Nutritional Status of Under-five Children in Urban Slums of Bagalkot

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Abstract

Background : Under-five children constitute most vulnerable segment of population and their nutritional status is considered to be a sensitive indicator of community health and nutrition. Nutritional status of urban slums is worst amongst all urban groups and even poorer than rural average, so the current study was undertaken to know the prevalence of malnutrition in underfive children in Bagalkot slums.

Methods: The present study was a cross sectional, population based study conducted in two slums of Bagalkot, which included 183 under-five children of whom 89 were boys and 94 were girls. Anthropometric data in the form of height in centimeter (cm) and weight in kilogram (Kg) was collected from study subjects and analysis was done using WHO child growth standards.

Results: The anthropometric measures for boys were higher than girls in all age groups. The percentage of malnourishment for both boys and girls taken together in the present study was 72.65%, 65.49% and 32.05% for height for age (stunting), weight for age (underweight) and weight for height (wasting) respectively. Age wise distribution of malnourishment showed very high percentage of malnourishment in 7-12 months age group and then again in 55-60 months age group.

Conclusion: There is very high prevalence of chronic malnutrition (H/A) along with relatively low prevalence of acute malnutrition (W/H) in the study population. Malnourishment was more prevalent in 7-12 months and 55-60 months age group children. Appropriate feeding and weaning practices, immunization of children and timely treatment of illnesses in children have to be introduced and child welfare programmes should reallocate priorities to under-five children, who are at high risk for development of malnutrition.

Key words: Nutritional status, under-five children, urban slum

Introduction

Nutrition is one of the basic requirements of any living organism to grow and sustain life [1]. Underfive children constitute the most vulnerable segment of population and their nutritional status is considered to be a sensitive indicator of community health and nutrition [2]. Malnutrition makes its principal impact on young children in developing countries. Recent research has convincingly demonstrated that up to two third of child mortality is associated with malnutrition. UNICEF report reveals that 53% of Indian children are malnourished [3]. With rapid urbanization 20% population are forced to reside in urban slums [4]. The nutritional status of slum children is worst amongst all urban groups and even poorer than rural average [5]. Many factors like poor hygiene, insufficient food intake, lack of food availability, illiteracy and poor socioeconomic status contribute to malnutrition in slum children [6]. Anthropometry is widely recognized as one of the useful techniques to assess the growth and nutritional status in children [7]. Weight for age(W/A), height for age (H/A) and weight for height (W/H) are most commonly used anthropometric indices to assess the nutritional status of children [7].

Presently as there is no data available about the prevalence of malnutrition in the slums of Bagalkot (District place of Karnataka, India), the current study was undertaken to know the prevalence of malnutrition in underfive children in Bagalkot slums.

Material and methods

This cross sectional study was conducted in underfive children from 2 different slums in field practice area of S. N. Medical college in Bagalkot urban area. The procedures followed were in accordance with ethical standards of institutional committee on human experimentation and Helsinki declaration (2008).Ethical clearance was taken from the institutional ethical committee. 2 slums selected were Koulapeth slum and Water tank galli slum. Total population of these slums is about 2000. Total population of underfive children was 240 by house to house survey (12% of population). After repeated follow up visits also, 57 children could not be found. So

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sample size of underfive children available for present study was 183.

Informed consent was taken from the parents/guardians. The measurements were taken by standard methods as reported by D.B. Jelliffe [8].

Following measurements were included in the study :

1. Height/Length (in cm): -

Length of Children up to 2 years (or up to 85 cm length) of age was measured with child on a horizontal measuring board. Height of children over 2 years of age (or over 85 cm) was measured by the child standing on a horizontal surface against a vertical measuring device. Standing height was recorded up to nearest 0.1cm. The child was asked to stand against the scale without shoes but heels together and with the shoulders, buttocks and heels touching the vertical surface. The child was asked to look straight so that the line drawn from the external auditory meatus to the inferior orbital margin was in the plane parallel with the floor (Frankfurt plane), with arms hanging at the sides in a natural manner. The head piece was gently lowered, crushing the hair and making contact with the top of the head. The same scale was used for the whole study.

