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Effects of Natural Disaster on Food Availability, Accessibility and Consumption in Household Level of Coastal Villages

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Abstract

Bangladesh certainly affected by natural disaster and coastal district of Bangladesh frequently exaggerated by this event. Natural disaster undoubtedly impact upon the individual's livelihood in coastal areas and extent of result sustain for a prolonged term. Beyond some factors have been identified which badly accountable for produces impact on coastal areas, where solely food security affect severely. Predominantly it has been identified food security becomes more vulnerable after the natural disaster and people of coast zone suffered much in this condition. In this study survey method was implemented and data were collected through interview schedule by using simple random sampling. Data were collected from household heads from Kamarkhola and Sutakhali villages of Dacope Upazila of Khulna district. Descriptive statistics was used to estimate percent analysis and inferential statistics was employed for Chi-square tests as quantitative data analysis; whereas, the secondary source was applied in the qualitative analysis. This research intent to evaluate the extent of change in food availability, food accessibility and consumption in the household level. This study correspondingly tries to identify the responsible causes of change of food availability, food accessibility and consumption in the household level. The further study analyzed the month wise food adequacy in household level in a post-disaster situation. Finally, in propositions testing, there were founded the significant relationship between the independent and dependent variables.

Keywords: Disaster; Food security; Coastal areas; Availability; Accessibility; Consumption

Introduction

Bangladesh is currently extensively recognized as one of the countries furthermost exposed to climate change. Bangladesh has been victims of climate change consequently and has been facing various kinds of natural disasters in the past decade or so. Natural hazards that arisen from increased rainfall and cyclones are predictable to increase as climate changes are individually extremely affecting agriculture, water & food security, human health and shelter. Natural disaster directly and indirectly,affects the food security and it's mean that the food insecurity increasing by the natural hazards. In Bangladesh, coastal region is much vulnerable to the natural disaster and mainly the cyclone affected zones are the coastal region severely [1]. In Bangladesh, it has been estimated that 30 million people live in the coastal areas and they depend mostly on agriculture, fishery, forestry, and other livelihood activities [2]. These huge number of population struggle whenever a natural calamities occurs in the coastal zone. In Bangladesh, There have been many cyclone hits in the coastal areas; if we look at past two decade from 1990s and 2000s we can see major three cyclones have hit us. Where in 1991 powerful tropical cyclone struck the Chittagong district of southeastern Bangladesh, in 2007 very severe cyclonic storm Sidr affected the coastal region and in 2009 tropical cyclone Aila hit in the southwestern part of the coastal region of Bangladesh. After the cyclone in the coastal zones, there happen various impacts on people's livelihood. The effect recorded on salt water shrimp cultivation, crops production, industrial and commercial activities, over-exploitation of natural resources have been blamed as major causes playing detrimental roles on its natural resources as well as livelihood, thus raising concerns about food security in the coastal region [3]. It has been observed that, after the natural disaster peoples of coastal zone where been affected by food insecurity, where their food availability, accessibility, and consumption pattern adversely obstructed. Furthermore, climate change related risks and uncertainties raise concerns regarding the healthy existence of the unique ecosystems as well as food security in the years to come. Thus, the overall situation is in full contrary of food security as providing physical and economic access to balanced diets to all people at all times [4] .Basically, this study concentrated on the post-disaster food security of the coastal population and their household. In the coastal areas, most of the land are cropped once and remain fallow throughout the year. Domestic food production of those coastal area provides little backup of food availability for the population of that area. Natural hazard has a substantial problem in this area, which has a great effect on food security. This study has a huge importance to determining the extent of change in food security in the coastal zone of Bangladesh. This study has evaluated important factors and provides a strong relationship with household food availability, food access, and food consumption. However, study intends to recognize the post-disaster situation of food security in the coastal zone of Bangladesh with household response to food availability, accessibility, and consumption in household level.

