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Lok Proshason Samoeeky
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Food Security in Bangladesh: Role of Public Policies

Md. Kamrul Hasan*

Abstract: *Ensuring food security for a huge population in Bangladesh with scarce land and limited resources is largely dependent on increasing domestic food production, proper management of food grain coupled with effective population control. Although the country has made good progress in increasing rice production through technological improvement and the supply of subsidized agricultural inputs; but the growing number of always create pressure on the increasing production. Again domestic food production is very frequently damaged by the natural calamities lead to sudden shortfall in food grain production. Inadequate production of food grain hampers the proper stock management of the government to run the social safety net program. As still 40 percent of the population lives below the poverty line, income inequality is prevalent; lack of proper management of food is distinct, growth of population is continuing, so any sort of mismanagement and price hiking hits the poorest, landless household severely. In this situation the present study assesses the current trends of food security in Bangladesh both at micro and macro level. The study identifies the factors addressing food insecurity in Bangladesh and suggests the role of government policies in ensuring food security of the citizen.*

1.0 Introduction

Despite some commendable progress in several development indicators like reducing population growth and child mortality rate, achieving gender and urban-rural parity in primary education, coping with natural disasters, doubling the food grain production compared to the decade of 1970s and pro-poor changes in different policies related to food and agriculture, ensuring safe and nutritious food for all is still great concern for the government of Bangladesh. Due to pervasive poverty, 40.4 percent of the total population cannot afford an adequate diet necessary for an active and healthy life (BBS: 2007:7). Again the typical rural diet in Bangladesh is repeatedly not well balanced. The main food in Bangladesh is cereals, largely rice. Nearly two thirds of the daily diet consists of rice, vegetables, a little amount of pulses and small quantities of fish. Milk,

* Upazilla Nirbahi Officer (Senior Assistant Secretary), Melandaha, Jamalpur

milk products and meat are consumed occasionally in very small amount. Fruit consumption is seasonal and includes mainly papaya and banana (FAO: 2007:1). To address the issue of balanced diet and to ensure minimum food for all, government of Bangladesh has taken initiatives formulating and implementing different policies. In view of the facts, the current study attempts to identify the areas where and how food security of the citizens is being hampered, how it can be achieved and what role public policies can play in ensuring food security in Bangladesh. The suggestions of this study will hopefully help attaining food sufficiency and to ensure food security in Bangladesh.

1.1 Background of the Study

To ensure the food security of the poor, the issue of addressing hunger has been repeatedly articulated in various national, regional and international forums. The right to food has been incorporated in the Constitution of the People's Republic of Bangladesh as a fundamental principle. Article 15(a) of the Constitution of Bangladesh says that -'It shall be a fundamental responsibility of the state to attain ... basic necessities of life, including food, clothing, shelter, education and medical care...'. To comply with the constitutional obligations, the Government of Bangladesh has formulated different policies like National Agriculture Policy, National Food Policy, and Disaster Management Policy etc. and to implement policies different programs like Poverty Alleviation Programs, Public Food Distribution System (PFDS) etc. have been taken. Along with other policies National Food Policy, 2006 has been formulated with the objectives of ensuring availability of sufficient, safe and nutritious food; ensuring accessibility of food with the increase of purchasing power of the people; and ensuring nutrition for all especially for women and children. Accordingly Government has adopted United Nations Millennium Development Goal in 2000 targeting to halve the proportion of people who suffers from hunger between 1990 and 2015 (World Bank Group: 2003: 2) with the implementation of National Strategy for Accelerated Poverty Reduction (NSAPR). With the present reality sudden increase in global food prices have triggered a wide variety of policy responses around the world. So, ensuring food security has become a great concern for the policy makers of Bangladesh.

1.2 Objectives

The objective of the study focuses:

- To explore the current status of food security in Bangladesh on the basis of availability, accessibility and utilization of food; and
- To identify the role of public policies in ensuring food security.

1.3 Methodology

Research has been conducted on the basis of both quantitative as well as qualitative data. Both primary and secondary data were used for the purpose of the study. As secondary sources of data different books, journals, survey reports, articles from daily newspapers, periodicals and websites have been consulted. As a policy research different government policies related to food and nutrition have been consulted. Primary data has been collected through a semi-structured questionnaire. For collection of primary data 50 families were randomly selected from two villages namely Kustia Namapara and Putiali of Sadar upazila under the district of Mymensingh. Data have been processed and analyzed by using MS Excel. To get the overall status of food security in Bangladesh secondary data has been analyzed on the basis of time series data based on different HIES report. Due to time and resource constraint primary data have been collected only from two small villages of Mymensingh district namely Kustia Namapara and Putiali.

1.4 Organization of the Paper

The paper is prepared under six sections. Section one is Introduction which includes background of the study, objectives, methodology and organization of the paper. Section two contains literature review, section three is written on the conceptual framework, section four discusses about the current status of food security in Bangladesh. Section five identifies the factors affecting food security followed by role of public policies in ensuring food security with recommendation and conclusion.

2.0 Literature Review

A number of books, journals, reports presented in different conferences, seminars and articles published in dailies and periodicals related to food security have been consulted to conduct the study. A report entitled Food 2000: Global Policies for Sustainable Agriculture published by World Commission on Environment and Development (WCED) depicts on world regional food production that gave emphasis on the factors of agricultural production with some suggestions as action points for ensuring sustainable food and livelihood security. The book suggests the ways of government intervention for sustainable livelihood security.

Another work titled Food Security in South Asia written by Dr. B. M. Bhatia discussed on the food security problem of the countries of South Asia individually as well as of the region as a whole in the perspective of international effort at building a world food security system (Bhatia: 1985:43). He has suggested a plan of action on world food security by adopting food grain stock policies, special arrangement for food security assistance and collective self-reliance of developing countries with increased agricultural growth, ensuring distribution of agricultural inputs, exchange of technical education and training facilities, managing pest as well as increasing regional cooperation for joint development of water, power and other resources essential for agricultural development.

Alan G. Smith (1997) in his book titled Human Rights and Choice in Poverty: Food Insecurity, Dependency, and Human Rights Based Development Aid for the Third World Rural Poor in Bangladesh chapter titled as 'The Scope of Food Supply and Health Care Insecurity in Bangladesh: Calorie intake and malnutrition' the author mentioned about the geo-climatic circumstances of Bangladesh favorable to agriculture. He mentioned about the problem of rural poverty and food insecurity of Bangladesh with available data of daily calorie intake based on different HES. Leather and Foster (2005) in their book titled The World Food Problem-Tackling the Causes of under nutrition in the Third World illustrates the causes and effects of under nutrition and related policies. Felix W. Charles (1987) in his book titled Food Protection Technology mainly focuses on the utilization of food based current and protected technologies for food protection.

