

Promotion of Food Security, Food Safety and its Regulation

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Abstract

Bangladesh has made substantial progress in enhancing food security by increasing food production. The country has a comprehensive agricultural policy and has undertaken various action programmes to further enhance food security. Government has also undertaken different safety net programmes, including special programmes for drought-prone and monga-prone areas. Despite this progress, however, the food production system still faces great challenges due to population increase, climate change, soil degradation etc. This paper puts emphasis on local efforts to face these challenges but at the same time suggests that better food security can be attained by regional cooperation, sharing of mutual knowledge and experience, and a joint approach towards weather and flood forecasting and disaster management. The paper notes that food safety is now increasingly becoming a matter of great concern, for which new food safety of regulating need to be undertaken. The paper has put forth a number of recommendations for further improving food security, formulating an effective safety policy and food laws of international standard, quickly enacting a Consumer Protection Act, and for constant monitoring of food safety practices.

1. Introduction

Bangladesh is predominantly an agricultural country. It plays a significant role in the overall economic development of the country. The Bangladesh Government has identified agriculture and rural development as the topmost priority sectors for

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rapid poverty alleviation. With about 21.11 percent of GDP contributed by agriculture (crops 11.72%, fisheries 4.73%, livestock 2.90%, and forestry 1.76%) and another 36 percent by the rural non-farm sector, the rural economy as a whole contributes more than 60 percent of the total GDP. Agriculture generates two-thirds of total employment, contributes 7.34 percent of total export earnings and provides food security to the increasing population. Bangladesh made a significant progress in cereal production in the last two decades. Cereal production has increased from 11.00 million tons in 1971 to almost 30.00 million tons in 2007. Ninety-eight percent of food comes from agriculture (MOF, 2008).

Food security describes a situation in which people do not live in hunger or fear of starvation. It is an access to food by all people at all times for a healthy life. The access is possible either through production in own land or purchase from the market. The latter depends on the purchasing power, which is determined by the jobs and income of the people.

Ensuring food security for all is one of the major challenges that Bangladesh faces today. Despite significant achievements in food grain production and food availability, food security at national, household and individual levels remains a matter of major concern for the Government. Ensuring food security for all requires a major effort at enhancing access to food through sustainable development of agriculture and subsequent utilization of food by the poor and distressed households.

2. Food Security Situation in Bangladesh

Bangladesh has made substantial progress in increasing food grain production over the last two decades. The country has made good progress in increasing rice production through technological progress, facilitated by private sector investment in small scale irrigation. Crop sub-sector contributed more than 11.72 percent to the GDP in 2006-07. Crop production in Bangladesh is being transformed from subsistence farming to commercial farming. Most agricultural production is still concentrated on a limited number of crops, with rice accounting for about 79 percent of total cultivated area. Other major crops include wheat (5%), jute (3.2%), pulses (3.4%), sugarcane (1.2%), and oilseed (3%). High value crops include vegetables, fruits, spices and potatoes.

The upsurge in cereal production has enabled the country not only to minimize the food requirement gap but also attain a modest surplus of cereals in recent years, although year to year fluctuation in production necessitates occasional food imports. A significant increase has occurred in maize production, from 1.17 lakh

metric tons in 2003-04 to 13.46 lakh metric tons in 2007-08. Besides, production of vegetables rose by almost 25 percent a year since the mid-seventies but the production of oilseeds and pulses has sharply declined since 2004-05, which is shown in Table 1.

Government programme to increase production of non-rice crops, especially high-value crops (vegetables and fruits) will be further intensified and diversified in accordance with the market growth. The production of sugarcane and cotton has

Table 1: Production of different food crops during 2002-03 to 2007-08

Crops	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Rice (lakh mt)	251.87	261.90	251.57	265.30	273.19	289.31
Wheat (lakh mt)	15.07	12.53	9.76	7.35	7.37	8.44
Maize (lakh mt)	1.17	2.41	3.56	5.22	9.02	13.46
Potato (lakh mt)	33.86	39.08	48.56	41.61	51.67	66.48
Pulses (lakh mt)	3.49	3.33	3.16	2.79	2.71	2.05
Oil seeds (lakh mt)	3.68	4.06	11.80	5.95	6.25	6.42
Vegetable (lakh mt)	49.52	56.22	65.31	57.32	69.67	86.85
Spices (lakh mt)	4.25	6.09	10.00	11.82	14.05	13.68
Total	362.91	385.62	403.72	397.36	433.93	486.69

Source: Bangladesh Bureau of Statistics, 2008; Bangladesh Economic Review, 2008

increased to 3.59 million metric tons and 77.50 bales, respectively. Potato production has increased from 9.03 lakh ton in 1981 to 66.48 lakh tons in 2007-08. The country is nearly self-sufficient in potato production (MOF, 2007).

