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Nutritional status and food insecurity among the children in Northern Sri Lanka

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Abstract

Consumption of adequate nutritious food is the most important element to ensure healthy living of children. The objective was to assess the nutritional status and food insecurity among the children aged 1-5 years in the Jaffna District. A descriptive cross-sectional study design was used. Height and weight were used to compute age and sex specific Z-scores for malnutrition. Food insecurity was assessed by cross-tabulating the Household Food Consumption Adequacy Score (HFCAS) and food access (assessed by food expenditure as a % of the total household expenditure), as specified by the World Food Program. The Socio-demographic factors and dietary pattern were obtained by using interviewer administered questionnaires. Sample size was 846 children [414 (49%) males].The prevalence of wasting, underweight and stunting were 21.6 (n=184), 33.1 (n=282) and 26.4 % (n=223) respectively. Among the subjects, 41.6 (n=351), 48.3 (n=408) and 10.1% (n=85) of children had good, average and poor food access respectively with a mean (±SD) of 75 (±13.6)%. The mean (±SD) HFCAS was 60.9 (±8.2) % with a range from 39 to 87% and all the children had adequate HFCAS (>35.1%). The mean HFCAS was significantly higher in urban children (67.5%) than in rural children (58.8%). Based on food access & HFCAS, food insecurity of Jaffna district was 10.1%. The prevalence of anaemia was 36.4 % (n=308) and it was higher [44.7% (n=38)] in food insecure than in food secure households [35.5% (n=269)]. In this population, 27.2% of the children had protein deficiency (<3.5g/dL) and it was observed as high (30.6%) among food unsecured children. Household income ($p<0.001$), expenditure for foods ($p<0.05$), and Hb concentration ($p<0.05$) were higher in food secure than in food insecure households. This study concludes that, the household food insecurity is prevalent and it was increased with income and expenditure for food in Jaffna district. Even though food insecurity was low in Jaffna it has a significant influence on undernutrition and anaemia in children.

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Keywords: Food insecurity; anaemia; anthropometry; food access; malnutrition.

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1. Introduction

In spite of the many achievements reported in demographic characteristics such as the drastic reduction of infertility rates, maternal and infant mortality levels, and improvement in educational attainments the under nutrition continues to be a serious health concern throughout Sri Lanka[1]. This is due to many years of conflict in the past, economic, humanitarian crises, and lack of resources such as fertile land for cultivation, variety disease free crops, water for irrigation and agricultural farms in Jaffna. Furthermore, rising food prices over the past years coupled with sustainable low incomes have increased the risk of malnutrition, especially among children in Sri Lanka.

Further, more than 1 in 5 under-five year olds are underweight in the country[1&2]. Nearly 1 in 6 babies born has a low birth weight. Children in the rural sector are twice as likely to be underweight than children in the urban sector. Despite countless initiatives to alleviate malnutrition over the years, child nutritional levels have improved only marginally in the country[1].

This is because there are deep rooted causes such as unavailability of food diversity, consumption of insufficient, unsafe, innutritious food. The majority of the population in the district practices subsistence farming, primarily the cultivation of rice and vegetables, with limited animal husbandry. However, unpredictable climatic conditions and seasonal flooding limit agricultural productivity in the area. However, inadequate data exist on the association between household food insecurity and the nutritional status of children. Therefore, this study was conducted in children aged one to five years in Jaffna district, with the objective of assessing nutritional status and the household food insecurity of children aged 1-5 years in Jaffna district.

2. Methodology

2.1 Subject

The study was conducted in children aged 1 to 5 years in Jaffna district. A cross sectional descriptive study design was used and samples were selected based on the multistage clustering method. To find out the sample size, the formula of $[z^2p(1-p)/d^2]$ was used, where p is the highest proportion of underweight from the previous studies[3]. With a z value of 1.96 (at 95% confidence level with type 1 error=0.05), margin of error of 5%, 10% of non-respondent and design effect of 2, minimum required sample size of 846 was derived.

2.2 Ethics

Ethical clearance was obtained from Ethical Review Committee of Faculty of Medicine, University of Jaffna. Informed written consent was obtained from mothers to include their children in the study.

