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POST-DISASTER FOOD HABIT AND DIETARY PATTERN OF WOMEN OF KHULNA DISTRICT IN BANGLADESH

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Abstract: The aim of this study was to explore the post-disaster food habit and dietary pattern of the women in south western coastal Bangladesh. The Primary data were collected using an interview schedule from a sample of 196 women aged 18-49 years drawn from 400 women during August-September, 2015 at *Jaliakhali* and *Channirchak* villages of Kamarkhola of Dacope upazila under Khulna district. They had been living in Khulna for the last seven years and were already affected by various disasters. These two villages are the most disaster affected areas in Dacope because the villages are situated beside the bank of the river Pashur. Before the disaster, the common food habit of those women were fish, pulse and sometimes they also ate various types of meat and fruits. But in post-disaster period, they cannot get proper dietary intake because most of the people in these areas are farmers and for the natural disaster the ponds and cultivable lands are overflowed. So, they cannot cultivate their lands to meet their proper dietary intake. For this reason, food crises increase tremendously. After the disaster, they generally eat rice, *ata,* potato, vegetables, *kolmishak, kochushak, shapla* and some fish. Basically, women are more vulnerable to disasters than men through their socially conducted roles and responsibilities and their relatively poorer and more economically vulnerable position especially in the developing countries like Bangladesh. Among 196 respondents, the majority retorted that their food quality had deteriorated in post-disaster period.

Keywords: Disaster, food habit, dietary patterns, women, south western coastal Bangladesh

Introduction

Bangladesh is a densely populated country with over 148 million in the world (Bangladesh Bureau of Statistics, 2011). Natural disaster is a common phenomenon in south western coastal region of Bangladesh. The mountains and hills bordering almost three-fourths of the country, along with the funnel shaped Bay of Bengal in the south, have made the country a meeting place of life-giving monsoon rains, but also make it subjected to the catastrophic ravages of natural disasters (Disaster Management Bureau, 1998). In developing countries like Bangladesh, about 93 percent of all deaths are caused by natural disasters and losses 20 times greater than those of developed countries experiencing similar events (Huq, Ahmed, & Koudstaal, 1996).

During post-disaster period, food habit and dietary pattern represent a broader picture of food and nutrient consumption, and may thus be more predictive of disease risk than individual foods or nutrients. On the other hand, dietary pattern addresses the complexity of dietary intake by driving informative combinations of food. The range of dietary pattern of

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women in developing countries much encompasses the whole range of problems that can occure place when dietary energy or nutrient intakes are poor, excessive or simply imbalanced. Women especially at their reproductive age, are often more helpless and undernourishment because of their different physiological requirements and having lower dietary rates (American Diabetics Association, 1996). Weeks et al. (2000) stated that insufficient food habit and dietary pattern occurred in post-disaster period create increased demands for energy and nutrients. In most of the women, inadequate quality and quantity of food are the prime determinants of a nutrition problem (Weeks et al. 2000).

Dietary practices of women may have a significant effect on the wellbeing of mothers and infants. Countries where poor food and dietary pattern is common basically in post-disaster period must lead to its immediate costs, including decreasing income from population who are malnourished. Islam (2010) conducted a study entitled the dietary intake status of women in Bangladesh: Comparison of energy intake and nutritional status of low income rural group with a high income urban group (Islam, 2010). The study identified that socio-economic status had an important effect on body weight and height. The energy intake was significantly higher in high income group than in higher income group. The contributory sources were different in high and low income groups. In both groups, energy intake was lower than the recommended level.

Diet plans that identify the quantities of different foods to be consumed to provide the human body with the required energy and nutrients play an important role in supporting long-term planning for balanced food intake but are not yet available for Bangladesh basically in post-disaster period (Imran, 2013).

Food habit and dietary pattern of women are most important factors in the promotion and maintenance of good health through the women's life cycle. Income, individual preferences and beliefs, cultural traditions, as well as geographical, environmental, social and economic factors all connect in a complex manner to shape dietary consumption patterns and affect the morbidity and other health status of women in post-disaster period. A normal balanced diet must include daily foods from the various food groups in sufficient amounts to meet the needs of an individual and to increase immunity. But in post-disaster period the dietary intake and nutritional status of women in disaster affected areas is found to be poor (Islam, 2010).

So, the main objectives of the study are to know about the risk of health through food habit and dietary patterns assessment of married women in south western coastal areas in Bangladesh.

