

Original Article

PROFILE OF NUTRITION AMONG 24-59 MONTHS CHILDREN IN A RURAL AREA OF BENGAL, INDIA

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INTRODUCTION

Under-nutrition is one of the commonest problems in developing countries and underlying cause of grave consequence among 0-5 years children.¹

Globally 6.6 million under five children died in 2012; 70% deaths occurred in African and South-East Asia regions; mal-nutrition contributed to 45% of all child deaths.²

Globally, 162 million under-five children were suffering from stunting; 99 million from underweight and 51 million from wasting in 2012.³

Malnutrition is India's silent emergency and among India's greatest human development challenges. About 43% Indian children are underweight, 45% are

ABSTRACT

Introduction: Globally, 162 million under-five children were suffering from stunting; 99 million from underweight and 51 million from wasting in 2012. The Government of India has introduced NewWHO 2006 Child Growth Standards in India for monitoring growth of children.

This study was conducted with the **objective** to assess the magnitude of under-nutrition among 24-59 months children in a rural area of West Bengal and some social factors influencing their nutritional status.

Materials and methods: A community based cross sectional study was conducted among 360 children of 24 - 59 months in ten randomly selected villages of West Bengal in March 2013 using a predesigned pre-tested schedule.

Results: The prevalence of underweight, stunting and wasting was 49.17%, 59.44% and 20.28% respectively. Boys suffered more than girls in all indicators. The prevalence of under-weight, stunting and wasting was significantly associated with age of the study population, literacy status of parents and socio economic status but not with sex.

Conclusion: The problem of under-nutrition amongst under-five children needs to be addressed through comprehensive preventive, promotive, curative and social measures.

Key words: 24 - 59 months children, nutrition, stunting, underweight, wasting

stunted and 20% are wasted. Six states - Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan, and Uttar Pradesh account for half of India's malnutrition cases.⁴

The consequences of malnutrition are; high level of morbidity, mortality and disability apart from poor physical growth and development.⁵

In April 2006 the WHO released new standards for assessing growth and development of children from birth to five years of age.^{6,7} The Ministry of Women & Child Development and Ministry of Health & Family Welfare have jointly introduced New WHO Child Growth Standards in India using the ICDS scheme and NRHM program with effect from 15th August 2008.⁸

With this background, this study was conducted among 24-59 months children in a rural area of West

Bengal to assess the magnitude of nutritional problem with the WHO standards for growth and some social factors influencing their nutritional status.

MATERIALS AND METHODS

Study design and study population: A community based observational, descriptive study, cross sectional in design, was carried out in ten randomly selected villages of Hooghly District in West Bengal of Eastern India, in the month of March 2013. Children of those ten villages in the age group of 24 - 59 months were the study population.

Study tools were a predesigned, pretested semi structured pro-forma; (prepared in consultation with experts of community medicine, pre tested, modified and validated by another 3 experienced persons of community medicine); weighing scale; height measuring machine; measuring tape; new WHO growth chart. The schedule had two parts: Part I consisted of age & sex of the child, parent's education & occupation, number of family members, total monthly family income, per capita monthly income (PCMI). Part II consisted of study participant's anthropometric measurements.

Study Variables: Age, sex, education of parents, occupation of parents, per capita monthly income (PCMI) were **explanatory** variables and anthropometric measurements (height, weight, mid upper arm circumference/MUAC) were **outcome** variables.

Sampling technique and Sample size: Considering the feasibility of our working team, socio-economy of rural Bengal, one community development block of Hooghly district was selected by multistage random sampling. Then ten villages were selected by simple random sampling method from and within the block and all the children of these villages between 24-59 months were included in the study. There were 388 (three hundred and eighty eight) children of 24-59 months. Of which, six were seriously ill; ten were absent during the survey and parents of 2 (two) children refused to participate. Thus the final sample size was 360.

