



A Study on Assessment of Nutritional Status of Under five Children using Composite Index of Anthropometric Failure (CIAF) in a Rural Area of Singur Block, Hooghly district, West Bengal

KEYWORDS

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ABSTRACT

Background: Reduction in malnutrition is the indirect MDG related goal to improve the child health. The most common problem among under-five children in India is undernutrition.. therefore this study was done to find out the prevalence of under-nutrition among the under-five children and also to find out the determinants of undernutrition using CIAF. **Methods:** This cross sectional study was conducted in rural Bengal among under five children, WHO z score system and CIAF classification was used to categorise the nutritional status. **Results:** Out of 182 children (47.5%) were undernourished and the undernutrition was more prevalent among girls (46.8%). After adjusting with other variables in a multivariable logistic regression model, family type, exclusive breastfeeding less than six months, and low education level of mother were significantly associated with under-nutrition. **Conclusion:** So, CIAF can be used in growth monitoring by frontline health workers to attain the MDG goal in future. Key words : undernutrition, wasting, CIAF, stunting

Introduction

The vulnerable and the most important target group in our country are under five children. Adequate nutrition during infancy and early childhood is essential to ensure the growth, health, and development of children to their full potential. Poor nutrition increases the risk of illness, and is responsible, directly or indirectly, for the deaths that has occurred in children less than 5 years of age. [1]

In the recent years, malnutrition has greater influence on morbidity and mortality among under five children. Identified risk factors for under nutrition are child, mother and grandly their environment. Undernutrition in childhood lowers the performance of the child in school, mental and motor development of a child and leads to poor health. Thus, the economic cost of child malnutrition in India is high. [2]

There are various causes for malnutrition among the under five children in our country, but the infant and young child feeding practices plays the most important role. India rates highest in the prevalence of underweight and it was nearly double the prevalence in Sub-Saharan Africa where close to 60 million children are underweight.[3] Worldwide, almost 7 million children die each year before they reach their fifth birthday but more than one-third of all under-five deaths occurring in India (24%) and Nigeria (11%).[4] The millennium development goal is to reduce the percentage of underweight children by one-half between 1990 and 2015 and also to indirectly reduce the MDG 4 (infant mortality rate) by two thirds.[5]

One third of the children with malnutrition in the world living in India. NFHS-3 (2006) stated that where 38.7 % of underfive children were underweight.[6] But in NFHS-4(2015-2016) found that 31.5% of the children under age five were underweight.[7]

Despite there are various studies in regard to under-nutrition among under-five children, oddly few researches were done in recent times in in rural West Bengal . Studies to find out the determinants of undernutrition by CIAF is also less in this part of India. Determining the prevalence of malnutrition among under five using CIAF along with its determinants will be useful for the health administrators for the policy making in future. With this background, a study was done to find out the prevalence of under-nutrition and also to explain its assorted risk factors among the under-five children in a rural area of West Bengal.

Material and Methods

This Community based cross-sectional study was conducted in Hooghly district of West Bengal. The study period was from (May 2015 to April 2016), starting from the ethical committee clearance and completion of data collection. There are 64 villages with a total population of 99229 in the field practice area under Rural Health Unit and Training Centre (RHUTC) of All India Institute of Hygiene and Public Health in Singur block of Hooghly district West Bengal. Public health services in these villages are being provided through 2 Union Health Centres , 4 subcentres and 12 health units. Among 12 health Units of Singur block, 6 were randomly selected. From each health unit, one village was selected randomly (total 6 villages). From the sampling frame of 654 children of 6 villages, 200 were chosen by simple random sampling. But 9 % of the parents didn't cooperate to participate in the study, so the final sample size was 182. **Inclusion criteria:** Children between 0-5 years residing in the study area. **Exclusion criteria:** Mothers who were not available during the time of data collection and who were unwilling to participate. **Sample size :** Prevalence of undernutrition (underweight for age) in West Bengal as 39% according to (NFHS 3 data) [6] was taken up and allowable absolute error (precision) of 10%, with design effect 2, the minimum required sample size was 200. However data analysis done