Ahmad in his work titled Towards Ensuring Food Security in Bangladesh has dealt with wide range of issues relating to food insecurity in Bangladesh including the nature and magnitude of the problem, the way its resolution may be approached, the constraints faced and how those may be addressed, and the need for social mobilization and community empowerment for solving the problem (Ahmad: 2001: 161-181). Hossain et al. (2005) in their study on 'Food Security and Nutrition in Bangladesh: Progress and Determinants' mentioned that Bangladesh has made good progress in increasing rice production through technological progress facilitated by private sector investment in small scale irrigation. The paper assesses the trends in factors that affect food production, availability of food and their impact on nutrition outcomes. He has suggested for policy measures to enhance food security with the review of Agricultural Policies with the increased access to food through market.

Talukder (2005) in his article titled 'Food Security, Self-sufficiency and Nutrition Gap in Bangladesh examined the status of food security and self-sufficiency of Bangladesh using both time series and cross section data. He has suggested for the elimination of nutrition gap with different sorts of food intervention programs with the existing programs.

A report published by FAO in 2008 on 'The State of Food Insecurity in the World 2008' focuses on high prices, which are having a serious impact on the poorest populations in the world, drastically reducing their already low purchasing power. They mentioned that high prices of food have increased the level of food deprivation specially the poor people of the world.

In view of the above discussion it is found that some have made importance on increasing food grain production; some argued for fair distribution, some has made importance on sufficient stock of food grain with targeted intervention as a Social Safety Net Program (SSNP). So, food security as a multidisciplinary issue draws attention to be addressed from various aspects of policy measures.

3.0 Conceptual Framework

The concept of food security has evolved over a period of time. Until 1970s, emphasis was placed on food self-sufficiency at the national level, principally through domestic production. In 1974, World Food Conference added another dimension to food security when it emphasized, apart from the overall availability, stability of food supplies within and over the years.

In 1985 Anderson, J. R. and J. A. Roumasset have developed a series of inequalities for conceptualizing the risk of food insecurity on a national scale (Anderson and Romumasset: 1985). By adapting these inequalities to the household level, we can better understand the concept of food security as well as what delivers the risk of food insecurity to a household. According to them the equation is:

> Value of food production deficit in a household (HH) $\leq$ Income and liquid assets available to purchase food

In its simplest form, the food security equation compares the value of the food production deficit in a household with the income and liquid assets that household has available to purchase food. The left-hand side of the equation can be factored into two components, the food purchase

requirement and the price of food, for the value of the food production deficit is the product of these two variables. So the equation can be rewritten as follows:

> Food purchase requirement × Price of food ≤ Income and liquid assets available to purchase food

In case of above equation the household's food purchased requirement can be shown as the difference between household (HH) food consumption requirement and HH production. Again we can rewrite the equation as follows:

> {HH food consumption requirement - HH food production}× Price of food ≤ Income and liquid assets available to purchase food

For any given family, to the extent that we can adopt policies to assure that the left-hand side of the above equation is smaller than the right-hand side, we will reduce the risk of food insecurity. From the above equation it is clear that household food security is dependant on families' ownership of land, the quantity and quality of technology and capital available, how this technology and capital are used, and a set of government incentives and disincentives which includes tariffs, taxes, price controls and subsidies to agricultural and purchased inputs. With the production of food prices of food, income and liquid assets of the households also determines the food security of the family. The price of food is influenced by amount of food demanded, quantity produced, the size of the population as well as the per capita income and the tastes and preferences of consumers. The income and liquid assets positions of a household is the result of complex factors, among them education of its members, its capital position, its land position, its employment opportunities, attitude towards work, the cost of transportation to and from work, health and tendency to savings.

With above discussion the term food security is defined by different authors differently. Reutlinger and his colleagues defined the term Food Security as 'access by all people at all times to enough food needed for an active and healthy life, its essential elements are the availability of food and the ability to acquire it' (Reutlinger: 1986:3).

Amartya Sen (1981) has mentioned the term 'entitlements' to refer to an individual's ability to acquire food. Sen points out that hunger can exists when there are not food shortages in the aggregate. In this framework,

hunger can be seen as 'entitlement failure' - the failure of a person to assert an entitlement right to a quantity of food large enough to provide adequate nutrition. Production, income and price all work together in defining a person's entitlement; and entitlement depends on social, political and cultural systems in which the person lives.

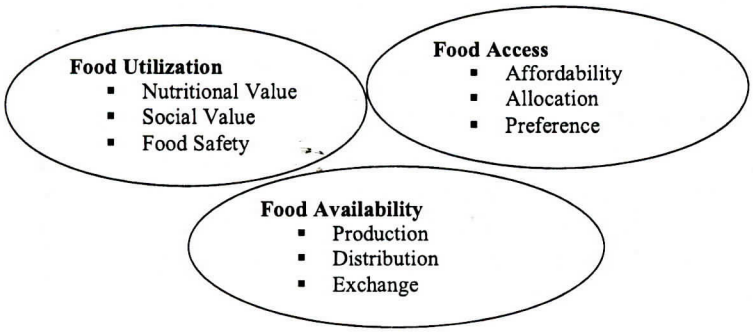
The Plan of Action of the World Food Summit, 1996 defines 'Food Security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life'. Thus food security is defined as availability, access, and utilization by all people at all times to enough food for an active, healthy life.

Availability of food depends on the domestic production, food import or export and food aid, security stock, exchange of food and the efficiency of distribution through market and other channels. Of these, domestic production is the major concern to ensure availability at both national and household level. The critical factors which influences the availability of food is the number of total population, population growth, per capita consumption of food and utilization of food grain for further production preserved as seed and losses of food grain due to some obvious reasons like floods, droughts, cyclones and other natural calamities like saline water intrusion in the coastal areas etc. Even availability is ensured household's income, government transfers, assistance from relatives and friends; remittance from abroad and assistance from (Non Government Organization) NGOs, lack of purchasing power, intra household disparity in food allocation, landlessness, seasonal unemployment of agricultural labor, poor wages, rising inflation, depreciation of taka against dollar at different times, improper functioning of market, unholy alliances of business syndicates and inadequate budgetary allocation to SSNP are affecting accessibility to food.

