

Nutritional Status Of Children Aged 6-11 Years In Bangalore Rural District

B.G.Ranganath, MD, Associate Professor, Dept of Community Medicine, Sri Devaraj Urs Medical College, Kolar. & H.S.Sheela, MD, Professor, Dept of Community Medicine, Sree Siddhartha Medical College, Tumkur.

Introduction

Malnutrition is endemic among children in developing countries. Stunting starts early in the childhood & persists to give rise to small adults (6). The influence of socio-economic status & environment on malnutrition in children has been well documented (3). Many agencies such as the NNMB, have expressed the need to find the extent of malnutrition in each District in the country among various socioeconomic and age groups; to know the changes in malnutrition over time; and to know the effect of development programmes on the nutritional status of people in the states (8). This study on children aged 6-11 yrs in Bangalore Rural District assesses the prevalence of Malnutrition and its distribution according to age, sex and socioeconomic groups.

Materials & methods

Fifteen cluster villages were selected in Bangalore rural district by probability proportional to size. In the selected cluster villages the initial household was selected randomly & data was collected on at-least 80 children aged 6-11 yrs, from consecutive households. The child's mother or a close relative answered a structured questionnaire on demographic, socio-economic & environmental characteristics of the family. The measurements made were age to the nearest month, height to the nearest 0.5 cm & weight to the nearest 250 gms. The survey was carried out in the months between Jan-March in the year 1997.

The indices Height-for-Age and Weight-for-Height were used as an indicator of stunting and wasting respectively. These indices were expressed as standard deviation (SD) scores with reference to the NCHS/WHO reference population. In order to describe the whole distribution and to compare it with the reference population a frequency curve of the SD scores was constructed. Prevalence of stunting and wasting were derived from the proportion of children below the cut-off point of $-2SD$ of the reference median height-for-age and weight-for-height respectively. The relationship for height-for-age and weight-for-height was analysed by cross-classification scheme and expressed as multiples of SD scores for the reference population. (9,12)

Results

1372 children aged 6-11 yrs were studied. The non-response rate was 5.7%. Table-1 shows the age & sex distribution of the studied children. The total number of boys & girls are almost similar & at-least 100 children in each age & sex groups from 6-10 yrs. Table-3 shows the distribution of the main characteristics of the households of the children studied. 56.2% of the mothers had never attended school. 36.0% of the father's had no formal education. A high proportion belonged to families with per-capita income less than Rs 150 per month & between Rs 151-400 per month. 77.6% were engaged in agriculture & 66% were small-scale farmers. Overcrowding was the rule; most of the households had 3 or 4 siblings & 4 or more persons slept in a room.

Table-1: Mean Height (cms) and Weight (kgs) of Children aged 6-11 yrs in Bangalore Rural District.

Age (years)	No	Boys		No	Girls		Total (%)
		Height (mean±SD)	Weight (mean±SD)		Height (mean±SD)	Weight (mean±SD)	
6	146	105.5±6.6	15.3±2.0	138	101.1±6.4	14.9±4.7	284(20.7)
7	124	113.5±4.7	17.2±2.1	108	112.5±5.5	16.9±2.0	232(16.9)
8	132	122.4±13.3	19.1±2.1	129	115.3±7.0	17.6±3.0	261(19.0)
9	111	123.5±6.2	21.1±1.6	111	119.0±5.0	18.6±2.8	222(16.2)
10	100	123.5±6.9	22.4±2.5	114	124.5±4.7	21.0±3.0	214(15.6)
11	84	133.6±9.3	24.3±2.9	75	132.7±7.3	25.1±5.2	159(11.6)
Total	697(50.8)				675(49.2)		1372

The Z-score distribution of height-for-age & weight-for-height among Bangalore rural children compared with the NCHS/CDC reference population (Fig 1&2)

The height-for-age and the weight-for-height curves are skewed extremely to the left.

Prevalence of stunting & wasting in the study children

Table-2: Cross tabulation of S.D. scores for wt-for-height & ht-for-age for Bangalore rural children aged 6-11 yrs as compared to NCHS/ WHO reference.

S.D. score (wt-for-ht)	S.D. score (ht-for-age)			Total
	>-2.00	-2.00 to -2.99	<-3.00	
>-2.00	573 (42.0)	267 (19.6)	333 (9.8)	973 (71.2)
-2.00 to -2.49	151 (11.0)	73 (5.3)	18 (1.3)	242 (17.8)
<-2.50	92 (6.7)	47 (3.4)	11 (0.8)	150 (11.0)
Total	816 (59.8)	387 (28.3)	162 (11.9)	1365 (100)

The indices, height-for-age & weight-for-height were cross-tabulated (tab-2) & expressed as multiples of SD scores for the NCHS/WHO reference population (12). Stunting defined as <-2SD scores was 40.2%. Wasting defined as <-2SD scores was 28.8%. Simultaneous stunting & wasting was 10.8%.

Fig-1: Z-Score distribution of Height-for-Age among Bangalore Rural Children compared with the NCHS/CDC Reference Population.

