

## **ACHIEVING FOOD SECURITY BY INCREASING CALORIE INTAKE: LOOKING THROUGH THE LENS OF NUTRITION**

Shaela Tasmina Mahbub

Assistant Professor in Economics, National University, Bangladesh

**DOI:** 10.46609/IJSSER.2020.v05i02.016 **URL:** <https://doi.org/10.46609/IJSSER.2020.v05i02.016>

### **ABSTRACT**

The features of achievement of food security of Bangladesh are analyzed in this paper using the data set of Household Income Expenditure Survey (HIES). This is a national data and the data set included daily data on food consumption for consecutive 15 days for 12,240 households. Bangladesh is successful in receiving calorie more than upper poverty line calorie level (2122 Kcal) for the last 20 years (1995 to 2010). Despite this achievement undernutrition in Bangladesh is among the highest in the world and remains as a serious public problem. Consumption pattern of the country is not appropriate for nutritional adequacy rather it creates undernutrition. Consumption pattern is biased towards carbohydrate and inadequate intake of other nutrients i.e. protein, fat and vitamin in the country. Food security can be achieved if the people have nutritious food in which Bangladesh is lacking. Therefore, achieving food security by increasing calorie is not enough it requires adequate calorie from all nutrients.

**Keywords:** Population, Poverty line, Food security, Nutrition, Socio-economic

### **INTRODUCTION**

Food consumption pattern means the process by which individuals identify, purchase and consume foods. It is however, multidimensional and shaped by various factors, including physiological, agricultural, historical, religious, socio-economic and psychological ones (Gedrich, 2003). Food consumption pattern/the dietary habits of people of a country have significant implications for attaining food security for its population. 'Dietary habit' broadly indicates the types, variety and quality of food intake and is highly dependent on the demographics of the consumer. With available household-level information on individual food items consumed, their shares in total consumption, frequency of intake and nutrient composition, it is possible to make general assessments of their dietary habits/consumption pattern.

Dietary consumption pattern changes over time, being influenced by many factors and their complex interactions. Income, prices, individual preferences and beliefs, cultural traditions, as well as geographical, environmental, social and economic factors all interact in a complex manner to shape dietary consumption patterns. Changes in these factors bring a palpable change in consumption pattern of any country or community in the passage of time. Food policy aimed at to bring changes in consumption pattern must give emphasis to these factors.

In the early stage of development of a country significant dependence on cereals are observed and gradually this dependency transform into more reliance on other high valued foods. As a result, the importance of cereals reduces and providing emphasis on other high valued foods emerges as a major concern to the people and to the policy makers and the government. Being a developing country heavy reliance on cereals especially rice is also found. In the food chart of the people consumption of other foods is not in accordance with the need of achieving food security.

## **LITERATURE REVIEW**

Human energy requirement is determined by energy expenditure plus additional energy required for growth, pregnancy and lactation. Energy expenditure and growth depends on age, sex, activity level, metabolism and body weight. Again literatures suggest that calorie requirement of persons of the same age, sex, body weight and activity level is not a fixed number, and even the requirement of the same person maintaining the same body weight and activity level varies from day to day (Quamrunahar *et al* 2013).

Several sources have estimated per capita calorie requirement in Bangladesh following the FAO/WHO guidelines. The Institute of Nutrition and Food Science (INFS) of University of Dhaka, in its Nutrition Survey Report of 1981-82 (Ahmad and Hassan 1983), estimated per capita calorie requirement of 2273 kcal per day for all age, sex and activity level. Knudsen and Scandizzo (1982) estimated average per capita per day calorie requirement of 2020 kcal for Bangladesh. Chen (1975), however, using quite rigorous methodology to account for climate, activity level, pregnancy and lactation allowances, calculated energy requirement of only 1589 kcal per capita per day. The INFS, in its Nutrition Survey Report of 1995-96, calculated energy requirement of 2039 kcal per capita per day for the average people of all age, sex and locations of Bangladesh (Jahan and Hossain 1998). This estimate of calorie intake compares fairly well with calorie intake norms of other developing countries such as India, Pakistan, Indonesia and Sri Lanka (Knudsen and Scandizzo 1982). Thus there are considerable variations in the estimates of calorie requirement, and one would require some kind of value judgment in selecting a particular level of requirement. However, according to FAO average calorie requirement per person per day is 2430 kcal (Country Nutrition Paper: Bangladesh 2014) and since it is the most

recent calculation, it would be judicious to consider this as standard requirement of calorie per person per day for Bangladeshi people.