Utilization of food is determined by intra household food allocation, dietary habit, storage, processing and cooking practices, food preferences as well as knowledge on health and sanitation.

The components of food security mentioned above corroborates with the description of the Global Environmental Change and Food Systems (GECAFS) shown in diagram 1. The diagram indicates the complexity of food system with three main factors namely availability, access and utilization with some sub components, all are very much related to its security.

Fig. 1: Components of food system with their main elements



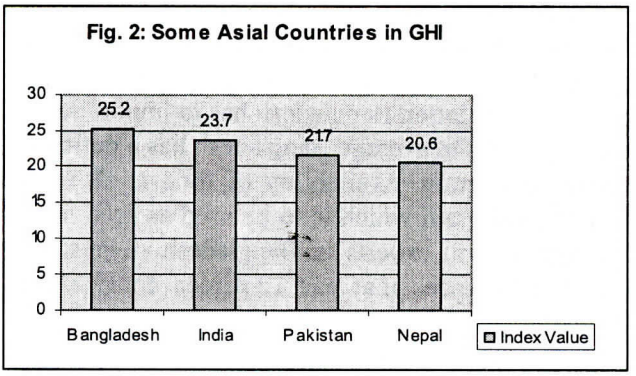
Source: Ingram *et al.* (2005)

4.0 Current Trends of Food Security

In an agrarian economy like Bangladesh domestic production has an important role to play in the quest for food security. But the natural calamities like recurrent floods, droughts, cyclones, tornados, tidal surges, river bank erosions, water logging and salinity hampers domestic food production very frequently. Despite such barriers domestic production has been increased reasonably. With increased productivity further improvements on access to food and utilization is essential. In view of this the current status of food security in Bangladesh is being described in the Global Hunger Index (GHI) standard, domestic food production, food import and food aid, food and calorie intake, pattern of food intake, households income and expenditure, share of food expenditure, households entitlement to land, fluctuation of prices, share of public expenditure, population growth, prevalence of undernourishment and infant mortality both from micro and macro level.

4.1 Food Security in GHI Standard

Recently the world is suffering from chronic hunger mostly living in Asia and African countries. Among the 832 million chronically hungry people of the world 65 percent is living in only seven countries: India, China, the Democratic Republic of Congo, Bangladesh, Indonesia, Pakistan and Ethiopia (FAO: 2008:12). International Food Policy Research Institute (IFRI) states that Bangladesh is one of the 33 risky countries regarding food insecurity. According to IFRI the degree of food insecurity in some Asian countries as measured in the GHI is shown in figure 2.



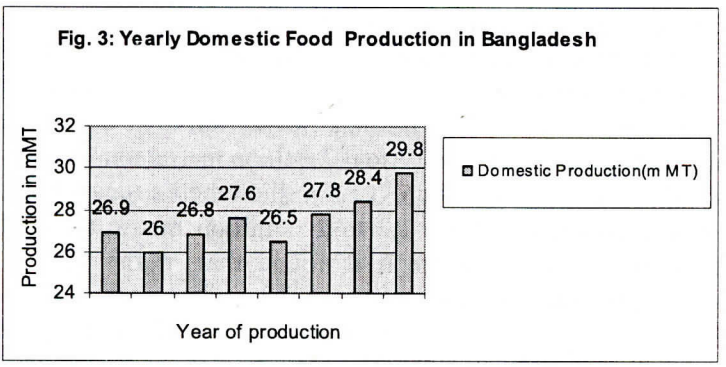
Source: International Food Policy Research Institute, 2008.

Among the food insecure countries with 25.2 points Bangladesh is at 70th position and among the 25 malnourished Asian countries Bangladesh is in 18th position (Khan: 2008:3).

4.2 Availability of food

Availability of food is determined by domestic production in addition to the amount of food import and food aid.

Domestic food production: In spite of doubling the domestic food production over the last three decades, Bangladesh is still a food deficit country. At present food grain requirement in Bangladesh has been estimated at about 32 million metric tons. Against this in 2007-2008 production was 29.7 million metric tons (BBS: 2008-2009). Trends of food production are shown in Figure 3.



Source: Self compiled from BBS 2006 and BBS 2008-09

In 2000-01 the domestic production of food grain was 26.9 million metric tons and in 2005-06 the domestic production of food grain was 27.8 million metric tons. The increase was only 0.9 million metric tons. But due to increasing population Bangladesh has to import 0.4 million metric tons more every year. On average Bangladesh has a deficit of 1-2 million metric tons of food grain. Availability of food is also affected by the preservation of food grain which is to be used as seed in the next year's production. Agricultural experts in Bangladesh suggest seed, feed and wastage (SFW) allowances of at least 12 percent for rice and wheat in the country (Talukder: 2005:38).

Food import and food aid: Despite increase in domestic production mainly of cereals Bangladesh still is heavily dependant on imports of all food items to meet the demand for growing population. Except shrimp export, Bangladesh is the net importer of all food items. The long term trend of import of major food items is shown in Table 1.

Table 1: Trends of imports of major food items (000 tons)

Food Item	1980-82	1990-92	1999-01	2005-06
Rice	295	140	872	543
Wheat	1366	1413	1969	1249
Pulses	3	113	245	-
Milk	211	291	334	56
Edible Oil	104	297	904	687

Source: FAO: 2004, Food Balance Sheet and BBS: 2007 a: 276

Table 1 shows an upward trend of import of major food items over the time. The import of rice remains stagnant at around 0.5 million metric tons per year, with substantial amount of wheat import. In the year 1980-82 the average volume of wheat import was 1.4 million metric tons which increased in 2000-01 to 2.0 million metric tons. In a normal year, Bangladesh imports rice from 0.3 to 0.7 million metric tons but in year of natural calamities it increases up to 1.5 million metric tons. On the other hand, wheat import is around 1.7 to 2.1 million metric tons (Mandal: 2009). From the above figure it is found that in the year 2006-07 Bangladesh imported rice and wheat of 2.3 million metric tons and in 2007-08 imported 3.5 million metric tons of food grains following two floods and cyclone Sidre in 2007. The other food items for which imports have been growing very fast are pulses, milk and edible oil. The volume of import of pulses was 3 thousand metric tons in 1980-82 which has

raised to 245 thousand metric tons in 1999-2001. In 1980-82 the volume of milk import was 211 thousand metric tons which has increased to 334 thousand metric tons in 1999-01 and then fallen continuously to 2004-05 remaining at 56 thousand metric tons. Increase in import of edible oil has been growing faster. In 1980-82 the volume of import of edible oil was 104 thousand metric tons which has increased to 904 thousand metric tons. In the early years of independence, the country faced major food deficits, most of which was taken care of through grain imports from the United States under the PL 480 program. Between 1975 and 1977, more than 1.3 million metric tons of food grains came into Bangladesh as food aid, which was more than 85 of the total inflow of food grain (Shahabuddin et al.:2005:108).

