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Socio-economic Predisposing Factors of Malnutrition among School Going Children in Bareilly District of North India: A Cross-sectional Study

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ABSTRACT

Background: Malnutrition remains the ever challenging, public health concern irrespective of age and economic status. Although nutrition is essential irrespective of age but it has peerless role in the school days. The present study was conducted to assess the socio-economic predisposing factors of malnutrition among school children in the Bareilly district of North India.

Methods: This cross-sectional study was carried out in Bareilly district of North India. A total of 465 school children were examined for nutritional status and socio-economic factors responsible for malnutrition. Applying multi-stage random sampling technique and pretested, pre-validated schedule was used for data collection which was compiled and analysed with Epi-Info software version 7.

Results: The study revealed 40% prevalence of malnutrition among school children. Socio- demographic factors such as gender, caste, type of family and residence were found statistically significant different with nutritional status of child ($p<0.05$). However, socio economic factors such as parental education, employment and socio economic conditions were discovered inversely related with malnutrition ($p<0.05$).

Conclusion: The study indicates the necessity to accelerate the government's coping strategies to win over malnutrition in especially in underserved population of country.

Keywords: Malnutrition, School Children, Overweight, Underweight, Socio-economic Factors, Body Mass Index (BMI).

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Introduction

The World Health Organization defines "malnutrition" as a double edged sword comprising of both under nutrition and over nutrition (WHO Factsheets-Malnutrition, 2021). Therefore malnutrition remains the ever challenging, public health concern irrespective of age and economic status.

The irony of malnutrition in a distinct in India is that the nation is struggling both variants of malnutrition due to unbalanced economy in rural and urban areas. Under nutrition is the main cause of childhood morbidity, mortality due to lack of basic necessity in rural areas (Nguyen, 2021). However, the other spectrum of urban affluent society among whom over nutrition is rising because of sedentary lifestyle and high calorie intake (Murarkar, 2020). Over nutrition in childhood and adolescence is associated with an increased risk of developing non communicable disease in adult life (Mathur, 2019).

Though, India has recently gained GDP up to 50%, the nation is still in the queue of low income countries, ranking 101 in Global Hunger Index (Global Hunger Index, 2021). Over 57 million children in the country do not have access to adequate nutrition and every third child suffering some sort of malnutrition (UNICEF-WHO-World Bank Joint Child Malnutrition Estimates, 2012). The battle for nutrition is more crucial, owing to rising population and limited resources. Despite challenges, the nation caters the world's largest program to tackle child malnutrition which is called, Integrated Child Development Services (ICDS) (Sachdev, 2001).

Although nutrition is essential irrespective of age, it has a peerless role in the school days. A foundation of good health and sound mind is kept in this age group that constitute lifelong health asset (Scientific Committee on Food,2000). Protein, calorie excess or deficiency in children results in various manifestations such as overweight, obesity underweight, wasting, stunted growth, lowered resistance to infection and impaired cognitive development (WHO Factsheets-Malnutrition, 2021).

According to a study conducted byGragnolati, M, the prevalence of underweight among children was 59.9% (357 of 596), and the prevalence of thinness among adults was found as 69.9% (Gragnolati, 2005). In developing countries, it is estimated that the prevalence of nutritional stunting in children will decrease from 29.8% in 2000 to 16.3% in 2020 (Bose, K et.al, 2007). Studies in various countries show that despite economic development, malnutrition in children is still a major health problem in developing countries (Singh, 2018; Singh, 2006; Pandey, 2019).

Since, the socioeconomic conditions of the individual are directly linked to the nutritional status of the family, community and society as a whole, the present study was conducted to assess the socio-economic predisposing factors of malnutrition among school children in the Bareilly district of North India to intervene malnutrition in its inception phase.

The aim of the present study is to estimate the prevalence of malnutrition and to determine the socio-economic predisposing factors of malnutrition among school children in the Bareilly district of North India.

Methods

Study Site: Department of Community Medicine, Rohilkhand Medical College & Hospital, Bareilly district of India.

Study Duration: November 2016 to January 2019

Study Design: Cross-sectional Study.

