

Food Security in Bangladesh: Insight from Available Literature

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ABSTRACT

Background: Bangladesh is a developing country; so, it is faced with the great challenge of food insecurity. In spite of achieving self-sufficiency in food production, a huge number of people experience the food insecure situation in this country. Since long time ago, scientists are striving to feed the growing population of Bangladesh. However, this study was conducted to assess the present situation of food security in Bangladesh. **Methods:** This systematic study investigated the available literature and recorded the related and different dimensions of food security in Bangladesh. **Results:** Bangladesh has made remarkable improvements in food availability, access, and utilization in the last few decades, but it is not the case regarding the food stability. The country experiences numerous challenges regarding food insecurity. Bangladesh has made significant improvement in cereals (rice) production. Despite the increase in the income of people, the food quality is not good. Unequal land ownership and income distribution have made the food access below par. Food utilization has improved but balanced food intake is still far below the standard. A notable portion of people are still severely food insecure and malnourished. To ensure food security, government of Bangladesh has undertaken several programs but they were not sufficient to cope with this everlasting issue. **Conclusion:** Despite the improvement in many aspects of food security, people of Bangladesh still lack dietary diversification, which leads to nutritional imbalance. In addition, several factors challenge the food security. Therefore, GOs and NGOs should work from the same platform to address the challenges affecting food security in Bangladesh efficiently.

Keywords: Food security; Availability; Access; Utilization; Stability; Bangladesh.

Introduction

Food is the basic need for all living organisms to continue their life cycles. Food security achievement is the key development priority for all developing countries such as Bangladesh (Parvin and Ahsan, 2013). Food security is a global concern for every individual; one in nine people

around the world (805 million) go hungry every day (FAO, 2014a). Moreover, the hidden type of hunger that is caused by deficiencies in micronutrients such as iron, Vitamin A, and Zinc affects two billion people worldwide (FAO *et al.*, 2014). In Bangladesh food insecurity situation is

more severe; overpopulation along with decrease of the land-to-human ratio (Shaheen and Islam, 2012) have made the need for food security of utmost necessity. Since Bangladesh liberation in 1971, the government has been trying hard to control the population growth and triumph over the food insecurity (Parvin and Ahsan, 2013, WFP, 2004). Food and Agriculture Organization (FAO, 2009) explains food security as a situation 'when all people at all times have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life'. The definition introduces the food security as a complex situation that involves physical and biological aspects of food production, distribution, and utilization considering food stability throughout the time (WFP, 2004). Thus, food security embraces four key dimensions of food availability, access, utilization, and stability (FAO, 2008).

Bangladesh is an agrarian country where more than half of the population are engaged directly in agriculture for survival (Jolliffe *et al.*, 2013). Besides, a lion share of the national economy comes from the agriculture sector (GDP-14.17%) (BBS, 2017). Bangladesh has nearly achieved self-sufficiency in food production (Mannaf and Uddin, 2012), especially in the case of rice. The production of rice (staple food of Bangladesh) was assumed to be tripled over the last 30 years (Hossain, 2014, Shaheen and Islam, 2012). The staple food of most people in Bangladesh is rice and more than 70 percent of their daily calories comes from rice (Magnani *et al.*, 2015). Hence, food security is considered synonymously with self-sufficiency in rice production (Hossain, 2013). In addition, Bangladesh has made remarkable progress in producing wheat, potatoes, and

vegetables (Hossain, 2013, 2014). It is also worth mentioning that Bangladesh has made tremendous improvement in ensuring the food availability. However, about 32 percent of people live below the poverty line and do not have sufficient access to food (FAO, 2011a). This shows that the other dimensions of food security still lag behind. Moreover, it is shocking that even with the sufficient food production, 26 percent of people are still chronically food insecure (Shaheen and Islam, 2012). So, it is imperative to assess the present status of food security in Bangladesh and to find out the drawbacks, especially in case of food access, utilization, and stability. Consequently, we need to study the future challenges of food security and to investigate the strategies to deal with them. Therefore, in this study we attempted to have an overview on the current food security situation of Bangladesh to address the above-mentioned drawbacks and to formulate some recommendations to improve the food security situation in Bangladesh.