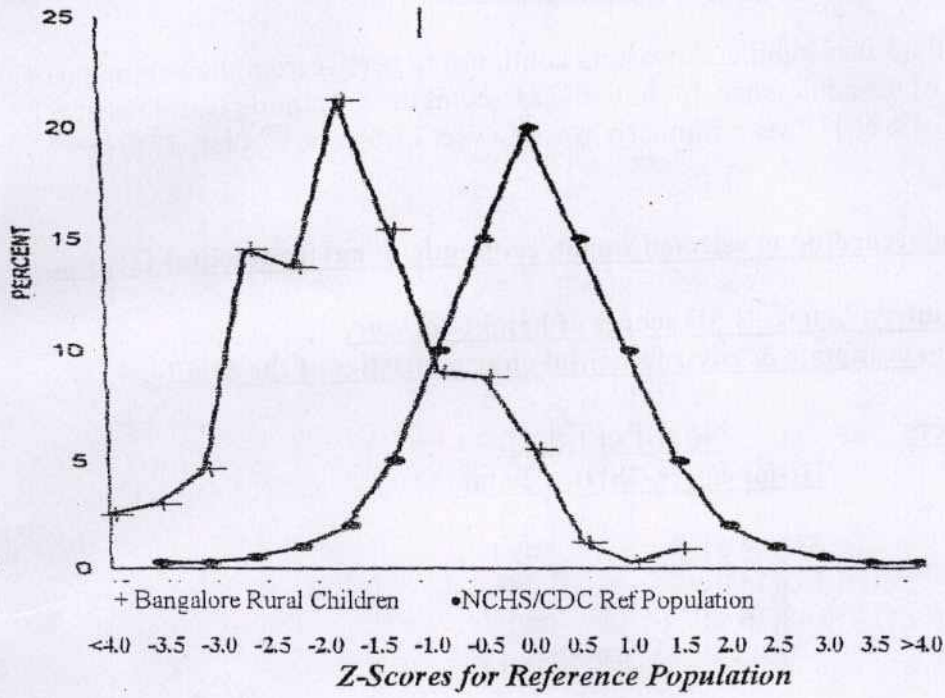
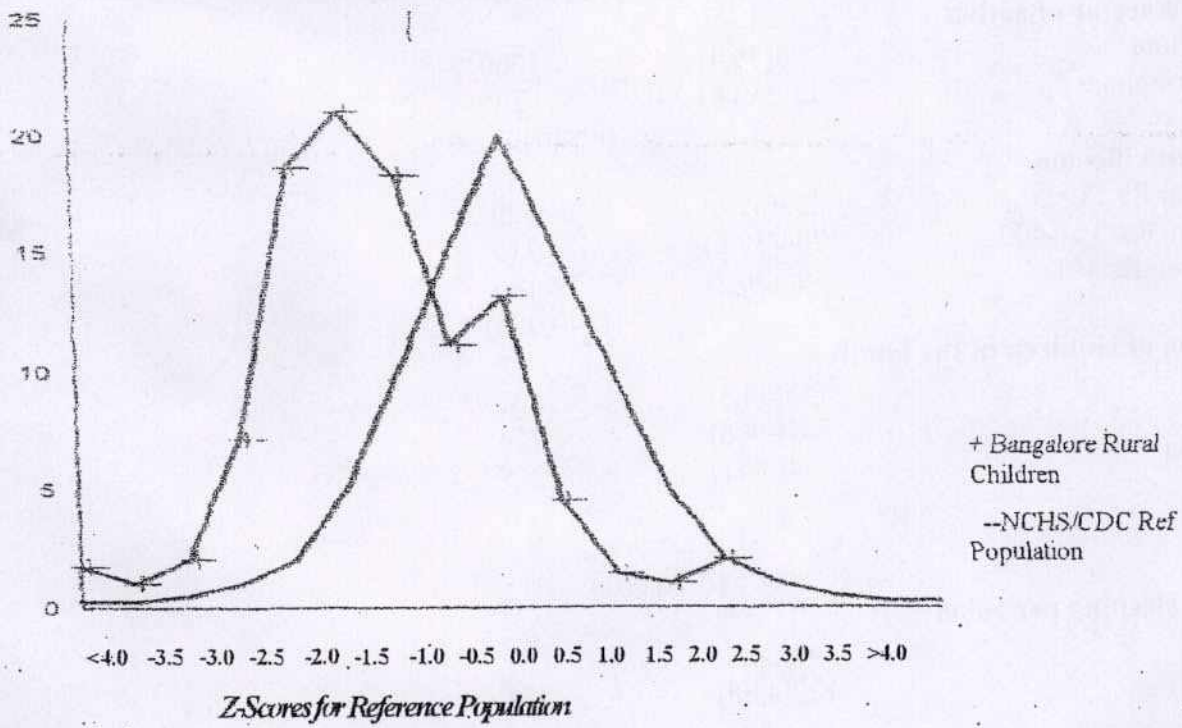


Fig-2: Z-Score distribution of Weight-for-Height among Bangalore Rural Children compared with the NCHS/CDC Reference Population.



