.3%
Total		Count	2136	2307	93	4536
		% within SECGROUP	47.1%	50.9%	2.1%	100.0%
		% within THIN	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	63.653	2	.000
Likelihood Ratio	59.119	2	.000
Linear-by-Linear Association	45.507	1	.000
N of Valid Cases	4536		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.69.

SECGROUP * STUNT Crosstabulation

			STUNT			Total
			1	2	3	
SECGRO	1.00	Count	400	895	7	1302

	UP					
		% within SECGROUP	30.7%	68.7%	.5%	100.0%
		% within STUNT	20.6%	34.6%	41.2%	28.7%
	2.00	Count	1541	1691	10	3242
		% within SECGROUP	47.5%	52.2%	.3%	100.0%
		% within STUNT	79.4%	65.4%	58.8%	71.3%
Total		Count	1941	2586	17	4544
		% within SECGROUP	42.7%	56.9%	.4%	100.0%
		% within STUNT	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	107.637	2	.000
Likelihood Ratio	110.082	2	.000
Linear-by-Linear Association	107.169	1	.000
N of Valid Cases	4544		

a 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.87.

Prevalence of anaemia

Anaemia was assessed by measuring haemoglobin levels of school children by Haemocue method. Total number of children tested for anaemia was 1701 and 965 from primary school children and adolescents respectively. Age dependent haemoglobin levels were taken to detect anaemia by adjusting the altitude.

Table 5

Prevalence of anaemia in school children by sex

	5-9.9 years		10-14.9 years	
Sex	**Sample size**	**Anaemia**	**Sample size**	**Anaemia**
Male	841	16.1%	472	13.6%
Female	860	18.1%	493	14.2%
Total	**1701**	**16.3**	**965**	**13.9**

Table 5 shows that the primary schoolchildren had high prevalence of anaemia (16.3%) than adolescents (13.9%). Girls are more affected than boys.

SECGROUP * ANAEMIA Crosstabulation

			ANAEMIA		Total
			1	2	
SECGROUP	1.00	Count	53	271	324
		% within SECGROUP	16.4%	83.6%	100.0%
		% within ANAEMIA	25.2%	30.5%	29.5%
	2.00	Count	157	617	774
		% within SECGROUP	20.3%	79.7%	100.0%
		% within ANAEMIA	74.8%	69.5%	70.5%
Total		Count	210	888	1098
		% within SECGROUP	19.1%	80.9%	100.0%
		% within ANAEMIA	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.276	1	.131		
Continuity Correction	2.029	1	.154		
Likelihood Ratio	2.330	1	.127		
Fisher's Exact Test				.153	.076
Linear-by-Linear Association	2.274	1	.132		
N of Valid Cases	1098				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 61.97.

Table 5 shows that the primary schoolchildren had high prevalence of anaemia (16.3%) than adolescents (13.9%). Girls are more affected than boys.

DISTRICT * ANAEMIA Crosstabulation

	ANAEMIA	Total

			1	2	
DISTRICT	1	Count	6	76	82
		% within DISTRICT	7.3%	92.7%	100.0%
	3	Count	11	33	44
		% within DISTRICT	25.0%	75.0%	100.0%
	9	Count	16	100	116
		% within DISTRICT	13.8%	86.2%	100.0%
	13	Count	14	66	80
		% within DISTRICT	17.5%	82.5%	100.0%
	16	Count	13	77	90
		% within DISTRICT	14.4%	85.6%	100.0%
	18	Count	21	90	111
		% within DISTRICT	18.9%	81.1%	100.0%
	20	Count	22	90	112
		% within DISTRICT	19.6%	80.4%	100.0%
	21	Count	19	101	120
		% within DISTRICT	15.8%	84.2%	100.0%
	22	Count	45	78	123
		% within DISTRICT	36.6%	63.4%	100.0%
	23	Count	29	120	149
		% within DISTRICT	19.5%	80.5%	100.0%
	24	Count	14	57	71
		% within DISTRICT	19.7%	80.3%	100.0%
Total		Count	210	888	1098
		% within DISTRICT	19.1%	80.9%	100.0%

