Dietary Habits, Food Consumption, Energy and Nutrients Intake of Adults of Selected Areas of Bangladesh

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Abstract

Purpose: Food consumption, energy and nutrients intake are the major concern now a days because they determine the nutritional well-being of a population. Hence, this study provide a clear picture of food consumption, energy and nutrients intake of adults of selected area of Bangladesh.

Design/methodology: It was a cross-sectional study conducted among 400 respondents from selected areas of Bangladesh.

Findings: The mean age of participants was 43.43±19.82 years. 58.75% of study participants were male where 41.25% were female. On an average, respondents consume rice (7±0) days/week. They consume other vegetables (6.95±0.27) days/week, fish (4.88±1.79) days/week, meat (0.83±1.07) days/week, leafy vegetable (2.57±1.81) days/week, pulses (1.98±1.78) days/week, milk and milk Product (1.8±2.75) days/week, sweet (1.66±1.92) days/week and oils (7±0) days/week. . About 57.5% of the respondents take more than 65% of total energy from carbohydrate, 37.5% of the respondents take less than 10% of total energy from protein sources and 24.75% of the respondents take less than 15% of total energy from fat.

54.75% of the respondents have "Highly Acceptable FCS", 23.25% of the respondents have "Low Acceptable FCS", 19.25% of the respondents have "Borderline FCS" and only 2.75% of the respondents have "Poor FCS". The per capita mean energy intake of Bangladeshi population was 2632kcal/day for male and 2249 kcal/day for female. Mean protein, carbohydrate, fat and fiber intake of the respondents were 56.7g/day,407g/day,30.9g/day and 34.7g/day respectively. Moreover, around 27% of the respondents are consuming less than 1805Kcal (* Hard Core Poor), 24.25% of the respondents are consuming 1805-2121 Kcal (**Absolute poor), 22% are consuming 2122-2600 Kcal and 26.75% of the respondents are consuming more than 2601Kcal.

Conclusion: Though the consumption of fruits, vegetables, meat, fish and milk product were increasing in the recent decades, this study results suggest the necessity of formulating policy and intervention strategies concentrating on the consumption of these food items in all levels in Bangladesh

Keywords: *Dietary Habits, Food Consumption, Energy and Nutrients Intake*

Introduction

Due to inadequate access to adequate, healthy and nutritious food, the nutritional well-being of a significant portion of Bangladesh 's population is still neglected. Since children and women belong to the most vulnerable group, they suffer from high levels of malnutrition and micronutrient deficiencies such as low birth weight (LBW), malnutrition (underweight, stunting and waste), vitamin A deficiency iron deficiency anaemia and iodine deficiency disorders ([1]). Several public health challenges in our nation arise over diet , obesity and related health issues ([2]). Throughout Bangladesh, the major component of the diet is cereal, mostly rice. Hence, this conventional diet is dominated by high cereal intakes which end up making the diet unbalanced. Household food consumption studies over the last 15 years have shown the consumption of cereal consumption declines, it still makes up the highest share (70 percent) of the diet, followed by non-leafy vegetables, roots, and tubers, that altogether comprise more than four-fifths of the rural people's total diet ([3]). In rural people 's diet protein and micronutrient-rich foods such as fish , meat, eggs , milk, milk products, fats and oils make up less than 10 per cent of total diet, and vegetable and fruit intake is steadily decreasing Rural consumption of leafy and non-leafy vegetables has persisted almost the same across the past two decades after increasing over the prior 30 years. The average Bangladeshi intake a total of 212g of fruits and vegetables daily, with an average national per capita intake of 31g of leafy vegetables, 136g of non-leafy vegetables and 45g of fruits .([4]). This is considerably below the amount of 400 g of fruits and vegetables recommended by FAO/WHO ([5]). As people consume less food than the recommended amounts, they suffer from energy deficiency which leads to under nutrition. The aims of this study, therefore, is to obtain dietary habits, food consumption, energy and nutrients intake of adults of selected areas of Bangladesh.