4.3 Access to food

Access to food is discussed on the basis of the household's entitlement of land, level of poverty of the household, household's income and expenditure and the distribution of income both at micro and macro level on the basis of primary and secondary data.

Household's entitlement of land: The entitlement of food based on household's own production would depend on the access to land. Percentage share of population below the poverty line by size of owned land in rural areas is presented in Table 2.

Table 2: Share of poor population by size of owned land in rural area

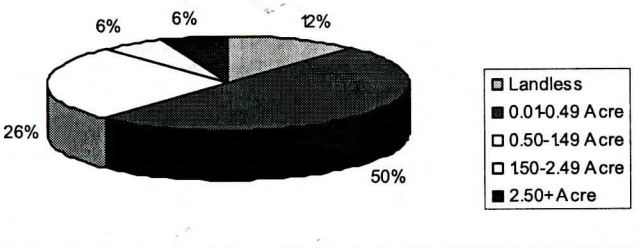
Size of land owned (Acre)	<2122 K. cal Absolute poverty	<1805 K. cal Hardcore poverty	<1600 K. cal Ultra poverty
2005			
Landless	59.57	33.15	15.26
0.01-0.49	47.87	23.61	9.57
0.50-1.49	36.97	14.52	4.60
1.50-2.49	32.10	11.19	3.59
2.50-7.49	23.35	7.32	1.61
7.50+	12.34	5.45	2.74
2000			
Landless	55.9	27.8	15.6
0.01-0.49	48.7	23.4	9.1
0.50-1.49	37.7	14.9	6.1
1.50-2.49	31.1	9.5	1.8
2.50-7.49	25.3	8.2	2.5
7.50+	15.2	2.7	1.7

Source: BBS: 2007:75

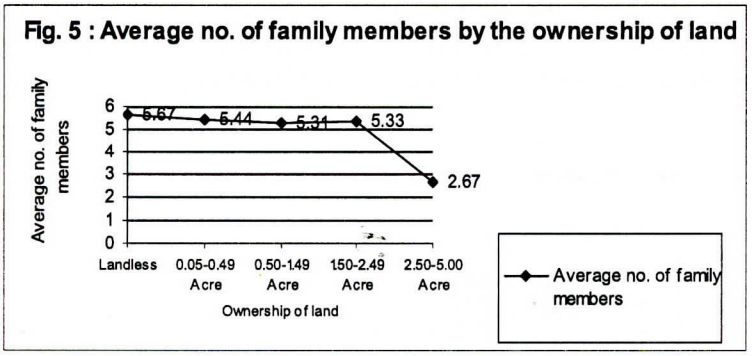
Table 2 shows the information on absolute poverty, hardcore poverty and ultra-poverty by the size of owned land in rural area. All the three parameters show a strong negative correlation with the size of the land owned in 2005 and in 2000. It shows that the hardcore poverty increased but ultra-poverty decreased for the landless in 2005 over the year 2000. It also shows that except for the range of land owned 0.50-1.49 acre, hard core poverty increased for all other cases in 2005 over 2000. But in case of ultra poor it varies for different ranges of land owned people. In case of landless it has decreased in 2005 over 2000. But in case of 0.01-0.49 acre, 1.50-2.49 acre and 7.50 acre intensity of ultra poverty has increased in 2005 over 2000. At the same time it has decreased for the range of land owned from 0.50-1.49 acre and 2.50-7.49 acre. In case of absolute poverty it has increased among the landless, but decreased among the people holding land of 7.50 acres and above in 2005 over 2000.

Level of poverty has a direct relation with the access to asset base mainly access to land. The possession of land on the basis of primary data is shown in figure 4. The figure shows that among the respondents 12 percent families are landless, 50 percent have only 0.05 to 0.49 acres of land, 26 percent have 0.50 to 1.49 acres of land, 6 percent have 1.50 to 2.49 acres of land and another 6 percent have a land of 2.50 to 5.00 acres.

Fig 4: Access to land (percentage) by the respondents



Generally in Bangladesh against the poor possession of land, average size of the households is large. Statistics show that average household size of Bangladesh is 4.9 and the average size of the household in Mymensingh district is 4.6 (BBS: 2007a:88, 89). But in the study area the size of the average household was more than that of both national and district average. Average size of the household in the surveyed area was 5.28. The average family members and the possession of land are shown in figure 5. The figure shows that families with less area of land have more population.



It is found that landless families have average population of 5.67; where as, families with 2.50- 5.00 acres of land have average population of 2.67. The amount of food intake by the ownership of land is shown in figure 6.

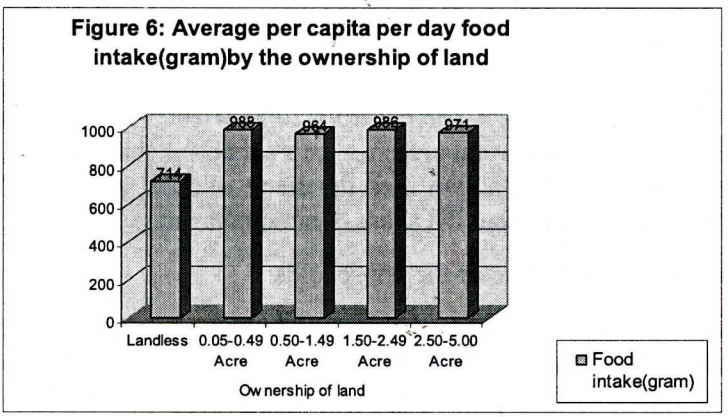
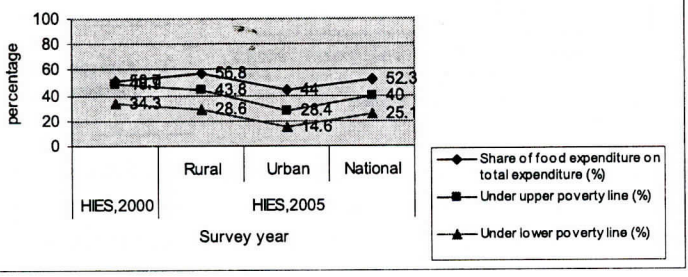


Figure shows that families with less area of land having large number of family members suffer from food insecurity. On average landless can intake only 714 gram per capita per day against the recommended level of 934 gram per capita per day. The rest of the groups' intake is more than the recommended level but imbalanced due to high intake of carbohydrates. The above statement also corroborates with the national food intake by different area of land owned group. National statistics shows that among the landless 59.57 percent are absolute poor, 33.15 percent are hardcore poor and 15.26 percent are ultra poor where as among the highest land owner group only 12.34 percent are absolute poor, 5.45 percent are hardcore poor and 2.74 percent are ultra poor respectively.

