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Original Article

Food Security of Small Farm Households: An Empirical Investigation in a Water Scarce Area of Naogaon, Bangladesh

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ABSTRACT

Food security remains a key development challenge for many developing countries in the world. In Bangladesh, agriculture is the mainstay of livelihoods of the rural population which provides employment for around 52% of the workforce counting for 63% of households of which the majority are small farm households. Although small-scale farmers play a vital role in food production, their households are mainly affected by the event of food insecurity, especially in the area where water is scarce for agricultural production. This study, therefore, sought to investigate household food security status through two measurement techniques named Household Dietary Diversity Score (HDDS) and Household Food Consumption Score (HFCS) among small farm households in Khajur union under Mahadevpur Upazila of Naogaon district, Bangladesh which was identified as a water-scarce area for the farmers. The estimated results of the HDDS based on the previous 24 hours recall reveals most of the households followed medium (55%) or low (27%) dietary in the study area. On the other hand, HFCS based on the previous 7 days of food consumption reveals that 83% of households had poor consumption levels. The major consumed food by households is rice followed by potato, oil, and sugar. The cross-tabulation analysis shows that 27% of households were completely food insecure while 55% were vulnerable to food security and 18% were food secure. The main coping strategy adopted by the sample households was taking a loan from NGOs when they face food shortages. It is recommended that government should provide support to the farm households through properly targeted income transfers, credit programs, and insurance mechanisms in times of crisis. Several food aid programmes such as Vulnerable Group Feeding or Social Security Policy Support programmes may have very high payoffs in improving food security status in the water-scarce areas.

Introduction

Food security is a multidimensional phenomenon that can be defined as "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (World Food Summit, 1996). The widely accepted World Food Summit (1996) definition reinforces the multidimensional nature of food security and includes food access, availability, food use, and stability as the components of food security. Bangladesh has made commendable progress over the past 40 years in achieving food security, despite frequent natural disasters and high population growth (World Bank, 2016). The agriculture sector plays a key role in this achievement. The average growth of the agriculture sector over the last 10 years stood at 3.8% and the government has prioritized the attainment of

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self-sufficiency in food grain production and achievement of the nutritional requirement by 2021 (CRI, 2019). Despite considerable progress in this sector along with the economic development of the nation, a significant proportion of the population remains food insecure (IFPRI, 2012; NIPORT, Mitra and Associates, and ICF International, 2013). Food security is yet to be achieved in full length in all areas of Bangladesh and unprecedented shocks to food security are not new to Bangladesh. Its history is dotted with famines, cyclones, and floods, which have elicited mature responses in dealing with food crises (WFP, 2008). Moreover, increases in cereals production have not been accompanied by significant increases in the availability of other foods. Over 40% of the population lives below the food consumption-based poverty line, lacking sufficient resources to afford a diet of 2,122 kilocalories (kcal) per person per day, along with other necessities (Hossain and Deb, 2009). Apart from the prevailing deficit in total calorie intake, the normal diet of Bangladeshi people is seriously imbalanced, with inadequate consumption of fat, oil, and protein, and with more than 80% of calories derived from cereals. Women and children are especially vulnerable due to their greater nutritional requirements (Hossain and Deb, 2009).

