

# The Prevalence of Undernutrition and Associated Factors among Children Aged One to Five Years in Siyambalanduwa MOH Area

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## Abstract

**Aim:** High prevalence of child undernutrition is a well-known issue in rural areas of Si Lanka. Identification of real burden, underlying specific causes and addressing those issues will help to improve the nutritional status of those children.

**Objective:** To describe the prevalence of undernutrition and associated factors among children aged one to five years in Siyambalanduwa MOH area.

**Methodology:** A community based cross-sectional study was conducted among 421 child-mother pairs in Siyambalanduwa MOH area using two stage cluster sampling method. Data collection done by using pre tested interviewer administered questionnaire. Relevant anthropometric measurements were done according to WHO slandered guidelines. Statistical analysis was done using SPSS 20. The chi-square test was used, and  $P < 0.05$  was considered for statistically significant.

**Results:** Overall 41% of children aged 1-5 years were undernourished in Siyambalanduwa MOH area. Among the study subjects 24% were underweight, 25.7% were stunted, 16.4% were wasted, 9.2% were both underweight & stunted, 6.8% were both, underweight & wasted, 0.5% were both stunted & wasted and 9.9% were underweight & stunted g & wasted. Only the low total monthly income ( $P < 0.001$ ) and low birth weight ( $P < 0.001$ ) were significantly associated with child undernutrition.

**Conclusions and recommendations:** Prevalence of undernutrition among children aged 1-5 years is unacceptably high and urgent efforts to reduce undernutrition should be a priority. Future studies should focus on assessing how to reduce the burden of undernutrition with low cost interventions.

**Keywords:** Under Nutrition, Children Aged 1-5 Years, Siyambalanduwa

## Introduction

Undernutrition is defined as the outcome of insufficient food intake and repeated infectious diseases. It includes being underweight for one's age, too short for one's age (stunted), dangerously thin for one's height (wasted) and deficient in vitamins and minerals (micronutrient malnutrition) [1]. Globally nearly half of all deaths among children fewer than 5 years are mainly due to direct or indirect effects of undernutrition. That is about 3 million young lives a year! [2].

According to the UNICEF conceptual framework there are three levels of causes responsible for child undernutrition. First the immediate causes which include the individual factors as inadequate dietary intake and diseases. Second the underlying causes which associate with family and community namely food, health and care. Third

the basic causes which relate to social structure, e.g. a government that lack incentives for leaders to perform interventions to reduce undernutrition makes it hard to implement political initiatives and deliver services to the citizens. All forms of undernutrition will create negative effects on health of a child. The main indicators used to monitor the growth of children in the national programme are weight for age (underweight), length/height for age (stunting) and weight for height (wasting).

The Nutrition and food security survey of Sri Lanka highlighted that even though many nutritional interventions (direct food assistance, food supplementation, food subsidies and poverty alleviation programmes) have been implemented over the decades targeting vulnerable populations, still maternal and child undernutrition remains as a significant public health issue in Sri Lanka [3].

In Sri Lankan setting, growth monitoring and promotion are the main

strategies used to reduce undernutrition among children. Regular measurement of height and weight and plotting on the growth chart will indicate early slowing down of growth before appearing of signs and symptoms. Therefore it provides an early warning to the mother and health care worker about the nutritional condition of a child. Every public health midwife (PHM) is supposed to weigh all the children up to 5 years under her care either at well baby clinics or at field weighing posts.

Monaragala is considered as a district with relatively high prevalence of all forms of undernutrition (underweight, wasting and stunting) among children, where siyambalanduwa is one MOH division situated in the administrative district of Moneragala. According to the National nutrition and micronutrient survey 2012, prevalence of severe acute malnutrition among fewer than 5 children in Moneragala district was 3.7% while the national figure was (2.3%) [4].

Therefore it is essential to identify the real burden of undernutrition and some of the key associated factors which will also help stakeholders and donors to identify the key underlying causes leading to undernutrition among children in Siyambalanduwa Divisional Secretariat area and take timely appropriate measures in future to improve their nutritional status. Therefore the objective of this study was to describe the prevalence of undernutrition and associated factors among children aged one to five years in Siyambalanduwa MOH area.

## Methods

This was a community based descriptive cross-sectional study. Study Population was child-mother pair of children aged 1-5 years, who lives in Syabalanduwa MOH area for least one year or more at the time of data collection and registered in the Birth and immunization register. The sample size was computed using the prevalence of underweight as 21%, a precision of 5% at a significance level of 5%. Calculated sample size was 255. The final sample was increased to 422 with a design effect of 1.5 and 10% non-response rate [5].