Poverty and food expenditure: Level of poverty indicates the status of household's access to food with the share of food expenditure. The level of incidence of poverty with the share of food expenditure is shown in Figure 7.

Fig. 7- Incidence of poverty and food expenditure in percentage



Source: Self Compiled based on HIES, 2005

The figure shows that the share of food expenditure has been increased from 50.7 percent to 56.8 percent from 2000 to 2005. In 2005, the share of food expenditure in rural areas was more than the share of expenditure in the national and in urban area the share of food expenditure is 44 percent which is less than the share of national average.

Income and expenditure of the households:

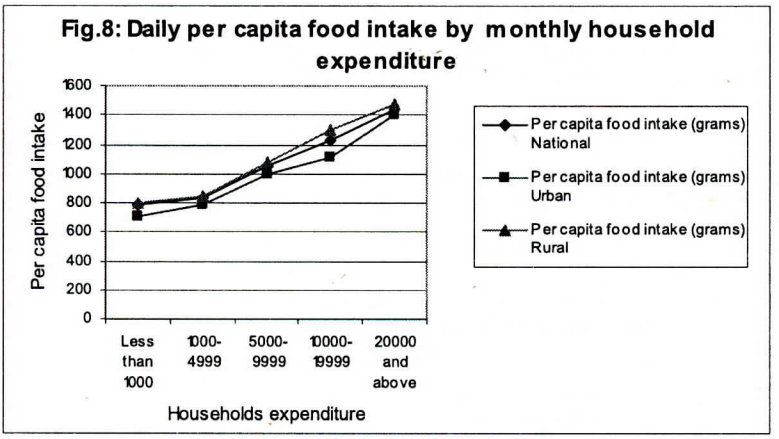
The access to food is largely determined by the income and expenditure of the household and the disparity in the share of income and expenditure is determined with the use of Gini Co-efficient. The more the value of Gini Co-efficient the more inequality exists. The trends of income inequality from 1983 to 2005 is shown in table 3

Table 3: Income Gini Co-efficient from 1983-2005

Year of Survey	Income Gini Co-efficient	
	Rural	Urban
1983-84	0.246	0.298
1988-89	0.265	0.326
1995-96	0.384	0.444
2000	0.393	0.497
2005	0.428	0.497

Source: BBS: 2007:28 and BBS: 2003:21

Table 3 shows that incomes are highly unequally distributed and have been worsening day by day. The concentration of income, as measured by Gini co-efficient, was estimated 0.246 for rural areas and 0.298 for urban areas in 1983. As compared to 1983-84, in 2005 the percentage of Gini co-efficient in rural areas has increased to 74 percent and in urban areas it has increased to 67 percent. In 2000 the lowest 5 percent people had 0.93 percent of income which has decreased in 2005 at 0.77 percent. In 2005 the top 5 percent had 26.93 percent of total income, where as lower 5 percent had 0.77 percent share of total income(BBS: 2007: 28). With the above mentioned inequality average per capita per day food intake by monthly household expenditure groups is shown in figure 8. The figure shows that per capita per day food consumption of the lowest expenditure group was about half of the consumption of the highest expenditure group for rural, urban and national level. At rural level the gap of per capita per day food intake between the lowest and highest level is 679 grams per capita per day which in urban area is 696 grams. At national level, the lowest expenditure group of less than Tk.1000 per household per month is consuming only 788 grams per capita per day compared to 1432 grams per capita per day consumed by the highest expenditure group. Thus, inequality of consuming food by different expenditure groups leading to malnutrition as well as obesity for the lowest and highest expenditure groups respectively.



Source: Self compiled from BBS: 2007: 303,304

Due to pervasive poverty with low asset base and low income most of the households spend more than their income which is shown in figure 9.

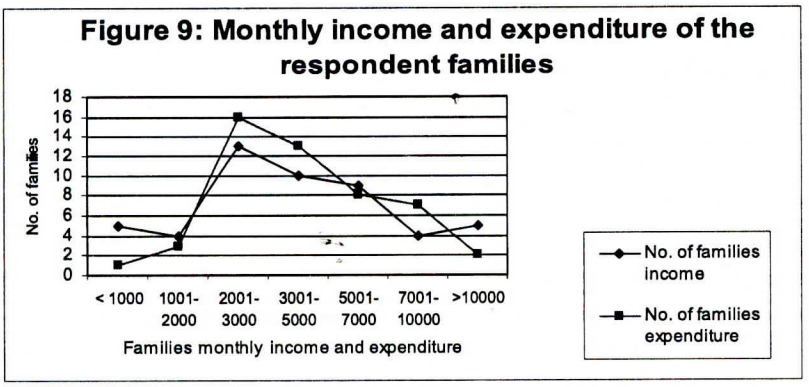
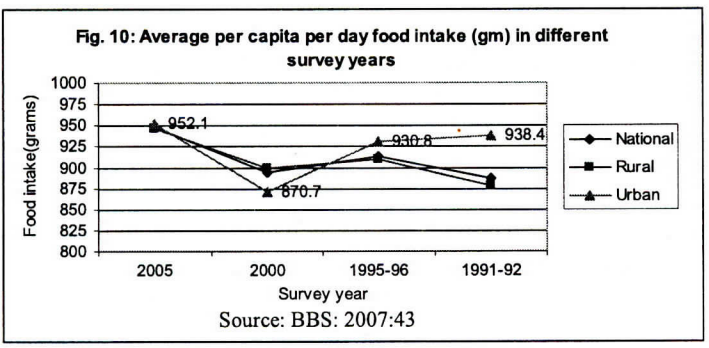


Figure shows that most of the families spend more than their monthly income. Only families in the income group less than 1000, 1001-2000, 5001-7000 and more than 10000 spend less than their monthly income, but their number in the surveyed people is less. It indicates that as many of the families are spending more than income, so they are not able to purchase enough food as they required. Due to weak purchasing power families with less income suffer more from food insecurity. Using the equation of Anderson and Roumasset we can say families with bigger left hand side than the right hand side are food insecure. It indicates that food purchased requirement of these families are more than their income and liquid assets available to purchase food. At the same time price hike at different periods both at national and international market makes the left hand side more unequal. As a result the people of mid-income group are the most vulnerable to food insecurity in the rural area of Bangladesh.