DISTRICT * ANAEMIA * SEX Crosstabulation

				ANAEMIA		Total
SEX				1	2	
1	DISTRICT	1	Count	5	45	50
			% within DISTRICT	10.0%	90.0%	100.0%
		3	Count	8	22	30
			% within DISTRICT	26.7%	73.3%	100.0%
		9	Count	7	47	54
			% within DISTRICT	13.0%	87.0%	100.0%
		13	Count	8	39	47
			% within DISTRICT	17.0%	83.0%	100.0%
		16	Count	4	29	33
			% within DISTRICT	12.1%	87.9%	100.0%

	18	Count	9	41	50
		% within DISTRICT	18.0%	82.0%	100.0%
	20	Count	5	52	57
		% within DISTRICT	8.8%	91.2%	100.0%
	21	Count	13	44	57
		% within DISTRICT	22.8%	77.2%	100.0%
	22	Count	22	40	62
		% within DISTRICT	35.5%	64.5%	100.0%
	23	Count	16	61	77
		% within DISTRICT	20.8%	79.2%	100.0%
	24	Count	6	26	32
		% within DISTRICT	18.8%	81.3%	100.0%
Total		Count	103	446	549
		% within DISTRICT	18.8%	81.2%	100.0%
2 DISTRICT	1	Count	1	31	32
		% within DISTRICT	3.1%	96.9%	100.0%
	3	Count	3	11	14
		% within DISTRICT	21.4%	78.6%	100.0%
	9	Count	9	53	62
		% within DISTRICT	14.5%	85.5%	100.0%
	13	Count	6	27	33
		% within DISTRICT	18.2%	81.8%	100.0%
	16	Count	9	48	57
		% within DISTRICT	15.8%	84.2%	100.0%
	18	Count	12	49	61
		% within DISTRICT	19.7%	80.3%	100.0%
	20	Count	17	38	55
		% within DISTRICT	30.9%	69.1%	100.0%
	21	Count	6	57	63
		% within DISTRICT	9.5%	90.5%	100.0%
	22	Count	23	38	61
		% within DISTRICT	37.7%	62.3%	100.0%
	23	Count	13	59	72
		% within DISTRICT	18.1%	81.9%	100.0%
	24	Count	8	31	39
		% within DISTRICT	20.5%	79.5%	100.0%
Total		Count	107	442	549
		% within	19.5%	80.5%	100.0%

DISTRICT

Chi-Square Tests

SEX		Value	df	Asymp. Sig. (2-sided)
1	Pearson Chi-Square	21.932	10	.015
	Likelihood Ratio	21.372	10	.019
	Linear-by-Linear Association	3.164	1	.075
	N of Valid Cases	549		
2	Pearson Chi-Square	28.584	10	.001
	Likelihood Ratio	29.205	10	.001
	Linear-by-Linear Association	6.582	1	.010
	N of Valid Cases	549		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.63.
b 1 cells (4.5%) have expected count less than 5. The minimum expected count is 2.73.

Geographical distribution of anaemia

Table
Prevalence of anemia among schoolchildren (5-14.9 years) in relation to districts and sex

District	Sex	No.	Anaemia among schoolchildren of 5-9.9 years aged (%)	Anaemia among schoolchildren of 10-14.9 years aged (%)
Colombo	Male	62	14.5	
	Female	58	13.8	
	Total	**120**	**14.2**	
Kalutara	Male	24	16.7	
	Female	20	0.0	
	Total	**44**	**9.1**	
Hambantota	Male	117	22.2	

