

## Prevalence of Undernutrition among Preschool Children under Five Attending Pediatric OPD in a Tertiary Care Hospital of Northeastern India

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### Abstract

#### Introduction

Prevalence of undernutrition in developing countries, though on the declining trend, is still a cause for alarm. The prevalence in South-central Asia is the highest in the world. The prevalence in India is also among the highest in the world. In such a scenario, this study was undertaken to find out the nutritional status of under five children attending the Pediatric OPD in a Tertiary Care Hospital of Northeast India.

#### Materials and Methods

A cross sectional study was carried out during 12 months at the Pediatric OPD, NEIGRIHMS, Shillong, Meghalaya-India. A total of 6,624 children aged 0-60 months were enrolled for the study. Weight and height was taken by trained staff following standard anthropometric techniques. The z-score of weight-for-height, weight-for-age and height-for-age was calculated as against World Health Organization (WHO) recent child growth standard.

#### Results

Out of the total, 6,183 children were included in the present analyses. Overall the prevalence of underweight, stunting and wasting was 19.7%, 35.5% and 8.5% respectively. Of these, 9.0%, 19.7% and 3.4% children were found to be severely underweight, stunted and wasted. It was observed that the prevalence of underweight, stunting and wasting was significantly higher in boys than girls. Based on the WHO classification of severity in malnutrition, the overall prevalence of underweight (>19%) and stunting (>30%) was high. While the prevalence rates of wasting (5–9%) were medium.

#### Conclusion

The nutritional status of the subjects is unsatisfactory. There is scope for a detailed community based study and nutritional interventions.

**Keywords:** Children, Nutritional status, Shillong, Stunting, Under weight

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## Introduction

It is a well-documented fact that undernutrition is the leading cause of under five deaths in the world (1). The prevalence of undernutrition in developing countries, though on the declining trend is still a cause for alarm. As of 2011, South-central Asia has the highest rates of wasting and underweight and the second highest rates of stunting in the world (2). Malnutrition in India is still a major problem. According to the third National Family Health Survey, the prevalence of undernutrition, stunting and wasting in India is 43%, 48% and 23%, respectively. The prevalence of undernutrition is especially more among tribal and underprivileged groups compared to others (3).

Meghalaya is a predominantly tribal state situated in the North-eastern part of India. The tribal population of Meghalaya forms 86% of states total population and 2.4% of India's tribal population (4). The population is mostly dependent on agriculture for sustenance and predominantly lives in rural areas (5). Most of the population is economically underprivileged. According to the National Family Health Survey (NFHS-3) among under three children in Meghalaya, 47.7% were stunted, 42.9% were underweight and 31.8% were wasted (3). There are very few recent data on the nutritional status of children in Northeast especially Meghalaya. In such a scenario, this study was undertaken to find out the nutritional status of under five children attending the pediatrics OPD of NEIGRIHMS.

Though it is a hospital based study the subjects belong to all socioeconomic strata of the society. There are also a sizeable number of subjects taken up in the study. As such is it largely representative of the normal population of Meghalaya (Picture.1).



**Picture.1:** Meghalaya, a state in Northeast India

## Materials and Methods

This hospital based cross sectional study was carried out at the Pediatric OPD, Neigrihms, Shillong. A total of 6,624 children aged 0-60 months were enrolled during 1<sup>st</sup> January 2012 – 31<sup>st</sup> December 2012. Data from OPD records for the year under study were taken out and analyzed. Out of the total number of 6,624 children, 6,183 children were included in the present analyses. Data for the remaining 441 were excluded due to missing values of age and gender. Weight and height were taken by trained staff following standard techniques (6). Z-scores were calculated as against recent WHO child growth as standard (7). Children were considered to be underweight and stunted if their weight-for-age and height-for-age Z-scores were below -2.0 Standard Deviation (SD), respectively.