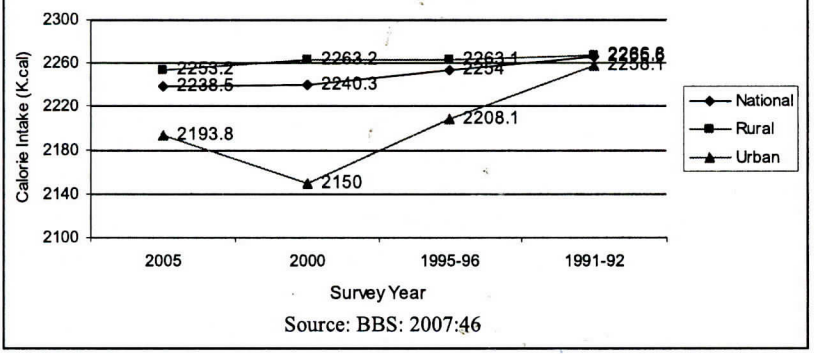
Food and calorie intake: Consumption of food and nutrient indicates the status of food security of different socio-economic group of people. Data of different HIES is presented in figure 10 and 11 to show the pattern of food and calorie intake respectively for rural, urban and national level from 1991-92 to 2005.



Source: BBS: 2007:43

In 2005 at national level the average consumption were 947.8 grams per capita per day which was 893.1, 913.8 and 886.2 grams per capita per day in 2000, 1995-96 and 1991-92 respectively. The survey years shows an uprising trend of food intake from 1991-92 to 2005 except for the year 2000. In 1991-92 the consumption of food at rural level was 878.1 grams per capita per day which rises to 946.3 grams per capita per day in 2005. In urban area in 1991-92 the average per capita per day food intake was 938.4 grams which rises to 952.1 grams per capita per day in 2005. Food intake at national level per capita per day has increased by 6.12 percent in 2005 over 2000. Figure 11 shows that at national level average calorie intake was 2238.5 k. cal in 2005 which was 2240.3 k. cal, 2254.0 k. cal. and 2265.6 k. cal. in 2000, 1995-96 and 1991-92 respectively.

Fig.11: Average per capita per day calorie intake (k.cal) in differenet survey years



Source: BBS: 2007:46

The rural pattern of calorie intake is mostly similar to that noticed at the national level. It was 2253.2 k. cal. in 2005, 2263.2 k. cal. in 2000, 2263.1 k. cal. in 1995-96 and 2266.8 k. cal. in 1991-92. It is clear that calorie intake has been reduced from 1991-92 to 2005 both at national and rural level. In urban area, the intake of calorie shows ups and downs over the periods. The graph shows the downward trends of urban calorie intake from 1991-92 to 2000 and again in 2005 it shows the upward trend of calorie intake which reaches to 2193.8 k. cal. Although the average calorie intake was always more than standard of 2122 k. cal. set by FAO, but income disparity among the rich and poor severely affect the food security of the country as a whole especially of the poor. As amount of food intake is one of the most important indicators of food security, so, in response to a question either they get sufficient food or not, 68 percent said they can afford three meals a day and 32 percent said they can afford

only two meals a day. It corroborates with the data that nearly 40 percent of the total population are the hardest victim of food insecurity. Average food intake by different occupation is shown in figure 12.

Figure 12: Average per capita per day food intake(gm)by different occupation

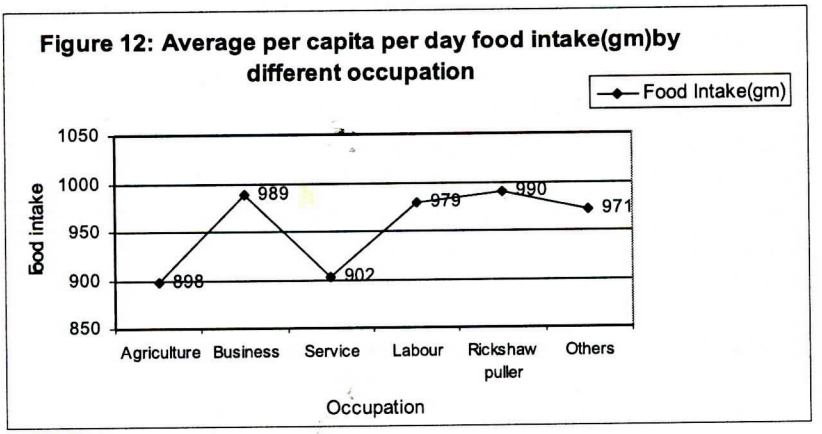
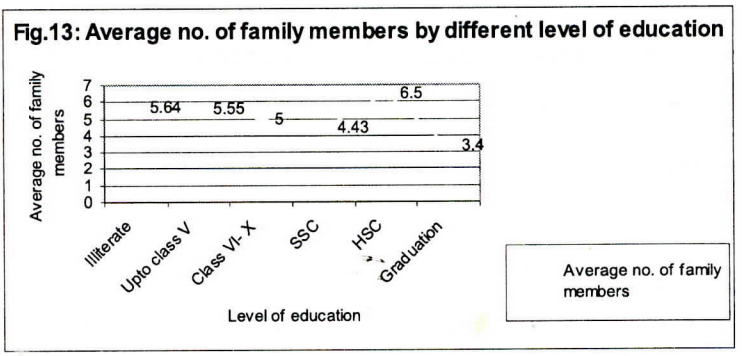
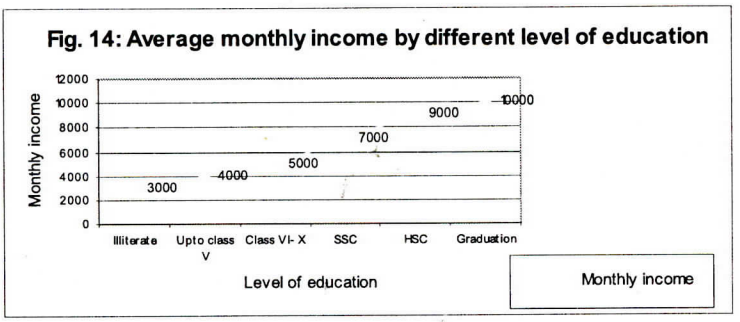