The prevalence of stunting & wasting according to age

Fig-3: Prevalence of wasting & stunting by age according to age among Bangalore rural children according to Z scores. (<-2S.D. score of the mean for NCHS/ CDC reference)

It can be seen from fig-3 that stunting & wasting continues to persist from the beginning of sixth year, to the beginning of the adolescence, for both the sex combined. Stunting was 43% at 6th year, 43.2% at 9th year & 40.3% at 11th year. Similarly wasting was 17.6%, at 6th year, 27% at 9th year & 46.1% at 11th year.

Prevalence of malnutrition according to selected social, economic & environmental factors.

Table-3: Proportion of children below -2 SD scores of height-for-age, according to socio economic & environmental characteristics of the family.

<u>Socio economic characters</u>	<u>No. of children</u>	
	<u>Ht-for-age(<-2SD)</u>	<u>Total</u>
1.Father's education level		
No schooling	230(46.5)	494
Pri / Mid school	163(35.0)	466
High school & above	148(36.5)	405
		(P <0.001)
2.Mother's education level		
No schooling	299(38.8)	711
Pri / Mid school	141(40.9)	345
High school & above	105(41.0)	256
		(P =NS)
3.Father's sector of activity		
Agriculture	386(36.4)	1060
Non agriculture	155(50.8)	305
		(P <0.001)
4.Per capita income		
Less than Rs 150	258(41.6)	620
Between Rs 151-400	204(39.0)	319
More than Rs 401	83(36.2)	146
		(P <0.001)
5.Total no. of children in the family		
1- 2	148(34.3)	431
3-4	323(44.6)	724
5 or more	74(34.1)	217
		(P < 0.001)
6.Persons sleeping per room		
2	49(26.8)	183
3	120(43.8)	274

4 or more	376(41.1)	915 (P< 0.001)
7.Type of house		
Pucca	50(31.5)	159
Semi pucca	303(37.4)	811
Kuccha	192(47.8)	402 (P< 0.001)

It is interesting to note in tab-3 that levels of schooling of father, rather than mother were associated strongly with stunting, even though there were more women who were not educated. Malnutrition was common among children whose father sector of activity was in the non-agricultural sector. Also low- income levels were strongly associated with stunting. Among the environmental risk factors studied, stunting increased as the number of persons sleeping in a room increased & if the number of children in the family were between 3 or 4 & with poor type of housing.

Discussion

There are at least 100 children in each age & sex groups from 6-10 yrs, which is a good representative sample according to J.C.Waterlow, et al (12). This data does not distinguish malnutrition due to decreased food intake or increased metabolic needs by infections or infestations. The method employed in this study is based on rapidity ease & low cost. 56.2% of the mothers and 36.0% of the father's had no formal education (tab-3). The female literacy in 1991 was 44% in Karnataka state (8). A high proportion of the children in this study belonged to families with per-capita income less than Rs 400 per month. The per-capita income for rural Bangalore at constant prices was Rs 3255 in the year 1991 (8). 77.6% of the families were engaged in agriculture & 66% were small-scale farmers. According to Government of Karnataka 80% of the population are engaged in agriculture (8). Overcrowding was the rule; most of the households had 3 or 4 siblings & 4 or more persons slept in a room. The mean heights & weights of children were less than NCHS/WHO (9) reference population, ICMR data (7) and affluent Indian children (1), but were comparable with children from low economic status in the country (12) & the NNMB data (8) on the children of Karnataka.

The SD-score indices for stunting & wasting are extremely skewed to the left, because of large number of children in the lower decile range (Fig 1&2). Stunting was 40.2% (tab-2). The prevalence of stunting in under- five children of Karnataka was 48% in the year 1997 (8). This shows that stunting continues to persist in children even as age advances. It can be seen from fig-3 that stunting & wasting continues to persist from the sixth year, to the beginning of the adolescence, for both the sex combined. There is no catch-up growth observed during 6-11 yrs of age in Bangalore rural children. Mortorell et al (6) concludes that stunting is a condition resulting from events in early childhood, which once present remains for life. There is no catch-up growth later in childhood & adolescence.

Associations were observed between stunting & father's level of education, non-agricultural activities, low income, overcrowding & poor environmental conditions in the households (P< 0.001). Similar associations between nutritional status & housing conditions & overcrowding were observed in Brazil & in Andalusia (2,3). One possible mechanism whereby housing & overcrowding characteristics might affect nutritional status is via the spread of air-borne infections.

Conclusions

Stunting and Wasting is a public health problem among children aged 6-11 yrs in Bangalore rural district. Stunting starts in the early childhood & persists into the adolescence. This survey forms a baseline for quantifying the extent & distribution of undernutrition and also could serve as a baseline for evaluating the effectiveness of nutrition programmes on children in the school age group in Bangalore rural district.

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