2. Weight (in Kg.) : -

Weight was recorded on portable machine (spring type) up to nearest 0.1kg in neonates and infants. Children more than 1 year were weighed with minimal clothing and bare feet with weighing machine pretested for accuracy. The same weighing machine was used throughout the study period.

Standard deviation or Standardized Z scores, -2 or more deviations below WHO standard values for height-for-age, weight for age & weight-for-height were taken as malnutrition and -3 or more deviations below the standard values were taken as severe malnutrition [9].

Statistical Analysis

Statistical analysis was done using software SPSS version 9, using Chi square test under the guidance of a biostatistician. $p < 0.05$ was taken as statistically significant, $p < 0.001$ was taken as highly significant, and $p > 0.05$ was taken as statistically not significant.

Results

There were total of 183 children and out of them 89 were boys and 94 were girls. Table 1 shows the mean values ± 1 Standard deviation (SD) for height and weight of boys and girls. The mean height of the boys was 79.73±14.10 cm, whereas that of girls was 78.16±14.18 cm. The mean weight of boys was 10.05±3kg, whereas that of girls was 9.15±2.89kg. The anthropometric measurements of boys for height and weight were more than girls in most of the age groups. Figure 1 shows percentage of malnourishment in boys and girls.

Table 2 and Figure 2 show the age wise distribution of malnutrition in boys. The prevalence of stunting (H/A) in boys was 75% in the age group of 0-6 months, from there it started to increase and reached peak of 88.88% around 25-30 months and then gradually decreased to 50% in the age group of 49-54 months, from there it again increased in 55-60 month age group up to 75%.The prevalence of underweight (W/A) and wasting (W/H) showed the similar age related pattern to that observed for stunting (H/A), except that the percentage of prevalence of wasting was less in all age groups as compared to stunting and underweight.
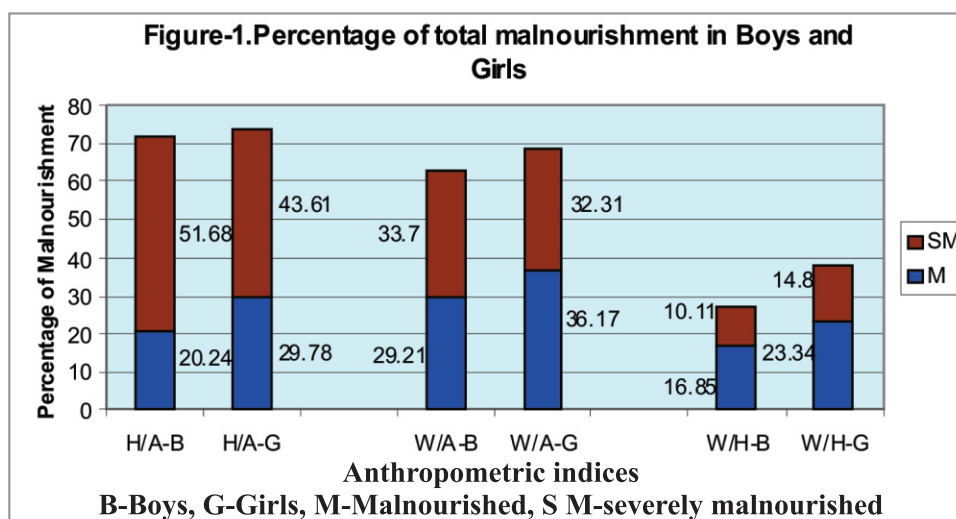
Table 3 and Figure 3 show the age wise distribution of malnutrition in girls.

The prevalence of stunting (H/A) in girls was 45.45% in the age group of 0-6 months, then sharply increased to 87.50% in the age group of 7-12 months and there was no much variation in the percentage of prevalence thereafter and remained stable till 55-60 months. The prevalence of underweight (W/A) showed similar age related pattern to that observed for H/A, except that it showed an increase in 55-60 month age group to 80%.The age wise distribution of wasting (W/H) also followed the same age related pattern as underweight (W/A), except that the overall prevalence of wasting was much less when compared to underweight.

The p value of total malnourishment between boys and girls was >0.05 for H/A and W/A (Chi-square test).

