

Prevalence of under-nutrition among primary school children

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■ **ABSTRACT** : Under-nutrition is a wide spread problem in developing countries and it reflects lack of knowledge and awareness on the part of the parents. Inadequate nutrition among children leads to improper development of their body and mind resulting into lower level of efficiencies. To know the prevalence of under-nutrition among primary school children, a sample of 270 children from Chamoli district of Uttarakhand state were selected. Three commonly used under nutrition indicators, *i.e.*, underweight, stunting and wasting were used to evaluate the nutritional status of the subjects. For this, the weight and height measurements were converted into weight-for-age, height-for-age and weight-for-height percentage of standard for each child using NCHS standards. The children were grouped into different grades of nutritional status by both Gomez's and Waterlow's classifications. The study revealed that weight and mid upper arm circumferences (MUAC) of both boys and girls were comparatively below the reference standards of both ICMR and NCHS. Height of boys and girls in all categories of age were almost equal to the reference standards of ICMR and NCHS. Regarding the prevalence of stunting, children in all age groups were found to be normal. Only 12.23 per cent children were mildly stunted in the category of 8 years. Regarding the prevalence of wasting, 65.18 per cent children were found to be normal, 22.59 per cent were in mild category of wasting and 12.22 per cent children were in moderate category of wasting. 62.96 per cent children were found to be mildly underweight.

■ **KEY WORDS** : Under-nutrition, Stunting, Prevalence

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The problem of malnutrition is multidimensional and inter-generational in nature, the determinants of which include household food insecurity, illiteracy and lack of awareness especially in women, access to health services, availability of safe drinking water, sanitation and environmental conditions and purchasing power etc. Besides early age at marriage of girls, teenage pregnancies resulting in low birth weight of the newborns, poor breast feeding practices, and poor complementary feeding practices, ignorance about nutritional needs of infants and young children and repeated infections further aggravate the malnutrition amongst children.

Many of our school going children consume inadequate diet and so they are malnourished. Malnutrition can be due to poverty. Parents may not be able to provide nutritious food to their children. Sometimes ignorance on the part of parents to

know the requirements of children, quantitatively or qualitatively may lead to malnutrition of children. When the child is in a hurry to go to school, he may skip breakfast or may not carry proper lunch to school or may become too tired after school activities and sleep off without taking night meals. Emotional disturbances at school due to poor academic performance or problems with siblings at home may reflect on the consumption of food (Srilakshmi).

Good nutrition is essential in childhood for optimum growth and performance in school. Under nutrition retards physical and mental growth which in turn, lower the efficiency in education and work. The foundation for good health and sound mind are laid during the pre-school age. Nutrition is one of the most important factors responsible for proper growth in infancy and childhood (Easwaran *et al.*, 1970).

Easwaran and Devdas (1984) reported that children with

inadequate dietary intake results in poor growth and poor school performance. They also reported a positive correlation between height-weight measurement and intake of energy, protein, calcium and beta-carotene.

Stunting (low height for age) and underweight (low weight for age) are widespread problems in developing countries and can reflect a broad range of results such as parental under nutrition, deficiencies of macronutrient and micronutrient deficiency, infections and inadequate attention by caregiver. The cause of stunting is widely believed to occur mainly in early childhood through a cumulative process. Stunting is known to be important in young children because it can have long- term consequences for entry into school, learning of educational performances and productivity (Mittal *et al.*, 2007).

The reduction in the prevalence of underweight in India in the 1990s is in line with gains made in earlier decades. According to the WHO Global Database on child growth and nutrition, the prevalence of malnutrition among children 5 in rural India fell from over 70 per cent in the late 1970s to below 50 per cent at the end of the 1990s for both underweight and stunting measures. The prevalence of severe stunting also declined over this period, from almost 15 per cent to less than 20 per cent; while that of severe underweight declined from 37 per cent to less than 20 per cent (Gupta, 2008).

The current survey report of National Family Health Survey (NFHS-3) 2005-2006 revealed that the prevalence of malnutrition was 47 per cent in India. NFHS-3 deploys three criteria to measure under-nourishment: height-for-age, weight-for-height and weight-for-age. The prevalence of malnutrition among children according to height-for-age is 48 per cent, according to weight-for-height is 19.8 per cent and according to weight-for-age is 42.5 per cent. But, for the survey weight-for-age is the composite index for height-for age and weight-for-height that means 42.5 per cent children are malnourished.

