

Malnutrition and Household Food Insecurity in Children Attending Anganwadi Centres in a District of North East India

Jyotismita Pathak, Tulika Goswami Mahanta¹, Priya Arora, Dibyajyoti Kalita², Gurmeet Kaur

Department of Community Medicine, Army College of Medical Sciences, Delhi Cantt, ²Department of Nephrology, Institute of Liver and Biliary Sciences, Delhi, ¹Department of Community Medicine, Tezpur Medical College, Tezpur, Assam, India

Abstract

Background: Child malnutrition is linked to household food insecurity. Literature reveals mixed results, but most studies were carried out in adults. **Aims:** The aim of this study is to assess household food insecurity and nutritional status in children attending Anganwadi centers (AWCs) of Dibrugarh district. **Materials and Methods:** Cross-sectional study among 510 randomly selected children attending AWCs in Dibrugarh was done. Data on nutritional status and food security were collected, and anthropometric measurements were recorded. **Statistical Analysis:** Data were analyzed using SPSS version 16. Categorical variables presented as percentages and differences between them tested using Chi-square test. Bivariate analysis was performed to find out independent risk factors. **Results:** The prevalence of stunting, wasting, and underweight was 39.8%, 26.1%, and 39.2%, respectively. Significant associations found between wasting, stunting, or underweight and household food insecurity. Stunting, wasting, and underweight were significantly associated with the literacy status of parents. Underweight and stunting were also associated with socioeconomic class. **Conclusions:** Malnutrition in all forms is common in the study population. Rates of stunting, wasting, and underweight were higher than the state average. Along-with access to food, an integrated approach that improves the overall socioeconomic well-being of families and parental education is needed.

Keywords: Anganwadi, Dibrugarh, household food insecurity, nutritional status, preschool children

INTRODUCTION

Child malnutrition is the most unfortunate and widely spread disorder in tropical and subtropical areas.^[1] At the household level, “a household is food secure when it has access to the food needed for a healthy life for all its members and when it is not at undue risk of losing such access.”^[2] The 2019 edition of the joint malnutrition estimates of UNICEF shows that 149 million children under five – were stunted in 2018, and over 49 million suffered from wasting.^[3] In India, 28.5% of the under-five population was found to be wasted (moderate and severe), 37.9% stunted and 36.3% underweight, respectively.^[3] Assam has reported a high prevalence of undernutrition, with 36.4% of children stunted. Dibrugarh, an eastern district of Assam, has reported 22.4% wasting and 33.3% underweight.^[4] Thus, in India, especially Assam, malnutrition is a rampant problem, and there is a pressing need to address this problem among young children to prevent avoidable morbidities.

Although various studies have been conducted to study the relationship between household food insecurity and nutritional

status of children, they have led to mixed results. Whereas some studies have reported a positive association, others have found no relationship or a negative association.^[5-13] However, a majority of these studies have focused on adults and older children, most of them being carried out in developed countries.

Malnutrition, poverty, and infections are a vicious circle that affects the whole population and children in particular. Malnutrition usually results as a consequence of a combination of inadequate dietary intake and infections.^[14] Children, being more vulnerable to adverse environments and rapidly responsive to dietary changes, are most at risk for becoming ill and malnourished. Consequently, their nutritional status is

Address for correspondence: Dr. Jyotismita Pathak, Department of Community Medicine, Army College of Medical Sciences, Delhi Cantt, Delhi - 110 010, India. E-mail: pathak.jyotismita.jp@gmail.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Pathak J, Mahanta TG, Arora P, Kalita D, Kaur G. Malnutrition and household food insecurity in children attending anganwadi centres in a district of North East India. *Indian J Community Med* 2020;45:405-9.

Received: 15-10-19, **Accepted:** 15-05-20, **Published:** 28-10-20

Access this article online

Quick Response Code:



Website:
www.ijcm.org.in

DOI:
10.4103/ijcm.IJCM_428_19

considered a good gauge for population-based malnutrition. Therefore, the survey results of the under-5-year population may be used to draw conclusions about the whole population and not just about that age group.^[15] This study was, therefore, undertaken to explore the prevalence as well as the relationship between household food insecurity and nutritional status among preschool children in the Dibrugarh district of Assam, India.