Fish production increased from 1.17 million tons in 1994-95 to 2.44 million tons in 2006-07. Fish sub-sector contributed 4.07 percent to GDP and 4.9 percent to the export earnings. Fish provides about 58 percent of the total animal protein intake of the country. Meat, milk and egg production has also increased from 1.78 million tons, 0.75 million tons and 4094 million no. in 2000-01 to 2.28 million tons, 1.04 million tons and 5369 million no. in 2006-07, respectively (MOF, 2007).

Food aid from the development partners plays a vital role to meet the food requirements of the country. During the FY 2005-06, 194 thousand metric tons of food grains (rice and wheat) was received from abroad as food aid.

2.1 Conditions of Food Security

Food Security needs to be achieved at four levels, that is, i) National, ii) Regional, iii) Household and iv) Intra-household levels. The challenge for Bangladesh is to

increase production to feed the increased number of population. It follows the following conditions:

- Ensuring adequate domestic supply
- Price stabilization
- Ensured accessibility of the poor to feed
- Development of adequate buffer stock
- Efficient food distribution mechanism through infrastructure development and
- Getting adequate nutrition from food intake

2.2 Access to Food

Access to pure food is a necessary corollary of right to life. Every human being has a right to get pure food for his consumption. Every state should provide a comprehensive law for the safety and purity of food. Pure and unadulterated food should be made available to every person, irrespective of his caste, creed, religion, race and nationality.

Poor people's access to food has improved over the years due to increased availability of food, rise in average household income, growth in rural infrastructure, diversification of non-farm income sources and expansion of social safety net programmes of the Government. However, a vast majority of the poor, particularly the vulnerable groups such as urban slum dwellers, small and marginal farmers and rural landless wage labourers still have limited access to food due to rising prices of food commodities, lack of purchasing power, lack of necessary assets, and inadequacy of food safety net programmes in some pockets.

2.2.1 Social Safety Net Programme

To bring the poor people under social safety net, the current important programmes in the country are: Food for Works (FFW), Test Relief (TR), Vulnerable Group Development (VGD), Vulnerable Group Feeding (VGF), Old age and widow allowances, Maternity allowances for the poor, Char livelihood projects etc. These programmes provide food security as well as employment opportunity to the poor. In addition, sufficient self-employment in the country is being created through micro credit programmes at government and non-government levels, training from youth development training centers etc. In the FY2008-09 budget, a 100-day employment generation programme was undertaken for the rural extreme poor, especially for the capable unemployed people in specific areas of the country where people remain unemployed during March-April and September-November. For the purpose, government approved a budget of Tk 2000 crore (Tk 20,000 million).

2.3 Nutrition Status

Although Bangladesh has achieved a remarkable progress in domestic food grain production since its independence in 1971, there is still prevalence of endemic poverty and widespread malnutrition. Per capita availability of energy has increased from 2069 calorie in 1992 to 2489 calorie in 2003-04. About two-fifths of the country's 148 million people are calorie poor, consuming less than 2122 kcal per capita per day, while one-fifth of the population are hard-core poor who consume less than 1805 Kcal per capita per day (BBS, 2008).

The current intake per capita of animal protein is less than 2 gm per day against the recommended 28 gm per day. Similarly, domestic milk production accounts for only 14 percent of the minimum requirement. Milk availability per capita is approximately 30 ml per day against the recommendation of 250 ml. The demand for food of animal origin and protein will increase at a higher rate because of their high income elasticity.

The Government adopted the National Food and Nutrition Policy in 1997 as a follow-up to the International Conference on Nutrition (ICN-1992) for improving nutritional development policies and programmes, improving food security down to the household level, and protecting consumers through improved food quality and food safety.

2.4 Action Taken by the Government

2.4.1 Major Policies and Strategies

Bangladesh Government has taken different policies, which emphasized intensification of cereal production, diversification of high value crops, processing of agricultural products, and raising the production of fishery and livestock products. Poverty Reduction Strategy Paper (PRSP) has placed special emphasis on technological advancement, including new technology (biotechnology, hybrid seeds, genetic engineering), by increasing investment in agricultural research and strengthening the capacity of National Agricultural Research System (NARS) and through fortifying agricultural research-extension linkages.

National Food Policy (NFP), 2006 has declared its overriding goal of ensuring a dependable sustained food security system for all people of the country at all times. The Ministry of Fisheries and Livestock has prepared National Fisheries Strategy to give specific direction to the specific fish areas.

