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Dietary Patterns and Nutritional Status of Young Adults in Northern Bangladesh

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ABSTRACT

Background: Limiting dietary diversity is a major challenge and the cause of malnutrition in Bangladeshi poor households. So this study determined dietary patterns and nutritional status of young adults in Northern Bangladesh.

Methods: In a cross-sectional conducted on 358 participants, data were collected using pretested, structured self-administered questionnaires and anthropometric measurements were also obtained and analyzed.

Results: Among the total population, 79.9% were Bengali and 20.9% were ethnic groups. Totally, 57.0% and 43.0% were female and male, respectively. A total of 53.6% belonged to 18-25 age group. Most of the participants were housewife (38.0%). Around 39.4% of respondents completed secondary education; whereas 14.8% had no education. Most of participants belonged to medium and high-income groups (36.6% and 62.3%, respectively). Among the study participants, 10% were underweight, 33.0% belonged to normal nutritional status, 19.8% were overweight and 37.2% were obese. Around 68.7% of participants had a high diversity score and 19% were with medium diversified food; while 12% had less diversified food. Most of participants did not consume fats and oils and vitamin A rich foods. A significant relationship was found with nutritional status and age, gender, occupation, monthly income.

Conclusion: In spite of high diversity score, most of participants did not consume fats and oils and vitamin A rich foods and the female participants suffered more from malnutrition than their counterparts. The prevalence of underweight among females was 6 times higher than males. These findings help health authorities for future nutritional planning.

Introduction

Bangladesh is a densely populated country with over 17 percent of the total population living below the poverty line (1). In Bangladesh, the main food is rice and other cereals. Almost two-thirds of the daily diet consists of rice, vegetables, a few pulses, and small amounts of fish when available. Milk, dairy products, and meat are now only consumed seldom or in very small amounts. Fruit intake is weather dependent, excluding papaya and banana that are produced throughout the year. Cooking oil and fat are in short supply in the diet. According

to the reports, the average Bangladeshi diet is unbalanced (2). People's food patterns represent the land's geographical and climatic situations, and also the influence of social and religious customs (2).

In Bangladesh, where limited dietary diversity is a major challenge and the cause of malnutrition in rural and urban poor households, undernutrition still persists. Most families heavily rely on carbohydrate-rich staple food crops and eat few animal proteins, fruits, as well as vegetables, making a contribution to a rise in the number of people suffering from malnutrition. Even though both the urban and rural poor are affected by undernutrition, those living in rural areas face more challenges such as social exclusion, sporadic drought, constrained participation of women in leading industries, restricted access to markets, poor rural medical services, poor roads, and an over relying on irrigated agriculture. Socio-cultural factors influence food consumption patterns, which are determined by food availability, access, and utilization. The rapid diversification of professions emphasizes food purchasing ability and food choice, which may have an impact on food consumption patterns. The disparity in dietary habits between the rich and the poor is influenced by different socio-cultural environments, economic activities, and lifestyles (1, 2).

According to Bangladesh's National Youth Policy 2017, "any citizen between the ages of 18 and 35 would be regarded as youth/Young Adults." Between the ages of 18 and 35, humans are at their most productive age and as a result, youths play one of its most key roles in national development. Youngsters are in an exciting stage of their lives, with multiple physical, psychological, and intellectual changes that occur on a regular basis, which all have an effect on health and well-being. Long-term efficiencies will result from a focus on young people's health and nutrition (1, 2).

Dietary habits are the amounts, ratios, variety, or mixing of multiple foods and drinks through diets, as well as the regularity with that they are consumed frequently (3, 4). Provided that food consumption is a multifaceted access, there are clearly a plethora of different food combinations to potentially explore. The approach based on dietary patterns provides a more reliable picture of dietary intake, which is a multi-dimensional phenomenon (5, 6). In this context, two main research methods were used. The first method is to use predefined indices designed to capture specific dietary patterns, such as measuring adherence to dietary guidelines. The second is to characterize major patterns of food intake using data-driven (exploratory) statistical methods (most notably cluster analysis, principal component and factor analysis, and reduced rank regression) (7-9). In Bangladesh country, very little research on dietary patterns has been conducted. Given the scope of the study, the current investigation was carried out with the goal of identifying dietary patterns using data-driven (exploratory) statistical methods.