Materials and Methods

The study was conducted through survey research design to collect primary data that were collected during August-September 2015. Data were analyzed and interpreted by using descriptive as well as inferential statistical techniques. Different computer software's like SPSS, MS Excel, MS Word etc. were used for analyzing and interpretation of data. The total numbers of 196 women, aged 18 to 49 years were selected by using simple random sampling because the age of marriage of age in Bangladesh starts from 18. Due to some convenient reason like the availability as well as the frequency of disaster, two villages, that is, *Jaliakhali*

and *Channirchak* village of (ward no.3) of Kamerkhola union of Dacope upazila in Khulna district was chosen purposely as the study area. These villages were chosen because these are the most disaster affected areas in Dacope than the others. The population (household) of this study area namely *Jaliakhali* and *Channirchak* of Dacope in south western coastal region was 400.

The sample size of the study was determined by the following formula:

$$SS\frac{Z^2XPX(1-P)}{C^2}$$

$$New\,SS_i=\frac{SS_i}{1+\frac{SS_i-1}{Pop}}$$

Here, *SS* = sample size ; SS_i = sample size, according to population; *Z* = confidence level (i.e. 1.9695% confidence levels); *P*= percentage of picking a choice (i.e. 0.5 used for sample size); *C* = confidence interval (i.e. 5); *Pop* = population

The respondents in *Jaliakhali* and Channirchak were 220 and 180 respectively. To calculate the sample size, it had been taken 49% of the total population 400. The estimated sample size is 49% of the total population. The major economic activities in south western coastal areas of Bangladesh with reference to the natural resources (CEGIS, 2012) is shown in Table 1.

Table 1: Major livelihood groups and activities in coastal areas of Bangladesh

Livelihood Group	Main Economic Activity	Livelihood Group
Farmer	Agriculture	Wage Labor
	Fish/ Shrimp /Fishing in river	
	Poultry & Livestock	
	Small business	
	Salt farming	
Fisher	Fish/Shrimp/Fishing in river/Sea	Women
	Small business	
	Agriculture	
	Drying fish	
	Net servicing/ preparation	
	Boat preparation/ servicing	
	Rickshaw/ van rent	
	Salt Farming	Other
	House rent	

Results

Demographic profile of the respondents: The respondents are from young and middle age that has chance to fertile and mostly feel vulnerable during disaster period and post-disaster period due to their age and maternal criteria. Data in the Table 2 show that majority (49.49 percent) women belonged to the age category 18 to 25 years and second majority (42.35%) belonged to the age group of 30 to 45 years. Therefore, it was found that most of the respondents of the study areas were young aged group.

Table 2: Age structure of the respondents

Age Structure (In Years)	Number of Respondents	Percentage
Young age (18-25)	97	49.49
Middle age (30-45)	83	42.35
Pre-old age (45-50)	10	5.10
Old age (>50)	6	3.06
Total	196	100.0

In the third world country like Bangladesh, religion is a cultural system that creates powerful and long-lasting meaning by establishing symbols that relate humanity to beliefs and values. Most of the respondents (60.71%) of the study area belonged to Islam religion (Table 3).

Table 3: Religious status of the Respondents

Religious Status of the Respondents	Number of Respondents	Percentage
Islam	119	60.71
Hindu	67	34.18
Christian	10	5.10
Total	196	100.0
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Education has a positive relationship with income which in turn has positive effect on the food habit of a person specially women. The Table 4 indicates that a large part of the respondents (30.06%) were illiterate whereas 20.4 percent of the respondents completed their primary level of education. Only 15.3 percent of the respondents completed junior secondary level education.

Table 4: Educational status of the respondents

Educational Status of the Respondents	Number of Respondents	Percentage
Illiterate	60	30.6
Incomplete Primary Education	34	17.3
Complete Primary Education	40	20.4
Complete Junior Secondary (JSC)	30	15.3
S.S.C	20	10.2
Say Nothing	12	6.1
Total	196	100.0

The main occupation type of Bangladeshi villages comprise of agriculture, fishing, van puller, day labor etc. The Figure1indicates that the majority of the household head's occupations (49%) were day labor whereas 17 percent was van puller/boatman/motorcycle driving and 18 percent was farmer.

On the other hand, women's employment increases household income, with consequent benefit to household nutrition in general and women's nutritional status in particular (Kennedy and Haddad, 1991). Here Table 5 illustrates that the majority of the women (73.0 %) were domestic laborers and the rest (27.0%) were farmers.