The survey also reveals that the four southern states *viz.*, Andhra Pradesh (32.5%), Kerala (22.9%), Karnataka (37.6%) and Tamil Nadu (29.8%), have lower malnutrition rates than Haryana (39.6%), Rajasthan (49.9%) and Uttar Pradesh (42.4) (Times of India, Oct., 2010).

A number of nutritional surveys have been conducted in recent years in different parts of the country by various agencies, but information regarding nutritional status of children from hilly region is very scanty hence the study was conducted to study the prevalence of under-nutrition among primary school children.

■ RESEARCH METHODS

The present study was conducted in primary schools of Narayan bager block and Tharali block that are situated in Chamoli district. Chamoli is an upper Himalayan district in Uttarakhand state. The sample consisted of 270 children of the 7 primary schools. The sample children were in the age group of 5-9 years. Both purposive and multi-stage random sampling technique were used for the study. Out of thirteen districts in Uttarakhand, Chamoli district was selected purposively as it was convenient to researchers. For the selection of the subjects, multi-stage random sampling was followed. There are nine blocks in Chamoli district, two blocks namely, Narayan bager and Tharali was selected and then total 7 primary schools were selected randomly from the selected blocks. Then total 270 children were selected in the age group of 5-9 years.

Evaluation of nutritional status:

Three commonly used under nutrition indicators, *i.e.*, underweight, stunting, and wasting were used to evaluate the nutritional status of the subjects. For this, the weight and height measurements were converted into weight-for-age, height-for-age and weight-for-height percentage of standard

Table A : Gomez classification		
% expected weight for age	Classification	Category of nutritional status
>90	Normal	Normal
76-90	Mild malnutrition	1 st degree malnutrition
61-75	Moderate malnutrition	2 nd degree malnutrition
≤60	Severe malnutrition	3 rd degree malnutrition

This classification is based on weight for age (underweight)

Table B : Waterlow classification				
Height for age Degree of stunting Per cent (Grade)	Weight for height Degree of wasting			
	>90% (0)	80-90% (1)	70-80% (2)	<70% (3)
>90% (Grade = 0)	Normal			Wasting
95-90% (Grade = 1)				
85-90% (Grade = 2)	Stunting			Stunting and wasting
<85% (Grade = 3)				

This classification is based on height large (stunting) and weight for height (wasting)

for each child using NCHS standards. The children were grouped into different grades of nutritional status by both Gomez's and Waterlow's classifications. The cutoff points for the two classifications are given in Table A and B.

■ RESEARCH FINDINGS AND DISCUSSION

The findings obtained from the present study have been discussed under the following sub-heads:

Anthropometric assessment:

For anthropometric assessment, height, weight and mid upper arm circumference (MUAC) of children were measured. The data regarding these anthropometric measurements of the children have been presented in Table 1 to 3.

Table 1 shows the weight of primary school children according to age and gender. It is clear from the table that the mean weight of both boys and girls in all categories of age was comparatively below the reference standards of both NCHS (1987) and ICMR (2010). The mean weight for boys in all categories of age ranged between 83-91 per cent of both NCHS and ICMR reference standards, whereas for girls in all

categories of age it ranged between 83-92 per cent of NCHS reference standards and 83-90 per cent of ICMR reference standards.

Table 2 shows the height of school children according to age and gender. It is clear from the table that the mean height of both boys and girls in all categories of age were almost equal to the reference standards of NCHS (1987) and ICMR (2010). The mean heights of boys in all categories of age ranged between 94-97 per cent of NCHS reference standards and 92-94 per cent of ICMR standards. Whereas for girls in all categories of age it ranged between 95-99 per cent of both NCHS and ICMR reference standards.

Table 3 shows the mean MUAC of primary school children according to age and gender. It is clear from the table that the mean MUAC boys in all categories of age were comparatively below the reference standards of NCHS (1987) and similar results were found for girls. The mean MUAC of boys and girls in all categories of age ranged between 88-94 and 85-94 per cent of NCHS reference standards.