In Bangladesh, most studies on food security have been conducted at a national level (for instance, Ahmed et al., 2012; Dorosh and Rashid, 2013; Faridi and Wadood, 2010; Hossain et al., 2005; Mainuddin and Kirby, 2015; Rich et al., 2015; Shahabuddin, 2010; Talukder, 2005). There is a lack of household-level food security studies (Alam et al., 2018). This study attempts to contribute to this area by exploring the small farm households' food security status in a water-scarce area. In Bangladesh, the majority of the farm households (58%) are small-scale farm households (BBS, 2019). Agriculture is the most important income source for most, and some will supplement their incomes with other means of earning money. Agricultural income and sustenance often hinge on one crop: rice. It is typical for households to grow between one and three crops, and one is almost always rice. Smallholders operate in a cash-based, informal economy and do not have formal contracts for the crops they cultivate. On the other hand, Bangladesh is one of the most climate-vulnerable countries in the world. Climate change accelerated the intensity and frequency of occurrences of drought, irregular rainfall, high temperature, etc. that is directly, and indirectly related to crop production (Faroque et al., 2013; Rahman and Anik, 2020; Rahman and Rahman, 2019; Sikder and Xiaoying, 2014). The northwest region of Bangladesh is characterized by high temperature and low rainfall compare to the average condition of Bangladesh. The region is primarily prone to drought which is likely to become more frequent and intense along with horizontal expansion due to climate change (Bhuyan et al. 2018; Karim et al., 2020; Mojid et al., 2015; Peña-Arancibia et al., 2020). The dry season crops, such as Boro rice, wheat, maize, pulses, and winter vegetables, are the main contributors to ensure food security at household, regional and national levels. Hence, growing dry season crops are crucial for sustainable production and ensure food security in northwest Bangladesh. Surface water is limited in that area, mainly in the dry season due to its higher elevation, high variability of rainfall, and high withdrawal of water in the upstream rivers Ganges (called the Padma in Bangladesh). Therefore, usage of groundwater is much higher in the northwest region than in the other parts of the country. Due to the high elevation of northwest Bangladesh, most of it is in the flood-free zone. Therefore, the main source of groundwater recharge in this area is rainfall, which is also the lowest in this part of the country (Alauddin and Sarker, 2014; Dey et al., 2017; Mainuddin et al. 2014; Mainuddin et al., 2020; Mojid et al., 2019). Consequently, the area has become considerably drought-prone including the Naogaon district of the Rajshahi division. Most of the people in this region still rely on agriculture and their food security status is highly correlated with their agricultural production. Despite important achievements in food grain production and food availability, food security at the national, household, and individual levels remains a matter of main concern for the government mainly due to drought (Kashem and Faroque, 2013). Therefore, food security at household level, especially in such water scarce areas needs to be studied to understand the dynamics of food production and consumption at household level. The present study, therefore, attempts to undertake a study to examine the food security status of small farm households in a water-scarce area. The findings may provide insights into the food security research area and will help the policymakers to better understand the underlying scenario of food insecurity at the farm level.

Materials and Methods

The study was conducted in the Khajur union under Mahadevpur Upazila of Naogaon district (Figure 1). The area was selected following the hydrological map from the Australian Government's Sustainable Development Investment Portfolio Phase-2 project where the area was identified as one of the water-scarce areas in that region where maximum people depend on deep tube-well supplied groundwater for agriculture and household purposes. Only one deep tube-well is operating in the area installed by the Barind Multipurpose Development Authority (BMDA) and

households of this area face water scarcity particularly during the dry season. An Integrated Water Modelling (IWM) study (2006) found that the abstraction of groundwater for irrigation requirement was higher than the recharge, causing constraints for Boro paddy cultivation when the level of groundwater is usually lowest. Farmers, therefore, face irrigation problems during the Boro season which increase the rice production cost and consequently affect the food security and livelihood of farm households.

To investigate this problem, a multistage sampling method was followed in the present study. Firstly, the study area was selected purposively. Then, a list of small farmers (landholder of less than 1 ha) was collected with the help of agricultural extension personnel of the study area and a total number of 60 households were then selected randomly from the list. The number of sample households was considered keeping in mind the limited time and cost to achieve the ultimate objectives of the study. Respondents of the study were household heads (usually the farmer) and principal caregivers (usually the wife of the household head) of the households. Relevant primary data were collected through face-to-face interviews with the respondents following the household survey method. Data were collected during November and December of 2018.