According to the Household Income Expenditure Surveys conducted by The Bangladesh Bureau of Statistics (BBS) people who receive less than 2122 kcal and 1805 kcal calorie per capita per day are considered as people living under absolute poverty line and hard core poverty line respectively. For reducing poverty providing people these two minimum requirements of calorie is the foremost need. To ensure food security attainment and maintenance of having more calorie than these minimum requirement is binding. However, average daily consumption of calories per person per day in Bangladesh is 2318 kcal (HIES 2010).

Bangladesh Institute of Research and Rehabilitation of Diabetes, Endocrine and Metabolic Disorders (BIRDEM) have prepared a Desirable Dietary Guideline for the people of Bangladesh with the support from National Food Policy Capacity Strengthening Program under the Ministry of Food of Government of Bangladesh in 2013. It has designed the guideline following the FAO recommendation and methodology (FAO/WHO 2003). The study develops the dietary pattern for the people of Bangladesh considering the socio-economic and physiological condition. According to this study desirable mean energy requirement or calorie intake for the Bangladeshi adults is calculated as 2430 kcal per day per person.

There are studies that relate food security and nutrient adequacy. Findings agreed with the view that food energy sufficiency was implied in the population, however, may not be true in case of other nutrients and the concept of household food security need to be studied and broadened to include micronutrients also (Srivastava *et al* 2014). A significant interrelation between household food security, nutrient adequacy, and dietary diversity is noted (Mitra *et al* 2019).

## **METHODOLOGY**

The consumption data of Household Income Expenditure Survey of different year are used in the paper. The data set included daily data on food consumption for consecutive 15 days for 12,240 households. Nutrition data are taken from Bangladesh Health and Demographic Survey. To analyze the data tables and different diagrams are used in the paper.

## **RESULTS AND DISCUSSION**

### **Nutritional Situation in Bangladesh**

Good nutrition is not only a determinant of development; it is also an outcome of development. Ensuring food security with adequate nutrition is, however, not only a matter of fulfilling the needs and rights of the people but it also makes momentous economic sense. No country can

expect to build a thriving economy on the backs of hungry and undernourished people. A successful economy needs people who are productive and motivated, and neither productivity nor motivation can be strong when people lack in access to nutritious foods. There exists a two-way relationship between undernutrition and development. Therefore, prevalence of undernutrition is a hidden threat for the betterment of any country which will continue for generations.

Nutritional deficiency occurs when the body cannot absorb or get the necessary nutrients from foods in right amount. An inadequate supply of essential nutrients in the diet brings malnutrition or disease. A person having nutritional deficiency cannot grow properly, possess an ill health and is unable to utilize his/her economic potentiality.

Despite much recent progress undernutrition in Bangladesh is among the highest in the world and remains as a serious public problem. In spite of concerted efforts and various policies undertaken by the government of Bangladesh, high level of undernutrition problem still remains. Approximately six million Bangladeshi children between six months and five years of age are chronically undernourished (BDHS 2011). Undernutrition situation in Bangladesh is stated in Table 1

**Table 1: Undernourishment Situation of Bangladesh**

Affected People	Undernourishment Indicator	Percentage
<b>Children</b>	Stunting among children under 5	41%
	Underweight among children under 5	36%
	Wasting among children under 5	16%
	Low Birth Weight	22%
	Anaemia among children aged 6-59 months	51%
	Prevalence of breastfed children aged 6-23 months receiving a minimum acceptable diet	21%
<b>Women</b>	Anaemia among women of reproductive age	42%
	Anaemia non-lactating non-pregnant women	40%
	Anaemia pregnant women	50%
	Thinness among women of reproductive age	24%
	Short Stature	13%
<b>Children and Women</b>	Underweight Women	24%
	Vitamin A deficiency	21%
	Overweight and Obesity	2%

Source: Bangladesh Demographic and Health Survey 2011

As per the Table 1 it is evident that both macronutrient and micronutrient undernutrition problem prevails in Bangladesh. The percentage of people suffering from nutritional problem is severe in the country.

### **Per Capita per Day Calorie Intake Situation of Bangladesh**

People need calorie to keep body temperature and protein is an essential component of food to attain and maintain healthy life. As per Table 2 it is important to note that per capita calorie intake slightly decreased from 1995-96 to 2005 for rural, urban and all households but again increases in 2010.