2.4.2 Fish Act And Ordinance

There Are Acts, Laws and Rules for Conservation of Safety and Quality Exportable Fish and Fisheries Product. These Are: The Tank Improvement Act, 1939; The Bangladesh (The Then East Pakistan) Protection and Conservation of Fish Act, 1950; The Marine Fisheries Ordinance, 1983; The Fish Feed Fish Products (Inspection and Quality Control) Ordinance, 1983; The Private Fisheries Protection Act, 1989; and National Fisheries Policy, 1998.

2.4.3 National Agriculture Technology Project (NATP)

GOB approved the National Agricultural Technology Project, which started to be implemented from the 2007-08 financial year. The overall objective of this project is to support GoB's strategy to improve national agricultural productivity and farm income with a particular focus on small and marginal farmers. The objectives will be achieved by increasing the efficiency and effectiveness of agricultural research and extension systems and by strengthening farmers' market linkage. Technology transfer is also an important part of the project.

2.4.4 Krishi Gobeshana Foundation (KGF)

Bangladesh government has formed a Krishi (Agriculture) Endowment Trust through Krishi Gobeshana Foundation with a seed money of Tk 350 crore (3500 million) for research work in agriculture sector. Government is giving subsidy for fertilizer, diesel and electricity to farmers for farming activities. For FY 2008-09, government approved Tk 4285 crore (42,850 billion) for that purpose.

2.4.5 Action Plan on Major Crops

Twelve action plans on major crops have been taken, among which initiative has been taken to implement rice and pulses action plan in the 1st phase (2007/08 - 2009/10). Under the programme, quality seeds of modern varieties of rice and pulses will be produced and transferred at farm level. Improved technology will be demonstrated at farm level, and farmers will be trained on modern technology. An additional 51.01 lakh mt of rice and 0.80 lakh mt of pulses will be produced with improved technology.

2.4.6 Fertilizer Use

Optimum fertilizer dose and schedule for crops and cropping systems have been worked out to ensure the use of balanced plant nutrients at farm level. A fertilizer recommendation guide has been updated and prepared. Water requirement of crops has been determined and irrigation schedule for crops and cropping systems

in different AEZ have been developed. Buried pipe and fita pipe (polythene pipe) water delivery system have been introduced at Barind and Tangail areas to reduce the cost of irrigation and to enhance the water productivity.

2.4.7 AEZ Map

A map of the country delineating 30 AEZ based on physiography of soil, period of crop growth, and long term agro-climatic data has been prepared. Soil and land resource utilization guide for 459 upazillas have been prepared and is in use for location specification fertilizer application.

2.4.8 IPM and ICM

Integrated pest management (IPM) and integrated crop management (ICM) programmes are being implemented by DAE at farm level through IPM club to reduce cost of inputs, lessen environmental pollution, and avoid problems of pesticide residue.

2.4.9 Dissemination of Hybrid Rice Seeds

Actions have been taken to introduce hybrid rice variety at farm level during boro season (winter rice) through the active participation of NGOs and private sector seed enterprises. Private sectors are encouraged by MoA to produce hybrid rice seed locally. Technical supports and training have been provided to the private sector by MoA, SCA (Seed Certification Agency), BARC (Bangladesh Agricultural Research Council) and BRRI (Bangladesh Rice Research Institute). About 4000 mt of hybrid seeds is being produced locally through private sectors.

2.4.10 Leaf Colour Chart, Gutti Urea and Drum Seeder

Steps have been taken to introduce leaf colour chart, gutti urea and drum seeder for cultivation of rice to optimize the use of fertilizer and timely establishment of rice crop. Programme has been taken to increase the truthfully labeled seeds (tls) of rice from 77,664 mt in 2005-06 to 1,79,185 mt in 2010-11 by BADC, DAE and private sectors. Specific actions have been taken for the poor to gain access to the fisheries resources and enable them to benefit from advice, access, resource distribution and credit.

2.4.11 Bio-technology

Crop improvement through biotechnology has been initiated recently. The research institutes initiated the research and development of GM crops through their planned research programme. Bt4 gene transferred in egg plants and trials are conducted (14 Bt4 varieties) under confined field conditions. Identification of

appropriate antagonistic fungus (*Trichoderma viridii*) for inhibiting the soil fungus is also a good example of biotechnological development in research and extension. The NARS institutions developed biotechnological laboratory for conducting demand-led biotechnological researches. Bio-safety measures have also been taken up for biotechnology research and development activities in Bangladesh.

2.4.12 Plant Genetic Resources

The genes in existing plants, domesticated and wild, improved varieties and land races, indigenous and exotic, are the plant genetic resources (PGR) from which breeders extract the traits essential for new varieties. A national Plant Genetic Resources Centre (PGRC) has been established under BARI, Gazipur to extend the collection of PGR to include endangered species and non-commercial species used locally for traditional cures, foods and other purposes.

