

# THE ASSOCIATION OF PREDISPOSING AND ENABLING FACTORS ON NUTRITIONAL STATUS IN CHILDREN

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## Abstract

BANGLADESH is still the world most densely populated country. Moreover child malnutrition coexist in poor communities even the households due to poverty, illiteracy, insufficient resources and knowledge leading to a high risk of disease, morbidity and mortality. Various studies have highlighted the associated factors. The objective of the study was to explore the association of predisposing and enabling factors on nutritional status in secondary school children. This cross-sectional study was conducted among 120 students aged 14-17 years old of class Standard-9 in four secondary schools which were randomly selected from a list of schools provided by the local government office of TANGAIL city from October to November 2013. Purposive sampling technique was applied to collect the sample and Data collection was done through a structured questionnaire by face to face interview. We assessed BMI following the Centers for Disease Control and Prevention age and sex specific growth chart. In this study 52.5% of respondents had healthy weight. While 45.5% were underweight and 2.5% were overweight. Female children (25%) were more malnourished than male children (17%). Most underweight children had poor knowledge about health and nutrition compared to their healthy counter parts that had fair knowledge. The association between nutritional status and some independent variables was found at 5% level of significance. These independent variables were taking snacks ( $P=0.001$ ), knowledge level ( $P=0.012$ ), total family income ( $P=0.037$ ), mother education ( $P=0.006$ ), taking care of respondents ( $P=0.008$ ), father occupation ( $P=0.027$ ), money for snacking ( $P=0.010$ ) and accommodation type ( $P=0.008$ ). Low income, low literacy rate, large families, food insecurity, food safety, women's education appears to be the important underlying factors responsible for poor health status of children from low socioeconomic class. Based on results, it's suggested that to avoid students snacking in the school time, it's better to let them bring a meal from home. Supplementary support from school is needed. Health and nutrition education should be provided both children and mother to improve nutritional status of the children.

**Keywords:** Nutrition, Nutritional Status, Predisposing Factor, Enabling Factor, BMI

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## 1. INTRODUCTION

Malnutrition is widespread problem and affects large number of people in developing countries. Vulnerable populations like school children are susceptible to health problems associated with micronutrient deficiencies. Malnutrition in children is the largest contributor to global burden of disease and causing heavy health expenditures in developing countries especially in Asia. In Asia, it was common in preschool children from 16.0% in China to 64.0% in Bangladesh [1].

A study conducted in BANGLADESH by Bangladesh Bureau of Statistics and UNICEF it had found that using the new WHO 2005 GRS, 40% of children aged <5 years were underweight. According to criteria of the World Health Organization, the prevalence of Underweight and stunting was "very high". Severe underweight were found in 11% of the population. In comparison with the urban population, the

rural Population was significantly more underweight (42% vs. 30%) [2]. In a second study stunting was also found to increase with age where younger school children were reported to have a prevalence of just 2% compared to 16% among older school children in Bangladesh [3]. UNICEF, 2006 said that one in every four children under-five (including 146 million children in the developing world) is underweight.

Childhood malnutrition is associated with a number of socioeconomic and environmental characteristics such as poverty, parents' education/occupation, and access to health care services [4]. The strong relationship between socio-demographic factors and secular growth was shown in some studies [5]. Among population groups who have experienced constraint on economic and social development and factors affecting the physical growth of school children before puberty are environmental, e.g., poor food consumption pattern, illness, lack of sanitation, poor hygienic practice,

food safety and women's education [6]. The prevalence of underweight, stunting and wasting was significantly higher among mothers with low education status [2]. A small state of Kerala in India, it has the highest rate of female literacy 87.86% compared to 54.16% for all India [7]. Kerala's infant mortality rate is 15.3 per 1,000 births versus 57.0 for India [8].

Malnutrition adversely affects physical and mental growth of children. So it is crucial to determine the nutritional status of children and find out the correlated factors which contribute on nutritional status. This study gives the prevalence of malnutrition and associated factors at countryside region in Bangladesh which helps the government and NGOs malnutrition prevention strategy.

## 2. METHODS AND MATERIALS

### 2.1 Study Site

This study was carried out at 4 different schools in and around TANGAIL town for a period of two months from October to November 2013. Schools were randomly selected from a list of schools provided by the local government. All schools were public school run by the government representing different socio economic strata and to reduce the selection bias for affluences.

### 2.2 Study Design

The study was designed as cross sectional study.

### 2.3 Study Population

The study population was all students aged 14-17 years old of class Standard-9 of four secondary schools in TANGAIL town.

### 2.4 Sample Size

There were 257 class standard 9 students of four secondary schools. Among them we selected 120 students for our study.