Materials and Methods

The study relating to identify dietary patterns and nutritional status was conducted at Northern area of Bangladesh (Durgapur, Netrokona). A cross-sectional study design was adopted and the data on diet patterns were collected from the household survey of Durgapur, Netrokona, while the study was conducted at the household level. In every alternate household covered for dietary, 24-hour recall method, food frequency and of last seven days diet pattern survey was carried out as described before (10). Individual dietary intakes were also assessed on family members of young adults of both sexes. Simple Random sampling method was used for selecting households.

Anthropometric measurements were taken with the respondents wearing light clothes and no shoes as described before (11). To ensure reliable measurements of body weight using the mechanical bathroom scale, the scale was zeroed before the respondent stepped onto it. The respondents were asked to remove any 'heavy' items from their pockets (key's, wallets etc.). They were asked to look straight ahead and stay still on the scales. The needle/digital screen was allowed to settle before the measurement was recorded. The body weight (kg) was measured to the nearest 0.5 kg. (12). For measurement of height, participants were positioned to stand on the platform, barefooted with his/her head upright looking straight forward. In this measurement, height of the respondent was measured to the nearest 0.1 cm by using non stretchable steel tape.

Measuring Body Mass Index (BMI) was calculated by weight in kilogram divided by the height in meter square and classified as described before (13). BMI as a simple index can classify underweight, overweight and obesity. Asian specific BMI cut-offs were used to define cut off value of BMI: Less than <18.5 regarded as undernutrition 18.5-<23.00 kg/m^2 as normal nutritional status, overweight as 23.00-<27.50 kg/m^2 and obese as 27.50->35.0 kg/m^2 (13).

Sixteen food groups were used for the dietary diversity score (DDS) as a factor which indicates the different food groups and varieties consumed (14). The food groups were namely; cereals, roots, tubers, vegetables, fruits, vitamins in rich fruits and vegetables, dark green leafy vegetables, organ

meat, flesh meat, eggs, fish/sea food, legumes/nuts, seeds, milk, milk products, oils, fats, sweets, coffee and tea. The DDS was classified as low DDS (≤3 food groups), medium DDS (4-5 food groups), and high DDS (≥6 food groups) (15). This was calculated based on the number of food groups consumed by the correspondents within the study period.

The main data collection instrument was structured questionnaire for interview. The detailed questionnaire contained both open and close ended questions including socio-demographic and economic characteristics such as education, occupation, number of family members, monthly income, nutritional status and dietary habits. The monthly income of the elderly family was categorized into three economic groups as low income (first quintile or lowest 20%), middle income (second to fourth quintile: 21% to 80%), and high income (fifth quintile: highest 20%). For height and weight measurements, steel tape and digital weight machine were used, respectively.

The questionnaire was drafted, pretested in a similar socio-economic area and finalized by inclusion of field experiences and suggestions from the field. Data were collected through a semi-structured questionnaire. Data collectors were trained for standard survey methodologies. Researchers revisited the household completed data from the data collector on the purpose of ensuring quality control. After data collection, factor analysis was applied as a statistical method. Data of the patterns were subjected to multivariate analysis. Univariate analysis of the individual component was done for all patterns under study using the mean values and using SPSS software (Version 20, Chicago, IL, USA). A p value less than 0.05 was statistically considered significant.

Informed verbal and written consent were obtained from participants after explaining the nature, purpose and procedures of the study. Ethical approval was obtained from the Ethics and Research Review Committee of Bangladesh Institute of Research and Training on Applied Nutrition (BIRTAN).