2.4.13 Agribusiness Development

Agribusiness development through group marketing and consumer cooperatives approach have been significantly improved in rural areas fostering the improvement of livelihoods of the rural households, especially the poor and the extreme poor. The poor and the extreme poor are involved in business services (retailer, vegetable collector, mobile vendors etc.) for improving their livelihoods due to the promotion of high value crops and introduction of group marketing in rural areas. The development of wholesale markets (27 markets have been constructed) under different projects like NCDP (North-West Crop Diversification Project) is also fostering the agribusiness opportunities in the rural areas involving the rural poor women.

2.4.14 Support in SIDR Area

In the recent flood and SIDR affected areas, the government has undertaken extensive programmes for increased production through inputs and credit distribution. The participation of Government delegates, scientists, NGOs, extension workers and farmers was tremendous during the period. This resulted in bumper production of boro rice (winter rice), potato, maize and wheat in those areas.

2.4.15 Special Programmes

For employment generation and livelihood changes, government has taken special programmes in hilly areas, drought-prone areas, Barind tract, char land, monga-prone areas, haor-baor and coastal belt with appropriate technological support.

2.4.16 Credit Support

For the increase in production of non-rice crops like pulses and oilseeds, government has given credit facilities at the interest rate of 2 percent. The commercial banks have played an important role in this regard.

2.4.17 Safe Fish Supply in the Market

Formalin is used for preservation and marketing of some fish species. But formalin is harmful for human health. Government has given emphasis to the supply of hygienic and safe fish in the domestic market of the country. Government has also extended various supports to the growers and exporters. For this reason, the use and sale of formalin preserved fish has come down greatly in the markets.

3. Opportunities for Increasing Food Production

3.1 Input Use Efficiency for Productivity Enhancement

In order to reduce the cost of production, an efficient use of input management is important at farm level. In order to improve the input productivity, application of urea super granule (gutti urea), alternate practices of irrigation to enhance water productivity, use of good quality seed, and integrated pest management practices have been introduced.

3.2 Yield Gap Reduction

A large gap (26-60%) exists in crop yield between research station and farmers' field. Crop production in the country may be increased if the yield gap is minimized by addressing farmers' socio-economic constraints related to HYV cultivation, improving farmers' knowledge base, input support and price support of the products.

3.3 Replacement of Traditional Varieties by Modern Varieties (HYV & hybrid)

Modern rice varieties (47) developed by BRRI occupy 70% of rice area and wheat varieties (24) developed by BARI occupy 100 percent of the area sown with wheat. Hybrid varieties of mango (BARI mango-4), maize (4 hybrids) and rice (1 hybrid) have been developed by BARI (Bangladesh Agricultural Research Institute) and BRRI. These are being cultivated by the farmers. Private sector is producing maize hybrid seeds in collaboration with BARI. These varieties (HYVs) need to be expanded in coastal and other potential areas of the country. Location specific variety and production technology are being expanded. In the

case of livestock, artificial insemination programme for dairy breed/herd has been developed.

3.4 Expansion of Irrigation Coverage

Area under the minor irrigation increased from nearly 1.6 million hectares in 1980 to about 5.0 million hectares in 2006, an annual rate of increase over 4 percent. The total irrigated area is about fifty percent of the total cultivated area. Water use efficiency is being increased for increasing the irrigation coverage of existing irrigation facilities.

3.5 Crop Diversification

Programmes are being implemented for crop diversification, availing of the existing opportunities and potentials. There is also the potential for cultivation of pulses, oilseeds, potato, onion, garlic and vegetables as intercropped with sugarcane. Different fodder crops are also included in the diversification programme.

3.6 Breaking the Yield Stagnancy of Modern Varieties by Hybrid and Super Rice

The yield of modern varieties (MVs), especially of rice, has now reached almost a stagnant level. New technologies like hybrid rice production as well as the development and adoption of super cultivars, specially of rice and wheat, need to be emphasized, which may break the stagnancy by increasing crop yield by up to 15 percent or higher over that of the existing MVs.

3.7 Adoption of Integrated Crop Production Technologies

Location specific AEZ-based production management technology packages for different crops are available. Extension personnel are now utilizing these technologies for wide scale adoption at farm level.

3.8 Quality Seed Production and Timely Supply of Seeds

Bangladesh Agricultural Development Corporation (BADC), a public sector organization, is mostly producing rice, wheat, potato, pulses, oilseeds and a small quantity of vegetable seeds. The national seed policy introduced in 1993 made provision for private sector involvement in seed production and marketing. This eased the way to fill in the gaps between the seed demand and supply. Since then the supply of quality seeds has been increasing steadily. BADC has taken up a programme to increase the production and supply of quality seeds from 13 percent to 20 percent (both public and private sector).

