

# Climate change effect on nutritional status and food security of south coastal people of Bangladesh

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Food security of south coastal people. One hundred family from 5 villages in Kalapara upazila like Malapara, Khajura, Fashipara, Tulatoli and Kuakata were selected by the simple random procedure. Then 1 male and 1 female were contacted of each family. At present climate change is one of the biggest issues in the world because it affects on food security, nutritional status and agriculture. Without knowledge about health status, social condition and climate change, people do not understand how much they should take food either increase or decrease amount and their health condition. So it is important to know anthropometric and demographic data of every people in south coastal area. The study is therefore conducted among 200 participants on 100 families from Kalapara upazila closer to Kuakata sea beach in Patuakhali district. On the coastal area equal percentages of participants are taken from males and females which are taken randomly and analyzed by Microsoft Word and Microsoft Excel computer and designed as cross-

sectional study. This study show that 63%, 69%, 96%, 66%, 83% males and 54%, 65%, 91%, 62%, 62% females were normal body weight, ideal blood pressure, normal heart beats rate, normal body temperature, allergies on BMI, blood pressure, heart beats rate status, body temperature status, disease screening. 78% male were farmer and 94% female were house wife but 43% family income was 5-8 thousand taka per month. 37%, 40% male and 46%, 23% female were completed below primary and SSC level, respectively. 86% male and 91% female were 15-60 years age. 78%, 98%, 73%, 83%, 42%, 85%, 73% farmers were cultivated Aman rice, Pulse, Water melon, Groundnut, Maize, Chili and Potato, respectively. Most of respondent said that water salinity was decreasing in day by day. 40% -60% respondents produced and cultivated rice, vegetables, pulse, other crops, fish for their family need. Because of changing the climate conditions the changing their normal life through the food security and nutrition security.

**Key Words:** Food security; Climate change; Nutrition; Coastal; BMI

Bangladesh is identified as one of the most vulnerable countries to climate change. There are numerous projections about temperature and sea-level rises and their potential impacts. Intergovernmental Panel on Climate Change estimated that a 0.5 degree Celsius increase in mean temperature and a 10 cm rise in sea level could lead to inundation of 15 percent (approximately 750 km<sup>2</sup>) of the Sundarban forest, the largest mangrove ecosystem in Asia IPCC [1]. Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [1]. A World Bank study (2000) projects that by the year 2050, average temperature will increase by 1.8 degrees Celsius, precipitation will fluctuate 37 percent compared to 1990 in the dry season, and sea levels will rise by 50 cm in Bangladesh. Between 1972 and 2009, per capita carbon dioxide emissions in Bangladesh also increased by a factor of 6.68. IEA Training Manual, Volume Two, Vulnerability and Impact Assessments for Adaptation to Climate Change [2]. Protocol for Monitoring of Impacts of Climate Change and Climate Variability in Bangladesh. Dhaka, Bangladesh, IUCN (International Union for Conservation of Nature) "Climate Change and Water" identified that several gaps in knowledge exist in terms of observations and research needs related to climate change and water (Bates et al., 2008) [3]. Thus, better observational data and data accesses are necessary to improve knowledge of ongoing changes and to facilitate adaptive management required under conditions of climate change. A strong and robust hydrometeorology monitoring network is therefore fundamental to further work on detection and attribution of present-day hydrological changes; in particular, changes in water resources and in the occurrences of extreme events like floods, cyclones, droughts, erratic rainfall, storms, cold spells etc. [3].

So, coastal water and its saline environment have close association with cholera disease. Outbreaks of cholera often occur after flooding, because the water supply becomes contaminated. Thus, sea level rise, by increasing flood risk, increase the risk of cholera outbreak too. Increasing salinity levels also lead to increased incidences of hypertension in the coastal areas. This is a major problem for expecting women can even cause involuntary fetus abortion [4]. The effect of climate change on the changes of food crop production and nutritional health was very poorly addressed in the south

coastal region of Bangladesh. The prevailing situation calls an urgent need to investigate the effect of climate change on food crop production and nutritional health of south coastal people of Bangladesh.