Table 5: Occupational status of women

Occupational Status of Women	Number of Respondents	Percentage
Domestic Labor	143	73.0
Farmer	53	27.0
Total	196	100.0

Family structure of the respondents: Details of household heads are presented in Table 6.

Table 6: Household heads in the study area.

Head of the Family	Number of Respondents	Percentage
Father	30	15.3
Mother	10	5.1
Brother	19	9.7
Husband	122	62.2
Others (Own self)	15	7.7
Total	196	100.0

As compared with women residing in medium/higher economic status households, the risk of being undernourished for women in very poor or poor households was significant. Fig. 1 illustrate that half of the respondents (n=90) reported having no income, but a significant portion (n=65) of the respondents' monthly income was within the range between BDT 1,001 to BDT 3,000. This shows that a significant proportion of respondents who are

involved in various occupations are contributing to get essential food consumption of their family. But about one-third of the respondents' household head (n=75) monthly income was within the range between BDT 3,001-5,000 followed by (n=55) had income range from BDT 5,001 to 8,000 (Fig. 1).

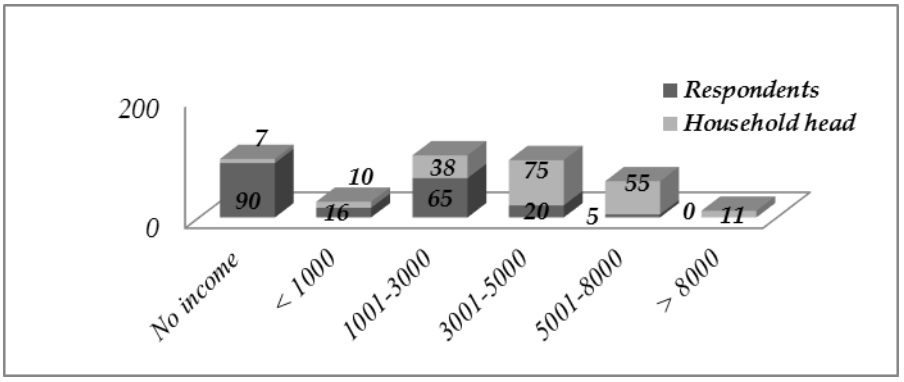

Fig 1: Monthly income in BDT of the respondents

Health risk through food habit and dietary patterns assessment

Average servings consuming food during pre- and post-disaster period: During post-disaster period, the women basically in south western region do not get enough rice to meet their daily necessities. Table 7 shows that majority of the respondents are deprived of sufficient rice consumption in post-disaster period than in pre-disaster period. Also, slightly less than the half of the respondents (46.9%) of women consume fruit in pre-disaster period but in post-disaster period, 71.4% women did not consume any type of fruit.

Table 7: Average servings consuming food in pre-disaster and post-disaster period

Variable	Average Servings Consuming Rice(1/2 cup rice=1 serving)				Average Servings of Fruits per Day (1 whole fruit=1 serving)			
	Pre-disaster		Post-disaster		Pre-disaster		Post-disaster	
Category	No. of Res.	Percen-tage	No. of Res.	Percen-tage	No. of Res.	Percen-tage	No. of Res.	Percen-tage
5 or more serving in a day	25	12.8	0	0	0	0	0	0
3-4 serving in a day	93	47.4	20	10.2	27	13.8	11	5.6
1-2 serving in a day	78	39.8	151	77.0	92	46.9	45	23.0
0 serving in a day	0	0	25	12.8	77	39.3	140	71.4
Total	196	100	196	100	196	100	196	100

Protein consumption during post-disaster period: Table 8 also discloses that 51.0 percent respondents consume milk 2 times per month during pre-disaster period but in post-disaster period, 79.1 percent women did not take it. The Table 8 also illustrates that the

egg consumption of the respondent is moderate during pre-disaster period but its percentage was very low during post-disaster period.