Inclusion Criteria

1.School children in the age of 5-14 years

2.Parents willing to participate and give written informed consent. Exclusion criteria

1.Children suffering from acute or chronic disease

Sample Size Calculation

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Taking prevalence of malnutrition as 48% from National Health Family Survyey-3 (Arnold, 2009).The sample size was calculated at 95% confidence interval by using the formula:

$n = Z^2 x\ p\ x\ q/l^2$

Where, n is the required minimum sample size, Q = 1-P = 50%, l = 10 % (Relative precision or error) = $1.96^2 x\ 48\ x\ 52 / (4.8)^2$

Taking non- response rate as 10%, Final sample size = 416.17 x 10 / 9 = 462.41

Therefore, minimum required sample size was 462.

Multi Stage Random Sampling Technique

The Bareilly district of Uttar Pradesh consists of 70 wards and 15 blocks (Bareilly District Population Census, 2011). 10% of total wards and blocks were selected randomly via lottery method. In every selected wards and block, 10% schools were selected in each stratum. In every selected school one section of all classes from 1st to 8th were selected randomly. In every section, the desired number of students was selected by simple random sampling among all eligible study participants after applying inclusion & exclusion criteria.

Nutritional Status Assessment

Nutritional status of students was estimated by using Body Mass Index formula as per the WHO classification of Malnutrition: 2007 (WHO, 2016).

Body Mass Index = Weight in kg / (Height in meter) ^{2}

Data Collection and Analysis

School children with their parents were invited to participate in the study; the importance of nutritional assessment was explained to them. Written informed consents were obtained from the parents of study participants. Data collection was done by pretested, pre validated schedule and entered in MS excel 2010 followed by analysed through EpiInfo software version 7.2.

Ethical Clearance:Institutional ethical clearance (IEC/IRB No. IEC/16/16/SEP) was obtained.

Results

Chart 1 shows nutritional status of school children in Bareilly district (n=465). Majority of study participants were found with normal nutritional status 60%. However, prevalence of malnutrition was discovered 40%, among that under nutrition, over nutrition were reported 31% and 9% respectively.

Table 1: Reveals socio demographic association with the nutritional status among school children. Out of 465 study participants, there was statistically significant difference found between nutritional status and age group of study subjects ($p<0.05$).In terms of gender, prevalence of malnutrition was found 7.3% higher among female as compared to male participants, and the mean difference was statistically significant ($p<0.05$). In this present study, prevalence of malnutrition was not found to be associated with religion of participants ($p>0.05$).

However, caste categories of children were found strongly associated with malnutrition, revealing higher prevalence of under nutrition among schedule caste and schedule tribes i.e. 49.1% and 69% respectively. Whereas > 10% over nutrition noted in general and other backward category classes which was found to be statistically significant ($p<0.05$). The nutritional status of school children belong to nuclear families was found 9.8% better than participants from joint families and the difference was statistically significant ($p <0.05$).

Present study reveals higher prevalence of normal nutrition 68.4% in pakka house. Whereas not a single case of over nutrition was reported from kachha houses. The difference was statistically significant between nutrition status and type of residence ($p <0.05$).

Table 2 elicits nutritional status of school children was associated with father's, mother's education and their occupation. The study shows majority of children suffering under nutrition belong to illiterate parents, the difference was statistically significant ($p<0.05$). Observed trend affirms the significant impact of parental education, job profile on the nutritional status of children.

Table 3 shows that the higher the socioeconomic status, the lower the prevalence of malnutrition. Nutritional status was found statistically significant in respect to socioeconomic status of families ($p<0.05$). Lower middle class were higher in under nutrition followed by lower class. It showed that there is significant role of socio-economic status on the nutrition status of children.

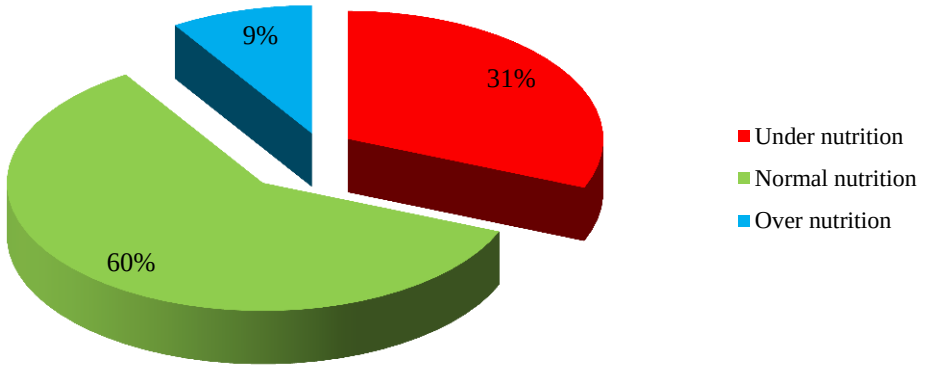

Chart 1. Nutritional status of school children in Bareilly district. (N=465)