Table 1. Height and weight of under-five boys and girls

Age group in months	Boys			Girls		
	No. of boys (%)	Height(Cms)	Weight (Kg)	No. of Girls (%)	Height (Cms)	Weight (Kg)
0-6	8(8.98)	60.18 ± 11.90	5.50 ± 2.19	11(11.7)	60.39 ± 9.44	5.02 ± 1.72
7-12	11(12.35)	64.31 ± 3.85	6.76 ± 1.22	8(8.51)	62.31 ± 3.51	6.91 ± 1.33
13-18	9(10.11)	72.82 ± 7.29	8.18 ± 2.07	11(11.7)	70.79 ± 4.45	7.86 ± 1.45
19-24	7(7.86)	75.21 ± 3.65	8.58 ± 0.95	5(5.31)	60.88 ± 26.36	7.60 ± 1.62
25-30	9(10.11)	77.12 ± 5.02	10.72 ± 1.72	8(8.51)	78.06 ± 4.17	8.69 ± 1.22
31-36	7(7.86)	84.64 ± 2.93	11.31 ± 1.38	14(14.89)	80.47 ± 5.40	9.29 ± 1.78
37-42	15(16.85)	88.66 ± 6.44	11.28 ± 1.73	10(10.63)	87.33 ± 7.03	10.39 ± 1.35
43-48	11(12.35)	93.80 ± 6.75	12.77 ±1.92	16(17.02)	91.34 ± 6.25	11.88 ± 1.83
49-54	8(8.98)	96.32 ± 5.03	12.68 ± 1.58	6(6.38)	93.08 ± 8.32	12.17 ± 2.71
55-60	4(4.49)	76.57 ± 39.11	14 ± 1.63	5(5.31)	95.78 ± 4.88	13.10 ± 1.75
Total	89(100)	79.73 ± 14.1	10.05 ± 3	94(100)	78.16 ± 14.18	9.15 ± 2.89

Figure-1.Percentage of total malnourishment in Boys and Girls

B-Boys, G-Girls, M-Malnourished, S M-severely malnourished

Table 2. Age wise distribution of malnourishment in terms of Stunting, Underweight and Wasting in boys

Age Group Month	No of Boys	Stunting (Height/Age)			Underweight (Weight/Age)			Wasting (Weight/Height)		
		M (%)	SM (%)	TM (%)	M (%)	SM (%)	TM (%)	M (%)	SM (%)	TM (%)
0-6	8	0(0)	6(75)	6(75)	4(50)	1(12.50)	5(62.5)	1(12.50)	1(12.50)	2(25)
7-12	11	1(9.09)	8(72.72)	9(81.81)	4(36.36)	4(36.36)	8(72.72)	3(27.27)	0(0)	3(27.27)
13-18	9	2(22.22)	5(55.55)	7(77.77)	1(11.11)	5(55.55)	6(66.66)	2(22.22)	2(22.22)	4(44.44)
19-24	7	1(14.28)	5(71.42)	6(85.71)	2(28.57)	3(42.86)	5(71.42)	1(14.28)	1(14.28)	2(28.57)
25-30	9	1(11.11)	7(77.77)	8(88.88)	1(11.11)	3(33.33)	4(44.44)	2(22.22)	1(11.11)	3(33.33)
31-36	7	3(42.85)	2(28.57)	5(71.42)	4(57.14)	0(0)	4(57.14)	1(14.28)	1(14.28)	2(28.57)
37-42	15	3(20.00)	7(46.66)	10(66.66)	4(26.66)	7(46.66)	11(73.33)	2(13.33)	1(6.66)	3(20)
43-48	11	3(27.27)	3(27.27)	6(54.54)	1(9.09)	4(36.36)	5(45.45)	1(9.09)	0(0)	1(9.09)
49-54	8	2(25.00)	2(25.00)	4(50)	3(37.50)	2(25.00)	5(62.5)	2(25.00)	1(12.50)	3(37.50)
55-60	4	2(50.00)	1(25)	3(75)	2(50.00)	1(25.00)	3(75)	1(25)	1(25)	2(50)
Total	89	18(20.24)	46(51.68)	64(71.92)	26(29.21)	30(33.70)	56(62.91)	15(16.85)	9(10.11)	24(26.96)