	Female	109	10.1	
	Total	**226**	**16.4**	
Vavuniya	Male	52	30.8	
	Female	51	17.6	
	Total	**103**	**24.3**	
Ampara	Male	49	20.4	
	Female	70	15.7	
	Total	**119**	**17.6**	
Kurunagala	Male	109	23.9	
	Female	123	21.1	
	Total	**232**	**22.4**	
Anuradapura	Male	119	21.0	
	Female	117	22.2	
	Total	**236**	**21.6**	
Polonnaruwa	Male	114	15.8	
	Female	115	20.0	
	Total	**229**	**17.9**	
Badulla	Male	105	16.2	
	Female	99	17.2	
	Total	**204**	**16.7**	
Monaragala	Male	92	16.3	
	Female	98	13.3	
	Total	**190**	**14.7**	
Rathnapura	Male	54	13.0	
	Female	56	16.1	
	Total	**110**	**14.5**	
Overall	**Male**	**897**	**17.8**	
	Female	**916**	**15.7**	
	Total	**1813**	**16.8**	

(Anaemia: children 5-11 years <11.5, 12-13 years <12.0, >13 years male children <13. g/d, >13 years female children <12. g/d l. Altitudes correction: Badulla = +0.7, Monaragala = +0.3 and Rathnapura = +0.3).

Table
Comparison of prevalence of anaemia among schoolchildren (5-14.9 years) in relation to the age

Age (yr)	No.	Anaemia among schoolchildren of 5-9.9 years aged (%)	Anaemia among schoolchildren of 10-14.9 years aged (%)
5	383	90 (23.5)	
6	516	102 (19.8)	
7	21	4 (19.0)	
8	406	56 (13.8)	
9	487	61 12.5)	
Total	**1813**	**326 (18.0)**	

The proportion of the school children with anaemia was classified by taking WHO cut-off points to reflect the distribution of anaemia among children as shown in Figure 8 and 9 (low, medium, high and very high prevalence).

Figure 8 and 9
Prevalence of anaemia among schoolchildren aged 5-9.9 years and 10-14.9 years by district in year 2002

Very high levels of anaemia were not seen in any district. A high degree of anaemia has been shown in Anuradhpura, Vavuniya, Rathnapura and Kurunagala districts. When it comes to the adolescent group Colombo district has a low level of anaemia and other districts have a medium level of anaemia prevalence except in Monaragala and Rathnapura districts.

Prevalence of Vitamin A deficiency

The clinical signs of VAD include night blindness, Bitot's spots, corneal xerosis and corneal scars or ulcers. The prevalence of clinical deficiency is estimated by combining night blindness and eye changes, primarily Bitot's spot to form a "total Xerophthalmia" prevalence (United Nation 2001).

Table 3

Prevalence of Vitamin A deficiency in school children by sex

Sex	Sample size	Bitot's spot	
		Present	No
Male	4616	22	4594
		.5%	99.5%
Female	4897	26	4872
		.5%	99.4%
Total	9513	48	9461
		.5%	99.5%

Clinical VAD assessed by eye deficiency (Xerophthalmia) is considered a public health problem at more than 1% prevalence (Asian Development Bank 1999). Bitot's spots were examined among the study subjects as shown in Table 3. It showed a 0.5% of prevalence with no difference between males and females. It indicates that the Vitamin A deficiency among schoolchildren is not a public health problem in Sri Lanka.

Geographical distribution of Vitamin A deficiency

Figure 10
Prevalence of Vitamin A deficiency among schoolchildren by district

DISTRICT * BITOT * SEX Crosstabulation

			BITOT		Total
SEX			1	2	
1 DISTRICT	1	Count		194	194
		% within BITOT		8.6%	8.6%
	3	Count		202	202
		% within BITOT		9.0%	9.0%
	6	Count		283	283
		% within BITOT		12.6%	12.6%
	9	Count	1	178	179
		% within BITOT	16.7%	7.9%	7.9%
	13	Count		101	101
		% within BITOT		4.5%	4.5%
	16	Count		121	121
		% within BITOT		5.4%	5.4%
	18	Count		156	156
		% within BITOT		6.9%	6.9%
	20	Count	2	189	191
		% within	33.3%	8.4%	8.5%