Two stage cluster sampling method was used to identify the study subjects. Out of total number of 22 PHM areas twelve PHM areas were randomly selected using computer generated random numbers. A group of mother-child (1-5 years of age) pairs within a selected PHM area was defined as a cluster. The children were selected using computer generated random numbers using birth and Immunization register of index PHM area as a sampling frame. Information was gathered from the selected children's caregivers. Inability to meet the caregiver in two consecutive days was considered as non-respondent.

A pretested interviewer administered questionnaire was used to collect socio demographic information of mother, father and index child, data related to maternal and childhood factors and the knowledge, attitudes and practices related to child nutrition. Weight was measured to the nearest 0.01Kg using standardized spring balance scales and height was measured to the nearest centimeter using a standardized audiometers. For children less than two years a length measuring board was used. Data were collected on all seven days of the week by two well-trained pre-intern doctors.

Children who were more than two standard deviations below the reference median values for weight and height were considered to be undernourished (stunted, wasted or underweight) [1]. Separate growth charts were used for boys and girls. Data were analyzed using

SPSS software. Chi-square test was used to verify the statistical significance of the associations at  $P < .05$ . A written informed consent indicating 'no penalty' for not participating in the study was obtained from all participants prior to the interview. Ethical clearance was obtained from PGIM Ethics Review Committee.

## Results

The overall response rate was 98% (413/421). The children participated were between the age group 13-60 months. (Mean 31.9 months/SD=13.59/ median 32months).

**Table 1: Distribution of basic socio-demographic characteristics of children aged 1-5 years**

Socio-demographic characteristics	Frequency N=413	Percentage (%)
<b>Sex</b>		
Male	200	48.4
Female	213	51.6
<b>Birth order</b>		
1 <sup>st</sup>	181	43.8
2 <sup>nd</sup>	153	37.0
3 <sup>rd</sup>	65	15.8
4 <sup>th</sup>	12	2.9
5 <sup>th</sup> or higher	2	0.5
<b>No of siblings in the family</b>		
1	157	38.0
2	152	36.8
3	86	20.8
4	14	3.4
5 and above	4	1.0
<b>Child routinely lives with Both mother and father</b>		
Mother only	106	25.7
Grand parents	9	2.2
Father only Others	1	0.2
<b>Age gap (years) B/W index child and immediately younger child</b>		
<1	28	6.8
≥1 - <2	28	6.8
≥2 - <3	4	1.0
≥3	1	0.2
Not applicable	352	85.2
<b>Age gap (years) B/W index child and immediately older child</b>		
<1	15	3.6
≥1 - <2	62	15.0
≥2 - <3	83	20.1
≥3	66	16.0
Not applicable	187	45.3

The basic socio-demographic characteristics of children were described in table 1. Nearly equal proportion of boys and girls were seen. Majority of children (297: 71.9%) were routinely living with both parents and 25.7% (N=106) routinely lives with mother

only. All were from Sinhala families and the majority (80.8%) of the study sample comprised of either first (44%) and second (37%) born children.

Hundred and fifty nine families (30%) have one child and 36.8% have two while there were only 4(1%) families have five and above. On analyzing the age gap between the index child and immediately younger child 352 (85.2%) were youngest in the family. Nearly 12% of the study subjects reported age gap less than 2 years between the index child and immediately younger child.

**Table 2: Distribution of overall nutritional status of the study subjects**

Nutritional status	Frequency N=413	Percentage (%)
Wellnourished	245	59.3
Undernourished	168	40.7
Total	413	100.0

The table 2 indicates that out of study population 40.7% (N=168) study subjects were undernourished and table 3 shows the distribution of undernutrition among the undernourished group.

**Table 3: Distribution of undernutrition among the study subjects**

Undernutrition status	Frequency N=168	Percentage %
Underweight	37	21.8
Stunted	39	23.0
Wasted	19	11.2
Underweight Stunted	38	22.4
Underweight Wasted	29	16.1
Stunted Wasted	02	0.2
Underweight+Stunted+Wasted	18	9.6
Total	168	100.0

**Table 4: Association of undernutrition with selected maternal socio-demographic characteristics of the study population**

