Original Article

Assessment of Dietary Pattern and Nutritional Status among Women of Reproductive Age Group in rural Bangladesh

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ABSTRACT

Background: *Malnutrition due to poor feeding habits, is still a major public health concern in Bangladesh. The dietary patterns, quality of diets and nutritional status of reproductive aged women have significant impact on both their own health and their offspring's health. For instance, healthy nutritional status and proper dietary pattern of women improves maternal and child health. Moreover, the double burden of malnutrition such as undernutrition and overnutrition are prevalent among the reproductive aged women due to changing lifestyle and eating behaviours, over the last few years. Therefore, this study aimed to assess the dietary pattern and nutritional status among women of reproductive age group in rural Bangladesh.*

Materials and methods: *This cross-sectional study was conducted in Upazila Health Complex, Sitakundu from September to November 2024 among 410 women of reproductive age group. The data were collected with face-to-face interview and body mass index was measured. The data were compiled and tabulated according to key variables and analyzed with IBM SPSS 29.0.2.*

Results: *Majority 32.2% of the study people belonged to age group 31-40 years. Among them 84.4% were married. Maximum respondents were housewives and of upper-low socioeconomic condition. Among them 45.4% of the respondents had healthy weight. Whereas, underweight was found in teenage group and overweight-obesity was found in older age group. Cereals, vegetables and fatty foods were consumed more by majority of the study population while pulses, fruits, milk and dairy were taken less. Fruits, milk, sugar and dairy products were consumed more by the 15-20 years aged women but vegetables, fats and oils were taken more by the elderly participants. However, cereals, meat, fish, egg, fat and oil were casually taken by all age groups. Majority of the underweight women had high intake of milk and fruits whereas most of the overweight and obese respondents had large intake of rest of the food groups.*

Conclusion: *The dietary pattern and nutritional status of women of reproductive age is still poor in Bangladesh.Therefore, Public health interventions and strategies such as quality food and nutritional education should be imposed. At the same time, dietary awareness should be increased among women to ensure healthy maternal and child nutritional states.*

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Introduction

Food is a basic need that encompasses a multiplicity of aspects that influence quality of life.Dietary patterns become a means of characterizing food intake trends. It can be defined as a set or group of foods consumed by a given population over a period of time.[1] It is an essential element of diet quality. Consuming a variety of foods across and within food groups is associated with a sufficient intake of essential nutrients and promoting good health.[2] The nutritional status is an indication of the overall well-being of a population. Eating a balanced diet and using nutrients adequately are the keys to maintaining a normal nutritional status.[3] In other words, low nutritional status results from consuming vitamins and minerals in an insufficient pattern.[4]

The dietary intake pattern plays a vital role in human health, mostly in low- and middle-income countries like Bangladesh where people consume inadequate and insufficient nutrients due to resource limitations.[5] Especially women of reproductive age are nutritionally vulnerable due to the physiological requirements of pregnancy and lactation. The reproductive age is defined as the age range of 15–49 years according to World Health Organization (WHO). Additionally, nonpregnant and nonlactating women have higher nutritional needs.[6]

The nutritional status of the mother before conception is thought to have an impact on the growth of the embryo and fetus.[7] Moreover, nutritional deficiencies in women account for 20% of maternal deaths.[8] Pre-pregnancy undernutrition has been associated with a higher risk of fetal loss, premature delivery, anemia, infections, Fetal Growth Restriction (FGR), Low Birth Weight (LBW) etc. On the other hand, maternal obesity is associated with stillbirth, congenital anomalies, neurological impairments, metabolic syndrome of neonate and neonatal intensive care unit admission.[9] Hence, maintaining optimal food habits throughout a woman's childbearing age is essential to optimize her health and that of her offspring.[10] Women of reproductive age, especially those who are planning a pregnancy, need to be counseled to take a well-balanced diet including fruits, vegetables and protein-containing foods daily and increase their consumption of vitamin and mineral rich food such as calcium- and iron-foods in conjunction with vitamin C-foods to enhance essential nutrients absorption.[11]

Worldwide, it is estimated that maternal malnutrition and its effects contribute to 3.1 million child deaths each year.[12] In Bangladesh, poor maternal nutrition especially among adolescent girls, significantly contributes to an intergenerational cycle of malnutrition and poverty.[13] Approximately 19% of women of reproductive age group are underweight (BMI < 18.5). In addition to that, 50% of pregnant women and 40% of non-pregnant/non-lactating women suffer from anemia, 57% of non-pregnant/non-lactating women are zinc deficient and 22% of non-pregnant/non-lactating women are deficient in B-complex.[14] Despite significant economic progress and poverty reduction, about 35% population of Bangladesh remains food insecure, with around 10% of ever-married women reported as moderately or severely food insecure. Although, undernutrition remains a significant issue in Bangladesh, overweight and obesity are also becoming concerns, with 24% of women overweight or obese.[15]