MATERIALS AND METHODS

This community-based observational study was conducted for 1 year in the Anganwadi centers (AWCs) of Dibrugarh, a district in Assam situated by the southern bank of Brahmaputra, to determine the nutritional status and household food insecurity during. Taking the prevalence of stunting as 36.4%, alpha of 0.05, and a relative error of 12%, the minimum sample size was calculated to be 466.^[4] There are eight Integrated Child Development Scheme blocks in the Dibrugarh district, and all of them were included in the study. In the first stage, the AWCs of different blocks were randomly selected in the study in a probability proportionate to the size of the number of AWCs in the given block. In the next stage ten children were randomly selected from the nominal rolls of the selected AWC. Then the households of the included children were visited. Data were collected in a predesigned and pretested questionnaire administered to the child's guardian/mother after obtaining consent. Modified B. G. Prasad Scale was used for determining socioeconomic status of the household. Household Food Insecurity was assessed using the Household Food Insecurity Access Scale (HFIAS)^[16] and anthropometry was done using standard procedures. HFIAS has nine questions, each having two components, an occurrence question, and a frequency question. The ultimate score was obtained by adding up all the frequency questions. Ethical clearance was obtained from the institutional ethics committee.

RESULTS

A total of 510 children with 249 (48.8%) female children, attending AWCs in Dibrugarh were included in the study. The mean age of the study participants was 43.4 months (+15.8 months). Out

of the total 510 children, 70.2% (358) were Hindu by religion, 24.5% (125) were Muslim, and the rest were Christians. Almost half of the children (47.3%) belonged to the OBC category, followed by general (34.5%), scheduled caste (14.7%), and scheduled tribe (3.5%). Among the study participants, 63.5% (324) belonged to nuclear families and the rest to joint families. About half (49.2%) of the households were classified as Class IV of the socioeconomic scale, followed by 29.6% in Class V, 13.5% in Class III, 7.1% in Class II, and only 0.6% in Class I.

Table 1 represents the prevalence of stunting, wasting, and underweight as 39.8%, 26.1%, and 39.2%, respectively. All forms of under-nutrition seen more commonly among male children except moderate wasting. The difference in the rates of malnutrition in both the sexes was found to be statistically significant.

It is observed from Table 2 that there was a significant difference in rates of under-nutrition among children belonging to different caste categories. It is also seen, that for stunting and underweight, there were significant differences among different socioeconomic classes.

Table 3 depicts that all the forms of malnutrition were more common among children with mothers who are illiterate or have primary level education than those with higher education. This difference was also found to be statistically significant. Among the households of the study participants, 44.5% (227) were food secure; 17.5% (89) households had mild, 24.9% (127) had moderate, and 13.1% (67) had severe food insecurity.

Maximum households having household food insecurity were from lower socioeconomic classes as depicted in Table 4, and this was found to be statistically significant.

It is seen from Table 5 that underweight and wasting in the children is significantly associated with the Household Food Insecurity Access category of the household. However, no significant association was obtained between household food insecurity and stunting.

On bivariate analysis of different factors, as depicted in Table 6, it was observed that there are significant correlations within different forms of malnutrition; between different forms of

Table 1: Distribution of the study participants according to their nutritional status and sex

Indicators of nutritional status	Total	Female (n=249)	Male (n=261)	P
Weight for age				
Normal	310 (60.8)	157 (63.1)	153 (58.6)	0.000
Moderate underweight	150 (29.4)	71 (28.5)	79 (30.3)	
Severe underweight	50 (9.8)	21 (8.4)	29 (11.1)	
Height for age				
Normal	307 (60.2)	163 (65.5)	144 (55.2)	0.000
Moderate stunting	140 (27.5)	64 (25.7)	76 (29.1)	
Severe stunting	63 (12.4)	22 (8.8)	41 (15.7)	
Weight for height				
Normal	377 (73.9)	182 (73.1)	195 (74.7)	0.000
Moderate wasting	84 (16.5)	48 (19.3)	36 (13.8)	
Severe wasting	49 (9.6)	19 (7.6)	30 (11.5)	

Figures in parentheses are the percentages

malnutrition and age, sex, caste, socioeconomic class, and food insecurity status.

DISCUSSION

The prevalence of stunting, wasting, and underweight was 39.8%, 26.1%, and 39.2%, respectively, which is a little higher than the state Figures.^[4] Considering the Dibrugarh district to be mostly comprising population of tea garden community, most of whom are engaged as daily wage laborers with uncertain income, these findings are not surprising.