Deficiency in either of these two will generate malnutrition which is referred as Protein-Energy Malnutrition (PEM). It is the real indicator of consumption of food and major nutrients contents of food. According to the FAO/USDA, the recommended daily minimum intake of protein for adults who are at an average weight and activity level is 56 grams per day for male and 46 grams per day for female. According to joint WHO/FAO Expert Group Guideline 10–20 per cent of overall calories must come from protein rich foods. Per capita protein intake also increases from 1995-96 to 2010 for all categories of households. It is also noteworthy that the levels of per capita calorie and protein consumption were well above the absolute poverty line calorie (2122 kcal) and recommended level of protein by FAO/USDA (56 grams) intake respectively. This implies that on an average the country is able to overcome PEM. But it is not pertinent with the undernutrition situation presented earlier. Intake of calorie and protein at national, rural and urban areas from 1995-96 to 2010 is given in Table 2.

**Table 2: Calorie and Protein Intake by Residence from 1995-96 to 2010**

Survey Year	Calorie intake (Kcal/cap/day)			Protein intake (gram/cap/day)		
	National	Rural	Urban	National	Rural	Urban
<b>2010</b>	2318.3	2344.6	2244.5	66.26	64.24	69.11
<b>2005</b>	2238.5	2253.2	2193.8	62.35	61.53	64.82
<b>2000</b>	2240.3	2263.2	2150.0	62.50	61.88	64.96
<b>1995-96</b>	2244.0	2251	2209	65.96	64.45	67.50

Source: HIES reports 1995-96, 2000, 2005 and 2010

### **Categories of Food as per Food Element Contents in Bangladesh**

Major food elements from which people generate calorie fall into six food elements. The food elements are; carbohydrate, protein, fat, vitamin, minerals and water. Of these food elements carbohydrate, protein, fat and vitamin are considered in this paper. In Bangladesh people derive carbohydrate from cereals like rice and wheat, protein from animal originated food i.e. meat, fish, egg, and plant originated food like pulses, fats from edible oils and vitamins from basically different vegetables. People of the country also eat lots of potatoes because of its availability. Although as a macronutrient contents it falls into carbohydrate category but the people of the country considered it as vegetable. In the study potato is considered as a food of carbohydrate

category. Milk/milk products is another important food item of our country and it is considered as a balanced food by the nutrition scientist since it is rich in terms of both macronutrient and micronutrient contents. Therefore, milk is considered as a separate food group by not keeping it under any one food category.

### Calorie Intake by Food Elements by Residence

According to HIES 2010 total calorie derived from carbohydrate, protein, fat, vitamin and milk/milk products consist of only the food items mentioned in previous section is 2043.9 kcal, 2087.5 kcal and 1921.5 kcal per capita per day at national level, rural and urban areas respectively. On the other hand total calorie derived from all food items consumed in Bangladesh according to HIES 2010 is 2318.3 kcal, 2344.6 kcal and 2244.5 kcal per capita per day at national level, rural and urban areas respectively. Therefore, calorie derived from other foods are 274.4 kcal, 257.1 kcal and 323 kcal per capita per day at national level, rural and urban areas respectively. In Table-3 calorie intake from food elements (carbohydrate, vitamin, protein and fat) and rest of the food items are given by residence in Bangladesh.

**Table 3: Food Element-wise Calorie Intake by Residence (per capita per day)**

Residence	Food Element					
	Carbohydrate	Protein	Fat	Vitamin	Milk/Milk Products	Other*
National	1593.2	150.1	184.1	89.1	27.4	274.4
Rural	1674.1	132.8	164.3	91.1	25.2	257.1
Urban	1366.1	199.0	239.7	83.2	33.5	323.0

