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Original Research Article

Study the Food Habit and Nutritional Status of Mothers and Its Relation to Their Under-5 Child Health at Coastal Region (West Nalua)

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ABSTRACT

Background: Although child and maternal malnutrition has been reduced in Bangladesh, the prevalence of malnutrition is still high.
Objectives: The purpose of the research was to study the nutritional status of mothers and its contributing factors and to evaluate the effects of maternal nutritional status on child health.
Methodology: A descriptive cross-section study was carried out among 50 mothers and 76 under-5 children from the village West Nalua of Bakergonj upazila, Bangladesh, through self-administered structure questionnaire. The sample has been selected through random sampling technique.
Result: In the present study, it was found that out of 50 mothers, 14% undernourished on the basis of BMI as well as 10% undernourished based on MUAC. Besides, only 18% mothers received sufficient antenatal care while 30% didn't. The analysis of mothers' FCS (Food Consumption Score) showed that 86%had acceptable FCS and 14%were in borderline. Maternal BMI and MUAC were significantly correlated with mother's FCS (Correlation co-efficient(r)=0.554, p-value<0.01 and r=0.757, p-value<0.01 respectively). Maternal MUAC also significantly correlated with family income and mother's educational level (r=0.268 and p-value<0.05). However, the prevalence of under-5 children malnutrition was found: 21.1%wasting, 32.9%stunting and 22.4%underweight. Child MUAC was positively correlated (r=0.437, p-value<0.01) and WHZ-score (Weight-for-height z-score) was negatively correlated (r=-0.345, p-value<0.01) with his/her FCS. Child FCS and MUAC were significantly correlated with maternal FCS (r=0.313, p-value<0.01 and r=0.256, p-value<0.05 respectively).
Conclusion: The study concluded that maternal and child nutritional status was correlated with their food habits or dietary diversity and child nutritional status was correlated with maternal dietary diversity.
Keywords **-** Food Consumption Score, MUAC, BMI, Dietary diversity, Nutritional status.

INTRODUCTION

Nutrition is a basic human need as well as prerequisite to a healthy life. An appropriate diet is essential from the very early stages of life for proper growth, development and to remain active. Food consumption, which mainly depends on production, access, distribution and affordability, impacts on the health and nutritional status of the population. Food consumed in amounts that are too small, or too large, or that is unbalanced, results in malnutrition or diseases. [1] Although Bangladesh has made considerable progress in increasing per capita income, national level food availability, the intake of energy

and other essential nutrients is still below the requirements and recommended dietary allowances.

With the reduction of poverty, the prevalence of malnutrition is also decreased in Bangladesh. According to MICS (Multiple Indicator Cluster Survey) report, the prevalence of malnutrition in under five children are as follows: 42% children are stunted, 16.4% are severely stunted, 9.6% children are wasted and 1.6% are severely wasted, 31.9% children are underweight and 8.8% are severely underweight. In Barisal, Underweight prevalence 35.2%, stunting prevalence 41.4%, and wasting prevalence 11.7%. [2] Although malnutrition is decreasing with increasing per capita income in Bangladesh, but malnutrition is still present in high-income family especially at coastal region of the country. Many factors that influence the causation of malnutrition, food habits and maternal nutritional status are among them.

Dietary diversity is an important element of dietary quality: consumption of a higher number of food items and food groups is associated with improved nutritional sufficiency of the diet. [3,4] About 40% of the population take more than 75% of total calorie from carbohydrate, 40% take less than 10% of total calorie from protein sources and 53% take less than 15% of total calorie from fat which reflects the scenario of stunting, wasting and underweight as well as related disease in the country. [5] Diets are largely imbalanced with the staple food cereals contributing around 70% of total energy intake in Bangladesh, [6] a practice that deprives people of essential nutrients such as protein, minerals and vitamins, mostly coming from fish, meat, milk, eggs, fruits and vegetables. A number of studies have been carried out on food security and nutritional status in Bangladesh under different aspects. [7-9] But there is limited literature and research regarding the relationship between dietary habits and nutritional status in Bangladesh. This fact from the literature encouraged to conduct the research on relationship between dietary diversity and nutritional status among children and mother at rural area in Bangladesh. The immediate cause of malnutrition inadequate dietary diversity, as well as high infectious disease burden, household food insecurity and inappropriate household practices in feeding especially adolescent girls, pregnant women, mothers and young children. [5]

Given the above backdrop, the objectives of this study are to study (a) the nutritional status of mothers and its contributing factors and (b) the effects of maternal nutritional status on child health.