Table 1. Distribution of Socio demographic factors with nutrition status of school children. (N= 465)

Variable Name	Categories	Under nutrition (%)*	Normal nutrition (%)*	Over nutrition (%)*	Total (%)**	(Chi-Square value, df)	p-value
Age	5-9 years	57 (29.4)	118 (60.8)	19 (9.8)	194 (41.7)	0.62,2	0.001
	10-14 years	88 (32.5)	160 (59)	23 (8.5)	271 (58.3)		
Gender	Male	67 (26.3)	161 (63.1)	27 (10.6)	255 (54.8)	6.937,2	0.023
	Female	78 (37.1)	117 (55.7)	15 (7.1)	210 (45.2)		
Religion	Hindu	89 (31.8)	165 (58.9)	26 (9.3)	280 (60.2)	11.786,6	0.452
	Muslim	52 (35.4)	85 (57.8)	10 (6.8)	147 (31.6)		
	Sikh	2 (8)	18 (72)	5 (20)	25 (5.4)		
	Christian	2 (15.4)	10 (76.9)	1 (7.7)	13 (2.8)		
Caste	General	43 (21.7)	134 (67.7)	21 (10.6)	198 (42.6)	38.014,6	0.02
	OBC	54 (29.8)	108 (59.7)	19 (10.5)	181 (38.9)		
	SC	28 (49.1)	27 (47.4)	2 (3.5)	57 (12.3)		
	ST	20 (69)	9 (31)	0	29 (6.2)		
Family type	Joint	86 (36.9)	128 (54.9)	19 (8.2)	233 (50.1)	7.147,2	0.014
	Nuclear	59 (25.4)	150 (64.7)	23 (9.9)	232 (49.1)		
Type of residence	Kuchha	17 (50)	17 (50)	0	34 (7.3)	42.031,4	0.027
	Pucca	53 (19.7)	184 (68.4)	32 (11.9)	269 (57.8)		
	Semi-pucca	75 (46.3)	77 (47.5)	10 (6.2)	162 (34.8)		
Total		145 (31.2)	278 (59.8)	42 (9)	465 (100)		

*% in rows **% in columns

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Table 2. Distribution of Parent's profile with the nutrition status of school children (N= 465)

Variable Name	Categories	Under nutrition (%)*	Normal nutrition (%)*	Over nutrition (%)*	Total (%)**	(Chi-Square value, df)	p-value
Father's Profile							
Education	Illiterate	49 (70)	20 (28.6)	1 (1.4)	70 (15.1)	88.073,8	0.003
	Literate	16 (43.2)	19 (51.4)	2 (5.4)	37 (8)		
	Primary school	28 (37.8)	43 (58.1)	3 (4.1)	74 (15.9)		
	High school	32 (27.6)	68 (58.6)	16 (14)	116 (24.9)		
	Graduate/ above	20 (11.9)	128 (76.2)	20 (11.9)	168 (36.1)		
Occupation	Unemployed	16 (84.2)	3 (15.8)	0	19 (4.1)	97.59,8	0.0154
	Unskilled	36 (63.2)	20 (35.1)	1 (1.8)	57 (12.3)		
	Skilled	48 (36.6)	80 (61.2)	3 (2.9)	131 (28.2)		
	Clerical	36 (24.8)	91 (62.8)	18 (12.4)	145 (31.2)		
	Semi-professional/above	9 (8)	84 (74.3)	20 (17.7)	113 (24.3)		
Mother's Profile							
Education	Illiterate	79 (54.9)	59 (41)	6 (4.2)	144 (31)	85.71, 8	0.024
	Literate	30 (39.5)	42 (55.3)	4 (5.3)	76 (16.3)		
	Primary school	15 (20.3)	48(64.9)	11 (14.9)	74 (15.9)		
	High school	13 (16.3)	63(78.8)	4 (5)	80 (17.2)		
	Graduate/Above	8 (8.8)	66 (72.5)	17 (18.7)	91 (19.6)		
Occupation	Housewife	91 (33.3)	160 (58.6)	22 (8.1)	273 (58.7)	40.65, 8	0.0425
	Unskilled	18 (56.2)	12 (37.5)	2 (6.3)	32 (6.9)		
	Skilled	29 (35.8)	48 (59.3)	4 (4.9)	81 (17.4)		
	Clerical	7 (13.7)	38 (74.5)	6 (11.8)	51 (11)		
	Semi-professional/ above	0	20 (71.2)	8 (28.6)	28 (6)		