Results

Among the studied population, 79.9% were Bengali and 20.9% were from ethnic groups. Totally, 53.6% belonged to 18-25 years old age group, 18.2% and 28.2% were from 26-30 and >30 age group, respectively, while 57.0% and 43.0% were female and male, respectively. Most of the participants were housewife (38.0%), and 28.5 % were student, while 3.1%, 11.7%, 1.7%, 12.3% and 4.5% were farmer, service holder, mechanic, business and labor, respectively. Around 39.4% of respondents completed the secondary education level, whereas only 14.8% had no education. Most of the participants belonged to medium and high-income groups (36.6% and 62.3%, respectively). Majority of the study participants were obese (37.2%), whereas 33.0% had normal nutritional status (Tables 1 and 2).
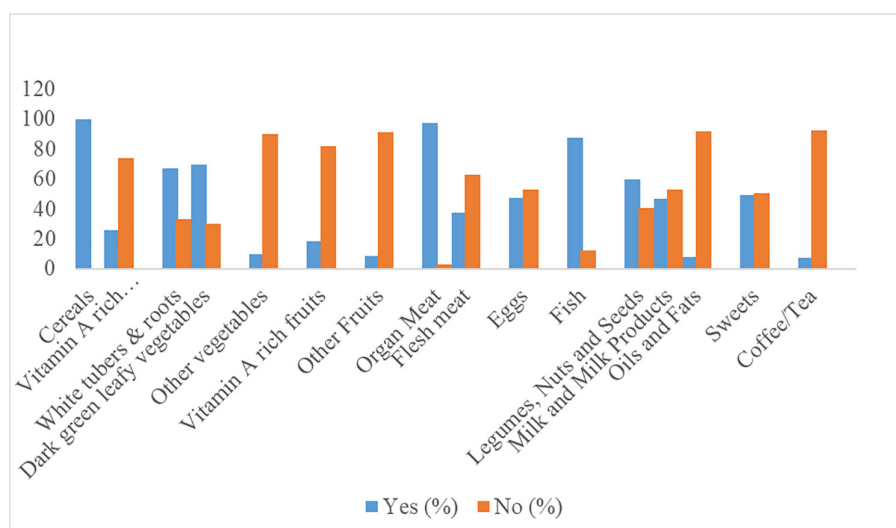
Figure 1 shows the consumption of different food groups among the study participants. Frequent consumed food groups were cereals, white roots, tubers, dark green leafy vegetables, organ meat, eggs, fish, legumes, nuts and seeds. Almost similar trends were observed in consumption of milk, milk products and sweets. In contrast, the highest number of participants did not consume fats and oils, and vitamin A rich fruits and vegetables. Among all participants, a large number had high diversity score (68.7% and 19% had medium diversified food, whereas 12% had less diversified food).

The bivariate comparison of nutritional status and different parameters were considered n important factors to impact the nutritional status of the adults. Regarding the ethnic groups when compared to Bengalis, they suffered more from malnutrition (overweight, obese), but the difference was not significant (For Bengali, underweight: 10%, overweight: 19.2%, obese: 34.6% vs. Underweight: 6.9%, overweight: 22.2%, obese: 47.2%) (χ^2=5.978, df=3, p=0.113). For age of 18-25 years (Underweight: 14.1%, overweight: 17.2%, obese: 27.1%), 26-30 years (Underweight: 7.7%, overweight: 20.0%, obese: 44.6%), >30 years (Underweight: 4.0%, overweight: 19.8%, obese: 51.5%); there was a significant correlation regarding malnutrition (χ^2=31.541, df=6, p=0.001).

Also, there was a significant relationship (χ^2=9.097, df=3, p=0.028) between female gender (Underweight: 12.7%, overweight: 15.2%, obese: 39.2%) and male sex (Underweight: 6.5%, overweight: 26.0%, obese: 34.4%). Considering employment status (39.9%) and unemployed (60.1%)), there was a significant difference (χ^2=4.590, df=1, p=0.032). For occupation of participants, housewives suffered more from overweight (19.1%) and obese (39.7%) and the difference was statistically significant (χ^2=33.301, df=21, p=0.043). However, there was no significant relationship between nutritional status and educational level as well as family member. Participants who belonged to medium income group suffered more from overweight and obesity in comparison to medium income group (Underweight: 9.6%, overweight: 21.7%, obese: 38.8% vs. Underweight: 10%, overweight: 19.2%, respectively) (χ^2=14.112, df=6, p=0.028). Respondents with medium and high diversity score suffered more from overweight and obesity in comparison to lower group, but there was no significant relationship (Table 2, Figure 2).

**Table 1:** Distribution of the socio-demographic variables among respondents.

Variable	Frequency (*n*)	Percentage (%)
Types of population		
Bengali	286	79.9
Ethnic group	72	20.1
Age category		
1 (18-25)	192	53.6
2 (26-30)	65	18.2
3 (>30)	101	28.2
Gender		
Female	204	57.0
Male	154	43.0
Occupation		
Housewife	136	38.0
Farmer	11	3.1
Service holder	42	11.7
Student	102	28.5
Mechanic	6	1.7
Business	44	12.3
Labor	16	4.5
Education level		
N/A	53	14.8
Primary	46	12.8
Secondary	141	39.4
Higher secondary school certificate	79	22.1
Up to higher secondary school certificate	39	10.9
Family members		
1-3	41	11.5
4-6	240	67.0
>6	77	21.5
Monthly income		
Low	4	1.1
Medium	131	36.6
High	223	62.3
Nutritional status		
Underweight	36	10.1
Normal	118	33.0
Overweight	71	19.8
Obese	133	37.2

Figure 1: Consumption percentage of different food groups.