MATERIALS AND METHODS

2.1 Sampling Method, sampling size and area of the study:

The locale for the present study was purposively selected at West Nalua, a village of Nalua Union of Bakergonj in Barisal district. About 50 mothers and their 76 under-5 children were selected by random sampling method.

2.2 Explanation on dependent variables:

The nutritional outcomes of mother and children were investigated by anthropometric measurements. In case of the mothers, BMI (kg/m^2) and MUAC (mm) were used as screening tools of malnutrition. BMI was dichotomized as (i) less than 18.50 kg/m^2 as 'undernourished' and (ii) more than or equal 18.50 kg/m^2 as 'normal'. The MUAC was dichotomized as (i) less than 220 mm 'undernourished' and (ii) more than or equal 220 mm as 'normal'. Usually, these were used for screening malnutrition of Asian people. [10,11] In case of children, commonly the Z-score values for weight-for-height (wasting), height-for-age (stunting) and weight-for-age (underweight) were considered as screening tools of malnutrition. WHO (1995)recommended that Children were categorized into four different groups of nutritional status based on their Z-score following the cut-off points. These were (i) Normal (Z-score > -1); (ii) Mildly malnourished (Z-score < -1 to > -2); (iii) Moderately malnourished (Z score <- 2 to -

>-3) and (iv) Severely malnourished (Z-score <-3).To determine the children's Z-score, ENA was used.

2.3 Explanation on independent variables

Food habits were used as independent variables. Food habits were measured by using Food Consumption Score (FCS). It was a 24-hour dietary recall process. The subjects were asked to recall exact food intake during the previous 24-hour period which was continued for seven days. The food consumption score was measured through the standard VAM 7-days food frequency data. All the food items were grouped into specific food groups (see Table-1). Afterward, all the consumption frequencies of food items of the same group were summed and recoded the value of each group above 7 as 7. Then, each food group was multiplied by its weight value and new weighted food group was created. Hereafter, the weighted food group scores were summed, thus the food consumption score was generated. [12] The thresholds to identify households with poor and borderline food consumption were set according to assumptions of a dietary pattern. A score below 21 was considered to poor food consumption, scores between 21 and 35 borderline food consumption score greater than 35 considered an adequate diet. [12] For under-5 children, the FCS was almost similar but differs in threshold level. According to UNICEF under-5 children food standard, four group of foods (cereals, pulses, meat/fish/egg and vegetables & fruits) must be taken daily. So, daily FCS was 10. Then, the FCS of under-5 children were categorized as follows: score ≥70 represented recommended/standard diversity; 50-69 represented higher diversity; 42-49 represented medium diversity; 35-41 represented low diversity and <35 represented very low diversity. These are the standard Food Groups and current standard weights used in all analyses (Table-1).

2.4 Explanation of socio-economic variables

Some predesigned and pre-coded questionnaire was selected to collect the family size, number of under-5 children, maternal and household head educational and occupational status, per month family income. The information about mother nutritional knowledge was collected by 5 predesigned nutrition related questions. Mother responses were recorded and the correct response was scored as '2', and the wrong response was recorded as '0'. The scores were summed up to create the mother knowledge score which categorized into four level of mothers nutritional knowledge as follows: the summed score '0' represented 'No nutritional knowledge', '2-4' represented 'Low nutritional knowledge', '6-8' represented 'Moderate nutritional knowledge' and '10' represented 'Adequate nutritional knowledge' that's were leveled as 1,2,3 respectively. The information about mothers care was collected by some pre-structured and pre-coded questions as participation of nutrition education session, receiving of antenatal care, taking of tetanus toxoid and iron supplementation during pregnancy etc.

Table-1: Food consumption groups with weight value

	FOOD ITEMS (*examples*)	**Food groups (definitive)**	**Weight (definitive)**
1	Maize , maize porridge, rice, sorghum, millet pasta, bread and other cereals	Main staples	2
	Cassava, potatoes and sweet potatoes, other tubers, plantains		
2	Beans. Peas, groundnuts and cashew nuts	Pulses	3
3	Vegetables, leaves	Vegetables	1
4	Fruits	Fruit	1
5	Beef, goat, poultry, pork, eggs and fish	Meat and fish	4
6	Milk yogurt and other dairy	Milk	4
7	Sugar and sugar products, honey	Sugar	0.5
8	Oils, fats and butter	Oil	0.5
9	Spices, tea, coffee, salt, small amounts of milk for tea	Condiments	0

Source: World Food Programme(2008). [12]

2.5 Methods of Data Analysis:

The obtained data from the survey was analyzed by using Microsoft Excel, ENA (Emergency Nutrition Assessment) software and SPSS (Statistical Package for Social Sciences) Statistics (version 16). ENA was used for under-5 children anthropometric measurement - height-for-age Z-score (HAZ), weight-for-age Z-score (WAZ), and weight-for-height Z-score (WHZ). The descriptive analyses explored the characteristics of the sample. This was followed by bivariate analysis to establish the relationship between the predictor variables and the outcome variable. Statistical significance was set at $P \leq 0.05$ and 95% confidence intervals were estimated.