### 2.5 Sampling

Purposive sampling technique was used.

## 3. RESULTS

### 2.6 Study Type

Mixed method both quantitative and qualitative

### 2.7 Development of Questionnaire

A standard questionnaire was developed for collecting data. The questionnaire was pre-tested and modified on the basis of test results. The questionnaire mostly multiple choices questions and contains 3 parts as follows- Socio demographic factors, Knowledge toward health and nutrition and Enabling factors regarding on nutritional status.

### 2.8 Collection of Data

Height and weight of the students were measured using WHO standard protocol [9]. Omron digital weighing machine and Fujita stadiometer were used for measuring weight and height respectively. Weight was measured up to 100g and height was measured up to 0.1cm fractions. Body mass index (BMI) categories (weight in kg divided by height in m<sup>2</sup>) were defined using age and sex-specific growth chart by the US Centers for Disease Control and Prevention [10]. Socio-economic status (SES) data, health and nutritional Knowledge and other data of the children's and their families were collected by using standardized questionnaire. Knowledge towards health and nutrition was measured and categorized based on Bloom criteria [11].

### 2.9 Data Analysis

SPSS for Windows, version 20.0 was used for analyse the data. SPSS-20 software was used to organize, analyze and statistical analysis of the quantitative and qualitative data. For tabular, charts and graphical representation Microsoft Word and Microsoft Excel were used. Test of significance used was Chi-Square and Statistical significance was represented by a P value < 0.05

**Table 1:** Frequency distribution of Nutritional Status of the respondents

Nutritional Status	Male (n=69)		Female (n=51)		Total (n=120)	
	n	%	n	%	n	%
Under weight	21	17.5	30	25	51	42.5
Healthy weight	42	35	21	17.5	63	52.5
Over weight	6	5	0	0	6	5

Table 1 shows the percent distribution of the students by nutritional status. According to the American Academy of Pediatrics, BMI for age is now the recommended method for screening overweight and underweight status in all children from 2–20 years of age [12]. BMI was plotted into CDC growth curve. CDC growth curve categorize nutritional status into four categories such as Underweight (<5

Percentiles), Healthy weight (>5 to 85 Percentiles), at risk overweight (>85 to 95 Percentiles), and Obese (>95 Percentiles). Regarding the classification of nutritional status, most of respondents, 52.5% had healthy weight. 42.5% of them were underweight and 5% were overweight. The results showed that male has more healthy weight than female.

**Table 2:** Association of Nutritional Status and Predisposing Factors

Predisposing Factors		Nutritional Status			Total	$\chi^2$ (2-Sided) P-Value
		Under Weight	Healthy Weight	Over Weight		
		n (%)	n (%)	n (%)	n (%)	
<b>Grade achieved in previous year</b>						$\chi^2=10.808$ .213
	A <sup>+</sup>	9 (7.5)	15 (12.5)	0 (0)	24 (20)	
	A	9 (7.5)	30 (25)	3 (2.5)	42 (35)	
	A <sup>-</sup>	12 (10)	3 (2.5)	0 (0)	15 (12.5)	
	B	15 (12.5)	12 (10)	0 (0)	27 (22.5)	
	C	6 (5)	3 (2.5)	3 (2.5)	12 (10)	
<b>Gender</b>						$\chi^2=4.054$ .132
	Male	21 (17.5)	42 (35)	6 (5)	69 (57.5)	
	Female	30 (25)	21 (17.5)	0 (0)	51 (42.5)	
<b>Age</b>						$\chi^2=.738$ .947
	14years	18 (15)	27 (22.5)	3 (2.5)	48 (40)	
	15years	30 (25)	30 (25)	3 (2.5)	63 (52.5)	
	16years	3 (2.5)	6 (5)	0 (0)	9 (7.5)	
<b>Birth order</b>						$\chi^2=5.138$ .273
	1 <sup>st</sup> birth	27 (22.5)	15 (12.5)	0 (0)	42 (35)	
	2 <sup>nd</sup> birth	21 (17.5)	45 (37.5)	6 (5)	72 (60)	
	>2 <sup>nd</sup> birth	3 (2.5)	3 (2.5)	0 (0)	6 (5)	
<b>Snacking habit/day</b>						$\chi^2=22.420$ .001
	<2 time	45 (37)	36 (30)	0 (0)	81 (67.5)	
	>2 time	6 (5)	27 (22.5)	6 (5)	39 (32.5)	
<b>Knowledge level</b>						$\chi^2=12.777$ .012
	Poor (<60%score)	45 (37.5)	21 (17.5)	3 (2.5)	69 (57.5)	
	Fair (60%-80%)	6 (5)	27 (22.5)	3 (2.5)	36 (30)	
	Good (>80% score)	0 (0)	15 (12.5)	0 (0)	15 (12.5)	