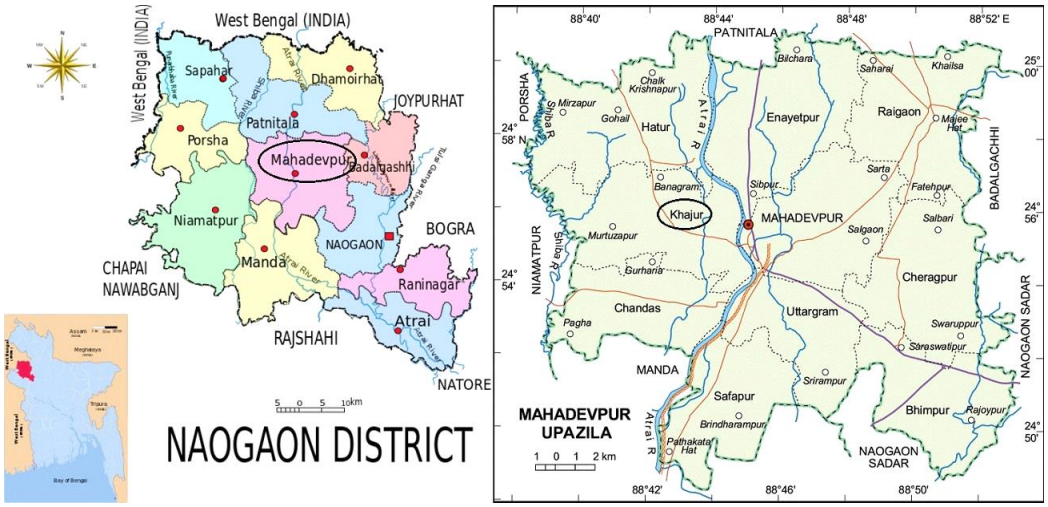

Figure 1. Naogaon District and Mahadevpur Upazila indicating Khajur union

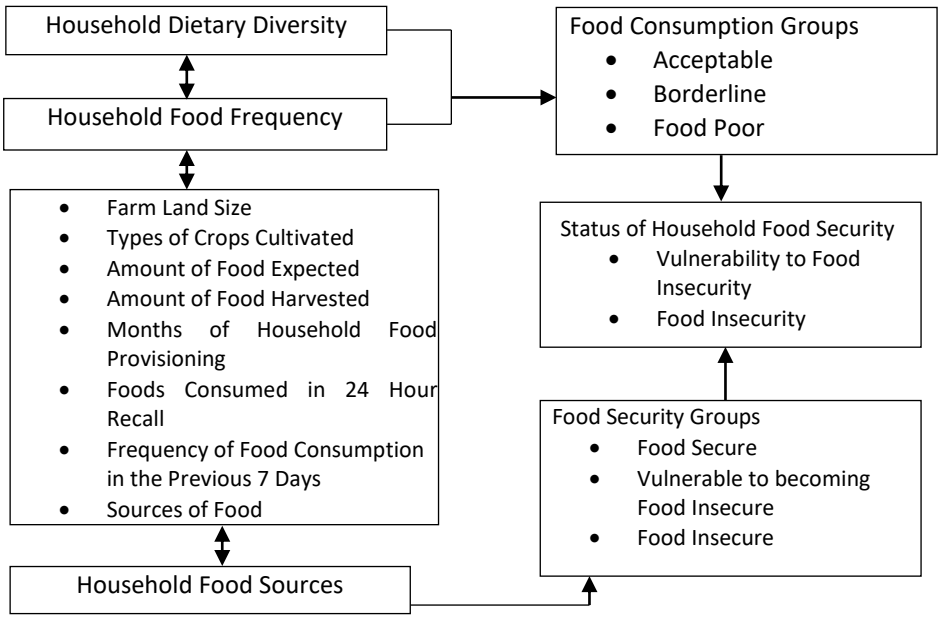

Chart 1. A Conceptual Model illustrating Household Food Consumption Approach adapted from WFP (2006)

The conceptual framework for the present study is based on the WFP's (2006) Household Food Consumption Approach model that uses dietary diversity, food frequency and food sources as household proxy indicators of household food insecurity (Chart 1). To know the status of household food production pattern; types of crops cultivated in the two crop seasons i.e. summer and winter of 2018, amount of expected crop production, amount of actual crop harvested, patterns of crops used by the households were examined. On the other hand, a household's food consumption pattern may encompass household dietary diversity and household food-frequency. According to FAO (2013), dietary diversity is the number of individual foods or food groups consumed over a fixed period of time and it is also reflective of adequate nutrient intake. Dietary diversity (a qualitative measure) reflects household access to diverse foods; this is commonly used as an indicator for nutrient adequacy with regard to individuals' diets (Ngema et al., 2018). There are 12 food groups were considered in this study adopted from FAO (2013) in calculating household dietary diversity score (HDDS) which are: cereals, roots and tubers, vegetables, fruits, meat-poultry-and-offal, eggs, fish and seafood, pulses-legumes-and-nuts, milk, and milk products, oil/fats, sugar and honey, and miscellaneous. The HDDS consists of a simple count of 12 food groups that a household or an individual has consumed over the preceding 24 hours. It is meant to reflect, in a snapshot form, the economic ability of a household to access a variety of foods. It is classified into three groups considering the scores: ≤3, 4 to 5, and ≥6 represent as lowest dietary diversity, medium dietary diversity, and high dietary diversity, respectively.