They were considered severely underweight and stunted if their weight for age and height for age Z-scores were below -3 SD, respectively. The children were considered to have wasting if their weight for height was below -2 SD Z-score. They were considered to have moderate malnutrition if their weight for height was between -2 SD and -3 SD Z-score. They were taken as severe malnutrition if the weight for height was less than -3 SD Z-score.

Two-way ANOVA was used to test for age and sex differences in height and weight.

Proportion test was performed to test for differences in prevalence of underweight, stunting and wasting between sexes. An Odds Ratio (OR) and Confidence Interval (CI) was also calculated by standard method. All statistical analyses were performed using the MedCalc statistical software. A p-value <0.05 is considered as statistically significant.

## Results

The age and gender specific means of weight and height were analyzed. The result reveals that mean weight (Figure.1) and height (Figure.2) significantly increased with advancement of age. The Z-score for Weight-for-Height (WHZ), Weight-for-Age (WAZ) and Height-for-Age (HAZ) was calculated as against WHO recent child growth standard. Overall mean z-scores for WHZ, WAZ and HAZ was  $-0.07 \pm 1.64$ ,  $-0.84 \pm 1.62$  and  $-1.30 \pm 2.32$ , respectively.

The prevalence of underweight, stunting and wasting was 19.7%, 35.5% and 8.5% respectively (Tables 1-3). Of these, 9.0%, 19.7% and 3.4% children were found to be severely underweight, stunted and wasted.

Overall prevalence of global malnutrition (wasting) was 8.5 % with a confidence interval of 7.3-9.9 (Table.1).

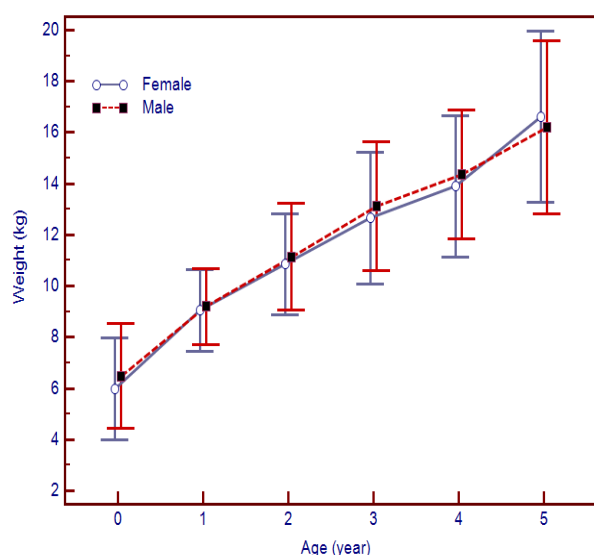
Among boys global malnutrition was 9.6 % (CI: 8.4-11) while among girls it was 7.2% (CI: 5.7-9.1). Similarly prevalence of moderate malnutrition was 5.1 % (CI: 4.2-6.2), 5.5 % (CI: 4.5-6.7) and 4.6% (CI: 3.6-5.8) among total, boys and girls respectively. Prevalence of severe malnutrition was 3.4 % (CI: 2.8-4.2). Among boys and

girls it was 4.1 % (CI: 3.3-5.1) and 2.6 % (CI: 1.9-3.7) respectively.

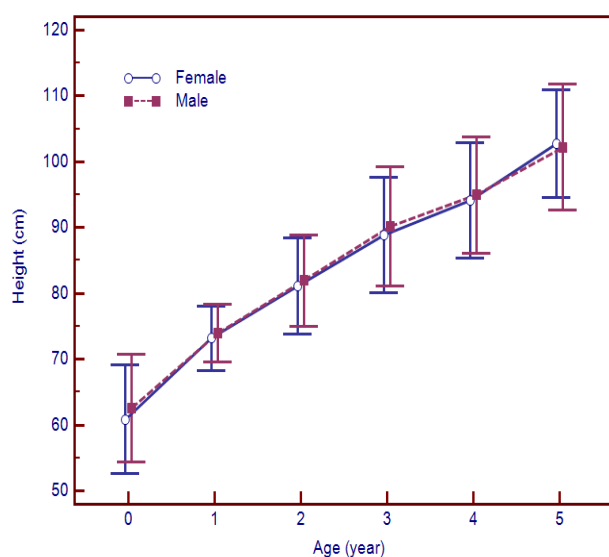
The prevalence of underweight was 19.7 % (CI: 18.2-21.2) while among boys and girls it was 21.0 % (CI: 19.3-22.7) and 18.2 % (CI: 16.4-20.2) respectively (Table.2). Moderately underweight children were 10.7 % (CI: 9.7-11.7), 11.2 % (CI: 9.6-13) and 10.1 % (CI: 8.9-11.4) among total, boys and girls respectively. The prevalence of severely underweight was 9.0% (CI: 7.9-10.2). Among boys and girls it was 9.8% (CI: 8.4-11.4) and 8.1% (CI: 7.2 -9.2) respectively.