**Table 3:** Association of Nutritional Status and Enabling factors

Enabling Factors		Nutritional Status			Total	$\chi^2$ (2-Sided) P-Value
		Under Weight	Healthy Weight	Over Weight		
		n (%)	n (%)	n (%)	n (%)	
Accommodation type						
	Parents	24 (20)	57 (47.5)	6 (5)	87 (72.5)	$\chi^2=9.681$ .008
	Relative or hostel	27 (22.5)	6 (5)	0 (0)	33 (27.5)	
Take care						
	Parents	24 (20)	57 (47.5)	6 (5)	87 (72.5)	$\chi^2=9.681$ .008
	Non parents	27 (22.5)	6 (5)	0(0)	33 (27.5)	
Father occupation						
	Govt. employee	0 (0)	12 (10)	3 (2.5)	15 (12.5)	$\chi^2=17.340$ .027
	Non govt. employee	3 (2.5)	15 (12.5)	0 (0)	18 (15)	
	Farmer	21 (17.5)	6 (5)	0 (0)	27 (22.5)	
	Business or others	27 (22.5)	30 (25)	3 (2.5)	60 (50)	
Mother occupation						
	Govt. employee	0 (0)	3 (2.5)	0 (0)	3 (2.5)	$\chi^2=.928$ .629
	Housewife	51 (42.5)	60 (50)	6 (5)	117 (97.5)	
Father education						
	Illiterate or primary	27 (22.5)	12 (10)	0 (0)	39 (32.5)	$\chi^2=9.570$ .296
	High school or college	18 (15)	39 (32.5)	6 (5)	63 (52.5)	
	Bachelor or others	6 (5)	12 (10)	0 (0)	18 (15)	
Mother education						
	Illiterate or primary	45 (37.5)	12 (10)	3 (2.5)	60 (50)	$\chi^2=21.683$ .006
	High school or college	6 (5)	48 (40)	3 (2.5)	57 (47.5)	
	Bachelor or others	0 (0)	3 (2.5)	0 (0)	3 (2.5)	
Family income/month						
	Low (<15000BDT)	48 (40)	6 (5)	0 (0)	54 (45)	$\chi^2=40.245$ .037
	Moderate (15000-20000 BDT)	0 (0)	21 (17.5)	3 (2.5)	24 (20)	
	High (>20000BDT)	3 (2.5)	36 (30)	3 (2.5)	42 (35)	
Household member						
	Up to 5 member	30 (25)	54 (45)	6 (5)	90 (75)	$\chi^2=8.302$ .081
	>5 member	21 (17.5)	9 (7.5)	0 (0)	30 (25)	
Money for snacking / day						
	<10 BDT	36 (30)	9 (7.5)	0 (0)	45 (37.5)	$\chi^2=39.743$ .010
	11-20 BDT	15 (12.5)	48 (40)	0 (0)	63 (52.5)	
	>20 BDT	0 (0)	6 (5)	6 (5)	12 (10)	

## 4. DISCUSSION

### 4.1 Characteristic and Associations of Predisposing Factors

Malnutrition is caused by a number of intertwining factors that form a web of causation and enhance each other's effect. It is largely the by-product of poverty, insufficient education, ignorance, low income, large family size, occupation, etc. Many factors might relate with nutritional status. The discussion on these related factors of children will be presented as follows.

The proportions of male and female respondents were 57.5.0% and 42.5% respectively. This study did not find any significant relationship between gender and nutritional status of children ( $P=0.132$ ). The same study was done by

Aghamolaei (2004) that showed no significant difference in nutritional status between male and female [13].

The mean age of respondent in this study was 14.67 years. The results of this study, age was not associated with nutritional status ( $P=0.947$ ). Majority of students (60%) was second born child in the family, only 35 % was first born child, and 5% was the third or fourth born child. But there was no association between birth order and nutritional status ( $p=0.273$ ).

Among the students 67.5% took snacks one or two time per day. 32.5% took snacks more than two times per day. But in this study we found the association between snacking habit and nutritional status ( $p=.001$ ). Study in Taheran describe that many factors such as breakfast eating habits and snack eating habits, in the school were also influence nutritional

status. Stunting and the habit of eating breakfast were related to educational performance of students. Therefore implementation of such programs in the community, such as food intervention and nutritional education may be effective [14].