Contrary to the general belief and findings from different parts of India, it was found that different forms of malnutrition were more prevalent among male children as compared to females.^[17] This study is done in northeast India, where many communities are matriarchal and the status of women in society better; this finding is reasonably explainable.

The prevalence of household food insecurity, as observed in our study, was 55.5%, which is consistent with another study done in Ethiopia in 2015.^[18] The nutritional status of the children was associated with the food security of the household. A study done in Chinese elementary school students in 2015 had similar findings.^[6]

Households belonging to lower socioeconomic classes were the ones with more household food insecurity. Lower socioeconomic status may limit the accessibility

and affordability of different food items and thus their intake, all these culminating into poor nutritional status. We found that the Household Food Insecurity was common among the subjects belonging to the lower socioeconomic status. Also, the nutritional status of children belonging to food-insecure families was generally poorer. This finding is consistent with findings from other studies conducted worldwide.^[5,19]

Child under-nutrition has a multifactorial origin and is determined by different factors. In our study, age, caste category, and socioeconomic class were found to be independently associated with underweight. For stunting, the independent risk factors were sex, caste, and socioeconomic class, and for wasting, the factors were age, caste, and religion. The diet pattern is different across different religious and caste groups, and this may attribute to the difference in the pattern of under-nutrition.

Food security is significantly associated with wasting and underweight. However, such an association was not found between food insecurity and stunting. Stunting, which represents chronic malnutrition, may be influenced by other factors and not just food security. Infections, which are linked with under-nutrition in a vicious cycle, have not been studied in the present study, and further studies are warranted to see the interplay between these factors.

Table 2: Distribution of the study subjects according to their type of malnutrition and caste category and socioeconomic class

Caste category	General (n=176)	OBC (n=241)	ST (n=18)	SC (n=75)	P
Weight for age					
Normal	103 (58.5)	139 (57.7)	10 (55.6)	58 (77.3)	0.013
Moderate underweight	52 (29.6)	74 (30.7)	8 (44.4)	16 (21.3)	
Severe underweight	21 (11.9)	28 (11.6)	0	1 (1.3)	
Height for age					
Normal	129 (73.3)	121 (50.2)	16 (88.9)	41 (54.7)	0.000
Moderate stunting	36 (20.5)	75 (31.1)	2 (11.1)	27 (36.0)	
Severe stunting	11 (6.2)	45 (18.7)	0	7 (9.3)	
Weight for height					
Normal	115 (65.3)	183 (75.9)	18 (100)	61 (81.3)	0.000
Moderate wasting	31 (17.6)	40 (16.6)	0	13 (17.3)	
Severe wasting	30 (17.1)	18 (7.5)	0	1 (1.3)	
Socioeconomic class	I and II (n=39)	III (n=69)	IV (n=251)	V (n=151)	P
Weight for age					
Normal	37 (94.9)	49 (71.0)	153 (60.9)	71 (47.0)	0.000
Moderate underweight	2 (5.1)	12 (17.4)	82 (32.7)	54 (35.8)	
Severe underweight	0	8 (11.6)	16 (6.4)	26 (17.2)	
Height for age					
Normal	34 (87.2)	45 (65.2)	143 (57.0)	85 (56.3)	0.022
Moderate stunting	4 (10.2)	16 (23.2)	74 (29.5)	46 (30.5)	
Severe stunting	1 (2.6)	8 (11.6)	34 (13.5)	20 (13.2)	
Weight for height					
Normal	32 (82.0)	47 (68.1)	192 (76.5)	106 (70.2)	0.362
Moderate wasting	6 (15.4)	13 (18.8)	39 (15.5)	26 (17.2)	
Severe wasting	1 (2.6)	9 (13.0)	20 (8.0)	19 (12.6)	

Figures in parentheses are column-wise percentages

Table 3: Distribution of literacy status of mother and under-nutrition of the study children

Indicators of nutritional status	Mothers literacy status				P
	Illiterate (n=174)	Primary school (n=162)	High school (n=119)	Posthigh school (n=55)	
Weight for age					
Normal	87 (50.0)	101 (62.3)	75 (63.0)	47 (85.4)	0.000
Moderate underweight	61 (35.1)	53 (32.7)	32 (26.9)	4 (7.3)	
Severe underweight	26 (14.9)	8 (4.9)	12 (10.1)	4 (7.3)	
Height for age					
Normal	78 (44.8)	95 (58.6)	87 (73.1)	47 (85.4)	0.000
Moderate stunting	49 (28.2)	60 (37.0)	25 (21.0)	6 (10.9)	
Severe stunting	47 (27.0)	7 (4.3)	7 (5.9)	2 (3.6)	
Weight for height					
Normal	118 (67.8)	119 (73.5)	90 (75.6)	50 (90.9)	0.008
Moderate wasting	40 (23.0)	25 (15.4)	19 (16.0)	0	
Severe wasting	16 (9.2)	18 (11.1)	10 (8.4)	5 (9.1)	