3.9 Integrated Nutrient Management

Farmers need to be trained and motivated to apply balanced fertilizer doses in appropriate time as per requirement of the soil and crop. Integrated nutrient management and promotion of organic manure are needed for better soil health and increased nutrient use efficiency, which will result in higher yield.

3.10 Farm Mechanization

Due to the gradual decrease of the availability of draft animal power, the use of power tiller is increasing day by day for land preparation, threshing, irrigation, transportation etc. The use of various farm powers for agro-processing and other farming activities need to be increased.

3.11 Green Manuring

Importance has been given on the use of organic manures to increase soil health as well as for getting chemical-free produce. For the purpose, programmes have been taken through DAE and NGOs for farmers' training for the preparation of compost, green manure etc. It will also reduce the dependence on chemical fertilizers.

3.12 Hill Agriculture Development

About 30,000 hectares of land are available in hill districts. Large areas of these districts have been denuded of trees due to unlawful tree cutting. As a result, topsoil has eroded, which decreases the land productivity. This issue needs to be addressed with full attention.

3.13 Bio-technology Research and Development

Biotechnology research and development on rice and other crops has already been started in BARI, BRRI, BSRI and other NARS Institutes on a limited scale. Besides, a National Institute of Bio-technology (NIB) has been established for conducting bio-technology research. Region specific crops developed through bio-technology (GMO crops) can meet the challenges of the agro-ecologically disadvantaged areas. These will expand the production base as well as livelihood opportunities for the poor.

3.14 Introduction of Improved Cropping Patterns

The crop production of Bangladesh is mainly rice based. Cropping systems research has resulted in the development of a sustainable multiple cropping system, i.e., rice-rice, rice-wheat-mungbean and rice-potato-mungbean capable of producing 10-12 tons to a ha a year under irrigated condition. Rice-based

cropping systems should be improved through incorporation of pulses, oilseeds and vegetables.

3.15 Insect Pest Management

Training is to be arranged for improving the knowledge base of the farmers about different diseases and insects of different crops. Integrated Pest Management (IPM) system and Integrated Crop Management (ICM) system are implemented for controlling different pests through minimum use of pesticides.

3.16 Technology Transfer

Extension activities and farmers' training have been strengthened and made operative for expansion of crop varieties and technology packages.

3.17 Infrastructure Development

The increased network of rural roads and highways linked with peri-urban and rural growth centres facilitates movements of agricultural inputs and produces. Various trades, services, production and consumption are very much related with the improvement of infrastructure. Lots of roads and electricity communication have been developed in the country by the government.

3.18 Research and Technological Innovation

There has been a lot of government technological progress as evidenced by the release of 47 HYV rice varieties by BRRI, 27 varieties of wheat, 30 varieties of potato, 35 varieties of oilseeds, 32 varieties of pulses, 36 varieties of fruits and 44 varieties of vegetables, 12 varieties of spices and another 114 varieties for other crops developed by BARI and Bangladesh Institute of Nuclear Agriculture (BINA). Bangladesh Jute Research Institute (BJRI) so far released 40 varieties of jute. Besides variety development, other technological developments in respect of cropping systems, water management, fertilizer management, pest and disease control measures, agricultural mechanization and post-harvest processing were achieved. Bangladesh Livestock Research Institute (BLRI) has developed 53 technologies for animal disease control and increasing livestock production.

3.19 Emerging Commercial Agriculture

Fresh vegetables and fruits are being regularly exported to Middle-East countries and to a some extent to European markets, which earn 32.92 and 6.67 million US\$ per year, respectively. Recently potato export to Singapore and Malaysia has earned US\$ 4.42 million. Aromatic rice is also exported to Australia, Canada,

Hong Kong, Italy, Japan, UK and Middle-East countries. According to EPB sources, an amount of US\$ 7.03 million is earned every year through exporting aromatic fine grain rice.

4. Issues and Challenges

Food production of a country is often threatened and affected by a number of factors, which may cause considerable instability in agricultural production. Any inattention or negligence in addressing these factors will gradually intensify the problem and may ultimately turn the food secure country into a highly food deficit country. Factors responsible for de-stabilizing the agriculture production system and emerging issues are discussed below:

4.1 Climate Change and Agriculture

Climate change affects agriculture performance by altering the availability of water, land, biodiversity and terrestrial ecosystem services and heightens uncertainties throughout the food chain, from yields to trade dynamics. Most damaging effects of erratic behaviour of present climate and extreme events in the country are flood, drought, cold weather and heat stress that are found to adversely affect crop productivity in almost every year. About 1.32 million hectare of crop land is highly flood-prone and about 5.05 million ha is moderately flood-prone. Besides crops, perennial trees and livestock are damaged by flood every year. Drought of different intensities in kharif, rabi (winter) and pre-kharif seasons cause damage to 2.32 million ha of T. aman (Kharif-II) and 1.20 million ha of rabi crop (winter crops) annually. Yield of wheat and pulses falls significantly in the country mainly due to climate change. In the livestock sector, the poultry industry has been found to become more and more prone to HPAI infection during winter season. In FY 2008-09, Bangladesh government formed an initial budget of Tk 300 crore (3000 million) to address the problem related to climate change.