Table 8: Consuming protein during post-disaster period

Variable	Consuming Milk					Weekly whole egg consumption on average			
	Pre-disaster		Post-disaster			Pre-disaster		Post-disaster	
Category	No. of Res.	Percen-tage	No. of Res.	Percen-tage		No. of Res.	Percen-tage	No. of Res	Percen-tage
1 to 2 times per week	80	40.8	0	0	8-11 per week	54	27.55	23	11.73
2 times per month	100	51.0	41	20.9	5-7 eggs per week	61	31.12	28	14.25
Never	16	8.2	155	79.1	2-4 eggs per week	81	41.33	145	73.98
Total	196	100	196	100	Total	196	100	196	100

Impact of shortage of meal: Fig. 2 indicates the impact of food shortage during the post-disaster period. Data clearly show that because of food shortage 30 percent respondents suffered from health problems, 29percent suffered from hunger, 28 percent suffered from financial debt and 13 percent migrated from their area to other area.

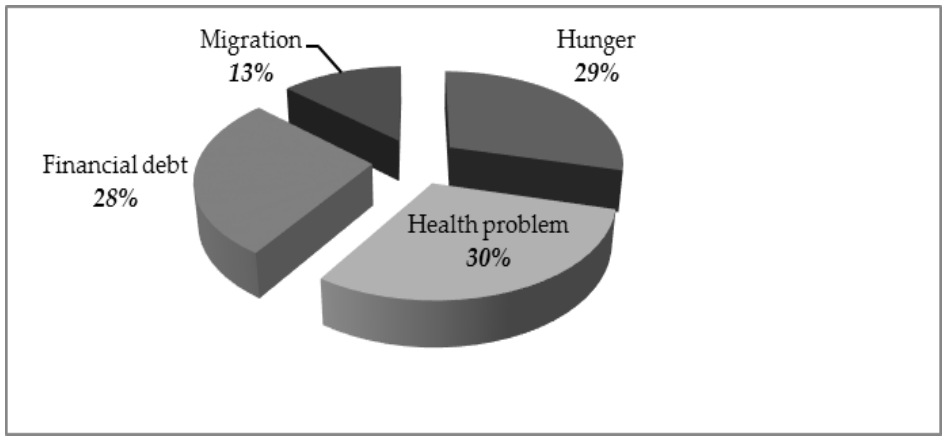

Fig. 2: Impact of the shortage of meal

Dietary evaluation

A balanced diet is a combination of food like carbohydrate, protein, fat, vitamin and mineral, which is essential for every human being. But the living condition of dwellers in the study area is very poor and sometimes they live from hand to mouth. Findings of the study demonstrate that 12.75 percent of the respondents had Excellent Dietary Pattern following 10.20 percent had Good Dietary Pattern, 7.6 percent had Fair Dietary Pattern, 25.51 percent had Poor Dietary Pattern (Table 9) following Pressman & Adams (1982).

Table 9: Classification of dietary patterns of the respondents

Scoring	Number of Respondents		Percentage	
	Pre-disaster period	Post-disaster period	Pre-disaster period	Post-disaster period
Excellent Dietary Pattern	50	25	25.51	12.75
Good Dietary Pattern	35	20	17.85	10.20
Fair Dietary Pattern	26	15	13.26	7.6
Poor Dietary Pattern	35	50	17.85	25.51
Very Poor Dietary Pattern	30	40	15.30	20.40
Extremely Unhealthy Poor Dietary Pattern	20	46	10.20	23.47

Food consumption during post-disaster period: Among the respondents, the majority 52.04 percent respondents ate rice and *ata* in each 4 days during the post-disaster period in a week. Vegetables contain lots of minerals which is necessary for women's health. Among the 196 respondents, 26.01 percent had eaten vegetables each three day, because during the disaster and just after disaster (post-disaster) period, getting vegetables is very difficult. Because these herbs and shrubs have low resistance to disasters. The fish consumption rate of the respondents during the post-disaster period is very low. Among the respondents the majority (87.25 percent) did not eat fish almost in 30 days in a month during post-disaster period (Table 10).

Table 10: Food consumption during the period of disasters

Frequency	Consumption of rice and *ata*		Fish consumption		Vegetables	
	Number	%	Number	%	Number	%
Not eaten	21	10.71	171	87.25	164	93.67
1 day/week	26	13.28	57	21.94	97	49.49
2 days/week	95	48.47	48	45.40	60	30.61
3 days/week	79	40.31	95	66.33	51	26.01
4 days/week	102	52.04	10	10 20	12	6.12
5 days/week	37	18.88	06	8.16	08	4.08
6 days/week	24	12.24	--	--	--	--
7 days/week	08	4.08	--	--	--	--

Association between types of disasters and availability of food: To determine the association between types of disasters and availability of food, the Table 11 shows that the calculated value of Pearson Chi-Squire is 30.010 and tabulated value is 21.03 (Gupta & Gupta, 2008) at 4 degrees of freedom with 1% level of significance. Hence null hypothesis is rejected and alternative hypothesis is accepted. So, there is a relationship between types of disasters and increases or decreases in the availability of food.