Table 4: Relationship between socioeconomic class of the family of study children and their household food insecurity

HFIA category	Socioeconomic class				P
	I and II	III	IV	V	
1 (food secure)	8 (20.5)	34 (49.3)	118 (47.0)	67 (44.8)	0.000
2 (mild food insecurity)	15 (38.5)	18 (26.1)	35 (13.9)	21 (13.9)	
3 (moderate food insecurity)	6 (15.4)	14 (20.3)	69 (27.5)	38 (25.2)	
4 (severe food insecurity)	10 (25.6)	3 (4.3)	29 (11.5)	25 (16.6)	
Total	39 (100)	69 (100)	251 (100)	151 (100)	

Column wise percentages in parentheses. HFIA: Household Food Insecurity Access

Table 5: Association between nutritional status of the children and their household food insecurity

Indicators of nutritional status	HFIA category				P
	1 (n=227)	2 (n=89)	3 (n=127)	4 (n=67)	
Weight for age					
Normal	127 (55.9)	71 (79.8)	72 (56.7)	40 (59.7)	0.000
Moderate underweight	64 (28.2)	12 (13.5)	48 (37.8)	26 (38.8)	
Severe underweight	36 (15.9)	6 (6.7)	7 (5.5)	1 (1.5)	
Height for age					
Normal	137 (60.4)	57 (64.0)	74 (58.3)	39 (58.2)	0.100
Moderate stunting	57 (25.1)	29 (32.6)	38 (29.9)	16 (23.9)	
Severe stunting	33 (14.5)	3 (3.4)	15 (11.8)	12 (17.9)	
Weight for height					
Normal	147 (64.8)	77 (86.5)	99 (78.0)	54 (80.6)	0.001
Moderate wasting	48 (21.1)	8 (9.0)	21 (16.5)	7 (10.4)	
Severe wasting	32 (14.1)	4 (4.5)	7 (5.5)	6 (9.0)	

Columnwise percentages in parentheses. HFIA: Household Food Insecurity Access

CONCLUSIONS

A higher prevalence of underweight among the study population reflects the recent crisis of food supply. There is also a significant association between the nutritional status, and food security status of the child's household, reinforcing that access to food is a key determinant for the nutritional status of the children.

Recommendations

Given that the determinants of chronic diseases in later life and health are laid down at this stage childhood is a crucial phase in one's life, the determinants of under-nutrition, for example, parental education, socioeconomic well-being of the family and access to food by the household play an important role. Thus along-with access to food, an integrated approach that improves the overall socioeconomic well-being of families, and

Table 6: Bivariate analysis of the factors affecting the nutritional status

	Height for age	Weight for age	Weight for height
Age			
Pearson correlation	0.009	-0.091	-0.095
Significant (two-tailed)	0.834	0.040	0.032
Sex			
Pearson correlation	0.122	0.053	0.017
Significant (two-tailed)	0.006	0.230	0.697
Caste			
Pearson correlation	0.098	0.221	0.165
Significant (two-tailed)	0.026	0.000	0.000
Religion			
Pearson correlation	-0.040	-0.034	0.136
Significant (two-tailed)	0.364	0.440	0.002
Type of family			
Pearson correlation	0.058	-0.013	-0.071
Significant (two-tailed)	0.193	0.765	0.107
Socioeconomic class			
Pearson correlation	0.129	0.243	0.050
Significant (two-tailed)	0.004	0.000	0.255
Food security score			
Pearson correlation	0.018	-0.092	-0.140
Significant (two-tailed)	0.679	0.037	0.002
Total (n)	510	510	510

parental education is needed to address malnutrition among preschool children.