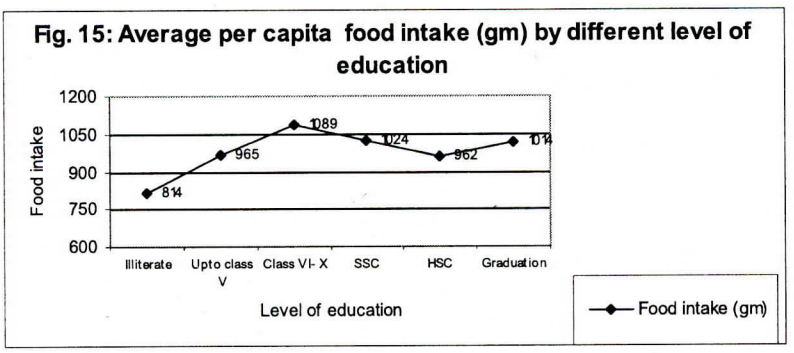
Figure shows that among the respondent's farmers food intake is the lowest which is 898 gm per capita per day followed by the service holders whose average food intake per capita per day is 902 gm. Both of the groups' average per capita per day food intake is much less than the average of national food intake in 2005. So, in respect of average food intake both the farmers and service holders are suffering from food insecurity.

Education has a direct impact on population growth and income of the family. Average number of family members and their monthly income by different level of education is shown in figure 13 and 14 respectively. Figure shows that illiterate people have the maximum number of family members on average of 5.64 per family where as families headed by graduates the least average number of family members of 3.4 per family has. Except for the group of HSC level education, number of family members is adversely correlated with level of education. Families with higher education earn more. Figure 14 shows that those who are illiterate earn 3000 taka per month and the families headed by the graduates earn more than 10000 taka on average. With the level of education food intake is also correlated from illiterate to the level of class X. After completing matriculation it varies in different levels.





Again as the level of education helps to utilize food properly with the better understanding on health and sanitation, it also ensures utilization of food by the educated families. Average per capita per day food intake (gm) by the respondent of different level of educational background is shown in figure 15.



Consumption pattern of food: Consumption of food is the real indicator of food security of different socio-economic groups. The normal diet of Bangladeshi people is seriously imbalanced, with inadequate consumption of fat, oil and protein and with more than 80 percent of calories come from cereals. Consumption pattern of food item in rural

areas is presented in Table 5 on the basis of primary data collected by the researcher and secondary data taken from the report of HIES 2005.

Table 5: Comparison of food intake between 2005 and 2009 at rural level

Food item	Balanced requirement	National rural food intake(2005)	Respondents food intake(2009)
Rice	390	460	421
Other cereals	100	26	15
Potato& other veg.	225	218	290
Pulses	30	13	24
Fish	45	40	72
Meat & Eggs	34	18	21
Milk	30	31	51
Oils & Fats	20	14	18
Fruits	50	32	28
Others	10	95	8
Total	**934**	**947**	**948**

Source: HIES, 2005 and Self Compiled

The table shows the picture of average intake of different food items in different period in comparison to normative food requirement prescribed by the National Nutrition Council for the average Bangladeshis for a balanced diet. From the table it is found that in 2005, average food intake in rural area was 947 gm per capita per day which was 948 grams per capita per day in the surveyed area in 2009. But the food is imbalanced due to high intake of carbohydrate. Although the intake of carbohydrate has been decreased to 421 gram per capita per day in 2009 from 460 gram per capita per day, but still it is high in comparison to balanced diet. The amount of fish and milk intake in the surveyed area which was 72 grams and 51 grams per capita per day, this is due to the cultivation pattern of the surveyed area. The surveyed area was fish and poultry dominant area. It indicates that the amount of food intake is satisfactory in the surveyed area but due to weak utilization of food, people of the surveyed area very often suffer from common diseases like diarrhea, fever, abdominal pain etc. It also supports the observations made by Harun et al. in 2005. They pointed that the diet of Bangladeshi people is very much imbalanced leading to poor nutritional outcomes. High consumption of cereals but low intake of edible oils, vegetables and fish may result in low level of

absorption of micronutrients and high level of anemia and other deficiencies.

From the above discussion it is found that although in some cases availability of food is satisfactory but due to weak purchasing power and poor asset bases the access to food especially by the poor people is not ensured. Even availability and access to food is ensured somehow, lack of knowledge on health and sanitation is hampering the proper utilization of food. As a result the food security of the common people especially of the downtrodden population is in jeopardy.

5.0 Reasons for Food Insecurity

Despite significant achievement in food grain production food security at national, household and individual level remains as a major concern for the Government of Bangladesh. No single factor is responsible for this. Number of factors affecting the food security has been identified by the respondents of the surveyed area are scarce land and huge population, insufficient earnings, high prices of commodity, lack of employment opportunity, low wages and lack of government assistance. These factors are interrelated. Negative impact of one factor affects the others negatively. With the above discussions factors responsible for food insecurity at different level can be mentioned as scarce land, huge population, natural calamities, climate change, loss of biodiversity, production of bio-fuels from plants, scarcity of irrigation water, lack of timely supply of agricultural inputs, poverty, income inequality, dietary habit, depreciation of money, and international price raise of food grain, slow technology generation, lack of sufficient investment in research and development in agricultural sectors.

5.1 Scarce Land and Huge Population: Paraphrasing Malthus, Heilbroner mentioned that 'Land, unlike people ... does not breed' (Heilbroner: 1953:82). The above quotation shows that land does not increase rather it decreases day by day due to rapid urbanization all over the world. The situation is more appropriate for Bangladesh. Even after long 38 years of our independence we failed to manage our land properly leading to decreasing cultivable land day by day due to rapid urbanization, industrialization, construction of roads, bridges, dams, unplanned markets, shopping malls etc. Statistics shows that in Bangladesh 1% arable land is declining per annum coupled with depleting soil fertility and micronutrients. If the rate continues in the year 2050 we will hardly get any land for agriculture and fishery.