Data sources

The study was conducted using a systematic design to investigate the records of food security in Bangladesh. Therefore, the data were mainly from the secondary sources. The main data were obtained from Bangladesh Bureau of Statistics (BBS), World Bank, Household Income and Expenditure Survey (HIES), Bangladesh Demographic and Health Survey (BDHS), Bangladesh Economic Review, Bangladesh Integrated Household Survey (BIHS), as well as other published and unpublished documents. In this study, we explored the information that covered all the four dimensions in this area, i.e., food availability, food access, food utilization, and food stability using a systematic literature review.

Table 1. Production trend of rice from 2014/15 to 2016/17

Rice Production	2014/15	2015/16	2016/17	2017/18
	Estimate (1,000 MT)	Estimate (1,000 MT)	Estimate (1,000 MT)	Forecast (1,000 MT)
Boro	18,600	18,700	18,890	17,800
Aus	2,600	2,600	2,338	2,700
Aman	13,300	13,200	13,350	13,680
Total	34,500	34,500	34,578	34,180

Source: Lagos and Hossain (2016) and USDA (2018)

Table 2. Production trend of fish, meat, milk, and egg in 1007/08, 2010/11, and 2013/14

Year	Fish (1,00000 MT)	Meat (1,00000 T)	Milk (1,00000 T)	Egg (Million piece)
2007/08	25.63	10.40	26.50	56532
2010/11	30.62	12.79	18.91	42110
2013/14	35.55	30.21	37.38	67452.80

Source: BER (2014)

Table 3. Per capita availability of major food items in 1994-95, 2004-05, and 2010-11 period

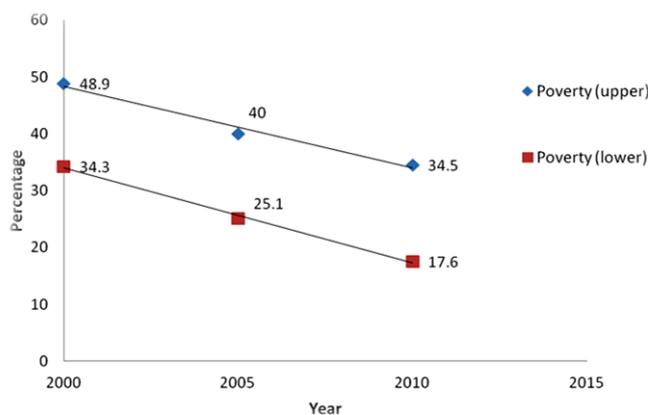
Food Item	Availability (g/capita/day)		
	1994/95	2004/05	2010/11
Cereals	374	464	647
Potato	32	108	153
Pulses	11	10	13
Oilseed	10	10	15
Vegetable	21	108	207
Fruits	24	68	65
Fish	27	41	53
Meat	11	21	35
Milk	35	42	55
Egg (Million number)	19	41	41

Source: BDP (2015)

Table 5. Per capita/day intake of protein (in gram) by food groups

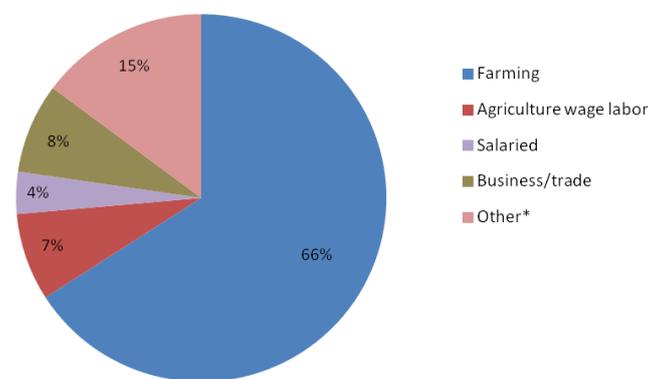
Food Group	National		Rural		Urban	
	2010	2005	2010	2005	2010	2005
Cereals	35.15	33.73	36.61	34.70	31.04	30.77
Potato	2.11	1.89	2.15	1.85	2.00	2.02
Vegetables	4.96	4.67	5.04	4.67	4.73	4.68
Pulses	3.47	3.52	3.19	3.16	4.24	4.63
Meat/Poultry/Eggs	5.56	4.37	4.33	3.66	9.02	6.50
Fish	9.70	8.50	9.05	8.06	11.53	9.86
Fruits	0.91	0.79	0.82	0.79	1.15	0.78
Sugar & Gur	0.00	0.01	0.00	0.01	0.00	0.00
Milk/milk prods	1.20	0.75	1.10	0.70	1.49	0.89
Edible oils	0.00	0.00	0.00	0.00	0.00	0.00
Miscellaneous Items	1.36	2.67	1.14	2.59	1.98	2.92
Total	66.26	62.35	64.24	61.53	69.11	64.82