Globally, studies have identified associations between dietary habits and health outcomes, as well as biomarkers, such as the Body Mass Index (BMI).[16] In Bangladesh, few researches were conducted about the diet and nutrition among the rural population, adolescent girl and elderly people. But very few or no studies have assessed the dietary patterns and nutritional status of women of childbearing age. Therefore, it was important to carry out this study which aimed at assessing the dietary consumption patterns, nutritional status of reproductive age group women in Bangladesh. This study will help to increase nutritional awareness and provide adequate dietary advices in pre conception specific to these groups of women to prevent maternal malnutrition and to reduce adverse pre-pregnancy and pregnancy outcomes. Also, the findings of this study will help the health authorities for future nutritional planning.

Materials and methods

This descriptive type of cross-sectional study was conducted in female Outpatient Department (OPD) of Upazila Health Complex (UHC) Sitakundu, Chattogram during the period of September to November of 2024 with a sample size 410 using face to face interview. The sampling technique was convenient type of non-probability sampling. Data were collected from the population who attended OPD of UHC, were present during the data collection and gave consent to participate in the study. After introduction with the respondents, informed consent was taken. Before data collection, it was assured that it would not violet their personal secrecy and privacy. Eligible participants were of childbearing age (15 - 49 years). Pregnant or lactating women who were on dietary supplementation as well as mentally disabled women were excluded from the study.

Dietary habits were assessed by collecting information on the frequency of consumption of various food groups using a Food Frequency Questionnaire (FFQ). The questionnaire was designed to capture all foods/beverages typically consumed. The various foods were then grouped into eight food items (Cereals and tubers group, pulses and beans group, milk and dairy products group, meat, fish and egg group, vegetable group, fruit group, oil group, sugar and derivative group).[17] Data on the frequency of consumption in a week of each food group were used to categorize each of the eight food group intake into three, Low: for food group intake 1-2 times per week; Moderate: for food group intake 3 - 4 times/week and High: for food group intake 5 - 7 times/week. These information were used to calculate the food frequency for each of the eight food items consumed in the last seven days for the study

population.An anthropometric measurement on body weight and height was used to calculate Body Mass Index (BMI, in kg/m^2) to evaluate overall nutritional status of the respondents. Body mass was measured with a portable weighting scale and to measure the height, a stadiometer was used. BMI is considered as underweight if below 18.5kg/m^2, normal weight at 18.5-24.9kg/m^2, overweight at 25-29.9kg/m^2 and obese at over 30.0kg/m^2 (WHO).

Both dietary and anthropometric data were administrated in a structured data collection sheet with valid and reliable questionnaires. After collection, the data were checked for discrepancies and verified. Compilation and tabulation of data were done according to the key variables and analyzed by using IBM SPSS 29.0.2. Result was presented in tables according to the objective of the study.

Results

Table I Sociodemographic profile of the study population (n=410)

Variables	Frequency	Percentage (%)
Age (years)		
<20	76	18.54
21 – 30	116	28.29
31 – 40	132	32.20
41 – 50	86	20.97
Marital status		
Married	346	84.39
Single	64	15.61
Education		
No formal education	120	29.27
Primary/ Equivalent	148	36.10
Secondary/ Equivalent	128	31.22
Higher Secondary/ Equivalent	14	3.41
Graduate or above	0	0
Occupation		
Housewives	322	78.54
Others	88	21.46
Socio-economic status		
Upper class	0	0
Upper-middle class	34	8.29
Lower-middle class	148	36.10
Upper-lower class	160	39.02
Lower class	68	16.59

This study comprises of 410 women, out of which 32.20% were in the age group 31-40 years, 84.39% were married, 36.10% were primary equivalent, 78.54% were housewives and 39.02% had upper-lower class status.