RESULTS

3.1 Socio-economic Status

In the study area, out of 50 mothers the research found that (Table-2) most of mothers received primary (64%) and secondary (24%) education where only 10% received higher education. About 92% mothers were housewife and others involved different jobs as well as 52% mothers had 2 under-5 children and 48% had 1 under-5 children. The study showed that only 10% household head received higher education where 52% received primary education and 32% received secondary education. About 4% household-head were farmer, 2% fisherman, 26% labor, 44% business, 4% driver and rest of 20% included in others job but most of family indirectly related with agriculture. The monthly income of family was found to be 5000-7000tk in 18% family, 8000-12000tk in 30% family, 13000-20000tk in 28% family and above 20000tk in 24% family.

Table-2: Socio-economic status outcomes

Variables	No. of mothers/ Household-head (N=50)	Percentage (%)
Maternal educational level		
Illiterate	1	2
Primary	32	64
Secondary	12	24
Higher study	5	10
Maternal occupational status		
Housewife	46	92
Teacher	2	4
others job	2	4
No. of under-5 children		
1 under-5 child	24	48
2 under-5 child	26	52
Household-head Educational Level		
Illiterate	3	6
Primary	26	52
Secondary	16	32
Higher study	5	10
Household-head Occupation		
Farmer	2	4
Fisherman	1	2
Labor	13	26
Business	22	44
Driver	2	4
Job	10	20
Household-head income (Taka)		
5000-7000	9	18
8000-12000	15	30
13000-20000	14	28
Above 20000	12	24

3.2 Maternal outcomes

The BMI of the mothers (Table-3) showed that 14% were undernourished whereas according to MUAC 10% mothers were undernourished. The study found that 2% mothers had no nutritional knowledge, 6% had low nutritional knowledge, 92% had moderate nutritional knowledge but no one

had adequate nutritional knowledge of the area. About 38% mothers participated in nutrition education session and 68% were not participated. The study also found that only 18% mothers were received sufficient antenatal care and 78% mothers taken tetanus toxoid during pregnancy. Only 3% mothers started taking of iron tablets before 2 month of pregnancy, 66% taken after 2 month of pregnancy. During pregnancy, 8% mothers took food less than before, 46% took food same as before and other 46% took food more than before.

Table-3: Maternal outcomes

Variables	No. of Mothers (N=50)	Percentage (%)
BMI level		
Undernourished (<18.5kg/m2)	7	14
Normal (≥18.5kg/m2)	43	86
MUAC Level		
Undernourished (<220mm)	5	10
Normal (≥220mm)	45	90
Maternal nutritional knowledge level		
No nutritional knowledge	1	2
Low nutritional Knowledge	3	6
Moderate nutritional knowledge	46	92
Adequate nutritional knowledge	0	0
Participation of nutritional education session		
Yes	19	38
No	31	62
Antenatal Care (ANC)		
Sufficient care	9	18
Insufficient Care	41	82
Tetanus Toxoid (TT) taken during pregnancy		
TT taken	39	78
TT not taken	11	22
Iron tablets taken during pregnancy		
Taken ≤ 2 month of pregnancy	3	6
Taken >2 month of pregnancy	33	66
Not taken	14	28
Food taken during pregnancy		
less than before	4	8
same as before	23	46
more than before	23	46
Rest during pregnancy		
less than before	3	6
same as before	25	50
more than before	22	44
Vitamin-A capsule within 6 weeks after delivery		
Taken	13	26
Not taken	37	74
Food Consumption Score classification profile		
Poor (0-21)	0	0
Borderline (21.5-35)	7	14
Acceptable (>35)	43	86

The percentage of mothers who took rest during pregnancy less than before, same as before and more than before were 6%, 50% and 44% respectively. On the basis of maternal food consumption score (FCS), the diversification of mothers diet were 14% in borderline and 86% in acceptable while there were no mothers in poor diversification (Table-3).