			BITOT		
	21	Count	1	180	181
		% within	16.7%	8.0%	8.0%
			BITOT		
	22	Count	1	329	330
		% within	16.7%	14.6%	14.6%
			BITOT		
	23	Count		233	233
		% within		10.4%	10.3%
			BITOT		
	24	Count	1	81	82
		% within	16.7%	3.6%	3.6%
			BITOT		
Total		Count	6	2247	2253
		% within	100.0%	100.0%	100.0%
			BITOT		
2 DISTRICT	1	Count		92	92
		% within		4.0%	4.0%
			BITOT		
	3	Count		162	162
		% within		7.1%	7.1%
			BITOT		
	6	Count	1	270	271
		% within	10.0%	11.8%	11.8%
			BITOT		
	9	Count	1	211	212
		% within	10.0%	9.3%	9.3%
			BITOT		
	13	Count		61	61
		% within		2.7%	2.7%
			BITOT		
	16	Count	1	157	158
		% within	10.0%	6.9%	6.9%
			BITOT		
	18	Count		187	187
		% within		8.2%	8.2%
			BITOT		
	20	Count	3	173	176
		% within	30.0%	7.6%	7.7%
			BITOT		
	21	Count	2	275	277
		% within	20.0%	12.1%	12.1%
			BITOT		
	22	Count	2	319	321
		% within	20.0%	14.0%	14.0%
			BITOT		
	23	Count		252	252
		% within		11.1%	11.0%
			BITOT		
	24	Count		121	121
		% within		5.3%	5.3%
			BITOT		
Total		Count	10	2280	2290
		% within	100.0%	100.0%	100.0%
			BITOT		

DISTRICT * BITOT Crosstabulation

			BITOT		Total
			1	2	
DISTRICT	1	Count		286	286
		% within BITOT		6.3%	6.3%
	3	Count		364	364
		% within BITOT		8.0%	8.0%
	6	Count	1	553	554
		% within BITOT	6.3%	12.2%	12.2%
	9	Count	2	389	391
		% within BITOT	12.5%	8.6%	8.6%
	13	Count		162	162
		% within BITOT		3.6%	3.6%
	16	Count	1	278	279
		% within BITOT	6.3%	6.1%	6.1%
	18	Count		343	343
		% within BITOT		7.6%	7.6%
	20	Count	5	362	367
		% within BITOT	31.3%	8.0%	8.1%
	21	Count	3	455	458
		% within BITOT	18.8%	10.1%	10.1%
	22	Count	3	648	651
		% within BITOT	18.8%	14.3%	14.3%
	23	Count		485	485
		% within BITOT		10.7%	10.7%
	24	Count	1	202	203
		% within BITOT	6.3%	4.5%	4.5%
Total		Count	16	4527	4543
		% within BITOT	100.0%	100.0%	100.0%

The district distribution pattern is shown in Figure 10. Bitot's spots were not found in Colombo, Rathnapura and Kurunagala districts. When the geographical distribution was taken into consideration, we can see that the clinical VAD is a public health problem in the Badulla district, but not in the whole country.

"In populations like these studied (with evidence of poverty, general social and biological deprivation marked by stunting and with evidence of existing vitamin A deficiency) improvement in vitamin A can be expected to have a beneficial effect on mortality."

By considering the above fact Vitamin A megadose supplementation for schoolchildren was initiated in year 2000 for grade 1,4 and 7 children by providing 100,000 IU once, but to have the successful supplementation it should be provided every 6 month period with a dose of 200,000IU.

It seems appropriate to quote ACC/SCN (1993) in relation to megadose supplementation, "Any programme designed to improve vitamin A status must monitor response of the population (e.g. through estimation of serum vitamin A or monitoring clinical symptomatology depending upon circumstances) rather than assuming that the administered/ingested vitamin is exerting an effect."