Table II Nutritional status of women of reproductive age in the overall population and by age group(n=410)

| Age groups Weight Status	< 20 Years n (%)	21 - 30 Years n (%)	31 - 40 Years n (%)	41 - 50 Years n (%)	Overall n (%)	p - Value
Underweight (BMI <18.5 kg/m²)	30 (7.3)	6 (1.5)	8 (1.9)	2 (0.5)	46 (11.2)	0.005*
Normal (BMI=18.5-24.9 kg/m²)	46 (11.2)	72 (17.6)	40 (9.7)	28 (6.8)	186 (45.4)	<0.001*
Overweight (BMI ≥ 25 kg/m²)	0 (0.0)	34 (8.3)	54 (13.1)	36 (8.8)	124 (30.2)	<0.001*
Obesity (BMI ≥ 30 kg/m²)	0 (0.0)	4 (1.0)	30 (7.3)	20 (4.9)	54 (13.2)	0.003*

p-Valueis considered as Statistically significant at < 0.05*level (2-tailed)

p-Value reached from Chi-square test.

[Confidence Interval : 95%]

[BMI=Body Mass Index].

Table II depicts that, out of all respondents 11.2% were underweight, 45.4% were in healthy weight range, 30.2% were overweight and 13.25% were obese. Among them, underweight was more in 15-20 years aged female, overweight and obese were in 31-40 years aged women at 13.1% and 7.3% respectively.
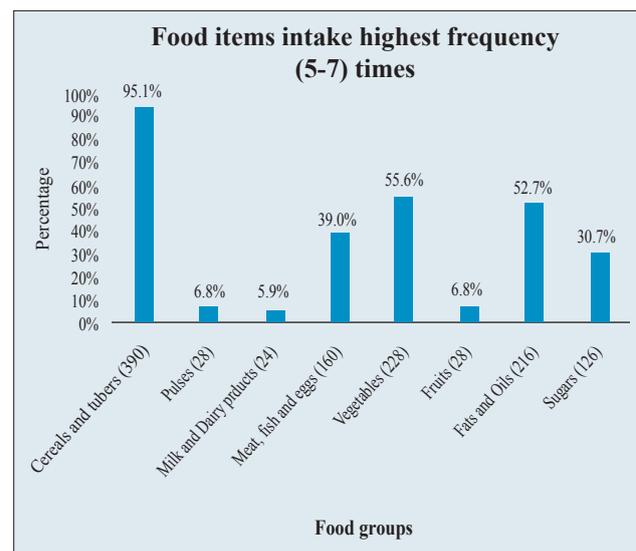
Figure 1 Highest intake of different food items (5-7 times) by the study populationdaily(n=410)

The Figure illustrates that, among all the respondents, 95.1% women consumed cereals, 55.6% consumed vegetables and 52.7% consumed fats and oil. Only6.8% eat fruits and 5.9% drank milk and dairy items.

Table III Frequency of consumption of different food groups in the study population by age group (n=410)

Age groups / Food groups	< 20 Years n (%)	21 - 30 Years n (%)	31 - 40 Years n (%)	41 - 50 Years n (%)
Carbohydrate rich foods				
Cereals and tubers	p = 0.002*	p = <0.001*	p = <0.001*	p = <0.001*
(1 - 2 times/week)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
(3 - 4 times/week)	17 (4.1)	3 (0.7)	0 (0.0)	0 (0.0)
(5 - 7 times/week)	59 (14.4)	113 (27.6)	132 (32.2)	86 (21)
Proteins rich foods				
Pulses	P = <0.001*	p = 0.007*	p = 0.170	p = <0.001*
(1 - 2 times/week)	56 (13.7)	56 (13.7)	60 (14.6)	38 (9.3)
(3 - 4 times/week)	20 (4.9)	50 (12.2)	64 (15.6)	38 (9.3)
(5 - 7 times/week)	0 (0.0)	10 (2.4)	8 (2.0)	10 (2.4)
Milk and Dairy products	p = 0.497	p = 0.005*	p = 0.094	p = 0.057
(1 - 2 times/week)	32 (7.8)	68 (16.6)	112 (27.3)	76 (18.5)
(3 - 4 times/week)	30 (7.3)	40 (9.6)	20 (4.9)	8 (2.0)
(5 - 7 times/week)	14 (3.4)	8 (2.0)	0 (0.0)	2 (0.5)
Meat, fish and eggs	p = 0.473	p = <0.001*	p = <0.001*	P = <0.001*
(1 - 2 times/week)	4 (1.0)	10 (2.4)	34 (8.3)	32 (7.8)
(3 - 4 times/week)	30 (7.3)	54 (13.2)	62 (15.1)	24 (5.9)
(5 - 7 times/week)	42 (10.2)	52 (12.7)	36 (8.8)	30 (7.3)
Vitamins and Minerals rich foods				
Vegetables	p = <0.001*	p = <0.001*	p = 0.003*	p = <0.001*
(1 - 2 times/week)	40 (9.8)	10 (2.4)	6 (1.5)	2 (0.5)
(3 - 4 times/week)	24 (5.9)	56 (13.7)	28 (6.8)	16 (3.9)
(5 - 7 times/week)	12 (2.9)	50 (12.2)	98 (23.9)	68 (16.6)
Fruits	p = <0.001*	p = 0.015*	p = 0.364	p = 0.077
(1 - 2 times/week)	30 (7.3)	80 (19.5)	112 (27.3)	66 (16.1)
(3 - 4 times/week)	32 (7.8)	30 (7.3)	18 (4.4)	14 (3.4)
(5 - 7 times/week)	14 (3.4)	6 (1.5)	2 (0.5)	6 (1.5)
Fats and oils and sugars rich foods				
Fats and Oils	p = 0.090	p = 0.006*	p = <0.001*	p = <0.001*
(1 - 2 times/week)	20 (4.9)	10 (2.4)	14 (3.4)	10 (2.4)
(3 - 4 times/week)	24 (5.9)	58 (14.1)	42 (10.2)	16 (3.9)
(5 - 7 times/week)	32 (7.8)	48 (11.7)	76 (18.5)	60 (14.6)
Sugars	p = 0.205	p = <0.001*	p = <0.001*	p = <0.001*
(1 - 2 times/week)	12 (2.9)	36 (8.8)	62 (15.1)	34 (8.3)
(3 - 4 times/week)	24 (5.9)	54 (13.2)	38 (9.3)	24 (5.9)
(5 - 7 times/week)	40 (9.8)	26 (6.3)	32 (7.8)	28 (6.8)