Table 3. Distribution of Socio-economic status with the nutrition status of school children (N= 465)

Variable Name	Categories	Under nutrition	Normal nutrition	Over nutrition	Total	(Chi-Square value, df)	p-value
Socio-economic Status	Upper class	3 (3.5)	66 (77.6)	16 (18.8)	85 (18.3)	104.302, 8	0.032
	Upper middle class	22 (18.3)	81 (67.5)	17 (14.2)	120 (25.8)		
	Middle class	27 (30)	60 (66.6)	3 (3.3)	90 (19.4)		
	Lower middle class	50 (46.3)	53 (49.1)	5 (4.6)	108 (23.2)		
	Lower class	43(69.4)	18 (29)	1 (1.6)	62 (13.3)		

Discussion

The present study commits nutritional status among school children is directly related to socio demographic factors such as gender, caste, type of family and residence. However, socio-economic factors such as parental education, occupation and socio economic status, proves inverse relationship with malnutrition.

The study reported 8% fall in prevalence of malnutrition during last 10 years as reported by National Family Health Survey conducted during 2005-2006 (NFHS-3) (Factsheets for 29 states, NFHS-3, 2007). The observed difference shows, slower pace of malnutrition decline, if the trend remains same; it may take up to 50 years for the nation to overcome malnutrition. The study calls urgent acceleration of coping strategies by government to combat malnutrition through various nutritional assistance programs.

The study depicts 7.3% higher prevalence of malnutrition among female child. Similar trends have been observed in other studies, highlighting

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the gender priority for male child in Indian society responsible for higher malnutrition in female child (Striessnig, 2020; Joshi, 2016).

The study reported higher prevalence of malnutrition in school children belongings to schedule cast, schedule tribe categories and residents of kuchha houses. The observed trend corresponds to other studies, indicating underserved population living in poor habitat are more victimised with malnutrition. The reason behind this could be lack of basic amenities, poor hygiene sanitation leading to helminthic infestation and poor coverage of government scheme in vulnerable section of society (Kshatriya, 2016; Raghavendra, 2009; Kulkarni, 2019).

The study affirms pre-existing proven socio economic factors of malnutrition. Children from lower socioeconomic status with poor parental education, occupation profile are more susceptible for malnutrition (Li, 2020; Singh, 2019).

Conclusion

Malnutrition is always a high priority concern that requires in depth investigation and timely intervention to resolve nutritional deficiencies across the world. Despite the recent increase in GDP, India is in an economic transition zone. The current trend of malnutrition reflects unequal distribution of education, employment, wealth and government schemes that constitute fundamental cause of malnutrition in the under-served population in rural and slum areas. Findings of the study highlight the necessity for accelerating government's coping strategies to combat malnutrition. Along with existing strategies against malnutrition, there should be an incentive-based clause for grass root level health workers such as Accredited Social Health Activist (ASHA) and Aganwadi workers, to search new cases of malnutrition in their respective areas. They should be encouraged to adopt 8-10 malnourished children as high-priority cases for nutritional supplements and regular follow-up, and they should be rewarded separately on achieving adequate nutrition. For children suffering with malnutrition, biannual nutritional assessments and prophylactic deworming therapy strongly advocated at school level.

Prevention and management of childhood malnutrition needs comprehensive correction at familial as well as educational level. The importance of balanced diet for optimum growth and development needs to be incorporated in the curriculum. Apart from academics, health issues of child also need to be focused in parent-teacher meetings for early correction of nutritional deviation. The parents should be given health education, how to achieve a balanced-nutritious diet within the pocket friendly budget.

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Conflict of interest

Authors declare that have no competing interest.

Authors' Contribution

The Original Research Article was part of M.D. thesis under the guidance of S.K who translated the concept into a research article and supervised during the course of study. Study Conception and Design, A.S.; contributed in preparing data collection tools and literature review, A.K.S.; Data compilation and analysis, A.S.; assessed the manuscript and critically evaluated the intellectual contents, A.K. and N.S.C.

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