## MATERIALS AND METHODS

### Type of study

The study is based on survey and laboratory work. A cross sectional sample survey was carried out among 100 family in Kalapara upazila of Patuakhali district. This methodology is chosen as it will show the nutritional status and food security factors affecting it of the coastal belt people at a point in time.

### Location of the study

Patuakhali is a district of Bangladesh that is located at southern part in Bangladesh. The study was done at 100 families in different village of Latachapali union of Kalapara upazila. The study area was very closer to Kuakata sea beach.

### Study population and sample size

The study population were in different village people at Kalapara upazila in Patuakhali district. There randomly 2 peoples were selected from every family from this villages.

### Procedure to assess nutritional status

#### Body mass index (BMI) measurement

To calculate BMI, I used the following equation (Table 1).

**TABLE 1**

The interpretation of BMI results

| BMI values | Interpretation |
|------------|----------------|
| <18.5      | Underweight    |
| 18.5-24.9  | Normal         |
| 25.0-29.9  | Overweight     |
| 30.0->40   | Obesity        |

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$$BMI = \frac{\text{Weight in kilograms}}{(\text{Height in meter})^2}$$

**Blood pressure measurement**

Blood pressure is a measurement of the force on the walls of the arteries as the heart pumps blood through the body.

**Body temperature measurement**

The normal body temperature of a person varies depending on gender, recent activity, food and fluid consumption, time of day, and, in women, the stage of the menstrual cycle. Normal body temperature can range from 97.8 degrees F (or Fahrenheit, equivalent to 36.5 degrees C, or Celsius) to 99 degrees F (37.2 degrees C) for a healthy adult. I took temperature by axillary procedure.

**Heart beats rate/pulse rate measurement**

The pulse rate is a measurement of the heart rate, or the number of times the heart beats per minute. As the heart pushes blood through the arteries, the arteries expand and contract with the flow of the blood.

**Questionnaire**

Other information will be collected by a prestructured questionnaire which includes questions on natural disaster, global warming, sea level rise, source of water, health, disease, sanitation, staple food, salinity etc.

**Data analysis**

All of the statistical analysis and all other data processing were done by using Microsoft word and Microsoft Excel for tabular, charts and graphical representation.

**RESULT**

**Anthropometrical measurement frequency distribution of male and female nutritional status based on body mass index**

Statistically analysed frequency distribution showed that 24% (24 males out of 100 males) males and 27% (27 female out of 100 females) females were underweight. 13% males and 18% females were overweight. Zero percent male and 1% female were obese on this study area. However, 63% (63 males out of 100 males) males and 54% (54 females out of 100 females) females were normal body weight (Figure 1). Akhter and Sondhya Nutritional status of adolescents in Bangladesh: Comparison of severe thinness status of a low-income family's adolescents between urban and rural Bangladesh [5].

**Comparison analysis of nutritional status of total samples based on BMI**

The Figure 1 showed that 63% males and 54% females were normal body weight. But 24% males and 27% females were underweight. 13% males were overweight but 18% females were overweight. 0% males and 1% female were obese on the study area.

The Figure 2 shows that 58.50% (117 out of 200 respondents) respondents were normal body weight. But 25.5% respondents were underweight males and 15.5% respondents were overweight. Five percent respondents were obese on the study area.

**Frequency distribution of male and female nutritional status based on blood pressure**

Statistically analysed frequency distribution showed that 9% (9 males out of 100 males) males and 17% (17 females out of 100 females) females were low blood pressure. The 17% males and 16% females were pre-high blood pressure. The 5% males and 2% females were high blood pressure on this study area. However, 69% (69 males out of 100 males) males and 65% (65 females out of 100 females) females were ideal blood pressure (Figure 3).