Methodology

Study Setting

The study was conducted in Dhaka, Mymensing, Sylhet and Khulna District in Bangladesh

Study Design, Period, and Sample Size

The study was a community-based cross-sectional study and it was conducted from January 01 to March 30, 2018. The study subjects were individuals aged 18 years and above and they were a permanent resident of the corresponding area. The sample size was 400.

Sampling Technique

This study was conducted among 400 adults aged 18 and above years who lived in Dhaka, Mymensing, Sylhet and Khulna District for more than six months before the survey. Here, multistage sampling technique was used. For the primary sampling units, four districts were randomly selected from a total of 8 districts. The sample size was equally distributed to each of the selected districts. Finally, a systematic random sampling technique was employed to select households for data collection. From the selected households sample were randomly selected.

Data Collection and Measurement

Data on demographic and behavioral characteristics were collected by trained personnel through a face-to-face interview using a semi structured questionnaire. The field study team was composed of enumerators and supervisors.

Dietary Habits:

7 days food frequency questionnaire (FFQ):

The frequency with which foods and/or food groups are eaten over a certain time period is measured by food frequency questionnaire (FFQ). Usually a close-ended food list and a frequency category section were included in the questionnaire that can be

performed by respondents or interviewer.

Hour recall method:

A 24-hour dietary recall is a dietary assessment tool which consists of a standardized interview in which respondents are asked to report all the food and beverage they have consumed in the past 24 hours. In the study, respondents are asked to recall the foods and drinks they have intake in the previous 24 hours they also asked to provide more detail when necessary.

Food consumption Score (FCS)

The frequency of consumption of food items was measured using the food consumption score (FCS) which is a proxy measure to access food security and it was established by WFP ([6]). As FCS is a well-defined measurement including standardized cut-off points, it has been used around regions and livelihood groups. It is a composite score based on food frequency, dietary diversity and relative nutritional importance of various food groups. The frequency of consumption of various food items over last seven days were asked to the respondents. Food items were grouped into 9 standard food groups with a maximum value of 7 days in a week. The frequency of consumption of each food group was multiplied by an assigned weight which relies on its nutrient content. The values were then summed up to obtain the total food consumption score. Then a comment was given depending upon the standardized threshold ([7]). **The formula for calculating FCS is given below:** $\mathbf{FCS=a_{Staple} \times X_{Staple} + a_{pulse} \times X_{pulse} + a_{vegetable} \times X_{vegetable} + a_{fruit} \times X_{fruit} + a_{Meat\ \&\ fish} \times X_{Meat\ \&\ fish} + a_{Dairy} \times X_{dairy} + a_{Sugar} \times X_{Sugar} + a_{oil} \times X_{oil} + a_{condiments} \times X_{condiments}}$

Where,

FCS = Food consumption score

a_1 = weight of each food group

x_1 = frequency of food consumption (no of days for which each group was consumed during the past 7 days)

Following the outlines, FCS for each household was calculated. The resulted score was used to categorize the household into four groups including poor consumption (0-28), borderline consumption (29-42), acceptable low food consumption (43-52) and acceptable high food consumption (>52). This classification was done for Bangladesh taking into account the importance of oil and fish in Bangladeshi population 's diet ([8]).

Dietary Diversity

Dietary diversity (DD) is universally recognized as a key component of high quality diets. Dietary factors are associated with increased risk of chronic disease and undernutrition and are therefore recommended by local and international dietary guidelines to help enhance dietary diversity. In most developed countries macro and micro-nutrient deficiencies are public health issues due to a monotonous, cereal-based diet that lacks diversity ([9]). Moreover, diverse diet indicates the nutrient adequacy of the diet ([10]). Several studies have also revealed that the overall nutritional quality of the diet can be improved with a diversified diet ([11–13]). The dietary diversity questionnaire can be used to collect information either at the individual level or the household level. **The individual dietary diversity score includes a small number of food groups. These groups are:**