Table.3 shows the overall prevalence of stunting was 35.5 % (CI: 32.6-38.2) while among boys and girls it was 37.2% (CI: 34.6 - 39.9) and 33.5 % (CI: 30.3-36.8). The prevalence of moderate stunting among overall, boys and girls was 15.8 % (CI: 14.5-17.2), 16.2% (CI: 14.5-18.2) and 15.3 % (CI: 13.8-16.9) respectively. The prevalence of severe stunting was 19.7 % (CI: 18.0-21.5), 21.0 % (CI: 19.4-22.7) and 18.2 % (CI: 15.7- 20.9) among overall, boys and girls respectively.

It is important to mention that the prevalence of underweight, stunting, and wasting was significantly lower among girls than the boys. They had 16% (OR=0.84, 95% CI: 0.74-0.95,  $p<0.01$ ), 15% (OR=0.85, 95% CI: 0.76-0.95,  $p<0.01$ ) and 27% (OR=0.73, 95% CI: 0.60 - 0.89,  $p<0.01$ ) significantly lower chance of being underweight, stunting, and wasting. Based on the World Health Organization classification of severity in malnutrition, the overall prevalence of underweight (>19%) and stunting (>30%) was high. Whereas, the prevalence of wasting under the medium category (5-9%).



**Fig.1:** Age-gender distribution of Mean ± SD body weight of studied children



**Fig.2:** Age-sex distribution of mean ± SD height of studied children

**Table 1:** Prevalence of acute malnutrition based on weight-for-height z-scores by gender

Variables	Total n = 5413	Boys n = 2890	Girls n = 2523
Prevalence of global acute malnutrition (z-score <-2SD)	8.5 (7.3 - 9.9)	9.6** (8.4 - 11.0)	7.2** (5.7 - 9.1)
Prevalence of moderate acute malnutrition (z-score <-2 SD and >=-3 SD)	5.1 (4.2 - 6.2)	5.5 (4.5 - 6.7)	4.6 (3.6 - 5.8)
Prevalence of severe acute malnutrition (z-score <-3 SD)	3.4 (2.8 - 4.2)	4.1** (3.3 - 5.1)	2.6** (1.9 - 3.7)

Values are percentage and 95% confidence interval. Significant sex difference: \*\*p<0.01.

**Table 2:** Prevalence of underweight based on weight-for-age z-scores by gender

Variables	Total n = 6163	Boys n = 3278	Girls n = 2885
Prevalence of underweight (z-score <-2SD)	19.7 (18.2 - 21.2)	21.0** (19.3 - 22.7)	18.2** (16.4 - 20.2)
Prevalence of moderate underweight (z-score <-2 SD and >=-3 SD)	10.7 (9.7 - 11.7)	11.2 (9.6 - 13.0)	10.1 (8.9 - 11.4)
Prevalence of severe underweight (z-score <-3 SD)	9.0 (7.9 - 10.2)	9.8* (8.4 - 11.4)	8.1* (7.2 - 9.2)

Values are percentage and 95% confidence interval. Significant sex difference: \*p<0.05, \*\*p<0.01.