Objectives

This study intent to extract the extent of changes along with its responsible causes of food availability, accessibility and consumption pattern in household level. Moreover, this research identify the correlates between sources of main food grain and extent of change in the food availability in household, income and extent of change in the

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food consumption in household, food availability and extent of change in the food consumption in household, food accessibility and extent of change in the food consumption in household, agriculture land ownership and extent of change in the food accessibility in household.

Methodology

This study is explanatory in nature that explains the situation to assess the level and extent of food insecurity problem after the disaster of coastal areas in Bangladesh. The survey method adopted was for primary data collection. Under the Khulna Zilla, the Dacope Upazila one of cyclone affected area, there are two villages respectively Kamarkhola and Sutarkhali are most cyclone affected areas of this Upazila. These two villages selected purposively for data collection. These two villages considered as study area of this research. Data were collected from the field by using simple random sampling technique. Within these two villages, data were collected from the 144 household head and the sample size was determined by the sample size determination formula, here taken confidence level 95% and confidence interval was 11. An interview schedule was prepared which contained both open and close-ended items and interview schedule was conducted pre-tasted before data collection. Raw data was found from the field and data were processing by removing inappropriate codes, decreasing logical variations, reducing improbabilities and by solving ambiguities. Coding was used to categorize the data in harmony to its quality, quantity, periodical source and then data was organized. Tabulated data was processed by automated and used computer software's SPSS and MS Excel. Process data was evaluated and inferred by means of descriptive along with inferential statistical techniques using the SPSS version 20. Descriptive statistics such as frequencies and percentages were mostly used to analyzed the data. Inferential non-parametric tests such as Chi-square (χ^2) test were performed to measure the vicariate associations between independent and dependent variables.

Literature Reviews

Due to natural disasters people in coastal areas of Bangladesh suffered by numerous serious factors, in which food security affected mostly coastal population severely. The food security which similarly happens after the regular situation is not positives then the shortage of food is spread out in a certain place [5]. Nevertheless, researcher could not identify the underlying causes of food security in his research study. In the 1998 flood-affected food security in Bangladesh at the national household levels, the response of the government to the crisis, and the coping strategies engaged by the household themselves [6]. However, they could not mention the specific coping mechanism for food accessibility, availability, and consumption, which is a specific gap in their research. Food availability affect by the natural disaster, where people have limited opportunity to maintain food security in household level. Availability of sufficient food at the country or local level does not mean that all people within that geographic unit are secured. Food security infers that food consumption must be satisfactory in quantitative standings [7], they both focused on the quantitative analysis of food security but the qualitative information could be essential to explain the real situation in particular areas. Natural disaster affects food security and access to food hurdle by negative factors so that people seeking for an alternative route to obtain food from sources. One would just assume that if climate change makes one type of food less accessible, people could just choose another food source [8], here did not properly specified the most reasonable causes of the impact of natural disaster on food security. The policy implication is one of the vital ways to reduce food insecurity if concern authority takes the disaster risk management measures, food security can be ensured in household level. Mitigate disaster impact on poor population groups, development policy, and disaster management need to become mutually supportive. It proposed that in disaster-prone locations measures to improve disaster resilience should be an integral part of food security policies and strategies [9], both researchersmentioned challenges of food security in terms of economics, but did not focus on socio-cultural factors for food insecurity after disaster. The food security problem is not a country based issue rather itis a global problem within the entire globe. Solutions require total international cooperation to succeed. This is because access is a social aspect of food security, and in a globalized world, our food society is the entire planet. A large amount of food needs to be sent to the areas where food is scarce. This will result in two things: the hungry will be fed, and the overfed will probably start to use food more efficiently. Using food sources more efficiently also means a change in preferences of food security [10], however, only food sources alone not enough for food security. There also need state and non-state support for food security, which not identified. Food security fundamentally measures on three foremost extents; food availability, accessibility, and consumption, which influenced by some external influences and natural disaster are one of them.