Table 2: Distribution of the socio-demographic variables in relation to the nutrition status.

Variable	Nutrition status				X^2 test value	df	p value
	Underweight n (%)	Normal n (%)	Overweigh n (%)	Obese n (%)			
Type of population							
Bengali	31 (10.8)	101 (35.3)	55 (19.2)	99 (34.6)	5.978	3	0.113
Ethnic	05 (6.9)	17 (23.6)	16 (22.2)	34 (47.2)			
Age (Years)							
18-25	27 (14.1)	80 (41.7)	33 (17.2)	52 (27.1)	31.541	6	
26-30	5 (7.7)	13 (20.0)	18 (27.7)	29 (44.6)			0.0001
>30	4 (4.0)	25 (24.8)	20 (19. 8)	52 (51.5)			
Gender							
Male	10 (6.5)	51 (33.1)	40 (26.0)	53 (34.4)	9.097	3	0.028
Female	26 (12.7)	67 (32.8)	31 (15.2)	80 (39.2)			
Education							
N/A	7 (13.2))	8 (15.1)	13 (24.5)	25 (47.2)	18.161	12	0.111
Primary	2 (4.3)	13 (28.3)	12 (26.1)	19 (41.3)			
Secondary	14 (9.9)	56 (39.7)	22 (15.6)	49 (34.8)			
Higher secondary school certificate	11 (13.9)	24 (30.4)	16 (20.3)	28 (35.4)			
Up to higher secondary school certificate	2 (5.1)	17 (43.6)	8 (20.5)	12 (30.8)			
Occupation							
Housewife	13 (9.6)	43 (31.6)	26 (19.1)	54 (39.7)	33.301	21	0.043
Farmer	2 (18.2)	2 (18.2)	2 (18.2)	5 (45.5)			
Service holder	3 (7.1)	6 (14.3)	12 (28.6)	21 (50.0)			
Student	14 (13.7)	48 (47.1)	15 (14.7)	25 (24.5)			
Mechanic	1 (16.7)	3 (50.0)	0 (0.0)	2 (33.3)			
Business	1 (2.3)	11 (25.0)	12 (27.3)	20 (45.5)			
Labor	2 (12.5)	5 (31.3)	4 (25.0)	5 (31.3)			
Family members							
1-3	3 (7.3)	16 (39.0)	7 (17.1)	15 (36.6)	4.842	6	0.564
4-6	23 (9.6)	72 (30.0)	52 (21.7)	93 (38.8)			
>7	10 (13.0)	30 (39.0)	12 (15.6)	25 (32.5)			
Family income							
Low	0 (0)	3 (75.0)	1 (25.0)	0 (0)	14.112	6	0.028
Medium	19 (14.5)	48 (36.6)	17 (13.0)	47 (35.9)			
High	17 (7.6)	67 (30)	53 (23.8)	86 (38.6)			
Dietary Diversity Score							
Low (<4)	8 (18.6)	17 (39.5)	4 (9.3)	14 (32.6)	8.005	6	0.238
Medium (4-5)	5 (7.5)	24 (35.8)	12 (17.9)	26 (38.8)			
High (>6)	23 (9.3)	77 (31.3)	54 (22.0)	92 (37.4)			

df: Degree of freedom
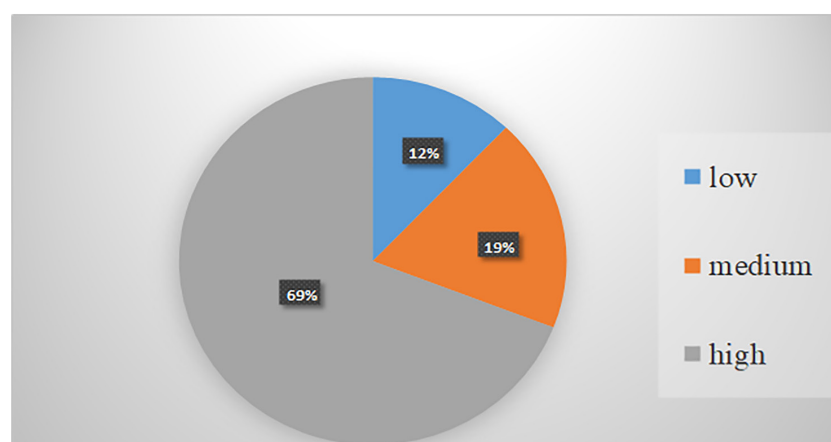
Figure 2: Dietary diversity score percentages.