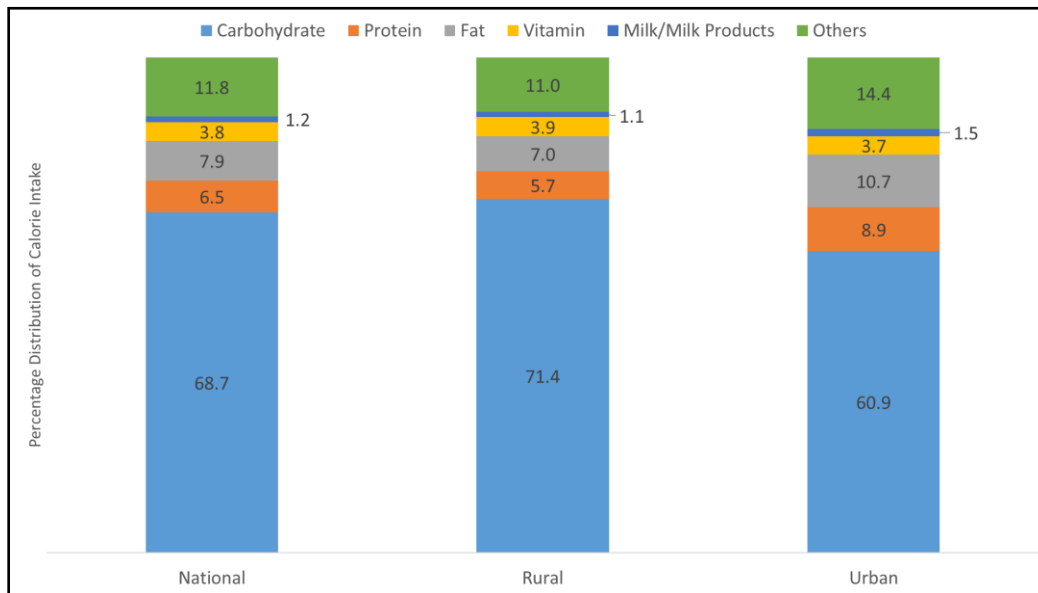
Source: Authors calculation from Household Income Expenditure Survey 2010:

Note: \*Others include condiments & spices, fruits, sugar/gur and miscellaneous items.

As per the Table 3 rural people are taking more calorie in total than the national average and urban population as well as calorie derived from carbohydrate and vitamin. On the other hand urban population is receiving more calories from protein and fat. Percentages of calorie intake from carbohydrate, protein, fat and vitamin to total calorie intake at national level are 68.72%, 6.47%, 7.94% and 3.84% respectively. Percentages of calorie intake from carbohydrate, protein, fat and vitamin to total calorie intake in rural area are 71.40%, 5.66%, 7.01% and 3.88% respectively. Percentages of calorie intake from carbohydrate, protein, fat and vitamin to total calorie intake in urban area are 60.86%, 8.87%, 10.68% and 3.71% respectively. Calorie derived from carbohydrate is more than the recommended percentage of 60% (Quamrunnahar *et al* 2013) both at national level and in rural area. In urban area it is near the recommended level. On the other hand calorie derived from protein and fat is lower compared to the recommended percentage (11% per cent from fats and 13.5 per cent of calorie from proteins as per Quamrunnahar *et al* 2013) at all areas (national, rural and urban area).

Percentage contribution of calorie intake from carbohydrate, protein, fat and vitamin to total calorie intake is given by residence at a glance in Figure 1.

**Figure 1: Food Element-wise Percentage Distribution of Calorie Intake by Residence**



Source: Authors Derivation from Household Income Expenditure Survey Report 2010

From Figure 1 it is manifested the percentage contribution of calorie intake from carbohydrate to total calorie intake is very high in both rural and national level and percentage contribution of calorie intake from other food groups to total calorie intake is very low in all areas. Again in both rural and urban population are showing similar pattern of consumption behaviour. People's consumption behaviour is biased towards the consumption of carbohydrate.

### Evidence of Imbalance in Food Consumption

The first and foremost prerequisite for achieving food security is that all people must have adequate nutritious food at all times. A balanced diet contains all the necessary nutrients in right amount. If a person can have a balanced diet for his/her whole life then he/she can be ensured of receiving proper nutrient for an active and healthy life. In addition to this the practice of receiving a balanced diet must be continued from generation to generation. Any imbalance in the diet will cause nutrition problem in the form of undernutrition and overnutrition. Therefore, establishing a balance in the food composition is at the heart of achieving food security in Bangladesh.

In a balanced diet, the ratio of energy distribution from carbohydrate, protein and fat would need to be: 7:1:2. According to the joint WHO/FAO Expert Group Guidelines a balanced diet exists when the following conditions are met:

The proportion of dietary energy provided by protein should in the range of 10%–20%.

The proportion of dietary energy provided by fats should be in the range of 15%–30%.

The proportion of dietary energy provided by carbohydrates should be in the range of 50%-65%.