Result and Discussion

Socio-economic profile of respondents

In this study there were only collected data from the household head; Table 1 summarizes present socio-economic profile of the respondents. There was found 88.2% male household head and only 11.2% was the female-headed household in the study area. It is crystallized the mean age of household head was 43 years, with the majority (28.5%) being between 36-41 years old. It was found that among them the majority (41.7%) had the family member of 5-6, with a mean family member of this group was calculated as 5. Among the total respondents of the study majority (51.4%) had the schooling of 6-8 years (Junior Secondary level) with a mean year of schooling of the respondents is 6. In the household head, 54.2% people live to lead their livelihood on agriculture work and rest of the respondents was occupied by non-agriculture labor. In this research income of households head categorized into three groups low-income group, medium income group, and high-income group. Among the head of households, head majority (65%) had their monthly income of less than 5001 BDT. Here mean monthly income was calculated 5109 BDT. The majority (67.4%) of household head monthly family expenditure was less than 5000 (BDT) and the average family expenditure of the respondents was 4778 (BDT) monthly. There were four categories of agriculture land ownership pattern identified: -Functionally landless (0.05-0.5 acre), Marginal (0.5-1.5 acres), Small land (1.5-2.5 acres) and large land (2.5 acres or more). In the ownership pattern over agriculture land, 70.8% have 0.5-1.5 acre agriculture land they are marginal level ownership. The household has more or fewer lands of agriculture land where the mean was calculated .93 acre.

Socio-economic Factors	(%)	Mean
Age Composition		
24-29	2.8	Mean=43
30-35	13.9	
36-41	28.5	
42-47	22.9	
48-53	21.5	
54-59	4.9	
60-65	5.6	

Sex Composition of the HH	(%)	
Male	88.2	
Female	11.8	
Household Size	(%)	
Below 3	13.9	Mean=5
03-04	28.5	
05-06	41.7	
Above 6	15.9	
Education	**%**	
Illiterate	11.1	Mean=6
Primary (1-5)	22.9	
Junior Secondary (6-8)	51.4	
Senior Secondary (9-10)	14.6	
Occupation	**(%)**	
Agriculture	54.2	
Artisan	11.8	
Daily laborer	2.8	
Fisherman	2.8	
Housewife	4.9	
Non-agriculture labor	9.7	
Rickshaw/van pulling	2.8	
Service	2.8	
Petty trader	8.3	
Income (BDT)	**(%)**	
Below 5000 (Low income Group)	65.3	Mean=5109
5001-8000 (Medium Income Group)	27.8	
Above 8000 (High Income Group)	6.9	
HH Expenditure (BDT)	**(%)**	
Below 5000	67.4	Mean=4778
5001-8000	28.5	
Above 8001	4.2	
Agriculture Land Ownership (acre)	**(%)**	
Functionally landless (0.05-0.5 acre)	18.1	Mean=0.93
Marginal (0.5-1.5 acres)	70.8	
Small 1.5-2.5 acres	6.9	
Medium/large 2.5 acres or more	4.2	

Table 1: Socio-economic profile of respondent.

Change of food availability, accessibility and consumption in the household level

Change of food availability in the household level: Food availability means that the food adequacy in the market or the ability to produce foods [11]. On the other hand, the availability of food can be arisen or the declined by the involvement of different events. Food is available as it can be found on marketplaces, as it is produced on native farms, land or home gardens, or because it reaches as part of food aid. The illustrate data signify that the food availability situation is not satisfactory at present that means half of the household has available food for the consumption. Table 2 reveals that change of food availability in the household levels, 56.9% household head response that the food availability decrease at present from the past, 19.4% household head response that the food availability increased present from the past, 12.5% household head response that the food availability as same as the past and 11.1% household head response that the food availability significantly decrease.