On the other hand, Household Food Consumption Score (HFCS) is a frequency-weighted HDDS. The HFCS is calculated using the frequency of consumption of eight different food groups (main staples, pulses, vegetables, fruit, meat and fish, milk, sugar, and oil) consumed by a household in the previous 7 days when a survey interview is conducted (IFPRI, 2008). The HFCS is estimated using a typical seven-day food dataset through categorizing food items into food groups and subsequently adding the consumption frequency of food items belonging to that particular group. A consumption frequency beyond 7 is captured as 7 and multiplied by the attained score for every food group by its weight. The weight considered for the eight food groups were 2, 3, 1, 1, 4, 4, 0.5, and 0.5 for main staples (cereals, roots, and tubers), pulses, vegetables, fruit, meat/fish/eggs, milk, sugar, and fat/oil, respectively. Weighted food group scores are added together, and finally, the HFCS, a continuous measure, is categorized into appropriate thresholds of food consumption groups as follows: 0-28 (poor), 28.5-42 (borderline), and above 42 (acceptable) (WFP, 2007; IFPRI, 2008). Descriptive statistical tools were mostly used to analyze the data and the results are presented in tabular and graphical forms in the present paper.

Results and Discussion

Socioeconomic status of the households

Household food security status is closely related to respondents' household size, age, education status, employment status, access to resources, etc. Table 1 summarizes the socioeconomic variables of the sample households and their outcomes. Household size represented the sum of members residing in a home together at the time of the study. The chances for large household size to be poor are high and therefore add more pressure on the household in terms of the number of people required to feed. On the other hand, household size can mean the availability of family labor by delegating important farming activities to other household members; this is likely to boost the food security situation of a household. Hence, the effect of household size on household food security status may not be predetermined (Ngema et al., 2018). Household size was measured as a continuous variable of one to seven people in a house. The composition of the household members with different age groups imparts a differential impact on the food security status of the household (Hossain and Bayes, 2009). Family member consisting of more children and old age people implies more burden to the family as they are not income earner. Four age groups e.g. 0-5 years, 6-14 years, 15-60 years, and above 60 years were considered in the present study. Education helps in accruing new information about innovation in the agricultural sector which makes the farm households more capable of managing scarce resources and earns the possible maximum profit. The educational status of sample households was therefore expected to positively correlate with household food security status. The formal educational groups taken into consideration were: illiterate, primary, secondary, higher secondary, and tertiary.

Table 1. Status of socioeconomic variables of sample households

Variable	Description	Outcome
Household size	Number of household members	62% of farm households have 3-4 family members
Age	Percentage of family members by age groups	72% of the family members belong to the age group 15-60 years who are the most active member of the family
Education	Percentage of family members received formal education	Most of the family members have primary education (52%) followed by secondary education (27%)
Occupation	Percentage of households engaged in a different occupation	Agriculture is the main occupation for more than 80% of the farm households
Housing type	Types of house	Most of the houses (84%) are made out of the mud as it is naturally available and less costly
Cooking energy	Percentage of household use cooking energy	Almost all the houses use firewood as the cooking energy

Source: Authors, 2018

Occupation in this paper denotes the state of an economically active individual working either on a full-time and/or part-time basis and earning an income. It was thus expected that the employment status would have a positive effect on the food security situation of households. The type of house reflects the economic condition of a household which is directly related to the food security status. House type was divided into three categories: building, semi-building, and muddy. Sometimes, the availability of cooking energy also affects the food security status of households as if it is costly, households try to minimize the food items in their daily meals. Most of the households use firewood as their cooking energy which they have to buy from the market.