Although mean protein intake is more than the requirements, the quality of protein is poor since 75% of protein comes from plant sources (Quamrunnahar *et al* 2013). Although rice protein ranks high in nutritional quality among cereals, the protein content is modest. Intake of pulses can upgrade the proteins from rice sources since limiting amino acids could be mutually improved in these two foodgrains. Because of the poor pulse intake (14g) it can mutually upgrades only about 25% proteins from rice sources in current Bangladeshi diets.

**a. Imbalance in Food Expenditure Pattern**

In Bangladesh, average expenditure and food expenditure is 11,200 taka and 6,031 taka per month respectively in 2010. It means percentage of expenditure on food items to total expenditure is 53.85 which is significant (HIES 2010). Again percentage of expenditure on cereals to total food expenditure is also very high which is 35.95% in 2010 (HIES 2010). It means that cereals comprise of an important part of the expenditure pattern in Bangladesh. Food item wise percentages of expenditure to total expenditure according to different Household Income Expenditure Surveys are given below:

**Table 4: Food Item Wise Percentage Distribution of Expenditure to Total Expenditure**

Food Item	2010	2005	2000	1995-96
<b>Cereals</b>	35.95	39.00	38.02	43.93
<b>Meat, Fish, Egg &amp; Pulses</b>	26.37	23.40	23.42	20.58
<b>Vegetables</b>	7.79	8.38	9.21	8.88
<b>Milk &amp; Milk products</b>	3.02	3.74	3.95	4.82
<b>Edible oil</b>	4.35	4.25	3.71	3.77
<b>Others</b>	22.52	21.23	21.69	18.02
<b>Total</b>	100.00	100.00	100.00	100.00

Source: HIES Report 2010, 2005, 2000 & 1995-96



The expenditure on cereals are reducing and on protein oriented foods (pulses, meat, fish and egg) are increasing slowly from 1995-96 to 2010 period. In Bangladesh, although the non-poor groups spend more on non-food items whereas the poor spends more on foods compared to the non-food item, both the groups spend a significant amount on food items.

**b. Imbalance in Food Composition Pattern**

Average per capita per day calorie intake at national level in 2010 is 2318.3 kcal. During the previous three HIES period the average per capita per day calorie intake were more than 2122 kcal per capita per day. It seems that the people of Bangladesh are able to engender significant improvement in energy generation from foods, despite the amount are still less than the FAO recommended amount of 2430 kcal per capita per day. To analyze the relative strength of this success, a closer view of the food compositional pattern is important. Food items wise percentage contribution in terms of calorie intake per capita per day is given below in Table 5.

**Table 5: Food Item-wise Percentage Contribution in terms of Calorie Intake (per capita per day)**

Food Item	2010
<b>Cereals</b>	69.8
<b>Meat, Fish, Eggs &amp; Pulse</b>	6.6
<b>Potato</b>	2.9
<b>Vegetable</b>	3.8
<b>Milk &amp; Milk products</b>	1.2
<b>Edible oil</b>	7.9
<b>Others</b>	7.8
Total	100.00

Source: Household Income Expenditure Survey 2010

According to the Table 5 it is apparent that bulk of the calorie is derived from cereals and from only rice it is 62.0% (HIES 2010). Second largest contribution for calorie intake is edible oils. The contribution of protein rich foods for calorie intake is only 6.6% which is very low.

**c. Imbalance in Source of Protein Intake Pattern**

The protein intake per capita per day in Bangladesh is 66.26 gram, 62.52 gram, 62.50 gram and 64.96 gram according to the HIES Report 2010, 2005, 2000 & 1995-96 respectively. These figures are appreciable in the sense that during these twenty years period the country was able to keep the protein intake level more than FAO/USDA recommended amount (56 grams per capita per day) consecutively. This finding required a more critical discussion since the source of protein from which it is generated is important. As a source, animal protein is considered to be

richer than plant originated protein in terms of nutrient content especially for its essential amino acid contents. Therefore, a closer look into the percentage contribution on protein intake of different food items is required to be noted. The table 6 given below provides a more clear view of the issue.