Awareness and 'concern'

Breakfast eating habits

DISTRICT * BREAK * SEX Crosstabulation

SEX			BREAK 1	BREAK 2	Total
1	DISTRICT 1	Count	184	10	194
		% within BREAK	11.5%	6.1%	11.0%
	9	Count	159	20	179
		% within BREAK	9.9%	12.1%	10.1%
	13	Count	93	8	101
		% within BREAK	5.8%	4.8%	5.7%
	16	Count	93	28	121
		% within BREAK	5.8%	17.0%	6.8%
	18	Count	129	27	156
		% within BREAK	8.0%	16.4%	8.8%
	20	Count	177	14	191
		% within BREAK	11.0%	8.5%	10.8%
	21	Count	164	17	181
		% within BREAK	10.2%	10.3%	10.2%
	22	Count	302	28	330
		% within BREAK	18.8%	17.0%	18.7%
	23	Count	225	8	233
		% within BREAK	14.0%	4.8%	13.2%
	24	Count	77	5	82
		% within BREAK	4.8%	3.0%	4.6%
Total		Count	1603	165	1768
		% within	100.0%	100.0%	100.0%

			BREAK		
2 DISTRICT	1	Count	89	3	92
		% within	5.4%	1.5%	5.0%
		BREAK			
	9	Count	186	26	212
		% within	11.3%	12.6%	11.4%
		BREAK			
	13	Count	54	7	61
		% within	3.3%	3.4%	3.3%
		BREAK			
	16	Count	115	43	158
		% within	7.0%	20.9%	8.5%
		BREAK			
	18	Count	154	33	187
		% within	9.3%	16.0%	10.1%
		BREAK			
	20	Count	168	8	176
		% within	10.2%	3.9%	9.5%
		BREAK			
	21	Count	253	24	277
		% within	15.3%	11.7%	14.9%
		BREAK			
	22	Count	299	22	321
		% within	18.1%	10.7%	17.3%
		BREAK			
	23	Count	243	9	252
		% within	14.7%	4.4%	13.6%
		BREAK			
	24	Count	90	31	121
		% within	5.5%	15.0%	6.5%
		BREAK			
Total		Count	1651	206	1857
		% within	100.0%	100.0%	100.0%

DISTRICT * BREAK Crosstabulation

			BREAK		Total
			1	2	
DISTRICT	1	Count	273	13	286
		% within	8.4%	3.5%	7.9%
		BREAK			
	9	Count	345	46	391
		% within	10.6%	12.4%	10.8%
		BREAK			
	13	Count	147	15	162
		% within	4.5%	4.0%	4.5%
		BREAK			
	16	Count	208	71	279
		% within	6.4%	19.1%	7.7%
		BREAK			
	18	Count	283	60	343
		% within	8.7%	16.2%	9.5%
		BREAK			
	20	Count	345	22	367
		% within	10.6%	5.9%	10.1%
		BREAK			
	21	Count	417	41	458

		% within BREAK	12.8%	11.1%	12.6%
	22	Count	601	50	651
		% within BREAK	18.5%	13.5%	18.0%
	23	Count	468	17	485
		% within BREAK	14.4%	4.6%	13.4%
	24	Count	167	36	203
		% within BREAK	5.1%	9.7%	5.6%
Total		Count	3254	371	3625
		% within BREAK	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	150.155	9	.000
Likelihood Ratio	138.115	9	.000
Linear-by-Linear Association	.120	1	.729
N of Valid Cases	3625		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.58.

BREAK * STUNT Crosstabulation

			STUNT			Total
			1	2	3	
BREAK	1	Count	1395	1852	7	3254
		% within STUNT	89.9%	89.6%	100.0%	89.8%
	2	Count	157	214		371
		% within STUNT	10.1%	10.4%		10.2%
Total		Count	1552	2066	7	3625
		% within STUNT	100.0%	100.0%	100.0%	100.0%

BREAK * THIN Crosstabulation

			THIN			Total
			1	2	3	
BREAK	1	Count	1532	1648	74	3254
		% within THIN	90.1%	89.4%	90.2%	89.8%
	2	Count	168	195	8	371
		% within THIN	9.9%	10.6%	9.8%	10.2%
Total		Count	1700	1843	82	3625
		% within THIN	100.0%	100.0%	100.0%	100.0%

Eating pattern of children

About 886 schoolchildren aged 10-12 years of a representative sample was interviewed on the food consumption during the previous week by introducing a food frequency questionnaire. Ten children from each selected school were randomly selected from attendance register by using computer generated random numbers.