Types of crop cultivated in two seasons

The farmers in the study area cultivate two crops per year, hence the seasons can be categorized as April-September (summer season) and October-March (winter season). The respondents were asked about the crops they cultivate in these two seasons and the distribution of the production between consumption and selling. Naogaon is the highest rice-producing district in Bangladesh (BBS, 2020). Therefore, it is not surprising that in the study area, the main crop produced is rice which is produced in both seasons. The period before the harvest of Aman and Boro rice was primarily noted to be responsible for the lean period phenomenon which is more pronounced in the northwest part of Bangladesh (Shonchoy, 2011; Zug, 2006). These occur in February to March and September to October-November (Gill et al., 2003; Khandker, 2012; Zug, 2006).

Table 2 indicates that farmers harvest on an average of 2710 kg and 2791 kg of rice in summer and winter seasons, respectively of which they consumed 795 kg and 771 kg, respectively, and the rest of the amount they sell either immediately after harvesting or keep as stock to sell later. The consumed amount includes the amount that farmers consume at their households or used to help neighbors, beggars, relatives in times of need. On the other hand, they produced onion, garlic, and potato only for their consumption purposes on small scale in the summer season. Among the respondent households, 38% said that they face food inadequacy in November as this fall in between the two harvesting periods.

Table 2. Types of crops cultivated by the farm households

Crops	Mean Amount (Kg per household)		
	April-September (summer season)		
	Harvested	Sold	Consumed
Aman Rice	2710	1915	795
Onion	16.75	0	16.75
Garlic	13.5	0	13.5
Potato	80	0	80
	October-March (winter season)		
	Harvested	Sold	Consumed
Boro Rice	2791	2020	771

Source: Authors, 2018.

Household Dietary Diversity of 24-hour recall

There are no established cut-off points in terms of the number of food groups to indicate adequate or inadequate dietary diversity for the HDDS and, so, it is recommended to use the mean score or distribution of scores for analytical purposes (FAO, 2013). In this paper, 24 hours recall-based HDDS of 12 food groups was estimated as: households consume 3 or fewer food groups, 4 to 5 food groups, and 6 or more food groups are classified as having the lowest dietary diversity,

medium dietary diversity, and high dietary diversity, respectively. Thus, the HDDS was used to serve as a proxy for household food security status in this paper. However, it should be noted that the quantity of the food consumed is not depicted by the dietary diversity score.

Table 3 indicates that the HDDS was generally poor for 27% of the households that had the lowest dietary diversity whereas 55% of households had medium dietary diversity and 18% households had high dietary diversity. The findings indicate that most of the households fall in medium dietary diversity in the study area.

Table 3. HDDS of 24 hours recall

HDDS	Frequency	Percentage
Lowest Dietary	16	27
Medium Dietary	33	55
High Dietary	11	18
Total	**60**	**100**

Source: Authors, 2018.

The 7-day food-frequency of the study adopts the quantitative aspect of food consumption pattern followed by IFPRI (2008) which is presented in Table 4. Results show that rice was widely consumed by the majority of households (100%) during the past week studied. This finding is in agreement that rice is the main staple food of Bangladesh and most of the households indicated that it was adequate for their household consumption. Other cereals like puffed rice and wheat were consumed by 95% and 10% of households, respectively. Potato is the main source of carbohydrates after rice and consumed by 100% of households 5 or more times a week. Oil and sugar are daily consumed items by households. Pulses and milk were the good source of proteins for household members and consumed by 83% and 23% of households, respectively. The main vegetables consumed among the households were ladies finger, gourd, bitter gourd, and sweet gourd by 67%, 75%, 80%, 42%, and 27%, respectively. The main fruits consumed were banana, orange, guava, and apple by 32%, 10%, 8%, and 30% households, respectively. It can be said that household food consumption patterns were influenced by a lack of variety of food items for consumption as the consumption pattern is heavily dependent on rice, oil, and sugar. Perhaps lack of knowledge about food nutrients is the main reason for not having varieties of food on daily basis.