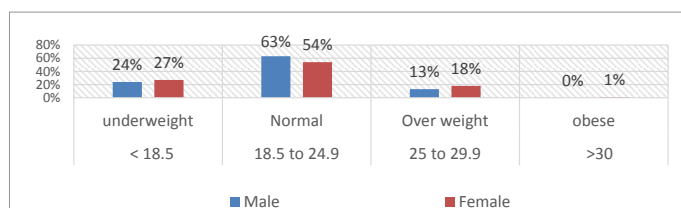


Figure 1) Frequency distribution of male and female nutritional status based on Body Mass Index.

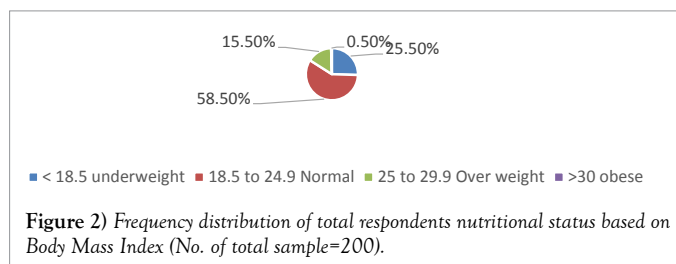


Figure 2) Frequency distribution of total respondents nutritional status based on Body Mass Index (No. of total sample=200).

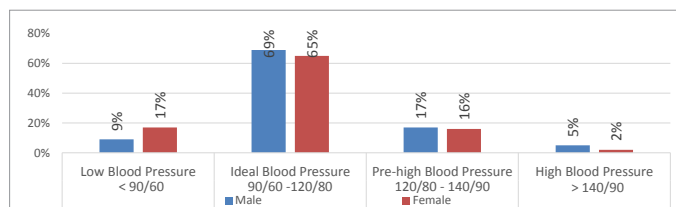


Figure 3) Frequency distribution of male and female nutritional status based on blood pressure.

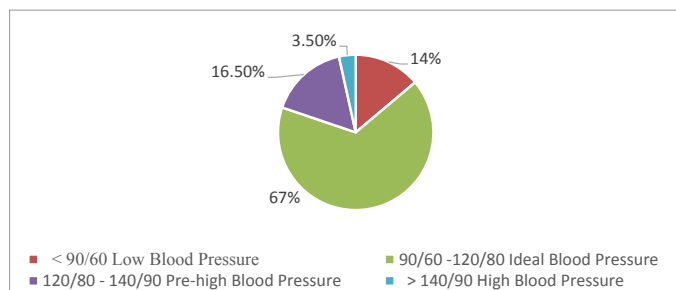


Figure 4) Comparison analysis of nutritional status of male and female respondents based on blood pressure.

The Figure 4 showed that 69% males and 65% females were ideal blood pressure. But 9% males and 17% females were low blood pressure. The 17% males were pre-high blood pressure but 16% females were pre-high blood pressure. 5% males and 2% females were high blood pressure on the study area.

**Demographic measurement**

Statistically analysed frequency distribution showed that out of 100 males, 78% were farmer, 15% fisherman, 5% wage labour and 2% had other occupation. Among the 100 respondents 94% were sole house wife, 2% wage labour and 4% had other occupation (Table 2).

**Comparison analysis of education level to the total samples**

The Figure 5 below showed that 3% males and 8% females can sign only and 11% males and 8% females can read and sign only. On the other hand 3% males and 14% females are illiterate. On the other hand, 37% males and 46% females are completed below primary education level. 40% males and 23% females are completed below SSC level. And 4% males and 2% females are completed HSC and above level on this study area.

The Figure 5 showed that 33.5% respondents (67 out of 200 respondents) are 15-30 years age, 28% respondents (56 out of 200 respondents) are 31-45 years age, 27% respondents are 46-60 years age, 10% respondents are 15-30 years age and 1.5% (3 out of 200 respondents) respondents are 76-90 years age.

**Frequency distribution of male and female disease condition due to salinity**

The Figure 6 showed that statistically analysed frequency distribution showed that 83% (83 males out of 100 males) male and 62% (62 females out of 100 females) female have allergies on their body. 42% males and 35% females have tonsil pain. 57% males and 64% females have vomiting problem on this study area. 67% male and 52% female have arthritis problem. 34% males and 41% females have high or low blood pressure. CDC and WFP a Manual: Measuring and Interpreting Malnutrition and Mortality [6]. Center Child and Mother Nutrition Survey of Bangladesh, 2005. Child mortality in rural Punjab, India.