Source: HEIS (2010)



Graph 1. Prevalence of poverty in Bangladesh

Source: Magnani et al. (2015) and Hussain et al. (2014)



Graph 2. National level labour forces in Bangladesh

Source: Ahmed et al. (2013) and Magnani et al. (2015)

*Other includes off-farm labor, rickshaw pooler, livestock worker, self-employed, and unemployed for household members with 15 years and older



Graph 3. Average per capita per day calorie (Kcal) intake

Source: HEIS (2010)

Food security status of Bangladesh

Availability of food: The major food crops are quite available in Bangladesh, especially rice, which is considered as the staple food of Bangladesh (Hossain, 2014, Shaheen and Islam, 2012). The rapid development and improvement of different high yielding crop varieties and technologies along with better agricultural extension system made it possible to ensure year round availability of food for people (Hossain, 2014). During 1970s and 1980s, it was difficult for the government of Bangladesh to assure the availability of two meals per day for the mass people. However, as **Table 1** shows, rice production has been increasing in Bangladesh, so that the advancement and distinct process is quite visible (Lagos and Hossain, 2016).

Besides self sufficiency in rice production, production of other crops such as potatoes, vegetables, and fruits boasted remarkably. Unfortunately, wheat as the second staple food of Bangladesh had a decreased production trend (BDP, 2015). This shows the dependency of Bangladesh people on rice as a starchy staple and lack of the necessary facilities to produce different foods to ensure the complete nutritional food security (Hossain, 2013). Beside the crop sector, Bangladesh has made notable progress in fish and livestock production. Bangladesh is the fourth fish producing country in the world (FAO, 2016). The increased production and supply of fish, meat, milk, and egg (as shown in **Table 2**) contributes to the overall availability of food to the general people (BER, 2014).

Considering the progress in food production, the per capita availability of foods has also increased (**Table 3**). It is evident that major availability was met in the case of cereals (e.g., rice) and potato. The availability of vegetables, fish, meat, and milk also increased notably; whereas, further measures are required in case of egg, pulses, oilseeds, and fruits' production (BDP, 2015).

Access to food: Despite making tremendous success in food production, Bangladesh is still experiencing limited access to sufficient food. Although 60 percent of people living in the rural

areas are directly or indirectly engaged with agriculture (Hossain, 2014), land distribution inequalities led to people's disproportionate access to food. Small farmers (owing 0.5-1.49 acres of land) are the major population of Bangladesh, who consist of 44.6 percent of the farming communities (Ahmed *et al.*, 2013). These small farmers mainly have access to cereals and other basic food items are not sufficiently available for them. Poverty is another factor that makes access to food difficult and ultimately create food insecurity (Bishwajit *et al.*, 2014). Bangladesh has made significant progress in reducing poverty rates (FAO, 2014b) and improved its extreme poverty situation (Graph 1) with the passage of time but changes were not significant.

Due to slow growth of gross national product (GNP) and high population growth, still one-third of the population live below the poverty line in Bangladesh (Hossain, 2014). This trend seemed a bit sluggish in the urban areas (Hossain *et al.*, 2014, Magnani *et al.*, 2015). Indicators such as wages and income are the key factors in accessing the food by the poor (Hossain, 2014). Majority of the labor forces belong to the farming community (Graph 2) and therefore, their income and wages are very low compared with other professions in this country (Ahmed *et al.*, 2013, Magnani *et al.*, 2015).