Financial support and sponsorship

Nil

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Explaining Child Malnutrition in Developing Countries: A Cross-Country Analysis – Research Report 111. IFPRI; 2000. p. 126. Available from: <http://www.nzd1.org/gsd1mod?e=d-00000-00---off-0fn12.2--00-0---0-10-0---0---0direct-10---4-----0-11--11-en-50---20-about---00-0-1-00-0-4---0-0-11-10-0utfZz-8-00-&cl=CL2.5&d=HASH01325c76310b8828f614ff82.2>=2>. [Last accessed on 2019 Jul 16].
- Nutrition-Relevant Actions – Nutrition policy Discussion Paper No. 10:132. Available from: https://www.unscn.org/web/archives_resources/files/Policy_paper_No_10.pdf [last accessed 2020 May 28].
- Malnutrition in Children. UNICEF Data. Available from: <https://data.unicef.org/topic/nutrition/malnutrition/>. [Last accessed on 2019 Jul 16].
- Assam Malnutrition, Social Vulnerability and Disaster Analysis. Coalition. Available from: <https://www.nutritioncoalition.org.in/s-tate-chapters/assam/>. [Last accessed on 2019 Jul 16].
- Dubois L, Farmer A, Girard M, Porcherie M. Family food insufficiency is related to overweight among preschoolers. *Soc Sci Med* 2006;63:1503-16.
- Shen X, Gao X, Tang W, Mao X, Huang J, Cai W. Food insecurity and malnutrition in Chinese elementary school students. *Br J Nutr* 2015;114:952-8.
- Chandrashekhar S, Aguayo VM, Krishna V, Nair R. Household food insecurity and children's dietary diversity and nutrition in India. Evidence from the comprehensive nutrition survey in Maharashtra. *Matern Child Nutr* 2017;13 Suppl 2:e12447. doi: 10.1111/mcn.12447. Available from: <https://pubmed.ncbi.nlm.nih.gov/29032>. [Last accesses 2019 July 16].
- Alaimo K, Olson CM, Frongillo EA, Briefel RR. Food insufficiency, family income, and health in US preschool and school-aged children. *Am J Public Health* 2001;91:781-6.
- PRIME PubMed | Poverty, Food Insecurity, and Nutritional Outcomes in Children and Adult. Available from: https://www.unboundmedicine.com/medline/citation/15587700/Poverty_food_insecurity_and_nutritional_outcomes_in_children_and_adults. [Last accessed on 2019 Jul 16].
- Cook JT, Black M, Chilton M, Cutts D, de Cuba Se, Heeren TC, *et al.* Are food insecurity's health impacts underestimated in the U.S. population? Marginal food security also predicts adverse health outcomes in young U.S. children and mothers 123. *Adv Nutr* 2013;4:51-61.
- Gundersen CG, Garasky SB, Lohman BJ. Food insecurity is not associated with childhood obesity as assessed using multiple measures of obesity. *J Nutr* 2009;139:1173-8.
- Saha KK, Frongillo EA, Alam DS, Arifeen SE, Persson LA, Rasmussen KM. Household food security is associated with growth of infants and young children in rural Bangladesh. *Public Health Nutr* 2009;12:1556-62.
- Hackett M, Melgar-Quiñonez H, Álvarez MC. Household food insecurity associated with stunting and underweight among preschool children in Antioquia, Colombia. *Rev Panam Salud Publica* 2009;25:506-10.
- Bellamy C; UNICEF. The State of the World's Children. New York: UNICEF; 1998.
- WFP, CDC: A Manual: Measuring and Interpreting Malnutrition and Mortality. 45f6abc92.pdf. Available from: <https://www.unher.org/45f6abc92.pdf>. [Last accessed on 2019 Jul 16].
- Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide | Food and Nutrition Technical Assistance III Project (FANTA). Available from: <https://www.fantaproject.org/monitoring-and-evaluation/household-food-insecurity-access-scale-hfi>. [Last accessed on 2019 Aug 08].
- Bharati P, Bharati S, Pal M, Chakrabarty S, Som S, Gupta R. Growth and nutritional status of pre-school children in India: Rural-urban and gender differences. *Coll Antropol* 2009;33:7-21.
- Tantu AT, Gamebo TD, Sheno BK, Kabalo MY. Household food insecurity and associated factors among households in Wolaita Sodo town, 2015. *Agric Food Secur* 2017;6:19.
- Kaiser LL, Melgar-Quiñonez HR, Lamp CL, Johns MC, Sutherlin JM, Harwood JO. Food security and nutritional outcomes of preschool-age Mexican-American children. *J Am Diet Assoc* 2002;102:924-9.