2.3 Study instruments

The study instrument consisted of anthropometric data, biochemical data and interviewer administered questionnaire which was used to get the information on socio demographic, socio economic and dietary data. Dietary data obtained with semi-quantitative food frequency questionnaire were analyzed to obtain the total calorie intake. Weight and height were obtained according to standard WHO procedures[4]. The weight and height of the children were used to compute age-and sex-specific z-scores to derive underweight, wasting, and stunting. Haemoglobin and albumin concentration were obtained to determine anaemia [haemoglobin<11g/dL] and protein deficiency [albumin<3.5g/dL] respectively.

Food insecurity was assessed based on the 'Nutrition and Food Security Assessment in Sri Lanka[5]. It was assessed by cross-tabulating the Household Food Consumption Adequacy Score (HFCAS) and food access (assessed by food expenditure as a % of the total household expenditure), as specified by the World Food Program[6]. HFCAS was calculated based on food groups consumed during 1 week prior to survey by taking eight food groups such as staple/starchy foods (rice/rice based products/wheat and wheat based products and tubers and roots), pulses/legumes, vegetables (including leaves), fruits, animal protein (fish/dry fish, meat, and eggs), sugar/Jaggery, dairy products (curd, yoghurt, cheese, ghee and milk), and oils/fats (coconut oil, vegetable oil, fats, coconut products) were used to calculate the food consumption adequacy score.

The number of days the food items consumed during the previous week was summed in each of the 8 food groups. The food score of each household was calculated as follows:

Simple food score = 2 * number of days (NOD) of staple food + 3 * number of days of pulses + 1 * NOD vegetables + 1*NOD fruit + 4 * NOD animal protein + 0.5 * NOD sugar + 3 * NOD dairy + 0.5 *NOD oil

The households were grouped according to their scores by applying the standard cut-offs as poor food consumption (simple food score is 0 – 21), borderline food consumption (simple food score is 21.01 – 35), adequate food consumption (simple food score is 35.01 and higher). Food access was categorized into 3 groups as indicating different levels of food access (<75 percent - good; 75t o 90 percent - average and >90 percent - poor food access) (Table 1). Food insecurity levels were categorized as severely food insecure, moderately food insecure and food insecure[7].

Table 1: Assessment of food insecurity levels.

		Food Consumption		
		Poor (0-21)	***Borderline (21.01-35)***	***Adequate (>35.01)***
Food Access	***Poor (>90%)***	Severely food insecure	Severely food insecure	Moderately food insecure
	Average (75-90%)	Severely food insecure	Moderately food insecure	Food secure
	Good (>75%)	Moderately food insecure	Food secure	Food secure

3. Results

3.1 Baseline characters of the study population

Among 846 children, 414 (48.9%) were males and the mean age was 34.73 (±13.14) months. Of the total, 205 (24.2%) were from urban area. Mean (±SD) monthly income of the family was LKR 24,117.55 (±15184.77). Mean (±SD) expenditure for food was LKR 13,889.71 (±4,536.85).

3.2 Nutritional status of children

The prevalence of wasting, underweight, stunting and overweight were 21.6 (n=184), 33.1 (n=282), 26.4 (n=223) and 3.4 % (n=27) respectively. Prevalence of anaemia (Hb<11g/dL) was 36.4 % (n=308) and mean haemoglobin concentration of the total sample was 11.7g/dL. In this study, the prevalence of anaemia was higher in males [37.2% (n=155)] than in females [35.7 % (n=155)]. Among the children, 27.2% was affected with protein deficiency (albumin level <3.5g/dL). Total calorie deficiency of the children aged 12-23, 24-35, 36-47 and 48-59 months was 77.5 (n=162), 84.9 (n=203), 88.7 (n=196) and 92.1% (n=163) respectively.

3.3 Food insecurity of the study population

In this study population, the mean (±SD) percentile food access was 75 (±13.6)%. Among the 844 children, 41.6 (n=351), 48.3 (n=408) and 10.1% (n=85) had good, average and poor food access respectively. Level of food access did not significantly differ between urban and rural children (p>0.05).The mean (±SD) HFCAS was 60.9 (±8.2) % with a range from 39 to 87% and all children in this study population had adequate HFCAS (>35.1%). The mean HFCAS was significantly high in urban (67.5%) than in rural children (58.8%). Based on the food access and HFCAS, Household food insecurity of children was 10.1% (10.7% in urban and 9.9% in rural).

When main food groups consumed by children in a household at least on 5 days during the week preceding the survey were assessed, the consumption of staple foods/starchy food (rice and rice based products, wheat products, and tuber and root), sugar/jaggery, and coconut oils/fat was 100%; vegetables/leaves was 72.6%; fruits was 17.8%; meat/poultry/fish/dry fish was 20.1%; dairy products was 3.3%; and legumes, nuts and pulses was 78.3%.