Price hikes and market instability have worsened the condition of the households and affected their food access (Hossain, 2014). Sudden price hikes in 2007s-2008s deteriorated the condition of people who spent over half of their income in purchasing starchy staple and discouraged them to invest in agriculture (Bishwajit *et al.*, 2014, Hossain, 2014). Likewise, seasonal food shortage, especially in the northern Bangladesh affected the availability of and accessibility to food by the poor and the middle-level households (Bishwajit *et al.*, 2014).

Food utilization and nutrition: Another dimension of food security in Bangladesh is deficiency in proper nutrition and utilization of food. Although food consumption has been increased in the last few decades, adequate uptake

of nutritious food is far below the standard. The national average per capita food consumption was 913.8 grams in 1995-96, but it was increased up to 1000.0 grams in 2010, which was higher than the normal food intake (934 grams/person/day) for a regular person. The extent of food consumption was significantly higher in the rural areas (1000.5 gm/person/day) than the urban settings (985.5 gm/person/day) in 2010 (HEIS, 2010). Despite the fact that urban people consume less amount of food, their overall nutrition is better than the rural people. The main portion of food intake by the rural people comes from cereals, especially rice. The average calorie intake of the rural people is higher than the urban people, which is due to the high calorie of rice. Graph 3 shows that the average per capita calorie intake has increased in the last few decades at rural, urban, and national levels. Calorie intake is comparatively higher in the rural settings than the urban settings (HEIS, 2010). Graph 3 clearly shows the sudden rise of calorie intake from 2005 to 2010. The average poverty rate has decreased to 31.5 percent in 2010 compared with 40.0 percent in 2005 as the per-capita expenditure has increased for the entire population (Gimenz *et al.*, 2014). So, people are getting more concerned about food quality and nutrition. They spend more on high quality food. The same progress is also noticed in the rural areas of the country.

It was found that the major percentage of calorie came from rice (71.1) followed by vegetables (8) and oils (7.4) in 2010. On the other hand, people used to acquire very less amount of calorie from eggs (0.4%) and fruits (0.4 %) (Ahmed *et al.*, 2013). Furthermore, the amount of protein intake was higher in the urban settings (69.11 gram) in comparison with the rural settings (64.24 gram). The highest amount of protein came from cereals (35.15 gram) followed by fish (9.70 gram); whereas, very low amount came from milk and milk products (**Table 5**). The major vulnerable groups (i.e., children and women) find this situation more difficult and are still undernourished; especially the reproductive-aged women and children less than 5 years (BDHS,

2014). This situation implicates the imbalanced nutrition consumption and lack of food security in food utilization and nutrition.

Food stability: Food stability is a new dimension in food security. Stability in food availability, food access, food utilization including nutrition and food safety are crucial factors in food security. Therefore, it is highly important to retain the stable condition in food market chain and food supply. To hit this target, trade plays an important role in stabilizing the food supplies and market. It reduces the consumption fluctuations and relieves the country from the costly burden of stock holding interventions. In the cases that trade cannot fulfill the goal of food market stabilization, maintaining food security stocks to a reasonable level depending upon the internal and external situations can play a vital role. Moreover, the government is expected to stabilize the food access throughout the year by employing the food safety net or social protection strategies (Nath, 2015).

Key challenges in achieving food security in Bangladesh

Bangladesh is not food secure and the probable future challenges may make the situation more critical. However, climate change is considered as one of the key challenges for food security (Muniruzzaman, 2013). Food security is directly dependent on the agricultural sector and climate change influences the agriculture rigorously (Amir and Ahmed, 2013). The changing patterns of hazards and natural calamities such as irregular and untimely rainfalls, uneven temperature fluctuation, salinity rise, ill-timed drought, river erosion, and floods (MoEF, 2010) have made Bangladesh more vulnerable to food insecurity in the coming days (FAO, 2003, Mondal, 2010). An expected estimation counts that climate change may cause up to US\$26 billion loss to Bangladesh's agricultural sectors during the 2005-2050 (Yu *et al.*, 2010). This loss may be more in rice production and leads to 3.9 percent reduction in rice production per year (Asaduzzaman *et al.*, 2010). The effect of climate change is harsher with regard to the majority of farmers, since they belong