Table 4. Seven-day food-frequency of consumption

Food Type	Percentage of households (%) consume the food	Frequency of consumption by households (%)					
		1	**2**	**3**	**4**	**5**	**6**
Rice	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Puffed rice	95.01	5.00	0.00	1.67	1.67	0.00	91.67
Wheat	10.00	90.00	1.67	5.00	0.00	0.00	3.33
Potato	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Honey/Sugar	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Fat/Oil	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Milk	23.32	76.67	3.33	8.33	0.00	0.00	11.66
Meat	51.65	48.35	33.33	10.00	6.66	0.00	1.66
Fish	93.31	6.67	18.33	31.66	11.66	8.33	23.33
Egg	61.65	38.34	11.66	30.00	5.00	3.33	11.66
Pulses	83.32	16.67	13.33	16.66	20.00	15.00	18.33
Nut	3.32	96.67	1.66	1.66	0.00	0.00	0.00
Ladies finger	66.66	33.34	41.66	20.00	5.00	0.00	0.00
Gourd	74.98	25.00	46.66	26.66	0.00	0.00	1.66
Spinach	79.99	20.00	45.00	33.33	0.00	0.00	1.66
Bitter gourd	41.66	58.34	28.33	13.33	0.00	0.00	0.00
Sweet gourd	26.66	73.34	18.33	8.33	0.00	0.00	0.00
Other vegetables	98.32	1.67	5.00	48.33	33.33	6.66	5.00
Banana	31.65	68.34	10.00	8.33	6.66	0.00	6.66
Orange	9.99	90.00	3.33	5.00	1.66	0.00	0.00
Guava	8.31	91.67	1.66	3.33	1.66	0.00	1.66
Apple	29.99	70.00	8.33	18.33	3.33	0.00	0.00

Source: Authors, 2018.

Note: 1=None, 2=Once, 3=Twice, 4=3 times, 5=4 times, 6=5 and more times.

Household Food Consumption Score (HFCS)

Household Food Consumption Score (HFCS), a frequency-weighted HDDS, was further estimated as an indicator of dietary diversity and frequency of consumption by use of the frequent consumption of eight various food groups. Table 5 indicates that 83.3%

of households had poor HFCS ranges between 0 to 28 and 16.7% had borderline HFCS ranges between 28.5 and 42 and no household fell within acceptable HFCS of ≥ 42 categories based on the previous 7 days of household food consumption. This means that the overall HFCS was relatively poor. Comparing HDDS to the HFCS gives an indication of how much additional precision is provided by accounting for the frequency of consumption as well as the diversity of consumption.

Table 5. Household Food Consumption Score (HFCS)

Profile	HFCS	Frequency	Percentage
Poor	0 -28	50	83.3
Borderline	28.5 - 42	10	16.7
Acceptable	> 42	0	0.0
Total		**60**	**100.0**

Source: Field Survey, 2018.

Household food sources

The principal caregiver, mainly the female was asked to respond to questions concerning the main sources of household food. The food sources were categorized into four groups: own production, market, gifts from relatives, neighbors, and friends, and others. Since no significant response was found other than own production and market, these two sections are presented in the result. Table 6 presents the percentage of households that consume major food items and the sources of their foods. Rice was mainly sourced from its production at 97%. Puffed rice, wheat, vegetables, local fruits, and milk are other major food items that households consume partially from their source. All other food items are mainly bought from the market.

Cross-tabulation of HDDS and HFCS

Cross tabulations were used to examine the matching between indicators for comparing food security classifications based on the HDDS and the HFCS. The findings of cross-tabulating HDDS and HFCS are shown in Table 7. The analysis of household food security status was in accordance with an analysis by WFP's Humanitarian Practice Network's study carried out in Darfur in 2005 for emergency food security and nutrition assessment that first classified households into three food consumption groups ('acceptable', 'borderline' and 'poor') according to the diversity of the diet and consumption frequency (Aiga and Dhur, 2006).

Table 6. Main sources of food items for households

Food Type	Percentage of households consume the food (%)	Main sources of food items (%)	
		Own Production	**Market**
Rice	100.00	96.67	3.33
Puffed rice	95.01	42.11	57.89
Wheat	10.00	33.33	66.67
Potato	100.00	63.33	36.67
Honey/Sugar	100.00	1.69	98.31
Fat/Oil	100.00	0.00	100.00
Milk	23.32	64.29	35.71
Meat	51.65	3.23	96.77
Fish	93.31	18.18	81.82
Egg	61.65	30.56	69.44
Pulses	83.32	0.00	100.00
Nut	3.32	0.00	100.00
Ladies finger	66.66	12.50	87.50
Gourd	74.98	11.11	88.89
Spinach	79.99	12.50	87.50
Bitter gourd	41.66	8.33	91.67
Sweet gourd	26.66	25.00	75.00
Other vegetables	98.32	11.86	88.14
Banana	31.65	0.00	100.00
Orange	9.99	0.00	100.00
Guava	8.31	60.00	40.00
Grape	1.66	0.00	100.00
Apple	29.99	0.00	100.00
Olive	1.66	0.00	100.00
Other fruits	8.33	40.00	60.00

Source: Field Survey, 2018.