The main source of energy derived from rice. Rice is more popular among children than other cereals like bread, yam and other starch foods like jak. 90.7% of children had consumed rice about 2-3 times per day.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
RICE	675	1	7	5.49	1.30
BREAD	680	1	7	2.64	1.26
KURUK	671	1	5	1.21	.55
MANIO	675	1	6	1.57	.84
JAK	658	1	5	1.35	.67
Valid N (listwise)	644				

Most frequently eaten animal food was fish and dry fish. But 30% of children have not consumed any animal food during the previous week. This is a devastating situation on production of hemoglobin and this is the peak growing period of children with high demand for Hb.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
DHAL	677	1	7	2.56	.98
DRYFR	672	1	6	1.44	.92
SOYA	678	1	6	1.75	.95
FEGG	677	1	5	1.36	.68
BEGG	677	1	6	1.71	.83
CRAB	664	1	6	1.07	.39
FISH	674	1	7	2.19	1.08
SAUS	658	1	5	1.08	.38
CHICK	673	1	7	1.48	.79
PORK	664	1	7	1.07	.45
BEEF	666	1	5	1.31	.73
Valid N (listwise)	627				

About 50% of children are not drinking milk or consumed any milk food like curd, yogurt etc. During this age group the calcium is essential and the requirement is high due to peak bone mass. Consumption of milk or milk foods are essential during this period to fulfill the required amount of calcium otherwise it is difficult to meet the required amount of calcium from other sources.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
MILK	672	1	7	2.58	1.65
YOGURT	676	1	7	1.56	.99
BUTTE	676	1	6	1.31	.76
Valid N (listwise)	659				

Though Sri Lanka is flourised with different kind of fruits 34.4% of children have not consumed any fruits during the previous week. When we see the sectoral difference, rural sector showed the higher percentage than the urban sector, i.e. 34.4% and 24.4%. It is interesting to note that only 7.7% children eat fruits 2-3 times per day, which is the recommended amount of fruits for this age group.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
LEAVE	678	1	7	2.45	1.16
CARROT	681	1	8	2.40	1.20
LEAKS	681	1	8	2.59	1.27
TOMA	683	1	7	2.23	1.21
PAPAW	682	1	7	2.37	1.08
Valid N (listwise)	668				

The similar pattern is observed with the green leave consumption. About 24.1% of children had not consumed any kind of vegetables during the last week. 9.7% had only eaten recommended amount of vegetables per day. Vegetables and fruits will supply the major portion of daily requirement of vitamins and minerals. If the consumption levels are so low like this the deficiencies can be expected in these children. When concerned on the price of food the cheapest food item in the market today is green leaves. So, this situation should be aware and concerned urgently to popularize and to create awareness among children and parents.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
OIL	675	1	7	2.25	1.19
COC	677	1	7	3.60	1.31
PEAN	672	1	8	1.92	1.20
CAKE	678	1	8	1.98	1.17

ICECR	666	1	7	1.71	.95
CHOCA	666	1	7	2.30	1.19
TEAS	667	1	8	3.56	1.47
Valid N (listwise)	640				

Why should we be concerned about the physical activity pattern of children?

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PLAY	668	1	8	5.24	2.52
CRICK	647	1	8	3.10	2.69
BADMIN	630	1	8	1.22	.90
VOLY	632	1	8	1.21	.99
SWIM	634	1	8	1.62	1.50
NETBA	629	1	7	1.09	.60
GYMNA	625	1	8	1.05	.46
CHESS	628	1	8	1.32	1.07
INDOOR	607	1	8	1.18	.86
OUTDOO	631	1	8	2.96	2.56
TUTION	634	1	8	2.90	2.37
TV	667	1	9	5.84	2.43
Valid N (listwise)	589				