on 182 children (Non response rate of 9%). **Tools and Techniques:** Institutional ethical committee clearance was taken before the start of the study and informed consent was obtained from the mothers of underfive children. A pre-designed and pre-tested schedule was used to conduct the interview. The schedule had the questions with the following parts. Part 1 includes demographic, socioeconomic and environmental characteristics of family, behavioural characteristics (Addiction) of parents, maternal and birth characteristics of study participants, feeding practices of children. Part 2 includes anthropometric measurements and part 3 includes clinical examination and history. Pretesting was done with 20 under five children. During pretesting, the questions which were found to be irrelevant were omitted and necessary modifications were done. Then the questionnaire (which was originally drawn up in English) was translated into Bengali (local language of the study area) and again back translated into English. Then the translated English version was compared with original English version and necessary correction was done. This English schedule was again translated to Bengali. Then the final Bengali schedule was developed by keeping the semantic equivalence with the original English schedule. To make the language of the schedule so simple, uttermost care was taken so that respondents could grasp the questions easily. Review of health records was done and data was collected with the help of a schedule. Following the standard operating procedures, clinical examination and anthropometric measurements were possessed. The data included were length (if the child can't stand without support), height, weight and mid upper arm circumference (for children above 3 months). Recorded data was analyzed by SPSS 16 and represented by various tables. Effect of different demographic, socioeconomic and environmental characteristics of families, behavioural characteristics of parents, maternal and birth characteristics of underfive children, food hygiene and feeding practices on undernutrition was elicited among under 5 children by univariate logistic regression. Variables which were significantly associated with undernutrition in univariate logistic regression were included for Multivariable Logistic regression model, by "Enter" method.

Definitions used

1. Weight-for-age

- **Under wt for age** was defined for z-score < -2.0 SD of the WHO (2006) reference standards
- **Severe under wt for age** was defined for z-score < -3.0 SD of the WHO (2006) reference standards
- **Stunting** was defined for z-score < -2.0 SD of the WHO (2006) reference standards
- **Severe stunting** was defined for z-score < -3.0 SD of the WHO (2006) reference standards
- **Wasting** was defined for z-score < -2.0 SD of the WHO (2006) reference standards
- **Severe Wasting** was defined for z-score < -3.0 SD of the WHO (2006) reference standards

It is based on the classification of under nutrition of under 5 children according to WHO growth standard 2006.

4. Composite Index of Anthropometric Failure (CIAF) : For a comprehensive measure of the overall prevalence of under nutrition, what is needed is a single aggregate indicator that incorporates all undernourished children, be they wasted and/or stunted and/or underweight. Such an aggregate indicator - the Composite Index of Anthropometric Failure (CIAF) - had been developed by Svedberg [8]. His original model suggested six sub-groups of anthropometric failure (labeled A-F); to which one more sub-group (labeled Y) was added by Nandy et al. The classification as follows: A - No Failure, B -

Wasting only, C - Wasting + Underweight, D - Wasting + stunting + Underweight, E - Stunting + Underweight, F - Stunting only and Y - Underweight only. The addition of the children in groups B to F provides the CIAF. As a single measure, CIAF provides the overall estimate of undernourished children and also identifies the children with multiple growth failures [9]. WHO Z-score system and the composite index of anthropometric failure (CIAF) was used in the present study to estimate the prevalence of under nutrition.

Results: Data of 182 children were collected and analyzed. Mean age of the study subjects was 26.7 month (± 17.2) and both sexes were almost equally distributed. Majority of the children were in the age group of 36-48 months. Majority of the study subjects were belonged to Hindu religion (92.3%) and the remaining were Muslims. Around (73.1%) of the study subjects were living in joint family. About 10.2% of mothers of the children were illiterate and 4.2% among them completed up to primary school. Mother's with education upto middle school was 38.2% and 41.2% of them were educated up to secondary or higher secondary. Only 6% of the mother's were graduates. More than three fourths (90.7%) of the mother's were homemakers and the rest were unskilled workers (2.7%). Mother's of (6.6%) of the children were agricultural workers. Majority (58.2%) of the families belonged to socioeconomic class IV (according to modified B.G. Prasad scale 2015) and 38.5% of the family belonged to class V. Children living in kutcha houses were 34.1% and overcrowding was present in 44% of the houses. Separate kitchen was present in 69.8% of the houses.

