

Original Article

## Comparison of WHO growth standards with Indian Academy of Pediatrics standards of under five children in an urban slum

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### Abstract

**Background:** Child undernutrition is internationally recognized as an important public health indicator for monitoring nutritional status and health in populations. Prevalence of under nutrition is very high in India; especially in urban slums.

**Objective:** To compare the prevalence of under nutrition among underfive children using WHO growth standards with IAP standards.

**Methods:** Community based cross sectional study was done during November-2008 to December-2009 in urban field practice area of Medical College Pune, India. All the underfive children (336) were enumerated by house to house survey. Parents were informed about the objectives of the study and their written consent was obtained. Anthropometric measurements of the children who were available during the study period were carried out as per WHO guidelines and IAP standards. Various indices of nutritional status were expressed in standard deviation units (z scores) from the reference median. Epi-Info 2002 and Primer of Bio-statistics software package was used for statistical analysis.

**Results:** Total 336 children were enumerated by house to house visit. Only 319 children were available during the study. Weights were recorded according to WHO and IAP standards. It was found that boys were more undernourished than girls by using WHO standards ( $P < 0.005$ ). When weights of girls were compared according to these two standards the girls were found to be more undernourished by WHO standards but difference was not statically significant.

**Key words:** Under nutrition, under five, Prevalence, WHO growth standards, Indian Academy of Pediatrics' (IAP) standards

### Introduction:

The best way to evaluate the nutritional status and overall health of a child is to compare the child's growth indices with the set cut-off points in the standard normal distribution of well nourished children that are associated with adequate growth<sup>1</sup>.

In April 2006 the WHO released new standards for assessing the growth and development of children from birth to 5 years of age<sup>2</sup>. In February 2007, the Ministry of Women and Child Development (nodal ministry for the ICDS programme) and the Ministry of Health and Family Welfare in India agreed to a changeover to WHO standards from the IAP growth curves in use at the time. It is, therefore, important to assess whether using the latter will lead to changes in the estimated prevalence of underweight and, if so, how much of a change<sup>3</sup>.

The aim of the study is to compare the prevalence of underweight as calculated by using WHO child growth standards with the IAP Standards.

### Methods:

It was a community-based cross sectional study conducted in urban field practice area of a Medical College of Pune, India during November-2008 to December-2009. The study protocol was approved by the Institutional Ethical Committee. For the purpose of the study all the children below five years were enumerated by the house-to-house survey. If a child was not available during the initial visit, two repeat visits were made to all eligible households. The survey covered all children aged 0-59 months currently present in the study area. A total of 336 children were enumerated. Of these 17 children could not be contacted due to temporary absence from their place of residence at the time of the study. Parents were informed about the objectives of the study and their written consent was obtained. A structured questionnaire was used for the pilot study on 30 children

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in different area to pretest the same. These were analyzed and necessary modifications were made in the questionnaire. The results of the pilot study were not included in the final analysis. Information on age, sex, weight, and maternal education was recorded with the help of questionnaire by interviewing the mother and other care takers. The exact age of the child was computed from the child's date of birth. When data on the exact date of birth was not available, the age as told by mother to nearest month was used. A regional local-event calendar was used to assist the mothers for better recall.

Standard precautions were taken while weighing the children,<sup>4</sup> who were categorized according to different grades of malnutrition using the IAP classification and the WHO Child Growth Standards. Underweight was defined as weight less than -2 and -3 from the median WHO standards. According to IAP standards those children who were below 3rd percentile in weight charts were classified as underweight, between 3rd and 97th percentile as normal and more than 97th percentile as overweight. Weight of the child was recorded in kilograms with minimal clothing using Salter weighing scale provided by UNICEF (model 2356S) with accuracy of 100 g and maximum reading of 25 kg.

Anthropometric data were recorded separately using both WHO and IAP standards. It was fed in MS Excel and analysis of data was done by using the statistical tools in Excel software, EPI-Info 2002 from CDC and Primer of Bio-statistics. Chi-Square test was used to verify the statistical significance of associations. *P* value of less than 0.05 was considered statistically significant.