Change of food accessibility in the household level: Food accessibility means that the ability of the people to acquire food. Basically access to food through a combination of home production, stocks, purchase, barter, gifts, borrowing or food aid [12]. It also depends on the market, social and recognized rights to which individuals have access [13]. Table 2 shows that change of food accessibility in the household levels, 32.6% household head response that the food accessibility decrease at present compared to the past, 28.5% household head responded that the food accessibility significantly decreased present from the past, 19.4% household head responded that the food accessibility increase at present from the past. The demonstrated data indicate that the food accessibility situation is not adequate at present that means majority of the household have limited accessibility for the food consumption.

Change of food consumption in the household level: Household-level food consumption forms are usually measured a substitution indicator of food access. Measures of food consumption redirect the energy and nutrient consumption of individuals and households [14]. Patterns of household-level food intake are strongly habituated by traditional behaviors and the cultural beliefs that influence choices about food. Table 2 presents that change of food consumption in response that the food consumption declined at present from the past, 29.2% household head response that the food consumption significantly declined present from the past, while 16.0% household head response that there is no change of food Consumption. Demonstrate facts denote that the food consumption pattern is not satisfactory at present that means the majority of the household has limited improved in food consumption at the household level.

Extent of change	Food Availability (%)	Food Accessibility (%)	Food Consumption (%)
Significantly increased	0	2.1	0
Increased	19.4	19.4	7.6
No change	12.5	17.4	16
Decrease	56.9	32.6	47.2
Significantly decrease	11.1	28.5	29.2

Table 2: Change of food availability, accessibility, and consumption at the household level.

Causes behind the change of food availability, accessibility, and consumption

Causes behind the change of food availability: Food availability refers that the household has a chance to acquire food without any complication [15]. Nevertheless food availability change by the diverse responsible causes and facts. In the cyclone-affected areas of the coastal region of the Bangladesh experiences the food scarcity which is quite related to the unavailability. In this study, there found the core responsible causes which change the food availability in the Kamarkhola and Sutarkhali village. Food availability changes after the natural climatic shocks and other negative events. Table 3 illustrated that 94.4% household head blamed that food unavailability increase the cause of reduction of income, 69.8% household head accused that food unavailability increase the cause of reduction of crops yield, 83.3% household head blamed that food unavailability increase the cause of excessive food price but there found the different picture in the cause of loss of employment where only 29.4% agreed about this cause. 50.0% household head blamed that food unavailability increases the cause of the increase of family's burden or dependent. In the above data it is noted that the income, food price and family expenditure determine the food availability at the household level.

Causes behind the change of food accessibility: Food availability usually refers to a household's economic means having sufficient income to buy food on the market, but it is also an extent of the asset of a household's public linkages and influence within a community. But there are some responsible causes which create the obstacle for the household level food access which includes the high market price of foods, low livestock price, and natural climatic problem. Food accessibility changes after the natural climatic shocks and other negative events [16]. Table 3 demonstrated that 95.7% household head blamed that food accessibility has been reduced due to the fact that the increased distance of food market or shops while 85.7% household head blamed that food accessibility have not been reduced due to the cause of decrease distance of food market or shops, 84.9% household head blamed that food accessibility reduces the cause of availability of required food decreased in the nearest market but while 78.2% household head blamed that food accessibility does not reduce the cause of availability of required food increased in the nearest market. In the above statement signify that the distance of the food market and unavailability of the required food in the nearest market created the problem in the route of food accessibility.

Causes behind the change of food consumption: Food consumption changes after the natural climatic tremors and other negative events where the cyclone effect in the coastal zone [17]. Food consumption reduced by common illness, poor sanitation, lack of proper nutrition information or culturally approved restrictions that affect access to nutritious food by certain groups or family members according to age or gender. Table 3 revealed that 85.9% household head blamed that food consumption decrease the cause deteriorated the quality of food, 76.8% household head blamed that both causes that the deteriorated quality and quantity of food. Though the household faces the food crisis but the quantity of meals reduces by 28.1% households. In the above statement signify that the income, food price, family expenditure determine the food consumption ability at the household level.