M-Malnourished, SM-Severely Malnourished, TM-Total Malnourished

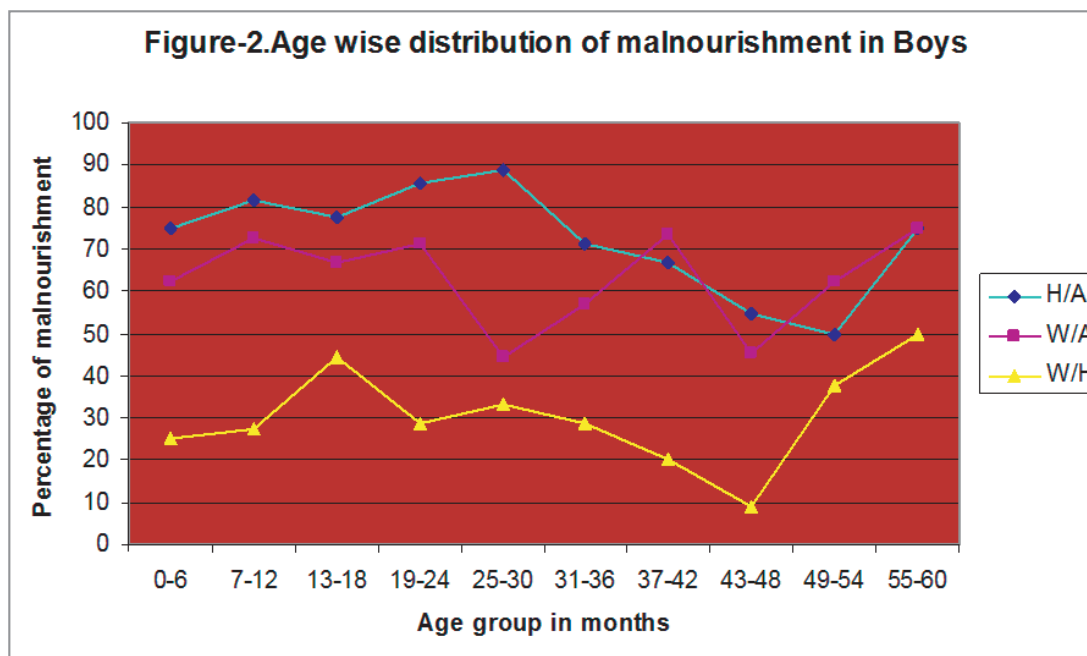Figure-2. Age wise distribution of malnourishment in Boys

Table 3. Age wise distribution of malnourishment in terms of Stunting, Underweight and wasting in girls

Age Group Month	No of Girls	Stunting (Height/Age)			Underweight (Weight/Age)			Wasting (Weight/Height)		
		M (%)	SM (%)	TM (%)	M (%)	SM (%)	TM (%)	M (%)	SM (%)	TM (%)
0-6	11	1(9.09)	4(36.36)	5(45.45)	3(27.27)	3(27.27)	6(54.54)	2(18.18)	3(27.27)	5(45.45)
7-12	8	2(25)	5(62.50)	7(87.5)	4(50)	2(25)	6(75)	2(25)	2(25)	4(50)
13-18	11	5(45.45)	4(36.36)	9(81.81)	4(36.36)	2(18.18)	6(54.54)	1(9.09)	2(18.18)	4(36.36)
19-24	5	2(40)	2(40)	4(80)	1(20)	2(40)	3(60)	1(20)	1(20)	2(40)
25-30	8	2(25)	5(62.50)	7(87.5)	1(12.50)	4(50)	5(62.5)	4(50)	0(0)	4(50)
31-36	14	5(35.71)	8(57.14)	13(92.85)	4(28.57)	7(50)	11(78.57)	5(35.71)	1(7.14)	6(42.85)
37-42	10	4(40)	2(20)	6(60)	7(70)	2(20)	9(90)	3(30)	1(10)	4(40)
43-48	16	7(43.75)	4(25)	11(68.75)	7(43.75)	3(18.75)	10(62.5)	1(6.25)	2(12.50)	3(18.75)
49-54	6	0(0)	4(66.66)	4(66.66)	2(33.33)	2(33.33)	4(66.66)	0(0)	1(16.66)	1(16.66)
55-60	5	0(0)	3(60)	3(60)	1(20)	3(60)	4(80)	2(40)	1(20)	3(60)
Total	94	28(29.78)	41(43.61)	69(73.39)	34(36.17)	30(31.91)	64(68.08)	21(22.34)	14(14.8)	35(32.05)