Discussion

The present study assessed dietary patterns of young adults in Durgapur, Netrokona. We noticed a relationship between dietary habits, nutritional status and other factors. In the present research, 10.1% of the study populations were underweight, while 19.8% and 37.2% were overweight and obese, respectively. Only 33.0% of participants showed normal nutritional status. The female participants were suffering from malnutrition more in comparison to their counterparts. The prevalence of underweight among females was 6 times higher than male gender. A greater number of males were suffering from overweight when compared to female sex.

Similarly in Spain, the overweight and obesity were higher in males (25%) when compared to females (13.9%) (16). In another study conducted among university students, underweight status was not observed among men, but was found 10% among females; whereas overweight proportion was 28.6% in males and 5.8% in females (17). Underweight status showed a decreasing trend with an increase in age; but in age group of 26-30 years and >30 years, the percentages of overweight and obesity increased. In another study conducted in Saudi Arabia on age group of 20-70 years, obesity increased with age and reached its peak in 55-64 years group, while decreased afterwards (18). The findings revealed a high prevalence of obesity among adult population, with females having higher obesity prevalence than males. They also found males with the highest prevalence of obesity and overweight was 19.2% and 38.6% in the 40-49 years age group, while in females, the overweight was mostly common in >50 years age group (34.8%) and obesity was the highest in 40-49 years age group (36%). A statistically significant increase was visible in the prevalence of both obesity and overweight with the age (18).

Socioeconomic status (SES) was recognized as an important determinant of health and nutrition as lower SES could contribute to health and nutrition disparities. Inadequate income, as an indicator of lower SES, put individuals at risk of developing unhealthy dietary patterns that could contribute to inadequate or excess intakes of energy and nutrients (19). In our study, participants from medium and high-income groups suffered more from overweight and obesity in comparison to low income group. Another study found that living in impoverished households could increase the risk of obesity and chronic diet related diseases in adulthood due to mechanisms that were poorly understood (20). We found opposite results due to a smaller number of participants in low income group.

The dietary patterns of the respondents showed the majority consumed more foods belonging to cereals, white roots, tubers, dark green leafy vegetables, organ meat, eggs, fish, legumes, nuts, and seeds and less for foods belonging to fats, oils, and vitamin A rich fruits and vegetables. This may affect the availability of the nutrients (i.e., minerals and proteins) to be inherent in these food groups. The DDS of the respondents demonstrated that they ate more than six food groups, which made available the necessary nutrients for an optimal health. The dietary diversity of the respondents was a reflection of better knowledge of basic nutritional values of the different food groups. In our study, the majority of the study participants consumed diversified foods. High dietary diversity included foods from more than 6 food groups which made available the balanced nutrients for an optimal health. The high DDS of the respondents indicated the consumption of wide varieties of foods which ensured availability of useful and balanced nutrients. This guaranteed optimal nutrition with a positive impact on nutritional and health status (21). Another study was conducted on 16-28 age group and found most of the participants consumed more cereals, roots, tubers, fruits, meats, oils, and fats groups and less for the foods belonging to vegetables and eggs group (22), that is not identical to our findings. The current study intended to identify the dietary pattern and its relationship with nutritional status. In spite of good economic status (as most of the participants belonged to medium and high-income group), still majority of the females were suffering from any kind of malnutrition (Overweight, obesity and underweight) (22).

We can recommend a large-scale study on relationship between dietary habits and nutritional status among the population to explore the magnitude or extent of the situation. This study reflected the need for the screening of the adults in the community for malnutrition status especially among high risk groups, and there is a need to develop interventions to prevent and control such problems. One of our study findings was less consumption of fats, oils and vitamin A rich fruits and vegetables. So further studies are necessary to undertake clinical and biochemical assessments and to find out vitamin A deficiency. There is a need to create awareness among the community people regarding dietary habit, nutritional deficiency and early recognition. Therefore, the provision of support is important to reduce the outcome of the malnutrition.

Conclusion

Overall, it may be concluded that dietary diversity

plays a crucial role in determining the nutritional outcomes among adults, while no significant relationship was seen between DDS and nutritional status. Peoples having diversified food were shown to suffer more from overweight and obesity. The findings can have an important role for authorities who plan for healthy nutrition.

Conflict of Interest

None declared.

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