Inclusion criteria: Children between 24-59 months (who is expected to leave breast-milk), both sexes, not seriously ill, present during the survey, residents of the surveyed villages, whose parents gave informed written consent were the criteria for inclusion in the study.

Exclusion criteria: Children above or below 24-59 months, absent during the survey, seriously ill, not resident of the surveyed villages, whose parents did not give informed written consent were taken for exclusion of the child in the study.

Data collection technique: Initially the informed written consent of the parents of the study population was obtained after explaining the purpose and nature of the study and knowing their willingness to share the

information. They were assured about their confidentiality and anonymity. Then data collection was conducted by interviewing the parents of the study population followed by examining their children; through house-to-house survey by faculty members of Community Medicine and other departments of different medical colleges. A pre-survey workshop of the principal investigator and co-investigators was conducted to ensure uniformity in data collection during the survey.

Each child was identified by name, age and sex. The parents were interviewed to collect background data (education, occupation, PCMI). The study population were subsequently socio-economically grouped according to modified B G Prasad Scale.⁹ Exact age of the children was recorded in completed months and ascertained from documentary evidences like birth certificate, hospital discharge certificate, records maintained by the Anganwadi workers in the Integrated Child Development Service centers, immunization cards, or by interviewing the mother with the help of a local events calendar, if any record was not available. Anthropometric measurements taken were weight (kg), height (cm) and mid arm circumference (cm) as per standard techniques. MUAC was measured to the nearest millimeter at the exact midpoint of the left arm using a narrow, flexible, and non-stretchable tape made of plastic.¹⁰ Cut-off values for normal, moderately underweight and severe acute malnutrition were considered as > 12.5 cm, $11.5 - 12.5$ cm and < 11.5 cm respectively.¹¹

The same measuring instruments were used throughout the study. Subsequently, the children were categorized on the basis of their weight for age, height for age and weight for height as per WHO international growth standards 2006 generated for boys and girls aged 0 to 60 months.¹² For the absentees, two extra visits were done to locate them in their house for examination.

Institutional Ethics Committee (IEC) approval: Institutional Ethics Committee of Midnapore Medical College, Paschim Medinipur was approached through proper channel prior to commencement of the study and proper permission was obtained.

Data management and statistical analysis: Data entry and analysis was performed by the computer using SPSS Version 16 software. Percentages were calculated for descriptive analysis. Chi-square test was used to evaluate association between variables. The probability level for significance was fixed at $p < 0.05$.

RESULTS

Sociodemographic profiles of the study population were illustrated in **Table 1**. About 40.28% were between 24 - 35 months age group and 51.39% were male children. The literacy rate of parents of the study population was 94.16%. Distribution of fathers based on their occupation was unskilled labour

(61.39%), skilled labour (24.72%), business (08.06%) and serviceman (05.83%). Distribution of mothers based on their occupation was house-makers (76.67%), unskilled labour (19.17%), social worker with household activity (3.05%), service-women as teacher (01.11%). With regards to socio-economic status, 47.50% belonged to class V followed by class IV (33.90%), according to modified B.G. Prasad's classification 2013.

Table 1: Distribution of study population according to socio demographic profiles (n=360)