Table 11: Relationship between types of disasters and availability of food

Types of Disaster		Decrease Number of Meal Per Day		Total
		Yes	No	
Flood	Number	81	5	86
	Row (%)	41.33	2.55	43.88
Cyclone	Number	51	5	56
	Row (%)	26.02	2.55	28.57
Tidal surge	Number	27	5	32
	Row (%)	13.77	2.55	16.33
Water-logging	Number	16	6	22
	Row (%)	8.18	3.06	11.22
Total	Number	175	21	196
	Row (%)	89.28	10.71	100.0
Pearson Chi-Square Value ($\chi 2$)= 82.558;df= 3 Level of Significance= 1%; Asymptotic Significance Level= 0.000;				

Relation between types of disasters and availability of meal per day: To characterize the identified dietary pattern by a factor analysis of the nutrient intake data, the study determined the relationship between types of disasters and decreasing number of meal per day. Table 12 shows that the respondents suffered from various types of diseases because of different types of disasters occurred in every year in south-western region. Here, the calculated value of Pearson Chi-Squire is 82.558 and tabulated value is 11.34 (Gupta & Gupta, 2008) at 3 degrees of freedom with 1% level of significance. Hence null hypothesis is rejected and alternative hypothesis is accepted. Therefore, there is an association between types of disasters and decreasing number of meal per day.

Table 12: Relation between types of disasters and decreasing number of meal per day

Types of Disasters		Both Increases or Decreases Availability of Food					
		Reduction of income	Loss of employment	Increase of food price	Increase of family's other income	Increase of family's burden	Total
Flood	Number	30	23	10	13	10	86
	Row (%)	15.31	11.73	5.10	6.63	5.10	43.88
Cyclone	Number	27	7	9	5	8	56
	Row (%)	13.77	3.57	4.59	2.55	4.08	28.57
Tidal surge	Number	6	7	6	6	7	32
	Row (%)	3.06	3.57	3.06	3.06	3.57	16.33
Water-logging	Number	5	5	5	5	5	25
	Row (%)	2.55	2.55	2.55	2.55	2.55	11.22
Total	Number	72	50	8	25	41	196
	Row (%)	36.73	25.51	4.08	12.75	20.92	100.0

Pearson Chi-Square Value ($\chi 2$)= 30.010;df= 12 Level of Significance= 5%; Asymptotic Significance Level= 0.000

Discussion

Women's age and parity are important factors that affect maternal depletion, especially in high fertility countries (Taddese, Larson, & Hanley, 1997). In most of the cases, it is found that women are more vulnerable to be affected by health problems because of improper food habit. In this study it has been found that, in the south western region, even now in the age of science most of the women who depend on general food items such *i.e.* rice, pulse, and vegetables are unaware about nutritious food. Moreover, it has been also identified that the number of women belonging to age 25-31 years old are the worst sufferer during the post-disaster period.

Education can improve not only the dietary pattern but also higher income, occupational status, better housing, better food, better drinking water, and living environment (Mason, 1990). It also improves occupational status, better housing, nutritious food, safe drinking water, and living environment. The educated people are more conscious about health and they are less likely to be deprived of having proper food. On the other hand, the illiterate do not have proper health education, do not follow the rules and regulations of health education and thus cannot understand the quality of eating healthy diet. As a result, they become malnourished. This study shows that 36.6% of the respondents are illiterate and thus the propensity of malnutrition is high.

Occupation refers to the actual physical possession or use of a dwelling piece of land. It exists only where it is recognizable as such and where the occupant has a sufficient measure of control that prevents interference from strangers (Business Dictionary.Com, 2017). Unemployed or unpaid (cash) employment of women is a vital factor for chronic energy deficiency compared with women employed for cash (The United Nations Children's Fund, 1993). This study shows that 73% women in the south western region are domestic labor (housewife) and only 27%women are involved in agriculture. Therefore, the propensity of malnutrition is very high.

The study shows that, most families are headed by husband of the women and most of the family members depend on his income. If the bread winner male members die, the women become the household heads. Thus, women have no decision-making power of having proper food.