4.2 Soil Degradation

Widespread deforestation activities, cutting of hills, filling of lakes, decline of soil nutrients and organic matter, invasion of salinity and water-logging, heavy erosion of soils and riverbanks, all help accelerate soil degradation. Estimates of areas affected by nutrient depletion and other forms of degradation are about 5.6 million ha in Bangladesh. About 0.83 million ha of land is affected by salinity at various degrees.

4.3 Lack of infrastructure and power supply

It increases food production and management problems, transport and transaction costs of agricultural inputs and food commodities. It reduces the power supply to the remote sites of DTWs, STWs, LLPs, etc. installed for irrigation of cropped land.

4.4 Bird flue of poultry (Avian Influenza)

This is a serious disease for poultry industry all over the world. The Asia-Pacific region has been or is confronted with the outbreak of Highly Pathogenic Avian Influenza (HPAI). However, following the outbreaks of pathogenic avian influenza in several South-East Asian countries since late 2003 and Bangladesh in March 2007, it poses a serious threat to the poultry industry in the region and has raised a serious global public health concern. Comprehensive and well-coordinated national preparedness and response is needed in mitigating the effect of HPAI/H5NI epidemic in birds and to minimize the risk of human pandemic influenza.

4.5 Global warming and sea-level rise

The forecasts of inundation of vast low lying coastal areas of Bangladesh resulting from global warming and sea-level rise are major threats to our existence. Such problem may make Bangladesh's existing food security uncertain through destabilization of its coastal agriculture and reduction of base assets.

4.6 High population growth and land scarcity

These are also the important limiting factors to the establishment of a viable food security system in the developing countries like Bangladesh. To sustain food security for the ever increasing population of Bangladesh like other land-scarce South Asian countries would need to increase food production many folds by the year 2020.

4.7 Pest infestation

Pest infestations are widespread in South Asian agricultural countries. They cause considerable damage to and account for about 25 percent loss of food grains in fields and storages. Frequent pest-attacks reduce production growth rate and cause fluctuations in food production trends.

4.8 Upstream withdrawal of water

Upstream withdrawal of water from the rivers originating in the Himalayan regions and flowing through India and Bangladesh into the Bay of Bengal, is

causing gradual desertification, salinity invasion and wiping out of the vast mangrove forest of Sundarbans and promoting natural imbalance in Bangladesh. Such ecological disturbances will contribute to instability of agricultural production and hence food insecurity.

5. Regional Cooperation for Food Security

Food security requires collective approaches and resources at regional and international level. Most of the developing countries are individually deficient in resources and necessary infrastructure. It would be extremely difficult for them to act individually to make a breakthrough in their own agricultural production with own resources and prepare a strong base for viable food security system.

The valuable networks like SAARC can be effectively utilized for supplementing facilities for attaining food security. The problems and concerns of agriculture are very similar in nature in many countries. These can only be solved through regional cooperation, integration of resources, sharing of knowledge and experience, exchange of new technology including quality seeds, exchange of germplasm, scientific materials, use of ICT in agriculture, education and human resources development, developing new varieties, hybrids and breeds, natural resource management techniques, biotechnology, weather and flood forecasting and disaster management, common data standard for GIS, etc. The decision on SAARC Food Bank should be in operation during emergency and shortage period of food requirement of the country.

South Asian countries will be the most adversely affected region by climate change and global warming. Most of the region will experience drought, heavy rains, floods and salinity in changing environment. To face the problems induced by climate change, a common fund may be created and adopted for common work plan for the management of agriculture among the developing countries. A dynamic water policy strategy should be adopted for sustainable and equitable use of natural water resource, specially sharing of river water.

6. Food Safety and Quality Food Supply

Food safety, an important public health issue, has been a concern of all governments and public authorities. This has assumed further importance as foods are now obtained from diverse sources. Food safety is interlinked with food security and is inferred that all people at all times need and deserve to get safe and nutritious food to maintain a healthy and active life.

Food safety is also an important global issue with international trade and public health implications. Food quality assurance is needed not simply for export, but also for supplying safe food to the domestic consumers.