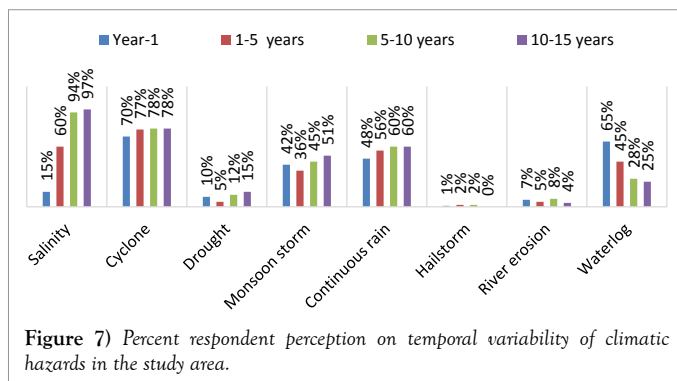
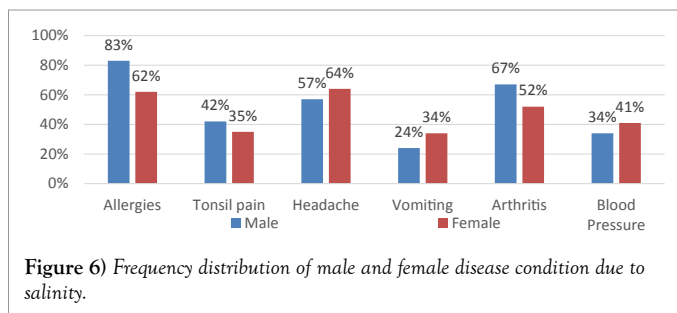
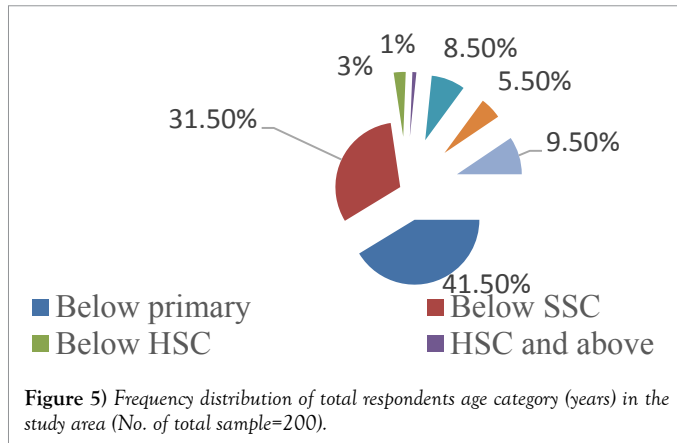
**Percent respondent perception on temporal variability of climatic hazards in the study area**

The Figure 7 showed that 15%, 70%, 10%, 42%, 48%, 1%, 7%, 65%

TABLE 2

Percent respondent perception of occupation in the study area

| Occupation  | Male Frequency | Occupation  | Female Frequency |
|-------------|----------------|-------------|------------------|
| Farmer      | 78%            | House Wife  | 94%              |
| Fisherman   | 15%            | Wage labour | 2%               |
| Wage labour | 5%             | Others      | 4%               |
| Others      | 2%             |             |                  |



respondents said to face salinity, cyclone, drought, monsoon storm, continuous rain, hailstorm, river erosion, waterlog in last 1 year. But 60%, 77%, 5%, 36%, 56%, 2%, 5%, 45% respondents said to face salinity, cyclone, drought, monsoon storm, continuous rain, hailstorm, river erosion, waterlog in last 1 -5 years. 94%, 78%, 12%, 45%, 60%, 2%, 8%, 28% respondents said to face salinity, cyclone, drought, monsoon storm, continuous rain, hailstorm, river erosion, waterlog in last 5 -10 years. But 97%, 78%, 15%, 51%, 60%, 0%, 4%, 25% respondents said to face salinity, cyclone, drought, monsoon storm, continuous rain, hailstorm, river erosion, waterlog in last 10-15 years.