3.4 Association of nutritional status and food insecurity of the study population

Prevalence of wasting [31.8% (n=27)], underweight [41.2% (n=35)] and stunting [34.1% (n=29)] of children of Jaffna District in food insecure group were significantly higher than the wasting [20.6% (n=157)], underweight

[32.5% (n=247)] and stunting [25.5% (n=194)] of children in food secure group ($p<0.05$). Household income ($p<0.001$), expenditure for foods ($p<0.05$), and haemoglobin concentration was high in food secured households than food insecure households (Table 2). Prevalence of anaemia was higher [44.7% (n=38)] in food insecure households than in food secure group 35.5% (n=269). Protein deficiency was higher (30.6%) among food unsecured children than secured children (26.8%).

Table 2: Characteristics of samples, stratified by household food insecurity status

	Food secure(n=85)	Food insecure (n=759)	Total (n=844)	*P*-value
Total income	25186.62	15138.82	24174.70	0.001
Expenditure for food	14076.40	12549.41	13922.63	0.05
Haemoglobin(g/dL)	11.8 (SD=1.8)	11.3 (SD=1.7)	11.7	0.05

4. Discussion

Childhood undernutrition manifested as wasting, underweight and stunting remains a substantial problem in Sri Lanka. Furthermore, dietary pattern of the children is one of the important associated factors for malnutrition. Thus the assessment of food security is an essential component for nutritional assessment of children. In this study, only 14.5% of the children satisfied the recommended level of calorie intake. This clearly explained that, children in Jaffna District consume inadequate energy. This could be due to the food insecurity (10.1%), deficit in the purchasing power of food items and improper complementary feeding practices. As a result of insufficient intake of energy, the prevalence of malnutrition was significantly higher among the children in Jaffna District.

Even though Jaffna District is considered to be an agricultural area, only 8.9% (n=75) were farmers and, the consumption of vegetables and dark green leafy vegetables by children were low [9.6, 7.3, 3.5, 1.4 and 4.3% of the children have consumed 'Murunkai'/'Murunga' leaves (leaves of Moringa oleifera), 'Ponnanganni'/ 'Mukunuwanna' (*Alternanthera sessilis*), 'Vallarai'/ 'Gotu kola' (*Centella asiatica*), 'Akaththi'/'Kathurumurunga' (*Sesbania grandiflora*) and 'Leeks'/ 'Liks' (*Allium porrum*) respectively on daily basis]. Highest percentage of deficit was observed (84.4%) in the consumption of green leafy vegetables.

The mean (±SD) HFCAS was 60.9% (±8.2) and all the children had adequate HFCAS (>35.1%). The mean HFCAS was significantly high in urban (67.5%) than in rural children (58.8%). Similar finding (mean HFCAS of 7.7%) was reported in Sri Lanka in 2007 and that the score was lower in rural sector (64%) when compared to urban areas (77.5%)[7].

It was observed that the household food insecurity was 10.1% and 9.9% in urban and rural children respectively. In contrast a much higher prevalence of food insecurity (75%) has been reported in Sri Lanka[8]. A prevalence of high food insecurity (76%) has been observed among the children aged 3-5 years from Polpithigama divisional secretariat in the Kurunegala District[9]. In Sri Lanka, 87.6, 11.8 and 0.5% of households were food secure, moderately food insecure and severely food insecure respectively[10]. It has been observed that our findings did not significantly differ from National data[7] while significantly differed from the others works ($p<0.05$)[8&9]. The persistence of food insecurity could be due to the high rate of poverty and the low purchasing power and limited access to the food by many households. In addition, restriction for availability of fertile agricultural land in Valikamam area and restriction for access to fishery areas are the main two causes of shortage of vegetables and fish in this region. Jaffna had adequate agricultural and fishing capacity to feed all before the start of three decades of war. Another reason to the food insecurity was due to the seasonal fluctuation in the production of the food. Typical diets of children in Jaffna District are rice as the staple food and is often eaten with dhal thus consists mainly of cereals and pulses, with limited sources of animal foods or plants. Hence, the combination would give a supplementary action as far as amino acid requirements are concerned.

5. Conclusion

This study concludes that, the household food insecurity is prevalent and it was increased with income and expenditure for food in Jaffna district. Even though food insecurity was low in Jaffna it has a significant influence on undernutrition and anaemia in children.

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