to the smallholding farming community (Ahmed *et al.*, 2013, Quasem, 2011). Besides, the increasing conversion rate of agricultural land to non-agricultural land could have adverse impacts on food security (Muniruzzaman, 2013, Quasem, 2011). One-third of the agricultural land was lost in the last 30 years due to the unplanned urbanization in this country (Rashid, 2012). This losing pace does not seem to slow down considering the overpopulation and tendency of people to convert into urbanized citizens (Shaheen and Islam, 2012). The population of Bangladesh is predicted to reach about 260 million in the mid-21st century (Streatfield and Karar, 2008), which will bring about severe food shortage in the coming years (Muniruzzaman, 2013). In addition, the global food prices began to rise slowly from 2004 and have fluctuated much since 2007, highlighting the vulnerability of global food supplies and revitalizing interest in farming and related issues after a long period of neglect (Foley, 2011, Tilman *et al.*, 2011). This situation also affects the food security condition of those who live in the suburbs of the country (Shakib, 2012). Since the majority of the Bangladeshi population are poor, they will face a tough challenge to afford the food costs in the future (Mondal, 2010, Muniruzzaman, 2013). In order to ensure the food security of people, better planning should be conducted about these challenges in the future. Currently, the initial and most important need of Bangladeshi people is food security, which should be met by taking appropriate measures

Opportunities for food security in Bangladesh

Protection of the existing arable land should be the first priority of the authorities to ensure the sufficient crops for the production of Bangladesh. The land distribution policy should be more agriculture and farmer oriented. Cultivable waste land should be distributed among the people who do not have land to be used for agricultural purposes (Mondal, 2010). Maximum but sustainable use of agricultural land should be ensured to get most crop production. The present yield gaps can also be exploited using simple interventions such as better seed, nutrients, and water

management (Mueller, 2012). Investment in sustainable agricultural and fisheries' productivity growth should be ensured to get sustainable supply of food over the long term. This includes investment in innovations, such as climate-resilient varieties that can enable the sectors to respond to the challenges posed by climate change (OECD, 2017). Bangladesh already has many research institutes working on this issue, but the studies should be problem specific to ensure better utilization of resources (Mondal, 2010). Since most of the farmers in Bangladesh are smallholders (Ahmed *et al.*, 2013), political strategies, focused investments, and planned measures should be implemented to enable these farmers to develop their farming activities and use new innovations (FAO, 2011b, Vorley *et al.*, 2012). The experienced farmers require economic and financial support to use their knowledge. Therefore, measures should be taken to improve the food access in short term using the targeted strategies (OECD, 2017). In other words, food access in the market and the economic affordability of foods are crucial factors. However, income inequalities have made food access difficult economically. The food intake should concern both enough calorie intake and nutritional adequacy to ensure good health and reduce morbidity rates (Mittal and Sethi, 2009).

Conclusions and Recommendations

Food security is the most challenging issue in Bangladesh. With the pass of time, we observed remarkable progress in the food security situations including food grain production, poverty reduction, food consumption, as well as energy and calorie intake with a notable improvement in child and women nutrition. Agriculture is dominated by cereals in Bangladesh and people lack dietary **diversification**. In other words, they do not have access to other nutrients in their major meals. Subsequently, nutritional aspects of human health have remained neglected in this country. Moreover, Bangladesh has experienced many challenges including climate change, poverty, loss of land, overpopulation, market instability, and post-harvest losses in achieving food security at the national to the local levels. The government of

Bangladesh has already made some measures to achieve food security, but many more strategies are required to achieve complete food security. Thus, the following recommendations are suggested for the future policy actions.

1. Investment on the need analysis should be increased. The contemporary technologies should be developed and disseminated to the farmers. Farmers should be encouraged to cultivate diversified crops. Besides, more studies should be conducted on the climate change and the strategies to cope with it.

2. Along with the government initiatives, NGOs should also address the challenges regarding the food security, especially for the landless and poor people who reside in the rural suburbs of Bangladesh.