Bangladesh is a signatory to the Sanitary and Phytosanitary (SPS) measures and the Technical Barriers to Trade (TBD) Agreements under the World Trade Organization (WTO), and also a member of the Codex Alimentarius Commission - bodies to ensure the supply of safe food. Priority may be given to assessment and prevention of risks involved in the distribution of safe food along the entire channel from production to consumption.

It is important to maintain certain standards so that consumers are satisfied with what they consume in terms of their quality, standard and hygiene. Food safety situation in Bangladesh is very much precarious. Bangladesh is yet to develop a unified food safety policy, a unified food safety administrative system and a unified food safety law.

6.1 Policy Linkages

Food Safety in all stages of the food chain, that is, from farm to table has been focused with due importance in all the relevant policies of GOB. The policies are-

- Bangladesh Environment Policy
- Bangladesh Food and Nutrition Policy 1997 and NPAN 1997
- Bangladesh Food Policy 1988
- Comprehensive Food Security Policy 2001;
- New National Food Policy 2001(draft)
- National Agriculture policy and
- Bangladesh Health Policy.

6.2 Efforts by NGOs

A wide range of activities on food safety awareness are being undertaken by a series of NGOs as follows-

- Consumers Association of Bangladesh (CAB)
- Bangladesh Paribesh Andolon (BAPA)
- DOSHER Bangladesh, etc.

6.3 SAARC Initiatives

SAARC member states have recently identified food safety as a topic of priority concern to ensure that both consumers and smallholder farmers in SAARC countries duly benefit from food trade and also to prevent farmers from marginalization due to food safety concerns in the process of globalization.

SAARC Food Security Reserve Board (SFSRB), at its 9th Meeting held in Islamabad in December 2002, urged the member states to consider harmonizing food laws, regulations, standards, quality control system, and control mechanism to facilitate maintenance of food safety for enhancing food trade.

6.4 Training and Human Resource Development

Training and human resource development should be targeted for i) food inspectors, ii) food scientists and analysts, iii) policy makers, iv) microbiologists, v) public health physicians, vi) food technologists, vii) serial librarians and documentation officials, viii) food law experts etc.

6.5 Conformity Assessment Infrastructure

Adequate testing facilities including microbiological and safety parameters analysis should be developed from farm to production. Cleaning, grading, testing, standardization, packing, storage, labeling and marketing based on well documented principles of good practice, HACCP, and scientific storage should be encouraged at farmers' level so as to promote direct integration of food processing units with producers.

6.6 Food Safety Database

Adequate data should be generated for pesticide residues, toxic metals in different food crops for use in risk assessment work, for ensuring consumer's protection and for harmonization of standards with that of safety standards under Codex.

Surveillance programme should be undertaken to collect more precise information about the incidence of food borne illness, especially illness caused by chemical and microbiological poisoning.

6.7 Awareness Building

Education, awareness and training through manuals, material, and practical demonstration as a priority to regulatory measures should be given to farmers, food processors, government regulators, policy makers, vendors and other persons involved in the system for compliance.

Adequate knowledge and guidance should be available to farmers for strict application of good agricultural and marketing practices for their food crops, and programmes to educate consumers about food safety should be launched.

6.8 Research and Study

Food Safety Policy research should be launched in the fields of production, processing, marketing and consumption. A study of collective impact of unsafe food intake should be carried out for which a technical assistance might be sought.

7. Bangladesh Food Safety Laws and Regulations

There are several laws in Bangladesh for maintaining health and safety standards. One should have a minimum knowledge of these laws so that the related official legal documents for health and safety in the past, present and future, can be better understood. The laws are listed below:

- The Bangladesh Pure Food Ordinance, 1959
- The Bangladesh Pure Food Rules, 1967
- The Food Grain Supply (Prevention of Prejudicial activity) Ordinance, 1956 (Ord. xxvi of 1979)
- The Iodine Deficiency Disorders (IDD) Prevention Act, 1989
- The Essential Commodity Act, 1990
- Fish and Fish product (Inspection and Quality Control) Rules, 1997

In addition, a number of other Laws and Regulations exist in the country to ensure safe and quality food, viz.:

- The Animal Slaughter (Restriction) and Meat Control (Amendment) Ordinance, 1983 (it is under revision)
- The Pesticide Ordinance, 1971 & the Pesticides Rules, 1985
- Destructive Insects and Pests Rules (Plant Quarantine), 1966, amended up to 1989
- Agricultural Products Market Act, 1950 (revised in 1985)
- Fish Protection and Conservation Act, 1950 (amended in 1995)
- Marine Fisheries Ordinance 1983 and Rules, 1983
- Fish & Fish Products (Inspection & Quality Control) Rules' 1997
- The Food or Special Courts Act 1956
- The Pesticides Ordinance-1971 & The Pesticides Rules-1985
- Procurement Specifications, Ministry of Food, Rice Mill Control Order etc.