Table 1- About 84 children (out of 182) were diagnosed with Anthropometric Failure (47.5%). It was found that combination of Wasting, stunting and under-weight was present in 8.8% of the study subjects. Chronic malnutrition (Stunting) was present in 11.5% of the under five children. Underweight only was present in 6.6% of the study subjects.

The prevalence of under nutrition according to different age groups is depicted in **Figure-1**.

The prevalence of wasting, stunting and underweight among participants is depicted in **Figure-2**.

Table 2- Shows the significant association of factors associated with under nutrition which was assessed by CIAF. In the univariate analysis, factors which were significantly associated with increased risk of under-nutrition were family type, low education level of mother and father, presence of overcrowding, mother's age at child birth and absence of morbidity of mother during antenatal period. Other variables like age, sex, religion, mother's occupation, occupation of father and mother, socio-economic status, mode and place of delivery of the child, and presence of separate kitchen were not significantly associated with under-nutrition assessed by CIAF in univariate analysis (data not shown). Variables which were significantly associated with undernutrition in univariate analysis assessed by CIAF were included for Multivariable Logistic regression model, by "Enter" method.

Table 3- Finally three logistic regression models were prepared to elicit the effect of various factors on under nutrition by CIAF.

Model 1: Demographic, Socioeconomic and Behavioural covariates like Family type, Education of mother and father and overcrowding were added.

Model 2: Covariates related to maternal and birth characteristics of children like the age of mother at child birth and maternal morbidity during antenatal period were added.

Model 3: Covariates of feeding practices of under 5 children like exclusive breast feeding for six months was added and thus adjusted with all other covariates.

Variables such as family type, education level of the mother and exclusive breast feeding for > 6 months remains significant in the final model of multivariable analysis in spite of being significant in the univariate analysis, where as other variables lost its significance in the multivariable analysis.

Discussion : In the present study, prevalence of under-nutrition using Composite Index of Anthropometric Failure (CIAF) was 47.5% which was much higher than the study done by Dasgupta A et al^[10] (32.7%) in West Bengal but the prevalence was lesser than the other studies^{11,12,13,14,15}. In the present study 46.8% of the girls and 45.4% of the boys were undernourished, showing a higher prevalence in girls as compared to boys. A study conducted by Sathyanath M S, et al^[16] also revealed, the same higher prevalence of under nutrition among girls (71.43%) compared to boys. Studies of Prakash J S, et.al in Uttar Pradesh^[14], Saqib H L, et.al in Pakistan^[18] and Safikul I et.al in Assam^[17] shown male children were comparatively more malnourished than female children. Age group wise prevalence of under nutrition was highest in 25-36 months age group (70%) in a study done by Vinod N, et al^[19] in Nagpur in 2012. Majority of the undernourished children (47.6%) belonged to 4-5 yrs age group in a study conducted by Sathyanath MS^[16] et al in India. In the present study the prevalence was highest in the age group of 3-4 years. Prevalence of wasting, stunting and underweight was 1.8% in a study conducted by Gupta V, et al in Haryana in 2014, which was 8.8% in the current study^[20]. Severe underweight, severe stunting, and severe wasting was found in 10.6%, 7.0%, and 8.6%, respectively in a study conducted by Safikul I et.al^[17] in Assam which was 11.0%, 13.8%, 19.2% in the present study.

Conclusion: Findings of this study clearly emphasize the effect of family type, education level of parents, antenatal care of mother and feeding practices of the children in the prevention of under nutrition. CIAF is helpful in identifying the children with anthropometric failures of different combinations. It can be easily assessed by frontline health workers. This is a serious issue, so that the identified children will not only get the benefit of extra supplementation of food and also broader intervention efforts will be ensured for them.

Recommendation: Mother's of under five children were advised to take the children to the nearest ICDS centre routinely during the time of study. This study also recommends that CIAF classification to be included in growth monitoring activities and also training of frontline line health workers is recommended to identify the children with multiple anthropometric failures at gross rural level. So the future policies will be developed in such a way, so that CIAF can be used for growth monitoring by frontline health workers to attain the MDG goal.

