

**RESEARCH PAPER****PATTERNS OF FOOD CONSUMPTION AND NUTRITIONAL STATUS OF PRESCHOOL CHILDREN IN TWO HIGH GROWN TEA ESTATES OF SRI LANKA**<sup>1</sup>Kudagammana ST, <sup>2</sup>Mohotti K, <sup>1</sup>Karunatilaka A, <sup>1</sup>Karunaratne RR<sup>1</sup> *Department of Paediatrics, Faculty of Medicine, University of Peradeniya*<sup>2</sup> *Tea Research Institute, Thalawakelle*Corresponding Author: Dr. S.T.Kudagammana : Email: [sanathusara@yahoo.com](mailto:sanathusara@yahoo.com), <https://orcid.org/0000-0002-5813-5907>**Abstract**

**Introduction:** Protein energy malnutrition continues to be a serious health concern in Sri Lanka and the country's estate sector is worst affected. Understanding the local patterns of food consumption will be beneficial before planning programmes of nutritional intervention.

**Method:** This study was conducted among preschool children of two tea estates in hill country. Data in relation to food types and their frequency of consumption was collected from their parents using a self-administered questionnaire in their mother tongue, Tamil.

**Results:** Out of the total 131 enrolled in the study, 108 children with complete data were further evaluated. The majority (68.5%) was non-vegetarians. The next commonest pattern of food consumption was pescetarianism with a percentage of 20.4 % (22 subjects). 8.33% of the children were lacto-ovo vegetarians. There was only one child each in the other three categories, lacto- vegetarian, ovo- vegetarian and pure vegetarian giving percentages of 0.93% each. In both Thalawakelle and Haputhale estates, the majority of the children were underweight i.e.68% and 92% respectively. The prevalence of stunting was at 32% and 40%. 48.5% of children were found to be anaemic.

**Conclusions:** Contrary to common belief the majority of the children consumed a non-vegetarian diet. In spite of this, nutritional problems are common in the studied population.

**Key words:** Protein energy malnutrition, Nutritional status, Pattern of food consumption

**Introduction**

Tea estates of Sri Lanka can be divided into three categories; up country, mid country and low country tea estates. Traditionally, tea has been grown at high altitudes by the British rulers who ruled the country from 18<sup>th</sup> to 20<sup>th</sup> century. The high grown tea estates of Sri Lanka employ labourers of

South Indian origin, brought to the country by the colonial rulers.

They traditionally follow Hinduism and speak Tamil language<sup>1</sup>.

Sri Lanka has a lower prevalence of underweight and stunting, compared to many other countries of South Asia<sup>2</sup>.



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Despite this, protein energy malnutrition continues to be a serious health concern in Sri Lanka. More than 20 per cent of the under-five year old children are underweight, and the country's estate sector is worst affected<sup>3</sup>.

The prevalence of malnutrition in Sri Lanka, including those who were underweight and stunted, has decreased between 1993 to 2000 and has increased subsequently<sup>4</sup>. According to the Sri Lanka Demographic and Health Survey 2006/07, variations can be seen among different sectors; especially the estate sector is different from most other parts of the country, where the decline of underweight prevalence is relatively slower<sup>5</sup>.

Similarly, it is shown that the prevalence of stunting is highest in the Uva and Central provinces, whereas highest prevalence of underweight in preschool children is also from the same provinces, which can be attributed to the high contribution from the estate population<sup>6</sup>.

The average calorie intake of a Sri Lankan adult man is 1912.7(1913 ± 567) kilo calories/day and a woman 1513.6 (1514 ± 458) kcal/d; yet the people in estate sector receive lesser number of calories than the required level, which is 1437.7 kcal/d<sup>7</sup>.

Therefore, malnutrition is a serious problem in the plantation sector and possible reasons could be poverty, poor education, and religious beliefs<sup>8</sup>.

These nutritional deficiencies result in a number of health problems such as low birth weight, poor growth and development, poor immunity and recurrent infections and later, malnutrition in women of reproductive age. This significantly affects the work force adversely thus reducing the productivity of the country. Other nutritional deficiencies are also known to be high in this population<sup>6</sup>.

The preschool population is a very vulnerable group needing tailored programmes to improve the health outcomes of the population concerned. Advances in health care alone cannot improve all health outcomes; childhood nutrition also plays an important role in it. Several programmes of nutritional intervention have attempted to improve the nutritional status, but seem to have failed. A significant amount of funds has also been allocated to the area to improve healthcare and infrastructure from the annual budget of the country over the years through the Ministry of Hill Country Infrastructure and Community Development. Among many factors which might have contributed to the failure, lack of an understanding of the local pattern of food consumption is likely to have made an impact.