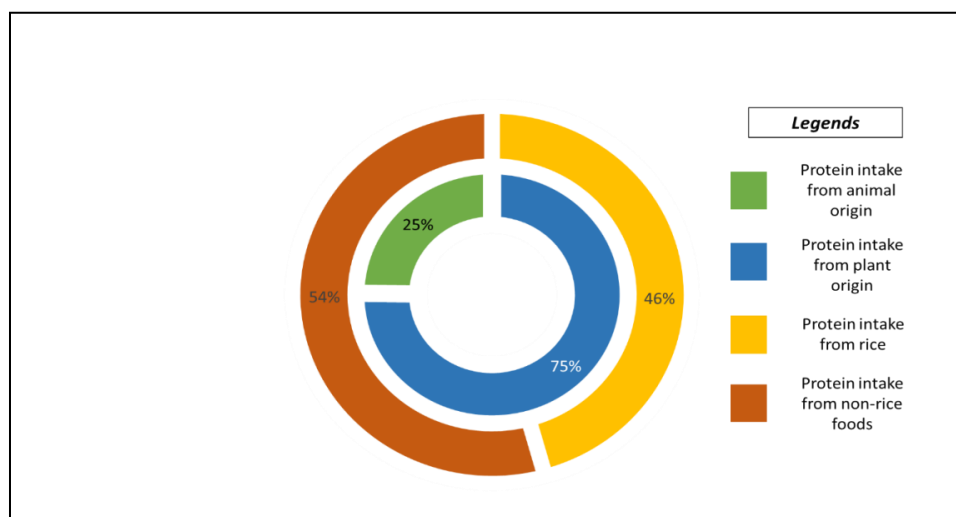
**Table 6: Item-wise Distribution of per capita Protein Intake per day by major foods**

Food Item	2010
<b>Cereals</b>	53.00
<b>Meat, Fish, &amp; Eggs</b>	23.0
<b>Pulse</b>	5.20
<b>Potato</b>	3.20
<b>Vegetable</b>	7.50
<b>Milk &amp; Milk products</b>	1.80
<b>Others</b>	6.30
Total	100.00

Source: Household Income Expenditure Survey 2010

The Table 6 given above manifests that in the food consumption basket of the people of Bangladesh; the contribution of cereals in protein intake is significant. Again total plant origin protein intake is 75.2 per cent and animal origin protein intake is 24.8 per cent. Moreover protein derived from rice is 45.7 per cent. The Figure 2 given below sketches the percentage contribution of rice, animal protein and plant originated protein to total protein intake.

**Figure 2: Distribution of protein intake per capita by animal and plant, and by rice and non-rice by Source.**



Source: Authors Derivation from HIES 2010

The Figure 2 shows the imbalance existed in consumption pattern in case of source of protein intake in Bangladesh. People are heavily dependent on rice for their protein need.

#### d. Imbalance in Calorie Intake from Different Food Groups

Consumption per capita per day (in gram) and Calorie intake from the food element per capita per day in 2010 is given in the Table 7 below:

**Table 7: Calorie Intake and Consumption of Food Element (per capita per day)**

Food group	Calorie Intake (kcal)	Consumption (grams)	Percentage Contribution	
			Calorie	Consumption
Carbohydrate	1593.2	512.3	72.70	53.41
Protein	150.1	90.0	6.48	9.00
Vitamin	89.1	166.1	3.84	16.61
Fat	184.1	20.5	7.94	2.05
Milk and milk products	27.4	33.7	1.18	3.37
Others	274.4	177.5	7.86	15.56
<b>Total</b>	<b>2318.3</b>	<b>1000</b>	<b>100</b>	<b>100</b>

Source: Household Income Expenditure Survey 2010

According to the Table-7 given above consumption of carbohydrate per capita per day is the highest (53.41%) in Bangladesh. Vitamin secured the second position (16.61%) in terms of consumption per capita per day. Percentage contribution in consumption of protein, fat and milk/milk products are 9.00%, 2.05% and 3.37% respectively. As a food element carbohydrate consumption is very high and protein consumption is very low.

Percentage contribution to calorie from carbohydrate is 72.70%. However, according to a research by BIRDEM under the research program of the Ministry of Food it should be 60% (Quamrunnahar *et al* 2013). This means that people, on average, consume more carbohydrate than the desired level in Bangladesh. In terms of protein it is 6.47% where as the recommended percentage is 13.5%. In terms of fat it is 7.94%, while the recommended percentage is 11%. On the other hand percentage of calorie generated from vitamin and milk/milk products are 3.84% and 1.18% respectively but the recommended percentage is 4% and 3.5% respectively. Clearly, there is an anomaly in food consumption pattern in Bangladesh and it is heavily based on carbohydrate.