M-Malnourished, SM-Severely Malnourished, TM-Total Malnourished

Figure-3.Age wise distribution of malnourishment in Girls
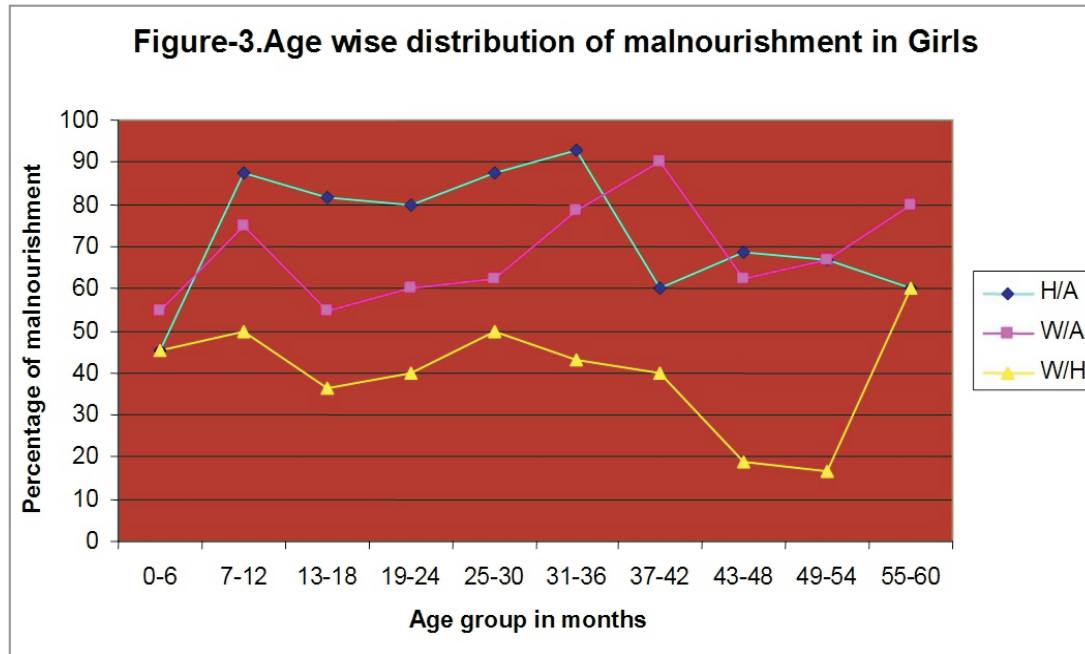
Discussion

The present study was conducted in two urban slums of Bagalkot. The study included 183 children, out of them 89 were boys and 94 were girls. The anthropometric measures of boys for height and weight were more than girls in most of the corresponding age groups. This can be attributed to the differences in the genetic make up of boys and girls.

A low H/A indicates stunting and reflects a process of failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions over a long period of time. Stunting indicates chronic malnutrition [10]. A low W/A indicates underweight and is influenced by both acute and chronic malnutrition. A low W/H indicates wasting or thinness and reflects acute malnutrition [7].

The present study data was analyzed by using WHO child growth standards obtained by a multicentre growth reference study [9]. The new WHO standards (2006) depict normal early childhood growth under optimal environmental conditions and can be used to assess children everywhere, regardless of ethnicity, socio economic status and type of feeding [11].

According to WHO child growth standards malnutrition is defined as two standard deviation scores or more below the median reference ($\leqslant$ -2 Z- Scores). Values three standard deviation scores or more below the median reference ($\leqslant$ -3 Z- Scores) are taken as severe malnutrition.