Knowledge toward nutrition showed significant association with nutritional status in this study ( $P=0.012$ ). This result can be support by Mii (2007), although majority of students had poor level of knowledge (57.5%), and fair level of knowledge (30%) and only 12.5% had good level of knowledge, but did not use their knowledge to make healthy food choice, this showed association between knowledge and nutritional status [15].

## 4.2 Characteristic and Associations of Enabling Factors

Considering the student's accommodation types, most of the respondents (72.5%) lived with parents, 27.5% lived with relatives and in hostel. There was strong significant association between student accommodation type and nutritional status ( $p=0.008$ ) at 5% level of significance.

For most of the respondents the caretaker was parents (72.5%) and for remaining respondents the caretakers were relatives and others. The results of this study found significant association between the students live with parents was significantly association with nutritional status ( $p=0.008$ ) at 5% level of significance. Similar study in Nepal reported that the students who take care by parents was also significantly associated to nutritional status ( $p<0.05$ ). Feeding practices that affect a child's nutritional status include adaptation of feeding to the child's abilities responsiveness of the caregiver to the child (perhaps offering additional or different foods); and selection of an appropriate feeding context. Psychosocial care is the provision of affection and attention to the child and responsiveness to the child's cues. It includes physical, visual, and verbal interactions [16].

Majority of the father's occupation were business (50%) and farmer (22.5%). Majority of the mother's occupation were housewife (97.5%). In this study father occupation was had significant association with nutritional status ( $p=0.027$ ). But mother occupation had no association with nutritional status ( $p=0.629$ ).

Majority of the respondent parents education were in the high school or college (father 52.5% and mother 47.5%). 32.5% father and 50% mother were illiterate or had lowest education. There was association between mother's education and nutritional status ( $p=0.05$ ). But fathers education had no association with nutritional status ( $p=0.729$ ). The positive and significant association between mother education and students nutritional status indicates the important role of education for women. This is support by the study conducted by the International Food policy Research Institute it had also found that half of the reason why malnutrition fell from 40% to 23% in East Asia over

period of 1070 - 1995 was attributable to improvement in women education [17]. Literate mothers can influence health of their children by challenging traditional beliefs and attitudes, leading to a greater willingness to accept developmental initiative and utilize modern healthcare. Study in Pakistan by Nabeela *et al* (2005) found Prevalence of malnutrition was 42.3% among children of illiterate mothers as compare to 20% in those of literate mothers [18].

Respondent's monthly family income fluctuated from the lower monthly income category (<15000BDT) was 45%, middle monthly income category (15000-20000BDT) was 20% and higher monthly income category (>20000BDT) was 35%. The mean monthly family income was 17550BDT. In this study monthly family income was significant with nutritional status ( $P=0.037$ ). Study in Pakistan by Nabeela *et al* (2005) also describe that nutritional status of children from lower socio economic class was poor as compared to their counter parts in upper socio-economic class. In her study she found Children with BMI <5th percentile was 41% in lower class while in upper class it was 19.28% [18].

In this study 75% households had less than five or five family members and 25% households had more than five members. In this study we found no association between family size and nutritional status ( $p=0.081$ ). A study by Pelto *et al* examined the extent to which household size is related to the nutritional status in school age children in Mexico.

The mean spent for buying snack was 15BDT. The lowest was 5BDT and the highest was 30BDT. The results of this study found significant association between money for snacking and nutritional status ( $p=0.010$ ). Most of the healthy students (40%) spent 11-20BDT and most of the underweight students (30%) spent less than 10BDT.

## 5. CONCLUSIONS

This cross sectional study was conducted to identify nutritional status and understanding the association of predisposing (gender, age, birth order, snacking habit, knowledge towards health and nutrition) and enabling (accommodation type, take care, parents occupation, parents education, family income, household member, money for snacking per day) factors among secondary school students of four different schools located in and around TANGAIL town. The problem of underweight found 42.5%, among them 25% was female and 17.5% was male. The problem of overweight was 5%. In this study we found some independent variable as like taking snacks ( $P=0.001$ ), knowledge level  $P=0.012$ , family income ( $P=0.037$ ), mother education ( $P=0.006$ ), taking care of respondents ( $P=0.008$ ), father occupation  $P=0.027$ , money for snacking ( $P=0.010$ ), accommodation type ( $P=0.008$ ) have significant association with nutritional status. Effective economic, social and political changes, improvement in food production, food security, personal hygiene, environmental safeguard, maternal education, nutrition education program especially for mothers and school children, expansion and

strengthen the school feeding action are few interventions and tools to bring about change in malnutrition. Government should take effective steps and make policy concerning health and nutrition considering prevention of malnutrition to make a healthy nation with healthy children.

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