Same children were interviewed about the activity pattern mainly concentrating on playing, organized games and sedentary activities like watching television and attending tuition classes. 23.4% of urban children have not participated with any type of playing. Only 42.9% of children involved with some playing more than one hour per day in contrast to the recommended physical activity pattern for this age group. At last one hour of physical activity is essential for this age group to facilitate the growth of bone mass otherwise this will aggravate the future osteoporosis prevalence. Not only that it will in turn produce more overweight and obese children with future unhealthy nation.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
VEGSOU	661	1	6	1.41	.98
MEATSO	661	1	5	1.07	.34
SAUSE	660	1	5	1.06	.32
PICKLE	661	1	3	1.02	.16
MARMIT	661	1	7	1.13	.56
Valid N (listwise)	656				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
JAM	657	1	7	1.37	.84
TEA	658	1	8	3.81	1.36
COFFE	653	1	7	1.57	1.09
COLA	616	1	8	1.32	.73
CORDI	660	1	7	1.25	.76

Valid N (listwise)	595

What possible action could be taken to prevent?

Don't overload the teachers; their first job is to teach

Do monitor and evaluate all activities implemented.

School based health and nutrition services that are simple, safe and familiar and address problem that are prevalent and recognized as important within the community. Interventions that are feasible to implement even in the most resource poor schools.

Nutrition education that focus upon the development of knowledge, attitudes, values and life skills to establish lifelong health practices.

What other things can be done about the problem of child malnutrition?

The future

Rise of overweight and reduction of physical activity patterns is not a good sign with schoolchildren, especially with the adolescent age group. This is a challenge for the future to be watched and study further in detail. This study highlights it is not only the problem among urban children it is becoming a problem for rural children also. The following future challenges should be concerned,

- Increase the physical activity pattern of children at least ½ - I hour per day.
- Increase the awareness of parents on physical activity as important as education. Otherwise they can't become healthy citizen. It will affect the future Sri Lanka.

What we see today about the nutritional problems among schoolchildren are sometime alarming. In this regard health professionals have a challenging role to play. About the mass media should disseminate the correct information, create awareness and educate the children and parents in the real danger.

In the light of what I have presented, so far the Department of Health has a challenging agenda to be taken care of. It should be tied down to specific objectives raised from this study and target oriented terms and reference in a specific timeframe.

Finally I would like to highlight the World Bank statement, "Good nutrition of schoolchildren is an investment in a country's future and in the capacity of its natives to thrive economically as a society".

Nutritional status among primary school children (5-9.9 years) in different districts

District	Sample size	Mean height (SD)	Mean weight (SD)	Wasting (mean Z score)	Stunting (mean Z score)	Underweight (mean Z score)
Colombo	464	119.5 (9.7)	21.9 (6.1)	11.4 (-0.5)	8.1 (-0.5)	14.4 (-0.6)
Kalutara	528	121.6 (7.2)	20.8 (3.7)	19.7 (-1.2)	10.4 (-0.9)	22.2 (-1.3)
NuwaraEliya	877	118.8 (7.5)	19.7 (3.3)	12.9 (-1.2)	25.8 (-1.4)	36.5 (-1.7)
Hambantota	592	115.3 (8.9)	18.4 (3.6)	16.6 (-1.3)	17.2 (-1.1)	29.2 (-1.6)
Vavuniya	261	118.7 (9.4)	19.7 (4.0)	16.9 (-1.3)	13.8 (-1.1)	27.2 (-1.6)
Ampara	372	117.9 (9.0)	19.2 (4.4)	22.0 (-1.4)	14.0 (-1.0)	32.8 (0.9)
Kurunagala	829	116.3 (9.3)	19.1 (4.3)	16.4 (-1.1)	13.8 (-1.0)	26.8 (-1.4)
Anuradapura	738	119.2 (8.8)	20.1 (4.0)	13.4 (-1.1)	17.3 (-1.2)	29.7 (-1.5)
Polonnaruwa	711	118.6(9.2)	19.9 (4.3)	12.7 (-1.1)	19.1 (-1.2)	27.7 (-1.5)
Badulla	745	117.6 (9.2)	19.7 (3.8)	10.3 (-1.1)	26.3 (-1.4)	34.2 (-1.7)
Monaragala	698	117.6 (8.4)	19.1 (3.7)	16.6 (-1.3)	19.8(-1.3)	34.0 (-1.7)
Rathnapura	314	117.5 (9.6)	19.2 (4.5)	20.7 (-1.3)	15.6 (-1.0)	32.8 (-1.5)
Overall	**7129**	**118.2 (8.9)**	**19.7 (4.2)**	**15.1** (-1.1)	**17.8** (-1.1)	**29.6** (-1.3)