Socio Demographic Profiles	Boys (%)	Girls (%)	Total (%)
Age in months			
24-35	75(40.54)	70(40.00)	145(40.28)
36-47	69(37.30)	65(37.14)	134(37.22)
48-59	41(22.16)	40(22.86)	81(22.50)
Education of father			
Illiterate	09(04.86)	12(06.86)	21(05.84)
Primary	29(15.68)	28(16.00)	57(15.83)
Secondary	98(52.98)	94(53.71)	192(53.33)
Higher secondary	40(21.62)	35(20.00)	75(20.83)
Graduate & above	09(04.86)	06(03.43)	15(04.17)
Education of mother			
Illiterate	10(05.40)	11(06.29)	21(05.84)
Primary	25(13.51)	25(14.28)	50(13.88)
Secondary	106(57.30)	103(58.86)	209(58.06)
Higher secondary	37(20.00)	30(17.14)	67(18.61)
Graduate & above	07(03.79)	06(03.43)	13(03.61)
Occupation of father			
Unskilled worker	112(60.54)	109(62.28)	221(61.39)
Skilled worker	47(25.41)	42(24.01)	89(24.72)
Service	12(06.49)	09(05.14)	21(05.83)
Business	14(07.56)	15(08.57)	29(08.06)
Occupation of mother			
Housewife	144(77.84)	132(75.43)	276(76.67)
Unskilled worker	33(17.84)	36(20.57)	69(19.17)
Social worker	06(03.24)	05(02.86)	11(03.05)
Teacher	02(01.08)	02(01.14)	04(01.11)
Per capita monthly income*			
V<773	101(54.59)	70	171(47.50)
IV773-1546	54(29.19)	68	122(33.90)
III1547-2577	15(08.11)	21	36(10.00)
II2578-5155	11(05.95)	13	24(06.66)
I>=5156	04(02.16)	03	07(01.94)
Total	185(51.39)	175(48.61)	360(100)

*(PCMI) (Modified B.G. Prasad Classification; April 2013)

Study revealed (Table 2) that according to WHO 2006 child growth standard, the prevalence rate of under-weight, stunting and wasting was 49.17%, 59.44% and 20.28% respectively. Boys suffered more than girls in all three indicators (50.81%, 61.63% and 21.62% versus 47.42%, 57.14% and 18.85% respectively). However, the sex difference was not statistically significant ($p=0.521$ for underweight; $p=0.387$ for stunting; $p=0.514$ for wasting).

Based on the mid upper arm circumference (MUAC), the prevalence of acute malnutrition was 27.50% (Moderately underweight 21.39% and Severe acute

malnutrition 6.11%). Boys suffered more (23.79%) than girls (18.85%) in moderately underweight though this difference was not statistically significant ($p=0.477$) (Table 3).

The prevalence rate of under-weight was significantly associated with age of children ($p<0.001$), literacy status of parents' ($p<0.001$) and socio economic status ($p<0.001$) but not significantly associated with sex of the study population ($p=0.521$). Similarly the prevalence of stunting and wasting was significantly associated with age of children ($p<0.001$), literacy status of parents' ($p<0.001$) and socioeconomic status ($p<0.001$) but not significantly associated with sex of the study population ($p=0.514$). (Table 4).

DISCUSSION

The WHO growth standard 2006 is unique in that it is purposefully designed to produce a standard rather than reference. Standard defines how children should grow; deviations from the pattern it describes are evidence of abnormal growth. A reference, on the other hand, does not provide a sound basis for such value judgments, although in practice references are often mistakenly used as standards.¹³

Prevalence of under-nutrition:

In the present study, it was found that malnutrition was a problem of 24-59 months old children in Rural West Bengal of India because the prevalence of underweight, stunting and wasting was 49.17%, 59.44% and 20.28% respectively according to WHO 2006 classification which was almost similar to some other previous studies.^{14, 15, 16 17}

In a study by Savita et al at Karnataka the prevalence of under-weight among under-5 children was 69.6% in boys & 62.6% in girls and the prevalence of stunting was 78.8% in boys and 81.5% in girls respectively.¹⁴ A study by Deshmukh et al at Maharashtra revealed that the prevalence of underweight for children 0-6 years was 64.3% (47.4% moderate underweight and 16.9% severe underweight respectively).¹⁵ Another study by Bandyopadhyay et al on assessment of under-nutrition among under-5 children in a slum of Kolkata showed the prevalence was 67.55%.¹⁶ Study by Shit et al at Bankura among slum children demonstrated that 46.1% had underweight; 71.8% of the children belonged to group stunting and wasting was 18.8%.¹⁷ However, some other similar studies in India and abroad revealed a comparatively lower prevalence.^{18,19, 20,21, 22, 23, 24}

The prevalence of stunting, underweight and wasting in a poor area in China, studied by Wang et al were 30.2%, 10.2% and 2.9% respectively.¹⁸ In a rural area of Nigeria, study by Senbanjo et al, it was found that prevalence of underweight was 23.1%, wasting 9%, and that of nutritional stunting 26.7%¹⁹; thus, compared to our study, prevalence of malnutrition was lower.