p-Valueis considered as Statistically significant at < 0.05*level (2-tailed)

p-Value reached from Multinominal logistic regression.

[Frequency of different items, how many times they hadtaken per week and playing what role on nutritional status had been narrated by p-Value]

[Confidence Interval : 95%].

[Food group was taken: 1-2 times/week=low intake, 3-4 times/week=moderate intake and 5-7 times/week=high intake].

This Table shows that, among the age group 31-40 years, 32.2%, 23.9% and 18.5% women had high intake of cereals, vegetables, fats and oil respectively, 15.6% had moderate intake of pulses and 27.3% had low intake of milk and dairy products. Among the respondents, around 12.7% of age 21-30 years consumed meat, fish and egg at high intake. Age group <20 years participants had high intake of fruits (3.4%) and sugary products (9.8%).

Table IV Nutritional status with respect to frequency of intake of various food groups among women of reproductive age

Weight status / Food groups	Underweight Frequency n (%)	Normal Frequency n (%)	Overweight Frequency n (%)	Obesity Frequency n (%)
Carbohydrate rich foods				
Cereals and tubers	p = 0.007*	p = <0.001*	p = <0.001*	p = <0.001*
(1 - 2 times/week)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
(3 - 4 times/week)	18 (4.4)	2 (0.5)	0 (0.0)	0 (0.0)
(5 - 7 times/week)	28 (6.8)	184 (44.9)	124 (30.2)	54 (13.2)
Proteins rich foods				
Pulses	p = <0.001*	p = 0.232	p = 0.025*	p = 0.378
(1 - 2 times/week)	42 (10.2)	100 (24.4)	60 (14.6)	8 (2.0)
(3 - 4 times/week)	4 (1.0)	96 (23.4)	60 (14.6)	12 (2.9)
(5 - 7 times/week)	0 (0.0)	10 (2.4)	4 (1.0)	14 (3.4)
Milk and Dairy products	p = 0.068	p = <0.001*	p = 0.23	P = 0.006*
(1 - 2 times/week)	26 (6.3)	136 (33.2)	104 (25.4)	22 (5.4)
(3 - 4 times/week)	16 (3.9)	54 (13.2)	18 (4.4)	10 (2.4)
(5 - 7 times/week)	4 (1.0)	16 (3.9)	2 (0.5)	2 (0.5)
Meat, fish and eggs	p = 0.006*	p = <0.001*	p = 0.008*	p = 0.584
(1 - 2 times/week)	10 (2.4)	50 (12.2)	18 (4.4)	2 (0.5)
(3 - 4 times/week)	20 (4.9)	94 (22.9)	46 (11.2)	10 (2.4)
(5 - 7 times/week)	16 (3.9)	62 (15.1)	60 (14.6)	22 (5.4)
Vitamins and Minerals rich foods				
Vegetables	p = <0.001*	p = <0.001*	p = 0.002*	p = 0.059
(1 - 2 times/week)	30 (7.3)	20 (4.9)	6 (1.5)	2 (0.5)
(3 - 4 times/week)	10 (2.4)	80 (19.5)	28 (6.8)	6 (1.5)
(5 - 7 times/week)	6 (1.5)	106 (25.9)	90 (22.0)	26 (6.3)
Fruits	p = 0.014*	p = <0.001*	p = 0.577	p = 0.009*
(1 - 2 times/week)	24 (5.9)	148 (36.1)	96 (23.4)	20 (4.9)
(3 - 4 times/week)	10 (2.4)	48 (11.7)	26 (6.3)	10 (2.4)
(5 - 7 times/week)	12 (2.9)	10 (2.4)	2 (0.5)	4 (1.0)
Fats and oils and sugars rich foods				
Fats and Oils	p = 0.029*	p = 0.127	p = <0.001*	p = <0.001*
(1 - 2 times/week)	14 (3.4)	34 (8.3)	6 (1.5)	0 (0.0)
(3 - 4 times/week)	20 (4.9)	90 (22.0)	30 (7.3)	0 (0.0)
(5 - 7 times/week)	12 (2.9)	82 (20.0)	88 (21.5)	34 (8.3)
Sugars	p = <0.001*	p = <0.001*	p = 0.371	p = 0.615
(1 - 2 times/week)	8 (2.0)	102 (24.9)	34 (8.3)	0 (0.0)
(3 - 4 times/week)	16 (3.9)	76 (18.5)	42 (10.2)	6 (1.5)
(5 - 7 times/week)	22 (5.4)	28 (6.8)	48 (11.7)	28 (6.8)

p-Valueis considered as Statistically significant at < 0.05*and <0.001**level (2-tailed)
p-Value reached from Multinominal logistic regression. [Confidence Interval : 95%].