3. The government should develop some strict laws and monitor implementation of these regulations to control the food market and to stabilize the market prices. In this case, researches can play a great role in studying the supply chain and food value chain.

References

- Ahmed AU, et al.** 2013. The Status of Food Security in the Feed the Future Zone and Other Regions of Bangladesh: Results from the 2011-2012 Bangladesh Integrated Household Survey (BIHS). USAID and IFPRI.
- Amir KI & Ahmed T** 2013. Climate Change and Its Impact on Food Security in Bangladesh: A Case Study on Kalapara, Patuakhali, Bangladesh. *Earth science & climate change*. **4 (5)**: 1-11.
- Asaduzzaman M, Ringler C, Thurlow J & Alam S** 2010. Investing in Crop Agriculture in Bangladesh for Higher Growth and Productivity, and Adaptation to Climate Change. Bangladesh Food Security Investment Forum.
- BBS** 2017. Gross domestic product of Bangladesh, 2016-17. Bangladesh Bureau of Statistics. Government of the People's Republic of Bangladesh, Dhaka, Bangladesh.
- BDHS** 2014. Bangladesh demographic and health survey 2014. (ed. M. o. H. a. F. Welfare): Dhaka.

4. The government should conduct programs on food security for the poor and women in the rural areas.

5. Apart from food security, the scientists should carry out nutritional studies to improve the health situation of people in this country.

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Authors' contributions

D Roy designed the study, reviewed the literature, organized the information, developed the draft, and edited the manuscript. DS Dev wrote and edited the manuscript. S Sheheli had the main responsibility for the final content. All authors read and approved the final manuscript.

Conflicts of interests

The authors declare no conflict of interests.

- BDP** 2015. Bangladesh Delta Plan 2100 Formulation Project: Agriculture and Food Security. Baseline Survey Report. . General Economic Division, Planning Commission, Government of the People's Republic of Bangladesh, Dhaka.
- BER** 2014. Bangladesh Economic Review 2014. . Ministry of Finance, Government of the People's Republic of Bangladesh.
- Bishwajit G, Barmon R & Ghosh S** 2014. Reviewing the Status of Agricultural Production in Bangladesh from a Food Security Perspective. *Russian journal of agricultural and socio-economic sciences*. **1 (25)**: 19-27.
- FAO** 2003. World Agriculture: Toward 2015/2030. Earthscan: Rome.
- FAO** 2008. EC-FAO Food Security Information for Action. Food and Agriculture Organization of the United Nations, Rome.