Table 7. Cross-tabulation of HDDS and HFCS

% of households			Categories of HFCS		
			Poor=0-28	Borderline= 28.5-42	Total
Categories of HDDS	Low = ≤ 3	Frequency	13	3	16
		HDDS	81.2%	18.8%	100.0%
		HFCS	26.0%	30.0%	26.7%
	Medium = 4 & 5	Frequency	29	4	33
		HDDS	87.9%	12.1%	100.0%
		HFCS	58.0%	40.0%	55.0%
	High = ≥ 6	Frequency	8	3	11
		HDDS	72.7%	27.3%	100.0%
		HFCS	16.0%	30.0%	18.3%
	Total	Frequency	50	10	60
		HDDS	83.3%	16.7%	100.0%
		HFCS	100.0%	100.0%	100.0%

Table 7 indicates that the number of households that had low HDDS and poor HFCS was 13, low HDDS and borderline HFCS were 3. The cut-offs for the households' food insecurity were determined by adding the frequency (n=13) and frequency (n=3), i.e. n=16 which is, 26.7% of households classified as food poor. Those that medium HDDS and poor HFCS were 29 and medium HDDS and borderline HFCS were 4. These frequencies were summed up (n=33) and their percentage calculated to establish households' vulnerability to food insecurity (borderline). The percentage of households at borderline was 55%. The households that had high HDDS and poor HFCS were 8 and high HDDS and borderline HFCS were 3. Frequency (n=8) and frequency (n=3) were summed up to get n=11. Therefore 11 (18.3%) households' food security was acceptable. The classification of the households in the study area according to the status of household food security was thus: 26.7% are food poor, 55% are vulnerable to food security and 18.34% are food secure. It was also revealed from the study that farmers usually take loans from local NGOs (68%) or borrow money from friends or relatives (25%) to cope with the food shortage. Sometimes they also sell their household assets (8%) to meet the food demand.

Conclusion and Recommendations

The results presented in this paper provide evidence that food security remains an issue in water-scarce rural areas of Bangladesh. The results reveal that the majority of households had medium dietary diversity levels based on HDDS, where the majority fell within the poor consumption score based on HFCS. This finding confirms that although households can have access to food, from a nutritional perspective, households may still not be able to meet the dietary diversity requirements to be deemed as food secure. The food habit is mostly starchy staples and oil and sugar are common items to consume. The cross-tabulations results revealed that only a few households (18%) are truly food secure.

Although the study was conducted in a small area with a limited number of samples, this might provide an idea of the food security status of the rural farm households similar to Khajur in general. Since own agricultural production, especially rice is the main source of own consumption and purchasing other food items, mechanisms should be put in place that will promote diverse agricultural production through extension. Development and dissemination of improved production technology must continue to sustain the growth in food production. Among crops, the research strategy must accord higher priority to high-valued, non-food grain products. Income generation and employment opportunities for these vulnerable rural households are critical to ensure their access to food security and this demands well-targeted policy interventions. A further better understanding of food security dynamics and linkages between adverse shocks (such as droughts), rural income, credit markets, and nutrition is important to recommend specific policies. However, it is expected that appropriately targeted income transfers, credit programs, and insurance mechanisms in times of crisis may have very high payoffs in improving food security. Several food aid programmes such as Vulnerable Group Feeding (VGF) or Social Security Policy Support (SSPS) programmes should be ensured for the vulnerable farm households in the time of crisis. Along with government institutions, different national and international NGOs, mass media such as TV, radio, etc. should come forward to increase awareness and provide sufficient support to farm households, especially during a food shortage or stress situation. Finally, it is recommended to undertake an in-depth inquiry on the household coping measures and access to extension, credit, social safety net programmes, and other institutional supports in

relation to household food security status to better understand the dynamics of this issue.

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