I. **Starchy staple,**

II. **Dark green leafy vegetable,**

III. **Other vitamin A rich fruits and vegetable,**

IV. **Other fruits and vegetable,**

V. **Organ meat,**

VI. **Meat and fish,**

VII. **Eggs,**

VIII. **Legumes, nuts, and seeds,**

IX. **Milk and milk products.** ([7])

To calculate the individual dietary diversity first, the individual dietary diversity score is calculated for every respondent. hence, the score for each food group is either 1 or 0. To find out the individual dietary diversity score, the 9 food groups in the dietary diversity questionnaire are combined. The value of this variable will range from 0 to 9. Then the score is categorized into 3 groups. The dietary diversity score classification is:

Lowest dietary diversity (≤ 3 food groups).

Medium dietary diversity (4 and 5 food groups).

High dietary diversity (≥ 6 food groups). ([14])

Data Analysis

The data was entered, cleaned, and analyzed using the SPSS version 23.0 software package. Descriptive statistics and chi- square were used to describe the characteristics of study participants.

Consent to Participate

Informed verbal consent was assembled from each respondent. All information regarding this study was kept confidential.

Results

In this study a total of 400 valid respondents have been included. The mean age of study participants was 43.43±19.82 years. Two hundred forty-one (60.25%) of the participants were under the age of 50. Majority (58.75%) of the respondents was male and 41.25% were female. Most (56.75%) of study participants either attended primary education or did not attend formal education. Two thirds of them (68.5%) were married whereas 86 (21.5%) were single. About 35% adults were farmer whereas 22% were housewife (Table 1).

Table 1: Socio demographic characteristics of the study participants

Characteristics	Frequency	Percent
Sex		
Male	235	58.75
Female	165	41.25
Age		
18-35	115	28.75
36-50	126	31.5
51-65	74	18.5
66-93	85	21.25
Education		
HSC and above	101	13.5
SSC	119	29.75
Primary	154	38.5
No education	73	18.25
Marital status		
Married	274	68.5
Single	86	21.5
Divorced	23	5.75
Widowed	17	4.25
Districts		
Dhaka	100	25
Mymensing	100	25
Sylhet	100	25
Khulna	100	25
Occupation		
Housewife	88	22
Farmer	140	35
Private Job	72	18
Other†	100	25

Other†: including students (n=26), Unemployed (n=35), Businessman (n=18), and daily laborer (n=21).

Dietary Habits:

7 days Food Frequency:

Table-2: Distribution of Food items intake of last 7 days

Food Item	Mean	SD
Rice	7	0
Ruti	1.4	2.31
Leafy Veg.	2.57	1.81
Others Veg.	6.95	0.27
Fruits	0.64	1.11
Pulse	1.98	1.78
Fish	4.88	1.79
Meat	0.83	1.07
Egg	1.53	1.77
Milk	1.8	2.75
Sweet	1.66	1.92
Oils	7	0

Table-2 indicates that respondents consume rice on daily basis (7±0) days/week. They consume other vegetables (6.95±0.27) days/week, fish (4.88±1.79) days/week, meat (0.83±1.07) days/week leafy vegetable (2.57±1.81) days/week, pulses (1.98±1.78) days/week, milk and milk Product (1.8±2.75) days/week and sweet (1.66±1.92) days/week and oils (7±0) days/week.

Food Consumption Score:

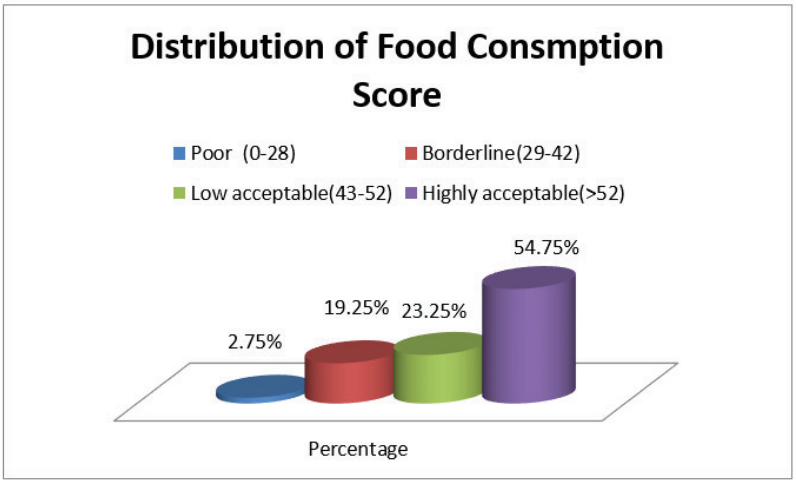

Figure-1: Distribution of Food Consumption Score

Figure-1 shows that 54.75% of the respondents have "Highly Acceptable FCS", 23.25% of the respondents have "Low Acceptable FCS", 19.25% of the respondents have "Borderline FCS" and only 2.75% of the respondents have "Poor FCS".

Dietary Diversity:

Table-3: Distribution of Dietary diversity of the respondents (n=400)

Dietary Diversity	Frequency	Percentage
Lowest dietary diversity (≤ 3 food groups)	47	11.75%
Medium dietary diversity (4 and 5 food groups)	194	48.50%
High dietary diversity (≥ 6 food groups)	159	39.75%
Total	400	100%

About half of the respondents (48.5%) consumed medium dietary diversified food whereas 11.75% of the respondent consumed lowest dietary diversified food and 39.75% respondents consumed highly diversified food.

24 Hour Recall Method:

Distribution of Nutrients intake:

Table 4: Mean per capita energy, protein, carbohydrate, fat and fibre intake

	Energy(Kcal/day)	Protein (gm/day)	Carbohydrate (gm/day)	Fat(gm/day)	Fiber(gm/day)
Male	2632±732	58.6±14.5	437±113	29.6±19.1	37.75±12.7
Female	2249±648	55.8±11.6	357±109	33.3±11.6	36.7±13.3
Total	2398±528	56.7±16.5	407±119	30.9±19.7	34.7±9.8

The per capita mean energy intake of the respondents was 2398 kcal/day, protein intake was 56.7g/day , carbohydrate intake was 407g/day fat intake was 30.9g/day and fiber intake was 34.7g/day . The average energy intake of the male and female was 2632 kcal and 2249 kcal per person per day, respectively.

Distribution of Calorie Intake:

Table-5: Distribution of Calorie intake among Male and Female

Calorie Intake	Male	Female	Total	Chi-square Test	P-value
<1805Kcal*	16.75%(67)	10.25%(41)	27%(108)		
1805-2121 Kcal**	12.5%(50)	11.75%(47)	24.25%(97)		
2122-2600 Kcal	13%(52)	9%(36)	22%(88)	2.267	0.047
2601-3000Kcal	9%(36)	4%(16)	13%(52)		
>3000Kcal	7.5%(30)	6.25%(25)	13.75%(55)		
Total	58.75%(235)	41.25%(165)	100%(400)		

Table-5 shows that 27% of the respondents are consuming less than 1805Kcal (* Hard Core Poor), 24.25% of the respondents are consuming 1805-2121 Kcal (**Absolute poor) (15), 22% are consuming 2122-2600 Kcal and 26.75% of the respondents are consuming more than 2601Kcal. The calorie distribution between male and female is statistically significant (χ^2 (4) =2.267, p=.047).

Table 6: Distribution ranges of respondents-nutrient intake goals

Macronutrients	Carbohydrates			Protein			Fat		
Range of Intake(%)	<55	55-65	>65	<10	10 to 20	>20	>15	15 to 30	>30
Respondents(%)	15.75	41.75	57.5	37.5	41.25	21.25	24.75	61.5	13.75
Respondents(n)	63	167	230	150	165	85	99	246	55

Table 6 indicates that majority (57.5%) of the respondents take more than 65% of total energy from carbohydrate and 37.5% of the respondents take less than 10% of total energy from protein sources and 24.75% of the respondents take less than 15% of total energy from fat.