This Table states that, maximum study population had high intake of cereals and tubers irrespective of their weight status. Obese women had high intake of pulses (3.4%). Overweight respondents had high intake of fat-oil (21.5%) and sugars rich foods (11.7%). Milk-dairy products, meat-fish-egg food group and vegetables were mainly consumed more by normal weight women at 3.9%, 15.1% and 25.9% respectively. Fruits is the only food item which wss more consumed by the underweight participants 2.9%.

Discussion
In this study, it is found that, majority 132 (32.2%) of the respondents were between 31-40 years. Around 116 (28.3%) were at age 21-30 years, 86 (21%) were above 41 and only 76 (18.5%) were below 20 years. That showed the majority were from the middle age group and extreme age people were less. In terms of marital status, 346 (84.4%) were married and 64 (15.6%) were single which is supported by the other study conducted by M'bobda et al. in Cameroon in 2020 where 70.6% female were married and 29.4% were single.[18]

Among the respondents 120 (29%) were illiterate, 148 (36.1%) were primary equivalent, 128 (31.2%) were secondary equivalent and only14 (3.4%) were HSC equivalent. Unfortunately, none of the respondents was graduate or above. Majority of the respondents 322 (78.5%) were housewivesand only88 (21.5%) had other occupational status (Table I). Educational and occupational status are important because they can influence on lifestyle and dietary habits.

Among the respondents only 34 (8.3%) were upper middle class, 148 (36.1%) were lower middle class, 160 (39%) were upper lower class and 68 (16.6%) were lower class. Majority of the respondents were in upper lower class and none of the respondents was in upper class according to the modified Kuppuswamy socioeconomic scale. This finding is slightly different from the other study conducted by Saber et al. where majority 37.3% people were in lower middle class and 7.1% people were in upper class.[19]

Regarding weight status according to BMI, among the study population186 (45.4%) of the women were in healthy weight.46 (11.2%) of the women were underweight.But up to 124 (30.3%) of them were overweight and 54 (13.2%) were obese among the respondents [Table II]. In another study most of the study people were obese 37.2% which was conducted by Salehin et al. in Bangladesh in 2022.[20] The prevalence of underweight was highest among women in the 15 - 20 years age group 30 (7.3%). While that of overweight was highest in the 31 - 40 years age group 54 (13.1%) and this was significantly different across all the age groups (p < 0.001). Theprevalence obesity 30 (7.3%) and 20 (4.9%) was found mostly in 31-40 years and 41-50 years age group respectively (Table II). In the present study, cereals and tubers food group was consumed mostly (5-7 times weekly) by the study population 390(95.1%) followed by vegetables and fatty food groups [228 (55.6%) and216 (52.7%) respectively]. The food groups which were taken less by the respondents were fruits 28 (6.8%) and milk 24 (5.9%) (Figure 1). The findings were almost similar to another study held in Nepal conducted by Kandel et al. in 2024 where cereals 99%% and vegetables 56.7% were largely eaten and fruits 4.2% was least eaten by the study people.[21]