Association of maternal nutritional status:

The study represented that maternal BMI and MUAC were significantly correlated with mother's FCS (p-value<0.01). Maternal MUAC also significantly correlated with family income and mother's educational level (p-value<0.05).

Table-4: Association of maternal nutritional status

Variables	Body Mass Index (BMI)		Mid Upper Arm Circumference (MUAC)		Food consumption score (FCS)	
	Correlation co-efficients	P- value	Correlation co-efficients	P- value	Correlation co-efficients	P-value
Food consumption score (FCS)	0.554	0.000***	0.757	0.000***		
Per Month Family income	0.266	0.020*	0.408	0.003**	0.328	0.004**
Educational level			0.268	0.019*	0.280	0.014*

Notes:Values in parentheses indicate the 95% confidence interval; Correlation is significant at ≤0.05. † $p<0.1$; * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

3.3 Child Nutritional Status

Wasting:

On the basis of weight-for-height z-scores, the study found that (Table-5) 78.9% children were normal whose z-score was >-2, 13.2% children were moderate malnutrition (<-2 z-score and ≥-3 z-score) and 7.9% were severely malnourished. The total prevalence of wasting (weight-for-height z-scores<-2) was 21.1%.

The prevalence of acute malnutrition (wasting) based on MUAC, 6.6% children were moderate malnourished whose MUAC ranged < 125 mm and ≥115 mm and rest 93.4% children were normal (> 125 mm).

Underweight:

The prevalence of underweight based on weight-for-age z-scores, 10.5% children were in moderate underweight and 11.8% were in severe underweight. The total underweight percentage of children was 22.4% (Table-5).

Stunting:

The study found that 17.1% children were in moderate stunting and 15.8% were in severe stunting. The prevalence of stunting was measured on the basis of height-for-age z-scores. The total prevalence of stunting was 32.9% (Table-5).

Table-5: Child Nutritional Status

	Wasting				**Underweight** (weight-for-age z-scores)		**Stunting** (height-for-age z-scores)	
	weight-for-height z-scores		**MUAC cut off's**					
	Moderate malnutrition (MAM) (<-2 z-score and ≥-3 z-score)	Severe malnutrition (SAM) (<-3 z-score)	Moderate malnutrition(MAM) (< 125 mm and ≥115 mm)	Severe malnutrition (SAM)(< 115 mm)	Moderate underweight (<-2 z-score and ≥-3 z-score)	Severe underweight (<-3 z-score)	Moderate stunting (<-2 z-score and >=-3 z-score)	Severe stunting (<-3 z-score)
Boys (n=37)	2 (5.4 %)	6 (16.2 %)	4 (10.8 %)	0 (0.0%)	3 (8.1 %)	7 (18.9 %)	4 (10.8 %)	8 (21.6 %)
Girls (n= 39)	8 (20.5 %)	0 (0.0%)	1 (2.6 %)	0 (0.0%)	5 (12.8 %)	2 (5.1 %)	9 (23.1 %)	4 (10.3 %)
Total (n= 76)	10 (13.2 %)	6 (7.9 %)	5 (6.6 %)	0 (0.0%)	8 (10.5 %)	9 (11.8 %)	13 (17.1 %)	12 (15.8 %)

Association of Child food consumption score with nutritional status:

The study also found that child MUAC was positively correlated (p-value<0.01) and child WHZ-score (Weight-for-height z-score) was negatively correlated (p-value<0.01) with his/her FCS. Child FCS and MUAC were significantly correlated with maternal FCS (p-value<0.01 and <0.05 respectively).

Table-6: Association of Child food consumption score with nutritional status

Variables	Mid Upper Arm Circumference (MUAC)		weight-for-height z-score (wasting)		Child food consumption score (FCS)	
	Correlation co-efficients	P- value	Correlation co-efficients	P-value	Correlation co-efficients	P- value
Child food consumption score (FCS)	0.437	0.000***	-0.345	0.002**	-	-
Mothers food consumption score (FCS	0.256	0.025*	-	-	0.313	0.006**

† $p<0.1$; * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

DISCUSSION

4.1 Association of Socio-economic Status with child and maternal health status

The study found that most of the mother received primary education (64%) and 24% received secondary education while only 10% received higher education. The main reasons of lower educational level of mothers were lower income, communications barriers, inadequate higher education institutions and lack of consciousness of the study area. A comparative study on maternal malnutrition represented that women's educational status plays an important role on maternal nutritional status [13-16] and also nutritional education of the mothers will positively effects eating behaviors and habits both mothers and children. [17,18] As same as the present study also represented that there was significant correlation between maternal educational status and food consumption score (FCS) (correlation co-efficient 0.280 and p-value<0.05).