Table 7: Mean food intake (g/p/d) of the respondents

Food items	Intake (g/p/d)
Cereals	472
Pulses	15.3
Fishes	47.7
Poultry	15.25
Meat	6.7
Egg	6.25
Potatoes	89
Leafy Vegetables	41
Others Vegetables	151
Fruits	31
Oils	30.4
Milk	37
Spices	52
Sugar	13

It was found that total cereal intake was 472g/ person/day. The intakes of fish, poultry, meat, egg, pulses, oils, fruits, potatoes, vegetables, milk and sugar (g/person/day) were 47.7, 15.25, 6.7, 6.25, 15.3, 30.4, 31, 89 , 192 , 37 and 13g ,respectively.

Discussion

Although extreme poverty rates are decreasing, according to the UN World Food Program (WFP), nearly 32 per cent of Bangladeshis still live below the national poverty line. About 25 percent of Bangladesh 's population still food insecure ([16]).

It was found that respondents consume rice on daily basis. It was established from other studies that largely rice, are the main food in Bangladesh ([4,17]). In another research it was found that total dietary energy was dominated by cereals in Bangladesh as against the internationally accepted value 54-55% for **developing countries** ([18]). As Bangladesh is producing more rice than before, the consumption is also increased

We have found that about half of the respondents (48.5%) consumed medium dietary diversified food whereas 11.75% of the respondent consumed lowest dietary diversified food and 39.75% respondents consumed highly diversified food. In another study from Bangladeshi student found out that while 10% of the respondents had consumed the least number of food groups, 4 % of the respondents consumed highest level of food groups ([19]). Another study from slum areas in Dhaka city Bangladesh have found out that approximately 61.3% of the adolescent girls consumed medium dietary diversified food and 30% of the respondent consumed lowest dietary diversified food where 8.7% girls enjoyed highly diversified food ([20]). As cereal products are mainly consumed , they try to neglect consumption of varieties of foods.

It was in this study that total cereal intake was 472g/person/day. The intakes of fish, poultry, meat, egg, pulses, oils, fruits, potatoes, vegetables, milk and sugar (g/person/day) were 47.7, 15.25, 6.7, 6.25, 15.3, 30.4, 31, 89 , 192 , 37 and 13g ,respectively. Researcher found in Northern part of Bangladesh the mean intake different food items such as cereals, potato, vegetables, pulses, meat and poultry, fish, milk and milk product, cooking oil, fruits, sugar and miscellaneous were 570.0, 115.0, 271.4, 8.6, 9.6, 36.9, 15.2, 11.2, 0.3, 2.0 and 12.8 g, respectively([21]). In other study it was found that with an average national per capita consumption of 23 g of leafy vegetables, 89 g of non-leafy vegetables and 14 g of fruit, the average Bangladeshi eats a total of 126 g of fruit and vegetables daily which is below the minimum daily consumption of 400 g of vegetables and fruit recommended by World Health Organization and FAO. ([22])

Average caloric intake among Bangladeshi population was 2632 and 2249 kcal/day among women and men, respectively which is slightly higher than the previous study where researcher found out that the caloric intake among Bangladeshi population was 2142 and 2394 kcal/day among women and men ([23]). The reason behind higher energy intake by study population may be due to the research is conducted in harvesting season.

Conclusions

Though residences of Bangladesh are now consuming more vegetables, fruits and animal products, the intakes should be more. Average consumption of energy in Bangladeshi population is approximately 280kcal less than the actual requirements. When the consumption is calculated on the basis of adult male equivalents, it is found that adult males are consuming sufficient energy although adult female are depriving a little bit. This study proposes a balanced diet with emphasis on fruits

vegetables, pulses, milk and other animal products consumption to fulfill the requirements.

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Ethical Consideration: This study was approved by Ethical Review Board of University of Dhaka. The researchers clarified the objective of this research and obtained informed consent from the respondents.

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