In this research work, a high intake of carbohydrate rich food was mostly observed among the 31-40 years age group 132 (32.2%) followed by the 21-30 years age group 113 (27.6%) and these findings were statistically significant (p= <.001). A moderate intake of carbohydrate rich foods was mostly observed among the 15-20 years age group (4.1%). In case of protein rich food, majority 64 (15.6%) of the participants of 31-40 years age group had a moderate intake of pulses. 14 (3.4%) of respondents had high intake of milk who were at 15-20 years age group but maximum respondents 112 (27.3%) had a low intake at age 31-40 years. 52 (12.7%) of them of age 21-30 years had a high intake and 54 (13.2%) had moderate intake of meat, fish and egg food group. The study of the frequency of consumption of vitamins and minerals rich foods revealed that, the 31-40 years age group presented the highest percentage of participants 98 (23.9%) with a high intake and 40 (9.8%) of 15-20 years age group had low intake of vegetables. On the other hand, the 15-20 years age group had high intake of fruits 14 (3.4%) and the 31-40 years age group respondents had low intake 112 (27.3%).With regards to the intake of fats and oils food group, the 31-40 years and 41-49 years age group showed the highest percentage of high intake 76 (18.5%) and 60 (14.6) respectively. The 15-20 years age group recorded the highest percentage,40 (9.8%) of a high intake of sugary food items compared to the other age groups(Table III). In association to the frequency of intake of various food categories, a higher prevalence of normal weight 184 (44.9%), overweight 124 (30.2%) and obesity 54 (13.2%) were all associated to a high intake of cereals and tubers which is statistically significant (p= <.001).

A high intake of pluses was found among obese 14 (3.4%) whereas moderate and low intake were more prevalent among the healthy weigh respondents 96 (23.4%) and 100 (24.4%) respectively. A low intake milk and dairy products in a week was significantly associated to a higher rate of overweight 104 (25.4%).A high intake of meat, fish and egg food group was associated to a higher rate of both normal 62 (15.1%) and overweight 60 (14.6%).A higher prevalence of underweight 30 (7.3%) was linked to a low intake of vegetables per week. In contrary, high intake of fruits was found among the underweight 12 (2.9%).It was also observed that, a high intake of fats and oils was associated to a higher prevalence of overweight 88 (21.5%) and obesity 34 (8.3%) compared to the other intake categories (p < 0.001). Likewise, oily food group, high intake of sugary products was associated to overweight and obese women 48 (11.7%) and 28 (6.8%) respectively. Whereas a low intake of sugar foods was associated to a higher prevalence of malnutrition 8 (2%) (Table IV).

Limitation

There are few limitations of the current study including relatively short study period and small sample size. Moreover, the study was conducted in a small area of Bangladesh. As a result, the study population might not represent the whole community. Another limitation is due to a cross-sectional design that could not explain causal relationship and no chance for follow-up.

Conclusion

At present, improper dietary pattern and malnutrition are emerging issues for the low-and middle-income countries like Bangladesh. From this study it can be conclude that,the dietary intake patterns to combat against malnutrition are not appropriate and nutritional status of women of reproductive age is still poor. The majority of women consume starchy staple food while less attention has been given to the consumption of vegetables, meat, fruits and dairy products. Thus, this study will help for better understanding of avoiding unhealthy dietary habits and improving healthy eatings. It will also benefit the policy makers for future planning and decision-making processes in the field of public health.

Recommendation

More research work should be conducted on this crucial public health issue with larger sample size and more confounding variables. Measures should be taken for increasing awareness through mass media and national programs to disseminate health education on diet and nutrition with lifestyle modification and healthy eating behaviours. Cultivation of vegetables and fruits and consuming them can prove to be an important factor in maintaining better nutritional status. Government and non-government organizations should act and national policy should be enforcedto improve dietary intake pattern of women in Bangladesh to promote women's health.

Disclosure

The authors declared no competing interest.

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