The results of prevalence of under nutrition stunting (height for age), wasting (weight for height) and underweight

Table 1 : Weight of children as compared with NCHS (1987) and ICMR (2010) standards

Age (year)	Boys				Girls			
	N	Weight (kg)			N	Weight (kg)		
		Mean ± SD	Standards percentage			Mean ± SD	Standards percentage	
			NCHS	ICMR			NCHS	ICMR
5	9	16.33±1.80	88.27	89.72	13	16.0±1.15	92.48	90.39
6	30	18.36±2.11	90.89	91.34	21	17.71±1.84	88.12	88.55
7	46	19.61±1.70	89.54	86.39	27	19.26±1.72	91.71	86.37
8	33	21.34±1.96	85.70	84.68	27	20.8±2.74	83.87	83.2
9	31	23.51±2.99	83.07	83.96	33	23.54±3.61	84.07	85.28

Table 2 : Height of children as compared with NCHS (1987) and ICMR (2010) standards

Age (year)	Boys				Girls			
	N	Height (cm)			N	Height (cm)		
		Mean ± SD	Standards percentage			Mean ± SD	Standards percentage	
			NCHS	ICMR			NCHS	ICMR
5	9	103.55±1.66	96.41	92.87	13	103.69±2.35	98.28	97.82
6	30	111.0±5.65	96.10	93.67	21	111.95±4.06	97.86	98.20
7	46	115.26±3.73	97.26	92.73	27	115.07±3.59	99.20	99.20
8	33	119.73±6.49	94.57	92.03	27	120.07±4.82	95.60	95.29
9	31	125.38±4.65	95.85	93.15	33	126.18±4.41	96.84	97.06

Table 3 : Mid upper arm circumference of children as compared with NCHS (1987) standards

Age (year)	Boys			Girls		
	N	MUAC (mm)		N	MUAC (mm)	
		Mean±SD	NCHS standards percentage		Mean±SD	NCHS standards percentage
5	9	154±3.67	88.0	13	152.15±2.96	86.94
6	30	162.7±1.42	90.89	21	162.52±1.72	92.34
7	46	173.48±2.44	92.77	27	172.81±2.43	94.43
8	33	178.03±3.91	93.70	27	177.11±4.60	90.82
9	31	181.93±1.98	90.96	33	180.60±2.33	85.59

Table 4 : Prevalence of stunting among 5-9 year primary school children

Age (year)	N	Stunting (height for age)			
		Normal	Mild	Moderate	Severe
5	22	22	0	0	0
6	51	51	0	0	0
7	73	73	0	0	0
8	60	27	33	0	0
9	64	64	0	0	0
Total	270	237	33	0	0

Table 5 : Prevalence of wasting among 5-9 year primary school children

Age (year)	N	Wasting (weight for height)			
		Normal	Mild	Moderate	Severe
5	22	13	9	0	0
6	51	30	21	0	0
7	73	73	0	0	0
8	60	60	0	0	0
9	64	0	31	33	0
Total	270	176	61	33	0

Table 6 : Prevalence of underweight among 5-9 year primary school children

Age (year)	N	Underweight (weight for age)			
		Normal	Mild	Moderate	Severe
5	22	13	9	0	0
6	51	0	51	0	0
7	73	27	46	0	0
8	60	27	33	0	0
9	64	33	31	0	0
Total	270	100	170	0	0

(weight for age) of children according to age are summarized in Tables 4 to 6.

Table 4 reveals the prevalence of stunting among primary school children of 5-9 years. Data in table show that the children in all age groups were found to be normal except in the age of 8 year. Out of 270 children, 87.77 per cent children were normal and only 12.23 per cent were stunted in all age groups. Among the 8 year old children, 45 per cent were normal and remaining 55 per cent were in the mild category of stunting.

Table 5 shows the prevalence of wasting in primary school children of 5 to 9 years. Data in table show that out of 270 children, 65.18 per cent children were normal, 22.59 per cent were mildly wasted and 12.22 per cent were moderately wasted. None of them were found in the category of severely wasted. In the five year old children, 14.75 per cent were in mildly wasted category, whereas in 7 and 8 years old children, all were found to be normal. In 9 year children, 48.43 per cent were mildly wasted and 51.56 per cent were moderately wasted.

Table 6 shows the prevalence of underweight in primary school children of 5-9 years. Data in table reveal that out of

270 children, 37.04 per cent children were normal and remaining 62.96 per cent children were in mild category of underweight. None of them were found moderately and severely underweight. In the age of 5 year old, only 5.29 per cent children were in mild category of underweight and in 6 year old children, 30 per cent children were mildly underweight. Regarding the age group of 7 year old children, 27.05 per cent were in mild category of underweight whereas in the age of 8 and 9 year old children the percentage of mildly underweight children were 19.41 per cent and 18.23 per cent, respectively. Regarding prevalence of under nutrition (stunting, wasting and underweight), majority of children were normal and only some were undernourished. Among these undernourished children, majority were in mild category followed by moderate category, none of them were found to be in severe category.

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