There are different patterns of food consumption; pure vegetarianism, where the child consumes no food of animal origin, lacto- vegetarianism, where the child consumes only milk products as food of an animal origin, ovo- vegetarianism, where egg consumption is the only food of animal origin. Lacto-ovo vegetarians consume both eggs and milk products in addition to food of plant origin. In pescetarianism, the child does not consume meat products, but consumes others including fish. In non-vegetarianism, the child has no restriction on animal food consumption. There is a dearth of information on the type of diet the children of the plantation sector consume.

When the place of origin and the traditional beliefs are taken into account, one can assume that most of the population concerned may be vegetarians. Our Study highlights the prevalence of basic patterns of food consumption in estate sector, so that it can be used in further studies as well as in planning interventions to improve nutrition among the estate population.

## Materials and Methods

Data was collected from parents of all preschool children in two estates of the hill country, namely, St Coombs tea estate, Thalawakelle and Idalgashinna bio tea project, Haldummulla, Haputhale. Data collection was done using a self-administered questionnaire in their mother tongue, Tamil. This questionnaire included the frequency of consumption of certain food types according to the food preferences of the family. They were helped in completing the forms by two trained assistants when requested. These children were then examined by the interviewers with regards to their growth parameters including height and weight. These were measured according to the standard methods of measurement. Finally a full blood count including red cell indices was done for the consenting subjects.

The collected data was first entered into a Microsoft Excel data sheet and analysis done in relation to the two separate estates and then as a whole. The completed data with regards to the food of each individual were scrutinized individually and allocated to a particular pattern of food consumption-pure vegetarian, lacto vegetarian, ovo vegetarian, lacto-ovo vegetarian, pescatarian, or non-vegetarian. The overall prevalence of each category was calculated. Growth parameters were analysed using standard growth charts for the age and sex of Sri Lankan children. Haemoglobin and red cell indices of these children were also compared with normal ranges of them.

Ethical clearance for the study was obtained from the Ethical Review Committee, Faculty of Medicine, University of Peradeniya.

## Results

A total of 131 preschool children were eligible, where 63 subjects were from Thalawakelle and 72 subjects from Bio tea project Haputhale. Out of the 131 children, 23 had to be excluded, 6 from Thalawakelle

and 17 from Bio tea project Haputhale, due to incomplete information, leaving 108 subjects for the data analysis.

The total number of eligible children in Thalawakelle was 57 and out of them 46 were non-vegetarians while there were no pure vegetarians. There was only one subject each in lacto-vegetarian and ovo-vegetarian categories, while there were 4 lacto-ovo vegetarians and 5 pescatarians.

Out of the 51 total subjects of the Haputhale bio tea project, 28 were non-vegetarians, whereas 17 were pescatarians. A total of 5 were lacto-ovo vegetarians while only 1 was a pure vegetarian. There were no lacto-vegetarians, or ovo-vegetarians in the Haputhale bio tea project (Table 1).

Overall, out of the 108 subjects, the majority (74) were non-vegetarians. As a percentage, this was 68.5%. Second common pattern of food consumption pattern was pescetarianism with a total of 22 subjects, which is about 1/5<sup>th</sup> of the total. There was a total of 9 lacto-ovovegetarians (8%), while only one subject was categorized into each of the other three groups, lacto-vegetarian, ovo-vegetarian and pure vegetarian.

The height and weight of the children were analysed using standard growth charts. The majority of them were underweight and undernourished giving below 2SD percentages of 67.8% and 92% respectively in Thalawakelle and Haputhale estates. Though the numbers were small all the pure vegetarians, lacto-vegetarians and ovo-vegetarians were underweight. All the pescatarians in Haputhale estate and all ovo vegetarians in Thalawakelle estate were stunted (Table 2).

Out of the 71 blood samples of the consented children 68 samples were analysed. The other 3 samples were not suitable for the analysis. Their results were as follows (Table 3).