Causes of the Change of Food Availability, Accessibility, and Consumption*	Yes	No
Change in Food Availability	**(%)**	**(%)**
Reduction of income	94.4	5.6
Loss of Employment	29.4	70.6
Reduction of Crop yield	69.8	30.2
Increase of food price	83.3	16.7
Increase of family's expenses	81	19
Increase of family's burden or dependent	50	50
Change in Food Accessibility	**(%)**	**(%)**
Distance of food market or shops increased	95.7	4.3
Distance of food market or shops decrease	14.3	85.7
Required food decreased in the nearest market	84.9	15.1
Required food increased in the nearest market	21.8	78.2
Change in Food Consumption	**(%)**	**(%)**
Decrease of number of meal per day	28.1	71.9
Deteriorated the quality of food	85.9	14.1
Both decrease and deteriorated quality and quantity of food	76.8	23.2
*Multiple responses.		

Table 3: Causes behind the change of food availability, accessibility, and consumption at the household level.

Monthly Food Adequacy in the Household

Food adequacy projected through the different month food availability of the year [18]. Food adequacy is determined by on the family income and expenditure [19]. Occupation is another important factor which provided adequate food security for the household and occupation stability highly determines the food adequacy of the household [20]. This information collected during survey from the household head of affected areas. Food adequacy differs from one month to another month which provided the different portion of food grain. Figure 1 presents that food adequacy in last one year in household level. 50.0% household has the adequate foods access in month May-June, while 48.6% household has the moderate portion foods access in month April-May and it was found that 56.9% household has the inadequate food access in October-November.

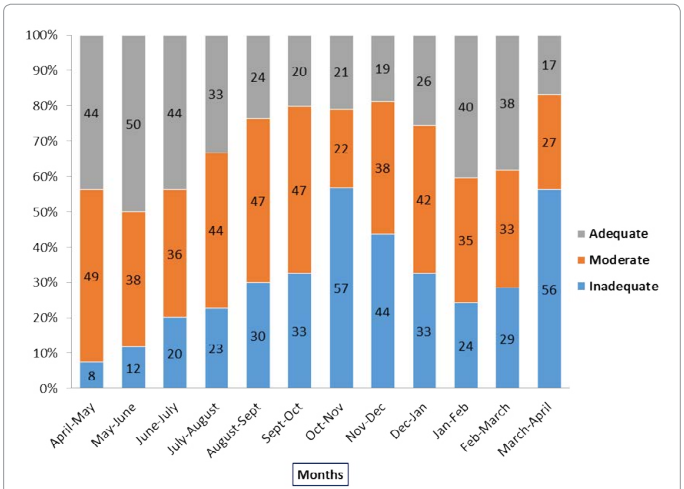

Figure 1: Monthly food sufficiency of the households, Source: Field survey.

Independent and dependent variables correlates

In this study, there were identified some main source of food, such as -own harvest, casual labor, borrowing, donations, purchase, and food aid and exchanging. Food availability extremely rest on food source or production at the household level, somewhere the drift of production drives to food security [21]. Table 4 shows a significant association between source of main food grain in household and extent of change in the availability of food in the household. These findings were further strengthened with Pearson's X^2test, where it is evident that the calculated value is higher than the critical value (62.09>28.87).

Food consumption arrangement of household with the fluctuations within the income ability [22]. If family income increases the food consumption ability will increase, on the other hand, if income decrease the food consumption ability will decrease. The discussion Table 4 shows that food consumption is highly dependent on the income of the household. These findings were supplementary braced with Pearson's X^2, where it is apparent that the calculated value is higher than the critical value (22.39>12.59).

Agricultural lands provide the foods and crucial ingredients for food production in the rural area of Bangladesh. Different research shows that land ownership pattern provides the source of income in a household where the income determines the food accessibility [23]. Table 4 at this point analysis shows that there is significance relation between the agriculture land and accessibility of food. These findings were additionally supported with Pearson's X^2 test, where it is marked that the calculated value is higher than the critical value (36.58>21.03).