Selected characteristic	wellnourished Number (%)	undernourished Number (%)	Chi-square value	Level of significance
<b>Age at the birth of IC (years)</b>				
<19	18 (7.3)	11 (6.5)	0.83	P=0.39
20-29	148 (60.4)	96 (57.1)	df=1#	NS
30-39	76 (31.0)	57 (33.9)		
40-49	3 (1.2)	4 (2.4)		
<b>Level of education</b>				
No schooling	4 (1.6)	0 (0.0)	2.12	P=0.18
Grade 1-5	6 (2.4)	12 (7.1)	df=1##	NS
Grade 6- 10	23 (9.4)	20 (11.9)		
O/L	144 (58.8)	100 (59.5)		
A/L	58 (23.7)	29 (17.3)		
Degree, Diploma or Higher	10 (4.1)	7 (4.2)		
<b>Employment status</b>				
Employed	26 (10.6)	15 (8.9)	0.31	P=0.57
Not employed	219 (89.4)	153 (91.1)	df=1	NS

Planning status of the pregnancy				
Want to become pregnant	204 (83.3)	138 (82.1)	0.43	P=0.80
Wanted to postponed	22 (9.0)	14 (8.3)	df=2	NS
Not want to have any more children	19 (7.8)	16 (9.5)		

# Rows 1, 2 & 3, 4 were amalgamated for chi-square analysis

##Rows 1, 2, 3, 4 and 5, 6 were amalgamated for chi-square analysis Table 4 describes the association of undernutrition with selected maternal socio-demographic characteristics of the children. Seven percent of undernourished children compared to 4% of well-nourished children with mothers' education level less than grade 5 and not schooled. Similarly 28% of mothers of well-nourished children were educated up to A/L or above compared to 22% of undernourished children but difference was statistically not significant (P=0.18).

No significant association was observed with employment status and planning status of the pregnancy between mothers of well-nourished children and undernourished children.

**Table 5: Association of undernutrition with economic status and wealth index quintiles of the children aged 1-5 years**

characteristic	wellnourished Number (%)	undernourished Number (%)	Chi-square value	Level of significance
<b>Total income (Rupees)</b>				
<5000	14 (5.7)	13 (7.7)	7.9	P=0.001
≥5000-<10000	34 (13.9)	27 (16.1)	df=2#	S
≥10000-<15000	25 (10.2)	30 (17.9)		
≥15000-<20000	33 (13.5)	19 (11.3)		
≥20000-<25000	19 (7.8)	11 (6.5)		
≥25000-<30000	21 (8.6)	20 (11.9)		
≥30000-<35000	48 (19.6)	24 (14.3)		
≥35000-<40000	17 (6.9)	11 (6.5)		
≥40000-<45000	15 (6.1)	6 (3.6)		
≥45000-<50000	9 (3.7)	4 (2.4)		
≥50000	10 (4.1)	3 (1.8)		
<b>Wealth Index quintile</b>				
Lowest	7 (2.9)	6 (3.6)	0.63	P=0.42
Second	10 (4.1)	17 (10.1)	df=1##	
Middle	137 (55.9)	89 (53.0)		
Fourth	78 (31.8)	53 (31.5)		
Richest	13 (5.3)	3 (1.8)		

#Rows 1, 2, 3& 4, 5, 6 & the rest were amalgamated for chi-square analysis

##Rows 1, 2, 3& 4, 5 were amalgamated for chi-square analysis

Table 5 describes the economic status and wealth index quintiles of children. The wealth index was developed according to housing characteristics [4].

In the well-nourished group 4.1% of families have reported total monthly income more than Rs 50000 compared to 1.8% in the

undernourished group. Among the undernourished group 41% of families reported total monthly family income less than Rs 15000 compared to 30% in the well-nourished group. This observed difference in the total household monthly income was statistically significant ( $P<0.001$ ). Although among the undernourished group 2% belonged to the richest quintile compared to 5% in the well-nourished group the observed difference was not statistically significant [6-13].

**Table 6: Association of undernutrition with selected characteristics of the index children aged 1-5 years**

Selected characteristic	wellnourished Number (%)	undernourished Number (%)	Chi-square value	Level of significance
<b>Age (in months)</b>				
13-24	69 (28.2)	43 25.6	1.3	P=0.25
25-36	131 (53.5)	94 56.0	df=1#	NS
37-48	44 18.0	30 17.9		
49-60	1 0.4	1 0.6		
<b>Sex</b>				
Male	125 51.0	75 44.6	1.62	P=0.20
Female	120 49.0	93 55.4	df=1	NS
<b>Birth weight in kg</b>				
<2.5	139 56.7	131 78.0	19.86	P=0.001
≥2.5	106 43.3	37 22.0	df=1	S
<b>Birth order</b>				
First	114 46.5	67 39.9	2.23	P=0.13
Second	90 36.7	63 37.5	df=1###	NS
Third	32 13.1	33 19.6		
Fourth	8 3.3	4 2.4		
Fifth or higher	1 0.4	1 0.6		
<b>Total number of siblings</b>				
One	101 41.2	56 33.3	1.73	P=0.23
Two	88 35.9	64 38.1	df=1###	NS
Three	43 17.6	43 25.6		
Four	10 4.6	4 2.4		
Five and above	3 1.2	1 0.6		