Table 2: Distribution of the children according to WHO (2006) nutrition classification (n = 360)

Indices	Boys*		Girls*		Total*		p value	Odds Ratio (95%CI)
	Normal	Under nourished	Normal	Under nourished	Normal	Under nourished		
Weight for age (Underweight)	91 (49.18)	94 (50.81)	92 (52.57)	83 (47.42)	183 (50.83)	177 (49.17)	0.521	1.14 (0.76 - 1.73)
Height for age (Stunting)	71 (38.37)	114 (61.63)	75 (42.86)	100 (57.14)	146 (40.56)	214 (59.44)	0.387	1.20 (0.79 - 1.83)
Weight for height (Wasting)	145 (78.38)	40 (21.62)	142 (81.14)	33 (18.85)	287 (79.72)	73 (20.28)	0.514	1.19 (0.71- 1.99)

*Figure in parenthesis indicate percentage

Table 3: Distribution of the children based on Mid Upper Arm Circumference (MUAC) (n = 360)

MUAC (cm)	Boys (%)	Girls (%)	Total (%)	p value	Odds Ratio (95%CI)
< 11.5 (Severe acute malnutrition)	10 (05.40)	12 (06.85)	22 (06.11)	0.477	0.62 (0.24-1.62)
11.5-12.5 (Moderately underweight)	44 (23.79)	33 (18.85)	77 (21.39)		
>12.5 (Normal)	131 (70.81)	130 (74.28)	261 (72.50)		
Total	185 (51.38)	175 (48.62)	360(100)		

Table 4: Distribution of the children according to socio-demographic profiles and under-weight (n = 360)

Socio-demographic profiles	Normal (%)	Under-weight (%)	Total (%)	z ² ; p value
N	183	177	360	
Age of child (months)				
24-35	63 (43.45)	82 (56.55)	145 (100)	22.6;0.000
36-47	60 (44.77)	74 (55.23)	134 (100)	
48-59	60 (74.07)	21 (25.93)	81 (100)	
Sex of child				
Boys	91 (49.19)	94 (50.81)	185 (100)	0.412; 0.521
Girls	92 (52.57)	83 (47.43)	175 (100)	
Education of father				
Up to primary	22 (28.21)	56 (71.79)	78 (100)	20.4; 0.000
Above primary	161 (57.09)	121 (42.91)	282 (100)	
Education of mother				
Up to primary	19 (26.76)	52 (73.24)	71 (100)	20.5;0.000
Above primary	164 (56.75)	125 (43.25)	289 (100)	
Per capita monthly income (PCMI)				
≥ Class III	19 (28.36)	48 (71.64)	67 (100)	16.6; 0.000
Below Class III	164 (55.97)	129 (44.03)	293 (100)	

The prevalence of moderate and severe underweight in a study by EL Mouzan et al of Saudi children was 6.9% and 1.3%, the prevalence of moderate and severe wasting was 9.8% and 2.9%, and the prevalence of moderate and severe stunting was 10.9% and 2.8% respectively.²⁰

A study on prevalence of Malnutrition in under 6-year olds in South Khorasan, Iran by Sharifzadeh et al showed the prevalence of under-nutrition in respect of wasting, stunting and underweight indices respectively was 32.2%, 45% and 47.8%.²¹

Mathad et al at Kakati study demonstrated the prevalence rate of underweight, stunting and wasting was 32.41%, 58.62% and 14.10% respectively.²² The prevalence of wasting was 23.8% and prevalence of underweight was 31% in the study population by Chowdhury et al at Kolkata.²³ Study by Seetharaman et al at Coimbatore revealed the prevalence of underweight

was 49.6%, stunting 48.4% and wasting 20.2% respectively.²⁴ In contrast, study by Brahmabhatt et al at Karnataka showed quite higher estimates (81.8% wasting, 95.5% underweight and 74.8% stunting respectively)²⁵ in comparison to other studies. Of course the study participants of this latter study were referred children from lowertire of health services.