Table 1

Acute under nutrition (wasting) of primary schoolchildren (aged 5-9.9 years) by district and sex

	Ampara	Rathnapura	Kalutara	Vavuniya	Hambantota	M'gala	Kurunagala	Néliya	A'pura	P.naruwa
	Colombo	Badulla								
Male	24.7	18.7	21.1	18.4	19.4	18.3	17.7	16.3	16.2	13.2
	11.7	14.3								
Female	20.2	19.2	18.4	14.8	13.7	14.8	15.3	8.8	10.4	12.2
	10.8	6.7								
Total	22	20.7	19.8	17.2	16.5	16.5	16.4	12.7	13.5	12.7
	11.4	10.4								

Table 2

Chronic under nutrition (stunting) of schoolchildren aged 5-9.9 years by district and sex

	Badulla	Néliya	M'gala	P.naruwa	A'pura	Hambantota	Rathnapura	Ampara	Kurunagala	Vavuniya
	Kalutara	Colombo								
Male	28.8	27.2	24	20.7	19.6	18	15.9	13.3	18.3	17.1
	10.2	5.3								
Female	24	24	15.1	17.7	15	16.8	15.3	14.3	9.6	9.3
	10.6	2.6								
Total	26.2	25.7	19.5	18.8	17.3	17.2	15.6	14	13.8	13.3
	10.4	8.6								

Table 3
Anaemia among schoolchildren aged 5-9.9 years by districts and sex

	M'gala	Vavuniya	Kurunagala	Badulla	Rathnapura	A'pura	P.naruwa	Ampara	Hambantota	Colom
Male	24.4	29.1	24.1	22.7	16.7	21.6	15.9	20.4	22.2	14.8
Female	28.3	18.4	21.3	21.7	22.3	20.6	20.2	16.2	10.2	14.3
Total	26.4	24	22.6	22.2	22	21.1	18.1	17.9	16.4	14.5

TABLE 4
Thinness of adolescents schoolchildren aged 10-14.9 years and districts and sex

	M'gala	Hambantota	Kurunagala	A'pura	P.naruwa	Badulla	Vavuniya	Ampar	Colombo		Rathnapura
Male	84.5	80.8	82.8	84.7	81.3	74.9	69.3	66.7	61.3	68.6	
Female	65.9	69.8	65.2	54.8	60.1	58.1	57.4	57.6	60.6	56.2	
Total	74.8	74.9	73.3	70.2	68.6	66.6	64.8	61.7	60.5	60.2	

TABLE 5
Over nutrition of schoolchildren aged 10-14.9 years by districts and sex

	Rathnapura	Colombo	Ampara	P.naruwa	Badulla	Kurunagala	Hambantota	A'pura	Vavuni	M'gala
Male	11.4	11.3	2.4	1.1	3	2.5	2.2	1.1	0	0.4
Female	9.6	5.3	7.6	7.6	6.2	4.3	4.2	4	3.3	1.6
Total	10.2	9.1	5.3	5	4.6	3.5	3.3	2.5	1.2	1

Table 6
Not taken breakfast before coming to school by district

Badulla	A'pura	P.naruwa	Vavuniya	M'gala	Rathnapura	Hambantota	Kuruna	Colom	Ampa
Not taken	5	5.9	9	9.8	10.2	10.2	10.8	13.2	17.1