#### Results:

The study group consisted of 336 children below the age of five years under area of jurisdiction of UHTC Bhosari. Out of which, 17 children could not be traced due to temporary absence from their place of residence at the time of the study. Thus, the response rate was 94.94%. Therefore, total 319 under five years children were examined, out of which 208 were undernourished as shown in Table 1. Thus, showing the prevalence of undernutrition to be 65.2% at 95% CI (Fishers) = 0.568 to 0.677. The mean age was 30.41 months with SD of 17.56 months with mean weight 10.44 kgs with SD of 2.9 kgs, and the mean length was 84.37cms with SD of 13.92cms. In Table 2 WHO standards showed that boys were more underweight by WHO standards as compared to IAP standards. This difference was statistically significant ( $P < 0.005$ ). When weight for girls was compared the results were similar but were not statistically significant.

**Table 1: Distribution of underfive children according to their age and gender**

Age group (months)	Females No (%)	Males No (%)	Total No (%)
0-5	18 (11.8)	10 (6.0)	28 (8.8)
6-12	2 (15.0)	20 (12.0)	43 (13.5)
13-24	32 (20.9)	35 (21.1)	67 (21.0)
25-36	46 (30.1)	30 (18.1)	76 (23.8)
37-48	23 (15.0)	30 (18.1)	53 (16.6)
49-60	11 (7.2)	41 (24.7)	52 (16.3)
Total	153(100)	166 (100)	319 (100)

\*Figures in the parenthesis are percentage.

**Table 2: Comparison of WHO standards with IAP standards**

Parameter	Gender	WHO	IAP	P value
Weight	Male (166)	Underweight 123 (74.10)	Underweight 98 (59.04)	0.005
		Normal 43 (25.90)	Normal 68 (40.96)	
	Female(153)	Underweight 85 (55.56)	Underweight 83 (54.25)	0.764
		Normal 68 (44.44)	Normal 70(45.75)	

## Discussion

It was observed that there were discrepancies in underweight prevalence estimates when using IAP versus WHO Child Growth Standards. It is due to fact that the new WHO standards are based on data from predominantly breastfed infants of a heterogeneous sample of children from developing and developed countries, whereas IAP standards are based on Harvard unisex tables of height and weight for age derived from predominantly formula-fed infants of North European descent. The data used for the new WHO standards were collected with a much greater frequency of weight recording in the first year of life than were data for the Harvard standards, allowing the dynamic growth in the first 12 months to be captured<sup>4</sup>.

The limitations of our study were that the study was conducted in a single urban slum in Pune, India and also all the children were from low socioeconomic class. Hence, our results are not representative of the entire country.

Deshmukh PR et al concluded that the prevalence of underweight by WHO standards was significantly lower (47%) compared to NCHS references (53%)<sup>5</sup>. Prinja, et al., compared WHO chart with the growth chart used in ICDS (Integrated child development services) programme which is based on Harvard growth standards and concluded that the prevalence of underweight was 1.4 times higher with Harvard standards, except in first 6 months of life where it was 1.6 times higher with WHO

standards<sup>6</sup>. Another study on use of WHO standards on 2-5 year old affluent urban Indian children, concluded that the growth performance of these children was suboptimal compared with WHO standard<sup>7</sup>.

The Ministry of Women and Child Development (responsible for the ICDS programme) and the Ministry of Health and Family Welfare in India have endorsed the WHO Child Growth Standards and have drawn timelines for the changeover from the currently used IAP growth curves to the new WHO child growth curves<sup>8</sup>. However, this change should be preceded by appropriate training of staff of all levels. Furthermore, the logistics surrounding the increased demand for supplementary nutrition in view of the greater number of severely underweight children need to be adequately addressed. Although WHO growth standards can be taken as ideal growth pattern and needs to be adopted, these may project a higher overall prevalence of underweight children in India. Because of this more children will be detected earlier and in a less severe state of undernutrition. And also there are no known risks or negative effects associated with therapeutic feeding of these children. The new WHO growth standards confirm earlier observations that there is the effect of ethnic differences on the growth of infants and young children in populations is small compared with the effects of the environment<sup>9</sup>. So if the environmental condition will be increased automatically the growth will also improve. Growth tracking with the new WHO standards is far

superior to the current practice of using IAP standards, especially in the first 6 months of life. Many studies can be done to pool out correction factor to find out the difference between WHO and IAP standards. Those studies which were earlier done with using IAP standards can be reviewed with using correction factor and making it to the level of WHO standards as these standards are used globally and have advantage over IAP standards.

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