The economic status of a household is an indicator of access to adequate food supplies, use of health services, availability of improved water sources, and sanitation facilities, which are prime determinants of maternal nutritional status (The United Nations Children's Fund, 1990). Through household level information, Nutritional Surveillance Project (NSP) data showed that there was strong relationship between household expenditure and proper dietary intake (Mitra, 2009). This study shows that, a significant portion (45.99%) is unemployed and thus, nutrition condition is poor.

Nutritional status is directly affected by the foods we eat and their nutrient content. Good nutritional status depends on eating the right amounts and the right variety of safe, good quality foods to meet our individual nutritional needs. Lack of knowledge of the dietary requirements and the nutritive value of different foods is an important contributory

causes of widespread occurrence of malnutrition among vulnerable section of the population in the developing countries (Padhyay et al. 2011). The spectrum of malnutrition in developing countries encompasses the entire range of problems that can be occurred when dietary energy or nutrient intakes are insufficient, excessive or simply imbalanced (Hossain et al. 2013).

This study reveals that, in the southern region most of the people are farmer. When disaster occurs then all the cultivable lands are totally damaged. As a consequence, they cannot cultivate enough crops. During post-disaster period maximum respondents lose their employment (Helen Keller International, 2000). Generally, female and children are mostly victims of diseases during and in post-disaster period. They do not get proper dietary intake, so they cannot recover them from the disaster shock. There is low possibility of women to spend much time on health care than that of men and boys.

Proper food habit and dietary problem may be caused not only by deficiency of protein, calorie, iron, Vitamin C etc. but by other conditions like malaria, worm infestation, adverse environmental and socio-demographic factors (Madhavi & Singh, 2011). Many common infectious diseases and common parasites have a major effect on health and nutritional status, for example, diarrhea and respiratory diseases, measles, malaria, tuberculosis, roundworms, hookworm and HIV/AIDS. The infections themselves damage nutritional status; a person suffering from infection usually has little appetite and tends to eat less. This lack of food during illness can be a serious threat to the health of a malnourished person, who has little or no stored reserves of energy and nutrients. Poorly nourished people are likely to suffer from these diseases more often, severely and for longer periods of time than well-nourished people (Hossain et al. 2013).

During post-disaster period, women do not get proper food to consume. At this time, they eat different types of foods such as rice, potato, *ata*, vegetables, local river fish and others so that they can survive. But they can afford to eat only a small amount of food. Access to health services was observed to have a significant relationship with nutritional status. This implies that households that had access to health services were more likely to have a better dietary intake. Access in the context of this study means proximity to affordable and quality health services (Rauel et al. 1992).

The picture of post-disaster period is totally different from the pre-disaster period. Most of our respondents indicate that in the pre-disaster period they get sufficient meal but in the post-disaster period, they did not get enough meal to survive themselves. Protein is very necessary for pregnant and lactating women and also for women of any age for their physical structure. The easiest and cheapest protein sources in coastal rural areas are sea fish, milk and egg. But when the natural disaster happens they loss their easily available protein sources.

After the above discussion, it can be said that women are the most victims of inadequate food habit and dietary pattern in post-disaster period. At that time, they could not eat proper nutritious food. There is a wide scope of research on the particular issue of post-disaster food habit and dietary pattern of women in southwestern coastal Bangladesh.

The present study which is confined to only the Dacope upazila of Khulna District can be extended to other districts of Bangladesh for more accurate generalizations.

Conclusion

The study has analyzed the post-disaster food habit and dietary pattern of women in the south western coastal region of Bangladesh. While natural disasters often impact human communities very broadly in the south western region, residents are not equally at risk of loss and harm nor equally able to recover. In the social, economic, cultural and political context, the women are more vulnerable to natural disasters. It has been very rightly said that the developmental status of a country is adjusted by the development of its countryside. Hence it is a matter of major concern that the rural population, particularly women shall be taken care of in terms of nutritional dietary intake and other infrastructure in the post-disaster period. Poor dietary intake poses a variety of treats to women. It weakens women's ability to survive childbirth, makes them more susceptible to infectious diseases, and leaves them with fewer reserves to recover from illness that extend through generations. Females have been singled out giving regard to their importance and role in the development and welfare of a family, society and a country as a whole. It is recommended that the Government and some non-government organizations should take initiatives through proper policy, planning and good governance to supply adequate food intake of women in post-disaster situation in south-west coastal region of Bangladesh.

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