# Rows 1, 2& 3, 4 were amalgamated for chi-square analysis

##Rows 1, 2& 3, 4, 5 were amalgamated for chi-square analysis

###Rows 1, 2& 3, 4, 5 were amalgamated for chi-square analysis

Table 5 describes the association of undernutrition with selected characteristics of the index children. There were no obvious different observed between well-nourished and under nourished children in relation to their age at the time of study but higher prevalence of undernutrition was seen among girls [55.6% (N=93)] compared to boys [44.6% (N=75)].

None of the characteristics of study subjects assessed show a significant association with their nutritional status except birth weight of the child ( $P=0.001$ ).

## Discussion

Out of study population 40.7% (N=168) study subjects were undernourished. Higher prevalence of undernutrition was seen among girls [55.6% (N=93)] compared to boys [44.6% (N=75)].

Similar results shown by the nutrition and food security survey done in Monaragala district (2010); stunting (Male; 22.4%: Female; 24%), wasting (Male; 11.9%: Female; 13.6%) and underweight (Male; 23.1%: Female; 31.8%). Siyambalanduwa being a highly rural area with traditional preference on male children on feeding and care may be a one possible reason for the observed increased undernutrition among girls compared to boys [14-18].

When considering undernutrition according to age groups, 37-48 month (4<sup>th</sup> year) age group accounts for highest underweight (32.9%:N=29) and wasting (20.4%:18) prevalence while stunting is more prevalent (28.5%:N=16) in the age group of 49-60 (5<sup>th</sup> year) months. In contrast to the national level, second year accounts for the highest prevalence of stunting (16.9%) while the prevalence of underweight and wasting was highest during the fourth year (31.1% and 26% respectively) (National nutrition and micro nutrition survey, 2012). These findings were compatible with the national figures for underweight and wasting indicating the accuracy of the study but for the higher prevalence of stunting in the fourth year than in the national figure of second year may be due to the specific practices of the mothers of the study group (good practices 12.8%, average 78%, poor practices 9.2%).

The prevalence of underweight, stunting and wasting of children aged one to five years in Siyanbalanduwa MOH area at the time of the study was 72%, 58% and 40% respectively. According to the nutrition and food security survey (2010) done in Monaragala district there were 23.2% underweight, 18.5% stunted and 11.8% wasted. The observed disparities indicated that further deterioration of the nutritional status among children in the area over the last five years. The only socio-demographic factor which is significantly associated with undernutrition of children according to this study was total monthly income ( $P=0.001$ ).

Sex ratio of the study sample had been 200 boys to 213 girls (48.4%: 51.6%). The prevalence of undernutrition 44.6% (N=75) among boys while 55.6% (N=93) in girls. Similar results shown by the nutrition and food security survey done in Monaragala district (2010) stated as following; stunting (Male; 22.4%: Female; 24%), wasting (Male; 11.9%: Female; 13.6%) and underweight (Male; 23.1%: Female; 31.8%).

In contrast the evidence from Sri Lankan national level studies highlighted that marginally higher prevalence of stunting (Male; 15.5%: Female; 14.5%) and wasting (Male; 22.6%: Female; 21.1%) among boys while higher prevalence of underweight among girls (M; 26.1%: F; 28.5%) (National nutrition and micro nutrition survey, 2012). Except low birth weight (16%) no other maternal or child related factor studied significantly associated with undernutrition. The national figure for low birth weight was 16.3% per 100 live births in government hospitals (Annual health bulletin, 2012). According to the study low birth weight was significantly associated with undernutrition ( $P<0.001$ , CI=0.23-0.57). The reason for high percentage of low birth weight may be due to high rates of maternal anemia [55.5% among pregnant mothers] in addition to high rates of low maternal BMI. [36.8% low BMI among pregnant women in Monaragala district] [4]. On the other hand the high rates of elective (14.4 %: N= 59) and emergency cesarean sections (12.3%: N=51) may also be additional causes for low birth weight [19-34].

## Conclusions

The study revealed that undernutrition is a problem that affects 40.7% of children aged one to five years in Siyambalanduwa MOH area. The factors that were significantly associated with undernutrition of children according to this study were total monthly income ( $P=0.001$ ) and Birth weight ( $P=0.001$ ,  $CI=0.23-0.57$ ) concluding poor people suffer from undernutrition.

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