**Table 3:** Prevalence of stunting based on height-for-age z-scores and by gender

Variables	Total n = 5499	Boys n = 2930	Girls n = 2569
Prevalence of stunting* (z-score <-2SD)	35.5 (32.8 - 38.2)	37.2** (34.6 - 39.9)	33.5 (30.3 - 36.8)
Prevalence of moderate stunting (z-score <-2 SD and >=-3 SD)	15.8 (14.5 - 17.2)	16.2 (14.5 - 18.2)	15.3 (13.8 - 16.9)
Prevalence of severe stunting (z-score <-3 SD)	19.7 (18.0 - 21.5)	21.0** (19.4 - 22.7)	18.2** (15.7 - 20.9)

Values are percentage and 95% confidence interval. Significant sex difference: \*\*p<0.01.

## Discussion

Severe acute malnutrition can be a direct cause of death. It can also increase the case fatality rates in children suffering from common childhood illnesses like diarrhoea and pneumonia (1). Though on a decreasing trend, undernutrition is still a major health problem in Asia and also in India. The National Family Health Survey (NFHS-3) showed that almost half of children under five years of age (48 %) are stunted and 43 % are underweight. The proportion of children who are severely undernourished is 24% according to height-for-age and 16% according to weight-for-age. Twenty percent of children under five years of age are wasted. Girls and boys are about equally undernourished. Children from scheduled tribes have the poorest nutritional status on almost every measure, and there is a high prevalence of wasting in this group (28%). Nutritional problems were also

substantially higher than average in Meghalaya (3).

A study in Andhra Pradesh assessed 1013 tribal children for malnutrition and found that 48.27 %, 23.59 % and 48.37% children were stunted, wasted and underweight (8). Another study from Rajasthan reported that 80 % children were underweight, 60 % were stunted and 88% were wasted among under three rural children (9). Rao et al. found that 61.6 % were underweight, 51.6% stunted and 32.9% were wasted among tribal preschool children in Madhya Pradesh (10). Nearer home, in a study among 3-6 years children in Midnapore, West Bengal, Bisai et al. found the overall prevalence of underweight, stunting and wasting were 63.7%, 47.8 % and 32.7% respectively (11). Another study among Kora-Mudi tribal children aged 2-13 years in West Bengal, Bisai et al. found an overall

prevalence of underweight, stunting and wasting of 52.9%, 49.6% and 22.7%, respectively (12). An earlier study reported 65.5% underweight, 54.2% stunting and 20.1% wasting among Santal preschool children (13). Present study shows a prevalence of underweight, stunting and wasting was 19.7%, 35.5% and 8.5% respectively, which is less in comparison to the other studies, which is probably because it is a more recent study and reflects the changes over the years.

One noticeable aspect of our study is significantly higher prevalence of underweight, stunting and wasting among boys as compared with girls. Rao et al. in their study also had found a higher prevalence of underweight (62.9 % vs. 60.3 %) and stunting (54.4% vs. 48.8 %) among boys. The prevalence of wasting however was higher among girls compared to boys (35.8 % vs. 30.1 %) (9). This was also reflected by the study of Bisai et al., which showed prevalence of underweight, stunting and wasting higher in boys (57.6%, 55.9% and 28.8%) than in girls (48.3%, 43.3% and 16.7%) (12). Stalin et al. however in a study in Tamil Nadu had found that malnutrition was more prevalent among girls than boys (62.6% vs. 44%) (14). An earlier study among Khasi boys of Meghalaya, Khongsdier et al. found very high prevalence of underweight (60%) and low prevalence of stunting (29 %) was lower from the present study (15).

### Conclusion

In conclusion it must be said that the situation in Meghalaya as regards to malnutrition has improved as compared to the previous studies. However, there are obvious shortcomings in our study as it is an OPD based study and we do not have details of their socioeconomic background and their food habits. Therefore a detailed community based study is warranted to

reveal a more accurate picture. Having said that, since this study have a large sample size reflecting the community at large, this study probably reflects the current status of the community to a major extent.

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