■ *Original Article*

# Nutritional assessment of children at Nepal Medical College Teaching Hospital

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**Abstract**

**Background:** Child malnutrition is the single biggest contributor to under-five morbidity and mortality. **Objectives:** To assess the prevalence and types of malnutrition in children below 60 months of age, attending outpatient department at Nepal medical college teaching hospital in Attarkhel, Kathmandu, Nepal. **Methods:** A prospective study was carried out in five hundred and twelve children below 60 months of age from September 2010 to April 2011. Children detailed history, sex, weight were recorded and length/height were measured using standard technique. The length /height and weight were plotted on WHO centiles curves.[1]The malnutrition were graded according to WHO classification. R**esult:** Out of 512 children, according to WHO based on weight for age assessment , 148 (28.9%) were undernourished .Subsequently, in weight for height analysis, 73 (14.2%) were wasted and in height for age assessment, 64 (12.5%) were stunted. The present study also shows , 59 (11.5%), 50 (9.80%) and 14 (2.7%) children with acute, chronic and acute on chronic malnutrition. **Conclusion:** This study revealed that a high prevalence of undernutrition exists in Nepalese children. Overall, 28.9% children were undernourished. Illiteracy, large family size, not exclusively breast feeding, delayed weaning and low socio- economic status are the major risk factors for malnutrition.

**Keywords**: anthropometry, undernutrition, World Health Organization.

## Introduction

Under nutrition includes both protein energy malnutrition and micronutrient deficiencies.[2] Undernourishment directly affects many aspects of the children's mental functions, growth and development which have adverse effects on children's ability to learn and process information and grow into adults. Undernourishment also impairs immune function leaving them more susceptible to infection. In any community, under- five children are one of the most vulnerable groups for nutritional deficiencies, owing to many factors ranging from low birth weight to maternal ill health to socio-economic and environmental factor.[3]

Pre-school children, reflects the nutritional status of their community as a whole.[4]The World Health Organization estimates that in year 2005, there were 126.5 million underweight and 147.5 million stunted pre-school children in the developing world that corresponds to 22.3% and 26.5% of their total population in developing countries respectively. South East Asian region has more pathetic situation with 23.4% children underweight and 22.7% being stunted.[5] The 2006 Nepal demographic and health survey (NDHS) found 45% and 43% of children below the age of five years to be underweight and stunted, respectively.

Nutritional status of our country is very poor. Hence, this study was done to know the prevalence and types of malnutrition in children.

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## Methods

To estimate the prevalence and types of malnutrition, a prospective study was conducted in 512 children below 60 months of age attending out-patient department at Nepal medical college teaching hospital, Attarkhel, Kathmandu, Nepal from September, 2010 to April 2011.The consent was taken from all the parents before the assessment. Systemic random sampling was done for selection of the children. The children with chronic diseases, diarrhea with dehydration, acute illness of more than 2 days, genetic diseases, gross congenital malformation and more than 5 years of age were excluded from this study. The detail studies was done by accumulating the information regarding address, feeding pattern ( breast feeding, bottle feeding, weaning), status of parents (alive or not), occupation, income, education, family size, water and disposal system. Body weight was recorded to the nearest 0.1kg using a balance beam scale .The body length in children less than 24 months were measured nearest to 0.5cm by standard technique using infantometer in recumbent position and the height in older children nearest to 0.5cm on the stadiometer. Nutritional status and protein energy malnutrition were expressed by weight for age, weight for height for age classification of WHO.[6] The standards used being WHO 50$^{th}$ percentiles growth chart.

## Results

In this study, 512 children were enrolled. Males and females were 291(56.8%) and 221(43.2%) respectively. WHO base on weight for age assessment shows, 148 (28.9%) were undernourished. Eightyseven (17.0%) male and 61 (11.9%) were female shown in Table-1.

**Table 1: Distribution of children according to WHO Classification**

| Wt.for age | No. of children | | Total | Reference |
|---|---|---|---|---|
| | Male | Female | | |
| | 291(56.8%) | 221(43.2%) | 512 | |
| > 80% | 204 (39.8%) | 160 ( 31.2%) | | Normal |
| 60 – 80% | 83 (16.2%) | 58 (11.3%) | 141(27.5%) | Undernutrition |
| <60% without edema | 4 (0.8%) | 3 (0.7%) | 7 (1.4%) | Marasmus |
| | 87 (17.0%) | 61 (11.9%) | 148 (28.9%) | Total undernutrition |

In weight for height analysis, 53 (10.3%) children were wasted and 20 (3.9%) were severely wasted. Total, 43 (8.4%) male and 30 (5.8%) female children were moderately to severely wasted shown in Table-2.