Semba *et al.* (2008) indicated that household economic status was positively associated with household food security which is a prerequisite for access to adequate dietary intake and improved nutritional status for all members of the household. [19] This study found that the majority families' income level was more than 8000tk. Also per month family income was significantly correlated with maternal BMI (p value= 0.020) and food consumption score (p value =0.004). Family income directly effects on food security and dietary intake of this family member and it's resulted in nutritional deficiencies.

4.2 Association of mother's health indicators with child and maternal health status

Using Body Mass Index (BMI) for age cut-offs for anthropometry, nearly a quarter, 24% of ever-married women (19-49 years of age) and 12% of adolescent girls, are underweight (BMI <18.5) in Bangladesh. [20] The study showed that 14% and 10% mother were undernourished on the basis of BMI (<18.50) and MUAC (<220 mm) respectively. Lack of appropriate nutritional knowledge, dietary behaviors, educational level, antenatal and postnatal care could be responsible for maternal nutritional status. Several studies determined that mother's nutritional knowledge positively effective on their children's eating behaviors and habits as well as maternal and child nutritional status. [20,22] In the study, only 18% mothers were received sufficient antenatal care while 82% didn't. But World Health Organization (1996) recommended that women receive antenatal care to minimum 4 visits. [23]

Dietary diversity is an important constituent of dietary quality, consumption of a higher number of food items and different food groups is associated with improved nutritional adequacy of the diet. [3,4] On the basis of food consumption score (FCS), the study represented that 14% mothers in borderline and no one in poor diversification of diet. However, mothers felt shy to provide accurate information about their diet or they could not memorized all the food items and/or they could have the tendency to say excess item of foods which were not consumed. We also found food consumption score (FCS) was strongly correlated with maternal BMI (p-value=0.00) and MUAC (p-value=0.00) in this research. Similar relation was found by Islam, Alam and Buysse (2012). [24]

4.3 Nutritional Status of Children

The prevalence of malnutrition in under-5 children were 9.6% wasting (1.6% severe wasting), 31.9% underweight (8.8% severely underweight), 36% stunting (12% severely stunted) in Bangladesh. [2] In this study area, the prevalence of malnutrition in under-5 children was 21.1% wasting, underweight 22.4% and stunting 32.9%. Most of the families income level was more than 8000tk, despite that wasting, stunting and underweight still existed in this area because of inappropriate food habits and nutritional knowledge.

There was a strong association between child dietary diversity and child nutritional status. [24] Dietary diversity was

also shown to be strongly associated with household socioeconomic status, and links between socioeconomic status and child nutrition and health outcomes. [26,27] There was an inverse association between stunting and dietary diversity, using HAZ as the indicator of nutritional status. [24,28] But in this study, food consumption score was positively correlated ($p < 0.01$) child Mid Upper Arm Circumference (MUAC) and negatively correlated ($p < 0.01$) child WHZ-score (wasting). There was no strong association with child WAZ-score and FCS score. Islam, Alam and Buysse (2012) also found no significant associations between food insufficiency and measures of underweight or under nutrition. [24]

Dietary diversity (DD) reflects micronutrient adequacy of the diet and is associated with better child growth, also increase micronutrient deficiencies – a major cause of child nutrition in Bangladesh. [29,30] Many studies represented that eating behaviour and maternal dietary diversity effects on child health. [31,32] Our results showed that mother food consumption score significantly correlated (p value=0.025) with child mid upper arm circumferences (MUAC). These findings are consistent with the few previous studies that observed significant associations between maternal and child DD in both developing. [29,33] Maternal food consumption score was significantly correlated ($p < 0.006$) with child food consumption score in this research.

Admittedly, there are some limitations in this study. It is very difficult to measure dietary diversity precisely. The accuracy of this definitive measure of dietary diversity is limited by difficulties to access accurate information from the respondents. It was also noted that respondents may not answer truthfully due to various non-controllable reasons such as the shyness to say about their diet and the lack of interest of the poor people to participate in an interview. However, the potential bias can be minimized through close contact with the respondents and careful construction of the questionnaire. [34]

CONCLUSION

The study concluded that food habits or food diversity has correlated both maternal and child nutritional status as well as maternal dietary diversity had impact on child nutritional status. To gain proper nutritional status of both mother and children, encouragement on acceptable dietary diversity should be enhanced. Further study can be done to check the improvement of dietary diversity to define the change of state in maternal and child nutrition.

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