**Table 1:** Patterns of food consumption in Thalawakelle and Haputhale estates

Type of diet	Thalawakelle estate -n (%)	Haputhale estate- n (%)	Total -n (%)
Vegetarian	0	1 (1.9%)	1 (0.9%)
Lacto vegetarian	1 (1.7%)	0	1 (0.9%)
Lacto ovovegetarian	4 (7.0%)	5 (9.8%)	9 (8.3%)
Ovo vegetarian	1 (1.7%)	0	1 (0.9%)
Pescetarian	5 (8.7%)	17 (33.3%)	22 (20.4%)
Non- vegetarian	46 (80.7%)	28 (54.9%)	74 (68.5%)
Total	57	51	108

**Table 2:** Prevalence of child malnutrition in Haputhale and Thalawakelle estates

Type of diet	Number and % of <2SD			
	Thalawakelle		Haputhale	
	Height (n, %)	Weight (n, %)	Height (n, %)	Weight (n, %)
Vegetarian	-	-	0	1 (100%)
Lacto vegetarian	0	1 (100%)	-	-
Lacto-ovo vegetarian	1 (25%)	2 (50%)	3 (66.6%)	5 (100%)
Ovo vegetarian	1 (100%)	1 (100%)	-	-
Pescetarian	0	3 (60%)	17 (100%)	17 (100%)
Non- vegetarian	16 (35.6%)	32 (68.9%)	7 (23.5%)	25 (88.2%)
Total	18 (32.1%)	37 (67.9%)	20 (40%)	47 (92%)

**Table 3:** Prevalence of anaemia in Haputhale and Thalawakelle estates

Type of diet (No tested)	Low HB (n, %)	Low MCV (n, %)	Low MCH (n, %)	Low MCHC (n, %)
Vegetarian (1)	0	0	0	0
Lacto vegetarian (1)	1 (100%)	0	0	0
Lacto-ovo-vegetarian(3)	2 (66.7%)	1 (33.3%)	1 (33.3%)	0
Ovo-vegetarian (1)	1 (100%)	0	0	0
Pescetarian (9)	6 (66.7%)	2 (22.2%)	3 (33.3%)	1 (11.1%)
Non- vegetarian (53)	23(43.4%)	12 (22.6%)	15 (28.3%)	1 (1.9%)
Total (68)	33(48.6%)	15 (22.1%)	19 (27.9%)	2 (2.9%)

Out of the 9 lacto-ovo vegetarians, 6 subjects had not undergone the haemoglobin and red cell indices tests, thus, the study was left with 3 subjects where two had low haemoglobin one had low MCV (Mean Corpuscular Volume) and one had low MCH (Mean Corpuscular Haemoglobin). This gives percentages as 66.6%, 33.3% and 33.3% respectively. Twenty-three out of the 53 available blood reports of non-vegetarians had features of microcytic hypochromic anaemia.

## Discussion

Childhood malnutrition is declining in Sri Lanka, according to the annual health bulletin published by the Ministry of Health Sri Lanka<sup>9</sup>. Although, a very high percentage of children were found to have evidence of protein energy malnutrition in the estate sector of Sri Lanka, including the two estates studied in this study<sup>10</sup>. The underweight and stunting percentages were 67.5% and 92% and 32% and 40% respectively in the Thalawakelle and Haputhale estates.

Hundred and eight preschool children in estate population were studied with regards to their food consumption habits and patterns. All the children who fulfilled inclusion criteria within this age group were recruited for the study, thus minimizing sampling errors. Two tea estates of similar geographical area with similar populations were selected. This helps in understanding the prevalence of food consumption pattern in the total estate population in high grown tea estates of Sri Lanka.

The majority of the children were non-vegetarians which accounted for 68% of the total. Out of them a considerable proportion was pescatarians while there were also children with other four types of vegetarian diets. This is a very important finding with many implications, as the type of diet greatly affects the nutritional level of

children and growth of children in the estate sector. According to a study done in India, compared to non-vegetarians (38%), more vegetarians (65.9%) were anaemic<sup>11</sup>. Preschool children, who have high rates of growth, need good nutrition to sustain their growth. The studied population has children with significant nutritional problems. This is in keeping with the published data<sup>6,12</sup>. The majority of this population were underweight and, a significant percentage showed stunting as well. On the other hand, when considering the laboratory data, this population has a high prevalence of anaemia as well. Thus, national interventional programmes targeted to the estate population to tackle malnutrition are urgent and essential.

The right nutrients and care at the right time in the early years of a child's life is the key to empowering health as an adult as well. The findings of the study will help to tailor-made programmes possible for this high-risk population. Contrary to Indian data, our population studied, shows non-vegetarianism as the commonest type of food pattern though their origins are from India. Extension of the study to involve a bigger sample from other high grown plantations will help to understand the situation better.

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## Conflicts of Interests

There are no conflicts of interest.

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