Food availability highly dependent on the source of the food and

income is the important factor to change the food availability in the household consumption. In Table 4 here analysis presents that food consumption can be change if the changes occur in the food availability sources. An additional study findings scrutiny showed that food consumption is highly dependent food availability [24]. These findings were endorsed fortified with Pearson's X^2 test, where it is clear that the calculated value is higher than the critical value (47.22>16.92).

Food availability very much reliant on the source of the food and income is the important factor to change the food availability in the household consumption. Table 4 present that food consumption can be change if the changes occur in the food availability sources. The data illustrated that food consumption is highly dependent food availability. These findings were further strengthened with Pearson's X^2 test, where it is evident that the calculated value is higher than the critical value (47.22>16.92).

In the household food intake guarantees by the ration of the ease of use of food. In the household consumption level, data provide the picture of household food security level. Table 4 Indicates that household food consumption directly related to the availability of the food. The extent of change in the accessibility of food occurs the change in the household level food consumption. Pearson's X^2, in this regard, shows a significant link between the extent of change in the accessibility of food in household and extent of change in the food consumption pattern in the household. These findings were further strengthened with Pearson's X^2 test, where it is evident that the calculated value is higher than the critical value (40.35>21.03).

Independent Variables	Dependent Variables	Test Conducted	Calculated Value	Asymmetrical Significance	Level of Confidence
Source of Main Food Grain	Food Availability	Pearson (X^2)	62.09	0.000	18
Income	Food consumption	Pearson (X^2)	22.39	0.001	6
Agriculture Land	Food accessibility	Pearson (X^2)	36.58	0.000	12
Food availability	Food consumption	Pearson (X^2)	47.22	0.000	9
Food accessibility	Food consumption	Pearson (X^2)	40.35	0.000	12

Table 4: Independent and dependent variables correlates.

Conclusion

The Kamarkhola and Sutarkhali villages of the Dacope Upazila are in place of coastal belt of Bangladesh. Being a part of coastal areas, people's livelihood suffered by natural disaster which made them more vulnerable than other region of Bangladesh, individually majority of livelihood suffered by food insecurity. Repeatedly Bangladesh also affected by the cyclone and coastal areas is the more vulnerable than the other part of the country. People of Kamarkhola and Sutarkhali villages faces different dimension of food insecurity with their different social dimension. The Coastal belt faces its specific phenomena like salinity, cyclone, and river erosion bearing vulnerability in food security. One cropped land cause low local production of food and makes livelihood security. There were also recognized various accountable causes which directly and indirectly affect the household in terms of food availability, food accessibility, and food consumption. Most of the household faces the food scarcity or crisis which leads to food insecurity; actually, there was very few household who has the enough food storage capacity for the next several months. The state and non-state actor's initiative could play the vital role to overcome the food insecure situation in the coastal region of Bangladesh.

Recommendations

In order to improve the households' food security in the coastal region, the following may be the major areas of intervention:

Government need to established continuous and robust food security assessment mechanism for measure the household food security in coastal areas, which will provide a clear explanation of the food security scenario of the household. Moreover, government and non-government organization can take the development initiative to protected food security of household level in the coastal zone.

State actor need to be more concern about food security situation in coastal areas. There need to take initiative to implement household food security programs, which will enable the vulnerable households to cope with the post disaster situation about food security.

Government and NGOs need to design and implement capacity building program for the poor and vulnerable farmer. Equivalently provide them training on modern technology based farming and small amount of loan to cultivate the agricultural land. That action will boost local farms to produce optimum crops and make the household food secure.

Post disaster situation food aid needs to be distributed to the affected areas through disaster management approach, here government and non-government can play a crucial role to provide aid support and ensure that each and every household get sufficient aid to reduce food insecurity in household level.

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