Total prevalence of malnutrition

Height for age (Stunting) : In total 72.65% of the children were stunted ($\leqslant$ -2SD) and stunting was almost equally present in both boys and girls. 46 (51.68%) of boys and 41(43.61%) of girls were severly stunted ($\leqslant$ -3SD). The stunting in the present study is comparable well with the Indian study of nutrition in South East Asia (63%) [10]. Prevalence of stunting in our study is higher when compared to the study done by National Family Health Survey (NFHS) conducted in 1992-1993 (47.1%) [7], NFHS in 1998-1999 (45.5%) [7] and NFHS in 2005-2006 (51.7%) [12]. It is much more higher when compared to Punjab study (39.2%) [7] and study done in Qatari (11.4%) [13].

Weight for age (Underweight) : The prevalence of underweight children in our study was 65.49% overall. The total prevalence of underweight was more in girls (68.08%) when compared to boys (62.91%). Among them 30 (33.7%) of boys and 30(31.91%) of girls were severely underweight ($\leqslant$ -3SD). The prevalence of underweight in the present study (65.49%) is close to the results of the study done in Mehasana city (43%) [6], NFHS survey done in 1992-1993 (51.5%) [7], NFHS survey done in 1998-1999 (47%) [7] and NFHS in 2005-2006 (44.6%) [12]. Percentage of underweight children in present study is much higher than the Punjab (16.7%) [7] and Qatari study (4.4%) [13].

Weight for height (Wasting) : About 32.05% of the children were wasted ($\leqslant$ -2SD). Wasting was more in girls (37.14%) than the boys (26.96%). Among them 9(10.11%) of boys and 14(14.8%) of girls were severly wasted ($\leqslant$ -3SD). The prevalence of wasting in our study population (32.05%) is higher than NFHS survey done in 1992-1993 (19.3%) [7], NFHS in 1998-1999 (15.5%) [7] and NFHS in 2005-2006 (18.7%) [12]. It is much higher than Qatari study (7.2%) [13].

The very high prevalence of stunting, underweight and wasting in the present study could be because of inclusion of slum children when compared to NFHS prevalence, which included all children (slum and non-slum areas) and the very low prevalence of stunting, underweight and wasting in Punjab and Qatari study, could be due to high socioeconomic status of these areas compared to our study area.

In our study we found that gender had no statistically significant association with malnutrition. There was no significant difference in malnourishment in terms of H/A, W/A and W/H between boys and girls (P>0.05). Similar results are reported by Goel et al. [14] and Bhatia et al. [15].

The high prevalence of malnutrition in terms of H/A, W/A and a relatively low prevalence of W/H suggest that there is high prevalence of chronic malnutrition than acute malnutrition in the study population.

Age wise distribution of malnutrition

Children in the first 6 months of life were relatively less affected by malnutrition in terms of all anthropometric indices, presumably the in-utero experience is the main determinant of nutritional status in this period [16]. However the malnutrition increased from 6 months onward till completion of one year and this period coincides with the time of weaning and also the time of disappearance of the maternal antibodies with decreased immunity in children, with an increase in susceptibility of infections [17]. Faulty weaning practices and infections contribute to malnutrition in under five children [18]. The severity of malnutrition was stabilized in the age group of 13 – 54 months and then again increased in the age group of 55-60 months. Around 55-60 months children start playing outside home and many children start going to school and come in contact with other children, with an increased risk of infection. Thus the present study shows the strong interlink between malnourishment, poverty and disease.

In conclusion, our study revealed that the anthropometric scores for boys were more than girls in all age groups. There was a very high prevalence of chronic malnutrition along with a relatively a low prevalence of acute malnutrition in the present study

population. The prevalence of malnutrition was more in the age group of 7-12 months and 55-60 months. Thus appropriate feeding and weaning practices have to be introduced in the population by parental education. Steps should be taken for immunization and early treatment of diseases in children. Reallocation of priorities, in covering children in various schemes like ICDS (Integrated Child Development Scheme), NCF (National Children's Fund) etc., should be directed towards under-five children who form high risk group for malnutrition. Steps should also be taken to improve the socioeconomic status and health education of slum dwellers.

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