**e. Food Element-wise Comparative Analysis between Required and Actual Calorie Intake by**

According to the study conducted by BERDEM about 40% of the population takes more than 75% of total calorie from carbohydrate. Forty per cent of the population takes less than 10% of total calorie from protein sources and 53% of the population take less than 15% of total calorie from fat which reflects in the scenario of stunting, wasting and underweight in the country. Dietary diversity score (DDS) which is a proxy for nutrient adequacy of the diet of individuals, was calculated using the HIES 2010 food consumption data. Dietary diversity score of fifty per cent of the households is less than 6 (Quamrunnahar et. al. 2013) indicating those households are at risk for micronutrient deficiency.

According to the Guideline prepared weighted per capita per day mean ( $\pm$ SD) carbohydrate (g), protein (g) and fat (g) intake for Bangladeshi population are  $413\pm 106$  gram,  $57.2\pm 15.6$  gram and  $29.3\pm 14.0$  gram respectively. When protein intake of Bangladeshi population has been analysed it is found that 66.5% of the population takes more than 50 gram of protein but which are largely from plant sources.

Weighted mean intake of vitamin A ( $\mu\text{g/day}$ ), calcium (mg/day), iron (mg/day) and thiamine (mg/day) for Bangladeshi population according to the HIES 2010 data were  $388\pm 291\mu\text{g/day}$ ,  $439\pm 227\mu\text{g/day}$ ,  $10.96\pm 3.82\mu\text{g/day}$  and  $1.0\pm 0.6\mu\text{g/day}$ . More than 70% of the population are consuming less than the requirements of vitamin A, calcium and iron. Although it appears that the mean intake of vitamin C ( $85.4\pm 67.1\text{mg/day}$ ) is sufficient, more than 25% of the population is noted to be consuming less than the requirement.

**Comparison between Required and Actual Calorie Intake by Food Group**

The desired food intake (g) and the percentages of energy that should be derived from each food element are given in Table-8 below as per guideline. Actual food intake and the percentages of energy that are currently derived as per HIES 2010 is also shown in the Table 8.

**Table 8: Comparison between Desirable and Actual Food Intake and Calorie Intake by Food Group (per capita per day)**

Food Item	Desirable Food Intake (DDP)		Actual Food Intake (HIES 2010)	
	Food Intake (g)	% of Energy	Food Intake (g)	% of Energy
Carbohydrate	500	60%	512.3	72.70
Protein	180	13.5%	90.0	6.48
Fat	30	11%	20.5	7.94

Vitamin	300	4%	166.1	3.84
Milk/Milk Products	130	3.5%	33.7	1.18
Other Foods	140	8%	177.5	7.86
Total	1280	100%	1000.1	100%

Source: Desirable Diet Pattern, BIRDEM 2013 and Household Income Expenditure Survey 2010

It is apparent from the above Table-8 that people are receiving less calorie from protein, fat, vitamin and milk compared to the recommended percentages and getting much higher percentage of energy from carbohydrate source. There also exists divergence between desired consumption per capita per day (in gram) and actual consumption per capita per day (in gram) of different food group.

In terms of consumption per capita per day (in gram) carbohydrate consumption has to be reduced by 12.3 gram (2.40%). Other than carbohydrate, consumption of protein, fat, vitamin and milk/milk products are less than the required amount. Consumption of protein, fat, vitamin and milk/milk products are needed to be increased by 90 gram, 9.5 gram, 133.1 gram and 96.3 gram respectively per capita per day. Percentages increase in consumption of protein, fat, vitamin and milk/milk products are 100%, 46.34%, 80.13% and 285.76%. This implies the consumption of these four food elements required to be increased significantly. Total consumption of food per capita per day has to be increased by nearly 280 gram (about 28%).

**f. Distribution of Population as per Nutrient Intake**

In a study forty per cent of the population takes less than 10% of total energy from protein sources and 53% of the population take less than 15% of total energy from fat (Quamrunnahar *et al* 2013). Low protein and fat intake are the possible factors implicated in the low birth weight prevalence which is 22% (WHO, 2012), 41% of stunting, 16% of wasting, 36% of under-weight (BDHS, 2011) and thinness i.e. 30% of the women have BMI less than 18.5 (BDHS, 2007). These findings reflect the presence of under-nutrition in Bangladesh attributed to disproportionate consumption of carbohydrate, protein and fat intake. Table-9 given below shows the percentages distribution of population as per nutrient intake.