Mid upper arm circumference (MUAC) is a measure of the diameter of the upper arm and gauges both fat reserves and muscle mass. Measurement is simple and requires minimal equipment; MUAC has therefore been proposed as an alternative index of nutritional status for assessing malnutrition. In our study, the prevalence of acute Malnutrition was 27.50% (Moderately underweight 21.39% and Severe acute malnutrition 6.11%) when MUAC was used as an indicator. This findings was more or less corroborative with the findings by Chowdhury et al at Kolkata²³ and Maiti et al at Midnapore²⁶ where the age combined rates of overall

(moderate and severe) undernutrition was 25.00% and 18.96% respectively. However Kakati study by Mathad et al²² showed lower prevalence, where based on the mid upper arm circumference, the prevalence rate of malnutrition was 14.75% (moderate under-nutrition was 11.80% and severe acute malnutrition was 2.95%).

In Midnapore²⁶ and present study boys were found to suffer slightly higher than girls though this difference was not statistically significant in present study. Moreover the age combined frequency of moderate under-nutrition was higher in boys than in girls but in case of severe under-nutrition it was opposite in manner in the present study and in Midnapore study.²⁶

IAP standards led to an overestimated prevalence of under-nutrition among girls in particular (by 21.2% compared with WHO standards). This effect can be explained by the use of unisex Harvard standards as compared with sex-specific WHO growth curves. Thus, the new WHO standards show a smaller gender bias in underweight prevalence than the IAP growth curves.²⁷ This phenomenon was corroborative with the finding of this study and some other previous studies²¹ where significant difference between the two sexes with regard to prevalence of different kinds of malnutrition was not found, However Maharashtra study¹⁵ and Saudi Arabia study^{20, 28} revealed that the boys were more likely to be under-weight than girls by WHO standards.

The various bio-social factors related to malnutrition were also found consistent with the other studies. These bio-social-demographic factors act in combination and augment effect of each other, more-over these factors are interrelated. This means that intervention directed towards one/other factor/s may bring about desirable changes in other factors directly or indirectly.

In Maharashtra study,¹⁵ the highest proportion of underweight, stunted as well as wasted children were found in illiterate mothers and the lowest in mothers with higher education.

The findings were also consistent with the present study and some other studies^{17, 19, 21, 28, 29} where maternal education level was in inverse proportion to malnutrition. Hence, higher maternal education appears to be associated with better child nutrition. Besides, prevalence of different types of malnutrition had a reverse statistical relationship to father's level of education in this study and other studies from India and abroad.^{15, 19, 21, 22, 28}

The relationship between low socio-economic condition and increase prevalence of malnutrition has been documented in a number of studies worldwide and in this study also.^{22, 28, 29}

CONCLUSION

According to modified WHO 2006 growth standard, almost half of the children were suffering from under-

weight, more than half were suffering from stunting and one fifth were suffering from wasting. Boys suffered more than girls in all three indicators though it was not statistically significant. Based on the mid upper arm circumference, the prevalence of acute malnutrition was 27.50%. Again the boys suffered more. Parents' literacy had a much higher impact on better nutritional status of children. Higher socio-economic status had beneficial effect in protecting children from malnutrition. Mission should be made to improve socio-economic-educational development of general population by general administration and this may require definite advocacy by health care providers.

RECOMMENDATIONS

The problem of under-nutrition amongst under-five children needs to be addressed through comprehensive preventive, promotive, curative and social measures.

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