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Table.1- Distribution of study subjects according to nutritional status (as per CIAF classification): (n=182)

Nutritional status	Number (%)
Group A: No failure	95 (52.5)
Group B: Wasting only	21 (11.5)
Group C: Wasting and under weight	13 (7.1)
Group D: Wasting, Stunting and under weight	16 (8.8)
Group E: Stunting and under weight	13 (7.1)
Group F: Stunting only	21 (11.5)
Group Y: Underweight only	3 (1.6)

Prevalence of Under nutrition (All CIAF group except group A)	84 (47.5)
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Table 2- Effect of covariates on under nutrition among under five children by CIAF (univariate logistic regression analysis): (n=182)

Independent Variable	Presence of under nutrition (by CIAF classification) Number (%)	Presence of under nutrition (by CIAF classification) [OR(95% confidence interval)]
Family Type: Nuclear (49) Joint (133)	16 (32.7) 68(51.1)	1 2.15 (1.08-4.28) **
Mother's Education: Secondary level and above (86) Up to middle (96)	21(24.4) 63(65.6)	1 5.90 (3.09-11.29)**
Father's education Secondary level and above(57) Up to middle(125)	17(29.8) 67(53.6)	1 2.71 (1.39-5.29) **
Overcrowding Absent (102) Present (80)	39(38.2) 45(56.2)	1 2.07(1.14-3.76) **
Mother's age at child birth: ≥ 20yrs (median age) (111) < 20 yrs (71)	58 (52.3) 26(36.6)	1 1.52 (1.08-2.97)*
Mother's morbidity during antenatal period: Absent (140) Present (42)	63(45.0) 21(50.0)	1 3.70 (1.59-6.33) **
Exclusive breast feeding ≥6 months (131) < 6 months (51)	54 (41.2) 30 (58.8)	1 2.03 (1.05-3.93) **

**Significant at 95% confidence limit

Table 3- Covariates on under nutrition among study subjects: Multivariable logistic regression (n=182)

Variable	Presence of undernutrition		
	Model 1 AOR (95% CI)	Model 2 AOR (95% CI)	Model 3 AOR (95% CI)
Family type			
Nuclear	1	1	1
Joint	4.58 (2.01-10.43) **	4.55 (1.99-10.41) **	4.25(1.84-9.80) **
Education of mother			
Secondary level and above	1	1	1
Upto middle	6.99 (3.32-14.7)**	6.78 (3.17-14.49)**	6.77(3.18-14.4) **
Education of father			
Secondary level and above	1	1	1
Upto middle	1.86 (0.85-4.09)	1.73 (0.71-4.20)	1.71(0.70-4.16)
Overcrowding			
Absent	1	1	1
present	1.69(0.84-3.39)	1.76(0.85-3.65)	1.76(0.84-3.66)
Variables related to maternal and birth characteristics of children:			
Age of mother at child birth			
≥ 20 yr (median age)	1	1	1
<20 yr		0.85(0.36-1.99)	0.85(0.36-2.00)

Mother's morbidity during ANC		
Absent	1	1
Present	0.63(0.25-1.54)	1.63(0.74-3.59)
Variables related to Feeding practices of study participants:		
Excusive breast feeding ≥ 6months <6months		1.58(1.64-3.89)**

**Significant at 95% confidence limit

(Hosmer and Lameshow test Non significant, Negelkerke R square=0.320).

Nagelkerke R2 was 0.320 showing that the variables included in the model predicted 32.0% of undernutrition

Figure 1: Shows the prevalence of under nutrition in different age groups (as per CIAF classification (n=84)

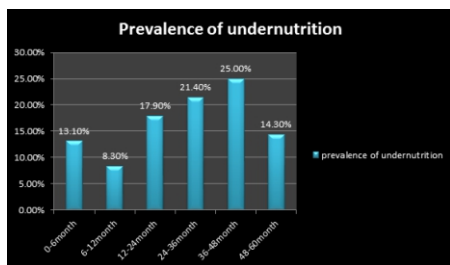
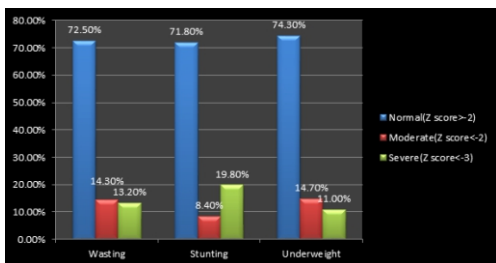


Figure 2: Shows the prevalence of wasting, stunting and underweight among participants (as per WHO 2006 reference standard): (n =182)



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