**Table 2: Distribution of children according to WHO Classification**

| Wt.for Ht. (wasting measuring) | No. of Children | | Total | Reference |
|---|---|---|---|---|
| | Male | Female | | |
| | 291(56.8%) | 221 (43.2%) | | |
| >80% | 248 (48.4%) | 191 (37.3%) | 439 (85.7%) | Normal |
| 70-79%(-2 to-3SD) | 32(6.2%) | 21(4.1%) | 53 (10.3%) | Moderate Undernutrition (wasting) |
| <70%(<-3SD) | 11(2.1%) | 9 (1.7%) | 20(3.9%) | Severe Undernutrition (Severe wasting) |
| Total moderate to severe wasting | 43(8.4%) | 30(5.8%) | 73 (14.2%) | |

Lastly, in height for age assessment, 51 (10.0%) children were stunted and 13 (2.5%) was severely stunted.Total, 36 (7.0%) male and 28 (5.5%) female children were moderately to severely stunted shown in Table-3.

**Table 3: Distribution of children according to WHO Classification**

| Ht.for age (stunting measuring) | No. of Children | | Total % | Reference |
|---|---|---|---|---|
| | Male | Female | | |
| | 291(56.8%) | 221(43.2%) | 512 | |
| ed90% | 255 (49.8%) | 193 (37.7%) | 448 (87.5%) | Normal |
| 85-89%(-2to-3SD) | 29 (5.7%) | 22 (4.3%) | 51 (10.9%) | Moderate Under-nutrition (stunting) |
| <85%(<-3SD) | 7 (1.4%) | 6 (1.2%) | 13 (2.5%) | Severe Undernutrition (Severe stunting) |
| Total moderate to severe stunting | 36 (7.0%) | 28 (5.5%) | 64 (12.5%) | |

Subsequently, according to WHO, 59 (11.5%), 50 (9.8%), and 14 (2.7%) children had acute, chronic and acute on chronic malnutrition shown in Table-4.

**Table 4: Detection of chronic, acute and acute on chronic malnutrition according to WHO**

| Wt.for Ht. | Ht.for age | No. of Children | | Total | Reference |
|---|---|---|---|---|---|
| | | Male | Female | | |
| | | 291 (56.8%) | 67 (43.2%) | 155 | |
| ed 80% | ed90% | 221 (43.7%) | 168 (32.8%) | 389 (75.9%) | Normal |
| <80 % | ed90% | 34 (6.6%) | 25 (4.9%) | 59 (11.5%) | Wasted |
| ed80% | dd90% | 27(5.3%) | 23 (4.5%) | 50 (9.8%) | Stunted |
| <80% | <90% | 9 (1.7%) | 5 (0.9%) | 14 (2.7%) | Wasted and Stunted |

The highest number of malnourished children were 42 (42.8%) in 13 – 24 months and lowest were 12 (16.9%) in 7 – 12 months age group shown in Table-5.

**Table 5: Distribution of children according to age**

| Nutrition status | <6 mth | 7-12mth | 13-24mth | 25-36mth | 37-48mth | 49-60mth |
|---|---|---|---|---|---|---|
| | n | n | n | n | n | n |
| Normal nutrition | 63 (12.3%) | 71 (13.9%) | 98 (19.1%) | 104 (20.3%) | 92 (17.9%) | 84 (16.4%) |
| Malnutrit-ion | 15 (22.2%) | 12 (16.9%) | 42 (42.8%) | 38 (36.5%) | 19 (20.6%) | 23 (27.4%) |

Here, five known factors for malnutrition were considered. It has been observed that extent of malnutrition was significantly high in children around 53.9 % and 40.6% in illiterate mothers and fathers. It also shows, 71.6% of children with large family size suffer more from malnutrition. Children who are not exclusively breast feeding and delayed weaning, subsequently had 37.4% and 44.0% of malnutrition shown in Table-6.