**Table 9: Percentages Distribution of Population as per Nutrient Intake**

Macronutrients	Carbohydrate			Protein			Fat		
<b>Range of intake (%)</b>	<55	55-75	>75	<10	10-15	>15	<15	15-30	>30
<b>% Population</b>	16.3	43.3	40.3	40	50	10	53	44	3

Source: Quamrunnahar *et al*, Desirable Dietary Guideline, BIRDEM, 2013.

According to the Table 9 significant percentage of people depends on carbohydrate for their calorie need and the percentage contribution of carbohydrate is higher than the required. On the other hand significant percentage of people receives less protein compared to the required percentage. Same observation is also found in case of fat intake.

## **CONCLUSION**

The analysis presented shows that a significant contribution of cereals (carbohydrate) in the consumption which indicate a cereal based consumption behaviour of the people of Bangladesh. If the average recommended calories are being achieved through consumption of excessive cereals or carbohydrate, it is obvious that there is failure to attain essential nutrients rich foods. Again protein generated from plant sources are considered as less preferred in terms of their nutrient contents. The persistence of this kind of consumption behaviour produce a population with ill health and less productive. The nutritional scenario reflects the result of this kind of consumption pattern. For a country like Bangladesh where poor performance in productivity is a concern for economic development, the country is not in a position to compromise it. The changes in the food-consumption pattern are pervasive and will definitely move towards high-quality food commodities in the long-run with the increase in income, urbanization, and perceptions of consumers regarding food quality, safety and health. Hence it can be predicted that the demand for non-cereal food commodities would likely grow faster.

Bangladesh is successful in maintaining to receive calorie more than the upper poverty line for the last twenty years. This achievement is not compatible with the nutritional condition of the country. A lot of people are suffering from both macronutrient and micronutrient deficiency. From the discussion of the paper it is showed that the people of Bangladesh are having a imbalanced diet in which cereals occupy the greater portion. People of Bangladesh receive much less protein, fat and vitamin compared to the required amount. They receive carbohydrate which is more than the required amount. Food security cannot be achieved if this sort of consumption pattern prevails. In order to consume a balanced diet or in other words to achieve food security it is indispensable to change the behavioural pattern of consumption. The change should be such that over reliance on carbohydrate is reduced and intake of other nutrient should be enhanced.

## **REFERENCES**

1. Ahmad, K. and Hassan, N. (1983). Nutrition Survey of Rural Bangladesh, Institute of Nutrition and Food Science, University of Dhaka.
2. Bangladesh Demographic and Health Survey, 2011

3. Chen, L. C. (1975). An Analysis of Per Capita Food Grain Availability. Consumption and Requirement in Bangladesh: A Systematic Approach of Food Planning, the Bangladesh Development Studies, Vol. 3.
4. Gedrich, K. (2003). Determinants of Nutritional Behaviour: A Multitude of Levers for Successful Intervention Research Report at 25th Anniversary Symposium of AGEV
5. Household Income Expenditure Survey 1995/96, 2000, 2005 and 2010.
6. Jahan, K. and Hossain, M. (1998). Nature and Extent of Malnutrition in Bangladesh, Bangladesh National Nutrition Survey, 1995-96, Institute of Nutrition and Food Science, University of Dhaka.
7. Knudsen, O., K. and Scandizzo, P. L. (1982). The Demand for Calories in Developing Countries, American Journal of Agricultural Economics, Vol.64.
8. Mitra, S. Mukhopadhyay, K. D.,Sarkar, A. P. and Saha, I. (2019) Are household food security, nutrient adequacy, and childhood nutrition clustered together? A cross-sectional study in Bankura, West Bengal Indian Journal of health and Nutrition vol 63 issue 3.
9. Quamrunnihar., Choudhury, S. and Faruque, O. M. (2013). Dietary Guidelines for Bangladesh, BIRDEM, Food Planning and Monitoring Unit, Ministry of Food and Disaster Management and National Food Policy Capacity Strengthening Programme, Government of Bangladesh.
10. Srivastava, S., Singh, B. and Kumar, S. (2014). Food Security Status and Nutritional Adequacy in Arid Part of India: A District Level Analysis, Journal of Agriculture and Life Sciences ISSN 2375-4214 (Print), 2375-4222 (Online) Vol. 1, No. 2; December 2014