Community Based Risk Assessment of Agriculture Sector in Sreerampur Union of Bangladesh [7]. Ashraf et al Salinity induced changes in  $\alpha$ -amylase activity during germination and early cotton seedling growth [8].

**Change in rearing of domestic animals due to climate change**

Statistically analysed frequency distribution showed that 74% respondents have <5 cows in current year, 17% respondents have 5-10 cows, 9% respondents have 10-20 cows in current year. But in 20 years ago, 8% respondent had < 5

cows, 64% respondents have 5-10 cows, 22% respondents have 10-20 cows, 6% respondent had >20 cows (Table 3).

84% respondents (84 respondents out of 100 respondents) said that they have <5 buffalo in current year. 16% respondents have 5-10 buffalo in current year. But in 20 years ago, 24% respondent had <5 buffalo, 56% respondents have 5-10 buffalo, 12% respondents have 10 -20 buffalo, 8% respondent had >20 buffalo.

62% respondents (62 respondents out of 100 respondents) said that they have <5 goat in current year. 33% respondents have 5-10 goat, 5% respondents have 5-10 goat in current year. But in 20 years ago, 8% respondent had < 5 goat, 76% respondents have 5-10 buffalo, 12% respondents have 10-20 goat, 4% respondent had >20 goat.

2% respondents (2 respondents out of 100 respondents) said that they have <5 chicken in current year. 6% respondents have 5-10 chicken, 21% respondents have 10-20 chicken, 71% respondents have >20 chicken, 21% respondents have 5-10 chicken in current year. But in 20 years ago, 12% respondents have 10 -20 chicken, 88% respondent had >20 chicken

2% respondents (2 respondents out of 100 respondents) said that they have <5 duck in current year. 11% respondents have 5-10 duck, 72% respondents have 10 -20 duck, 15% respondents have 10-20 duck in current year. But in 20 years ago, 8% respondents have 5-10 duck, 13% respondents have 10 -20 duck, 79% respondent had >20 duck.

14% respondents (14 respondents out of 100 respondents) said that they have <5 goose in current year. 66% respondents have 5-10 goose, 12% respondents have 10 -20 goose, 8% respondents have > 20 goose in current year. But in 20 years ago, 3% respondents have < 5 goose, 25% respondents have 5 -10 goose, 56% respondent had 10-20 goose, 16% respondent had >20 goose. Greg et al [9]. Climate Change, Food Security and Agricultural Productivity in Africa: Issues and policy directions.

**Changes in using water source due to climate change**

Statistically analysed frequency distribution showed that 100% respondents said that they drink tube well water at present. But 20 years ago, 85% respondent drank rain water and 15% drank tube well water. For cooking water, 100% respondents said that they use pond water at present. But 20 years ago, 87% respondent used pond water and 13% used rain water. For bathing water, 94% respondents said that they use pond water and 6% use tube well water at present. But 20 years ago, 100% respondent used pond water. For irrigation water, 5% respondents said that they use pond water and 3% use tube well water, 80% use rain water and 3% use other source of water at present. But in 20 years ago, 100% respondent used rain water (Table 4).

Water supply, sanitation and hygiene Sanitation Report Series, No. 1. World Bank, Washington, District of Columbia [10]. WHO 2003. Public Health Initiatives-Health Impact of Highly Saline Waters [11]. Geneva: World Health Organization. WHO 2008. Guidelines for Drinking-Water Quality.