- FAO** 2009. The State of Food Insecurity in the world. Food and Agriculture Organization of the United Nations, Rome.
- FAO** 2011a. State of the World's Land and Water Resources for Food and Agriculture. Food and Agriculture Organization of the United Nations, Rome.
- FAO** 2011b. Food and Agriculture Policy Trends after the 2008 Food Security Crisis: Renewed Attention to Agricultural Development. Food and Agriculture Organization of the United Nations, Rome.
- FAO** 2014a. World Hunger Falls, But 805 Million Still Chronically Undernourished. In *UN Report*.
- FAO** 2014b. Bangladesh Country Programming Framework: Towards Sustainable Agriculture and Improved Food Security & Nutrition, CPF-2014-2018. Food and Agriculture Organization of the United Nations, Rome.
- FAO** 2016. The State of World Fisheries and Aquaculture: Contributing to Food Security and Nutrition for All. Fisheries and Aquaculture Department, FAO, Rome.
- FAO, IFAD & WFP** 2014. The State of Food Insecurity in the World 2014: Strengthening the Enabling Environment for Food Security and Nutrition. Food and Agriculture Organization of the United Nations, Rome.
- Foley JA** 2011. Solutions for a Cultivated Planet. *Nature*. **478**: 337-342.
- Gimenz L, Jolliffe D & Sharif I** 2014. Bangladesh, a Middle Income Country by 2021: What Will It Take in terms of Poverty Reduction? *Bangladesh development studies*. **XXXVII (1&2)**: 1-19.
- HEIS** 2010. Report of the Household Expenditure and Income Survey in 2010. Ministry of Planning, The Government of the People's Republic of Bangladesh, Dhaka.
- Hossain M** 2013. Food Security in Bangladesh: Achievement and Challenges. In *The Daily Star*.
- Hossain M** 2014. Sustaining Food Security: Achievements and Challenges. In *The BEF Conference*. Bangladesh Economist's Forum: Dhaka.
- Hussain AMZ, Talukder MQK & Ahmed T** 2014. Nutrition Background Paper to Inform the Preparation of the 7th Five Year Plan.
- Jolliffe D, Sharif I, Lea G & Ahmed F** 2013. Bangladesh-Poverty Assessment: Assessing a Decade of Progress in Reducing Poverty, 2000-2010.
- Lagos JE & Hossain T** 2016. Bangladesh: Gain and Feed Annual. USDA Foreign Agricultural Service. Global Agricultural Information Network.
- Magnani R, Oot L, Sethuraman K, Kabir G & Rahman S** 2015. USAID Office of Food for Peace Food Security Country Framework for Bangladesh (FY 2015-2019).
- Mannaf M & Uddin MT** 2012. Socioeconomic Factors Influencing Food Security Status of Maize Growing Households in Selected Areas of Bogra District. *Bangladesh journal of agricultural economists*. **XXXV (1&2)**: 177-187.
- Mittal S & Sethi D** 2009. Food Security in South Asia: Issues and Opportunities. Working Paper No 240. Mimeo, ICRIER.
- MoEF** 2010. Climate Change and Agriculture in Bangladesh: Information Brief. Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh.
- Mondal MAL** 2010. Challenges to Our Food Security. In *The Daily Star*: Dhaka.
- Mueller ND** 2012. Closing Yield Gaps through Nutrient and Water Management. *Nature*. 254-257.
- Muniruzzaman ANM** 2013. Food Security in Bangladesh: A Comprehensive Analysis. *Peace and security review*. **5 (10)**: 46-73.
- Nath NC** 2015. Food Security of Bangladesh: Status, Challenges and Strategic Policy Options In *19th Biennial Conference on Rethinking Political Economy of Development*.
- OECD** 2017. Building Food Security and Managing Risk in Southeast Asia. OECD Publishing: Paris.
- Parvin GA & Ahsan SMR** 2013. Impacts of Climate Change on Food Security of Rural Poor Women in Bangladesh. *Management of*

- environmental quality: an international journal.* **24 (6)**: 802-814.
- Quasem MA** 2011. Conversion of Agricultural Land to Non-agricultural Uses in Bangladesh: Extent and Determinants. *Bangladesh development studies.* **XXXIV (1)**: 59-85.
- Rashid M** 2012. Future of Farming and Farmers in Bangladesh. In *The financial Eepress.*
- Shaheen N & Islam S** 2012. National Situation of Food and Nutrition Security in Bangladesh. Asian Alliance against Hunger and Malnutrition (AAHM) and the Asian NGO Coalition for Agrarian Reform and Rural Development (ANGOC).
- Shakib SU** 2012. Impact of Price Hike over Lower Middle Class: A Case Study on Dhaka Metropolitan Area and Sylhet Division of Bangladesh. *European journal of business and Mnnagement.* **4 (3)**: 1-7.
- Streatfield PK & Karar ZA** 2008. Population Challenges for Bangladesh in the Coming Decades. *Journal of health, Pppulatoin and nutrition.* **26 (3)**: 261-272.
- Tilman D, Balzer C, Hill J & Befort BL** 2011. Global Food Demand and the Sustainable Intensification of Agriculture. *Proceedings of the national academy of sciences.* **108**: 20260-20264.
- USDA** 2018. Bangladesh: Grain and Feed Update. United States Department of Agriculture, Foreign Agricultural Service.
- Vorley B, Cotula L & Chan MK** 2012. Tipping the Balance: Policies to Shape Agricultural Investments and Markets in favour of Samll-scale Farmers. IIED and Oxfam: Oxford, UK.
- WFP** 2004. The Food Security Atlas of Bangladesh. Bangladesh Planning Commission, Bangladesh Bureau of Statistics and the United Nations World Food Programme.
- Yu WH, et al.** 2010. Climate Change Risks and Food Security in Bangladesh. Earthscan: London.