**Table 6: Distribution of children according to sex, literacy of parents, family size, weaning, breast feeding**

| Study variables | Total no. of childrens No.(512) | Children suffering from malnutrition WHO weight for age |
|---|---|---|
| | | n |
| **Sex** | | |
| Male | 291(56.8%) | 87 (17.0%) |
| Female | 221 (43.2%) | 61 (11.9%) |
| **Mother's literacy** | | |
| literate | 299 (58.4%) | 33 (11.0%) |
| illiterate | 213 (41.6%) | 115 (53.9%) |
| **Father's literacy** | | |
| literate | 347 (67.8%) | 81 (23.4%) |
| illiterate | 165 (32.2%) | 67 (40.6%) |
| **Size of family** | | |
| Small ( dd 2 children) | 244 (47.6%) | 38 (15.6%) |
| Medium (3-4) | 187 (36.5%) | 54 (28.9%) |
| Large (>4 children) | 81 (15.8%) | 58 (71.6%) |
| **Age of weaning** | | |
| <6 mths | 210 (41.0%) | 36 (17.1%) |
| >6mths | 193 (37.7%) | 85 (44.0%) |
| yet to wean | 109 (21.2%) | 27 (24.8%) |
| **Duration of exclusive breast feeding (EBF)** | | |
| breast feeding | | |
| (4-6 mths) | 226 (44.1%) | 41 (18.1%) |
| not EBF | 286 (55.8%) | 107 (37.4%) |

The children from parents of low socio- economic status had high risk of malnutrition shown in Table-7.

**Table 7: Distribution of children according to socio- economic status**

| Nutritional status | Upper | Middle | | Lower | |
|---|---|---|---|---|---|
| | | upper middle | lower middle | upper lower | lower |
| Normal nutrition | 4 (0.8%) | 22 (4.3%) | 43 (8.4%) | 176 (34.3%) | 267 (52.1%) |
| malnutrition | — | 3 (13.6%) | 8 (18.6%) | 48 (27.3%) | 89 (33.3%) |

## Discussion

Anthropometric indices are used as the main criteria for assessing the nutritional status of children by comparing them to a reference growth chart. Deficits in the anthropometric indices from the median value of the population are regarded as evidence of malnutrition. In children, the 3 most commonly used anthropometric indices are weight-for-height, height-for-age, and weight-for-age. Deficit in height-for-age is called stunting or shortness and indicates chronic malnutrition. Deficit in weight-for-height is called wasting and indicates acute malnutrition. Deficit in weight-for-age is often referred to as underweight and reflects low weight-for-height, low height-for-age, or both (global malnutrition). Weight-for-age is thus not a good indication of recent nutritional stress in the population.[7] In our study, WHO based on weight for age shows, 28.9% children were undernourished. A study done by Masood shows, 53.8% of children had malnutrition which was more as compare to our study.[8,9] Statistically, there was a slightly higher gender

difference, around 17.0% male and 11.9% female were undernourished. Similar study done by Bhalani shows, higher prevalence of malnutrition in girls around 28.4% as against 16.9% in boys.[10]WHO anthropometric system also helps to identify 11.5% children with acute, 9.8% children with chronic and 2.7% with acute on chronic malnutrition. If IAP guidelines were followed, then we would have missed the wasted and stunted children.[11] Education of mothers and fathers has significant effect on the nutritional status of their children. Here, 213 (41.6%) mothers and 165 (32.2%) fathers were illiterate out of which 115 (53.9%) and 67 (40.6%) children had malnutrition. This study shows that, 58 (71.6%) children from larger family suffer more from malnutrition compare to small family where only 19.6% of children had malnutrition. Two hundred and eighty six (55.8%) children were not exclusively breast fed in which 107 (37.4%) had more malnutrition in contrast to exclusively breast fed children. Delayed weaning is highly associated with malnutrition in 85 (44%) children. Similar study was done by Mallik *et al* shows 60.0%, 61.1%, 66.7% and 100% children were malnourished because of illiterate mother, large family size, delayed weaning and not exclusively breast feeding.[12]

The effect of low socio-economic status is also one of the major risk factor for malnutrition. Here, 48 (27.3%) and 89 (33.3%) children with upper lower and lower socio-economic status had malnutrition.[13]

## Conclusion

Overall, 28.9% children were malnourished. This is a serious problem, by any scale. More wide spread use of WHO score system of classification, especially in community-based studies, is recommended. The finding of this study confirmed that lack of formal education, large family size, late weaning, lack of breast feeding, low socio-economic status were the risk factors that were associated with malnutrition in children.We should make a comprehensive, integrated and intersectoral strategy for addressing under-nutrition. The nutritional assessment and gap analysis is necessary for better implementation.

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