7.1 The Bangladesh Standards and Testing Institution Ordinance, 1985

This ordinance relates to the establishment of an institution for standardisation, testing, metrology, quality control, grading and marking of goods. Within the framework of this ordinance, the government has established the Bangladesh Standards and Testing Institution (BSTI). One important task of this organisation is to certify the quality of commodities, materials, whether for local consumption or for export and import. The Ordinance was amended as The Bangladesh Standards and Testing Institution (Amendment) Act, 2003.

7.2 Quality Assurance

Food quality assurance is needed not simply for export, but also for supplying safe food to the domestic consumers. To this end, a country should have a National Food Safety and Control system.

The government should promote Good Agricultural Practice (GAP) in production and in supply chain management and also Good Manufacturing Practice (GMP) in food process against contamination, growth of pathogens or fungi. Sanitary and Phytosanitary (SPS) measures should be ensured during production, processing and marketing. Quarantine services should also be strengthened to meet the needs of both domestic and export market.

7.3 Setting Food Standards

It is necessary to promulgate standards of food related to their physical, chemical and other characteristics, including recommended steps in production practices to avoid contamination of food.

7.4 Coordination Among GOB Organizations and GO-NGO Activities

- Domestic harmonization of activities, procedures, method of testing etc. among the GOB agencies are very much required in the first place.
- A national commitment and the collaboration of all ministries concerned with health, agriculture, finance, commerce, food, industry, municipality and concerned NGOs are to be ensured.

7.5 Law Enforcement

- The laws in place should be implemented with full force and hurdles in implementing the existing laws against adulteration should be eliminated.

8. Conclusions and Recommendations

8.1 Conclusions

- Bangladesh has made substantial progress in enhancing food security by increasing production of rice, wheat, maize, potato and vegetables, improving infrastructure, making food delivery to the poor more efficient and liberalizing agricultural inputs.
- Bangladesh government has also given importance to increase production of non-rice crops, especially high-value crops in accordance with the market growth. Fish, meat, milk and egg production has also increased significantly over the last ten years.
- The government has comprehensive agricultural policy with region specific technology intervention and different national action programmes. Poverty Reduction Strategy Paper (PRSP) has placed special emphasis on technological advancement, including new technology (biotechnology, hybrid seeds, genetic engineering), by increasing investment in agricultural research and strengthening capacity of National Agricultural Research System (NARS) and fortifying agricultural research-extension linkages.
- In spite of the progress, the food grain production system is facing great challenges due to increasing population, climate change, soil degradation and decreasing agricultural land, bird flu of poultry (Avian Influenza), pest infestation and depleting natural resource base.
- The Government has taken different social safety net programmes and has also taken special programmes for hilly area, drought-prone area, Barind tract, char land, munga-prone area, haor-baor and coastal belt with appropriate technological support.
- Food security can be attained only through regional cooperation, integration of resources, sharing of knowledge and experience, exchange of germplasm and new technology and scientific materials, education and human resources development, providing strategic infrastructure and technical support, GIS, biotechnology, weather and flood forecasting and disaster management, post-harvest technology, agro-processing, ICT etc.
- Food safety is an important global issue with international trade and public health implications. It is needed not simply for export, but also for supplying safe food to the domestic consumers. Food safety has been a concern of the present government with necessary policies and measures.
- The government has undertaken new food safety regulations by proper amendments of the existing ones and through encouraging the private sector initiatives.

8.2 Recommendations

- For increased production, farmers should have easy access to quality seeds, fertilizers and credit support with improved cultural practices in their fields.
- Biotechnology, plant protection measures, crop diversification as well as agricultural diversification with improved technology to the farmers are very important for sustainable agriculture development.
- The government should ensure development of trade-supportive and market-friendly regulatory environment to improve market structure and encourage increased production.
- A comprehensive and unified food safety policy should be formulated, a unified administrative system should be established, and a unified food safety law should be enacted.
- Food ordinances, food regulations and other relevant Acts should be updated from time to time in view of the changing requirements arising out of scientific and technical developments.
- There should be harmonization among the provisions of laws, rules, regulations and standards.
- For quality assurance, the government should promote Good Agricultural Practice (GAP) in production and in supply chain management. Sanitary and Phytosanitary (SPS) measures should also be ensured during production, processing and marketing.
- Food laws and regulations should accommodate international standards by adopting the guidelines and practices of CAC, HACCP, SPS and TBT.
- A national food control agency should be established.
- Consumer Protection Act, Feed Act etc. should be enacted as early as possible.
- Food production should be monitored along its every step. Food safety practices should be inspected from the farm to the dining table. Management of food safety practices should be undertaken from the beginning of the supply chain i.e. the producer to the end of the supply chain i.e. the consumer.

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