TABLE 3

Percent respondent perception to change in rearing of domestic animals (number) due to climate change

| Animals | Current years |      |       |     | 20 years ago |      |       |     |
|---------|---------------|------|-------|-----|--------------|------|-------|-----|
|         | <5            | 5-10 | 10-20 | >20 | <5           | 5-10 | 10-20 | >20 |
| Cow     | 74%           | 17%  | 9%    | 0%  | 8%           | 64%  | 22%   | 6%  |
| Buffalo | 84%           | 16%  | 0%    | 0%  | 24%          | 56%  | 12%   | 8%  |
| Goat    | 62%           | 33%  | 5%    | 0%  | 8%           | 76%  | 12%   | 4%  |
| Chicken | 2%            | 6%   | 21%   | 71% | 0%           | 0%   | 12%   | 88% |
| Duck    | 2%            | 11%  | 72%   | 15% | 0%           | 8%   | 13%   | 79% |
| Goose   | 14%           | 66%  | 12%   | 8%  | 3%           | 25%  | 56%   | 16% |

TABLE 4

Perception of respondents to take source of using water.

| Types            | Present |            |           |        | 20 years ago |            |           |        |
|------------------|---------|------------|-----------|--------|--------------|------------|-----------|--------|
|                  | Pond    | Rain water | Tube well | Others | Pond         | Rain water | Tube well | Others |
| Drinking water   | 0%      | 0%         | 100%      | 0%     | 0%           | 85%        | 15%       | 0%     |
| Cooking water    | 100%    | 0%         | 0%        | 0%     | 87%          | 13%        | 0%        | 0%     |
| Bath water       | 94%     | 0%         | 6%        | 0%     | 100%         | 0%         | 0%        | 0%     |
| Irrigation water | 5%      | 80%        | 3%        | 3%     | 0%           | 100%       | 0%        | 0%     |

## DISCUSSION

This study was composed of coastal belt people in Kalaparaupazila at Patuakhali district southern parts of Bangladesh. This study was aimed to investigate the nutritional status by anthropometric dimensions and food security by different demographic dimensions in the south coastal people but it was not representative all coastal area information in Bangladesh. But it was represented differences geographical situation, climate change, education, habit, health status and economic to the coastal people. A number of indicators were used to classify the nutritional status and food security of coastal people such as body mass index, blood pressure, body temperature, heart beats rate, disease, food consumption, crops pattern, using water, domestic animal, salinity condition which gives indications of the long term impact of south coastal people. In this study, 59% respondents are normal body weight based on BMI where 63% males and 54% females are normal body weight. And 67% respondents are ideal blood pressure based on blood pressure range for adult where 69% males and 65% females are ideal blood pressure. 93.5% respondents have normal heart beats rate based on heart beats rate range for adult where 96% males and 91% females are normal heart beats rate. 64% respondents have normal body temperature based on body temperature range for adult where 66% males and 62% females are normal body temperature. 72.5%, 72.5%, 60.5%, 60.5%, 59.9%, 37.5% respondents have allergies, tonsil pain, headache, vomiting, arthritis, blood Pressure and other disease. 78% female respondents are farmer and 94% female respondent are house wife. Other respondents have different occupation. 43% respondents monthly family income are less than five to eight thousands taka only. Others respondent monthly family income is more than eight thousands taka only. 41.5% respondents are completed below primary level and 31.5% respondents are completed below SSC level. Others respondent can sign or read only. 64% respondent's age are 15-45 years age where 44% respondent are males and 79% respondents are females. Other respondent's age is more than 45 years age. 17%, 16%, 33%, 6%, 11%, 66% respondent said that they have 5-10 cow, buffalo, goat, chicken, duck, goose in current years but others respondent have more or less domestic animal. 100% respondent said that they drink tube well water but use pond water for cooking at present. 80% uses rain water for irrigation. 94% respondents use pond water for bath. From the article its clear that the climate change affect the household food security.

## CONCLUSION

Climate is changing day by day and human's nutritional status and food security will be affected Anthropometry is a systemic and scientific process of human body measurement which identify the effect and demographic result which represent the reflection of present condition. Bangladesh is a developing country with significant problem of climate change, malnutrition, different disease, health problem and food security problem. This study reported that climate change is more affected to our south coastal people and their nutritional status and food security. It is high time for our government

and local people to take step to prevent the climate change and take another step to protect our south coastal people, their nutritional status and food security.

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