5.2 Natural Calamities: Natural calamities like recurrent floods, draughts, cyclones, river erosion and huge land slides make the food security situation more vulnerable. The November 15 cyclone named as Sidre has destroyed acres of rice paddy, ruined the shrimp farms of the southern coast, and, according to the World Food Program, left 2.3 million people in need of urgent food aid (The New York Times: 2007). The government estimates that 6 million people were affected by the storm. Due to the victim of natural calamities some people are becoming environmental refugees, some are becoming unemployed for a long time, some are losing their agricultural land and some are losing their planted crops before harvesting facing double loss. Thus they remained unfed or underfed.

5.3 Climate Change: Climate change along with many other dimensions is also adversely affecting the issue of food security. Changes in climate not only increase the temperature of the world it also increases the intensity and frequency of drought, floods and cyclones. Climate change will impact the agriculture of Bangladesh by extending flood specially intensifying flash flood, increasing temperature leading to droughts, causing water scarcity for irrigation and domestic uses in north-west Bangladesh, increasing inundation and salinity intrusion, limiting crop cultivation with the existing varieties, especially in the coastal regions, increasing loss of land to river erosion, reducing land-based livelihood opportunities, and increased drainage congestion and water logging due to sedimentation of rivers, limiting production options for the char dwellers. According to Intergovernmental Panel on Climate Change (IPCC) prediction, global temperatures will rise between 1.8 degrees and 4 degrees (Celsius) by the last decade of the 21st century. Bangladesh will be one of most victims of this temperature change. According to IPCC by 2050, changing rainfall patterns with increasing temperatures, flooding, droughts and salinity (in coastal belt) could cause a decline in rice production in Bangladesh by 8 percent and wheat by 32 percent, against 1990 as the base year. The recent estimates using different models with changed assumptions predicts for 2050 reduction in production by 1.5-25.8 percent for aus rice, and 0.4-5.3 percent for aman due to the effect of high temperature. For boro rice, production could be increased by 1.2-9.5 percent, assuming the temperature would not exceed the 35° C threshold limit for rice production (Daily Star: 2009).Thus climate change has a direct impact on the production of food grain. Any loss in production of food grain will intensify the problem of food insecurity.

5.4 Loss of Bio-diversity: Loss of biodiversity is adversely affecting the production of food grains. Without preserving bio-diversity, we cannot expect sufficient and diversified production of food grain and other elements of subsistence. According to FAO, 75 percent of biodiversity was lost in the 20th century. As different plant and animal species form the ecosystem and the interaction among plants and animals along with non-living organism creates a balanced environment for the production of food and medicines, so any loss in the biodiversity will make loss in the pollination, loss of variety in different food grain and it will damage the soil characteristics. With the loss of bio-diversity the ecological balance will be hampered which will seriously effect the production of food adversely contributing to the food of the world, where Bangladesh is not an exception.

5.5 Lack of timely agricultural inputs: Supply of agricultural inputs like irrigation water, quality seeds, fertilizers and pesticides etc. are the key factors of production. Without ensuring timely and quality agricultural inputs we cannot expect optimum production. Without optimum production we can not provide sufficient food at the time of need to ensure food security.

5.6 Poverty and Unemployment: The basic causes of endemic food insecurity of millions of people are the limited access to productive employment opportunities. Due to unemployment or underemployment they lose their purchasing power. Thus incidence of poverty and huge unemployment is an important denominator to the food security in the country.

5.7 Income Inequality: Income inequality is one of the important reasons for food insecurity in Bangladesh. In Bangladesh top 5% household earns 33471 taka per month per household where as bottom 5% household earns 1605 taka per month per household. Nationally top 5 percent spend 33.2 percent of their income for food expenditure and 66.8 percent for non-food expenditure and bottom 5 percent spend 67.9 percent for food expenditure and 32.1 percent for non-food expenditure (BBS: 2007:41). Thus higher income groups are taking more food leading to obesity and lower income groups are taking less food leading to malnutrition which are against the notion of food security.

5.8 Depreciation of money: Depreciation of money results less amount of food import which creates scarcity of food. Due to depreciation of taka imports become expensive and the price of food grain increases which affects the purchasing power of the poor.

5.9 Prices of food grain: Price rise of the commodities hit hardest to the rural poor. Among the poor landless and female headed households are the most vulnerable. A recent analysis by Bayes and Hossain based on a nationwide survey cited by M. A. Sattar Mandal in his work reveals that a 50 percent increase in rice price takes away 25 percent of poor household's income, meaning a negative effect on meeting other basic needs. The researchers analysis shows that average quantities of rice and protein rich foods have significantly fallen in 2008, compared to 2007 and that 72 percent families have not only consumed lesser foods but also lower quality rice (Mandal: 2009: 58). Due to price hike 20 lac children are not getting sufficient nutritious food and suffering from malnutrition at the age of 6 months to 5 years. 5 lac children are suffering from long-term malnutrition. More than 37% children are living with underweight. (Prothom Alo: 2009). Thus price hike in the national and international market seriously affecting the poor to meet up their daily requirement of food leading to food insecurity.

5.10 Hoarding and Syndicates: Hoarding of food grain illegally increases the price again and disrupts the distribution of food grain. Marketing and distributing bottlenecks lead to access problem, particularly on the poorer segments of the society. Hoarding by syndicates make the market unstable. Thus the poor people become more food insecure.

5.11 Dietary Habit: Dietary habit mainly high consumption of cereals, but low intake of edible oil, vegetables and fish result in a low level of absorption of micronutrients and a high level of anemia and other deficiencies.

5.12 Insufficient Social Safety Net Program: In a disaster prone country like Bangladesh social safety net programs are must to insulate the poor and vulnerable from shocks of the sudden natural disasters. To insulate the disastrous people the coverage of SSNP's is inadequate. Less than 1% of GDP is allocated to various SSNP's, far less than the average allocation of 5% of GDP in South Asia (World Bank: 2004). Approximately 10% of the poor and 5% of the ultra poor is covered by any SSNP. 50% of eligible old age people are not covered by any pension scheme. Mismanagement in the distribution processes of social safety net program also jeopardizes the food security.

5.13 Lack of Health Education: Very often the available and accessed foods are not properly utilized due to improper storage, processing and cooking practices. Processing also greatly affects physical and chemical properties of food. Careless and excessive washing of food items before

cooking often causes huge loss of food values. Sometimes too much of heating impairs color, flavor and nutritional value of food. So, lack of health education our people is being deprived of taking balanced diet.

6.0 Role of Public Policies for ensuring Food Security

Most of the increased production and management of food grain is related to the application different public policies. The macro policy interventions include the agriculture policy, land use policy, import substitution or export orientation in other words trade policy. In addition, in a country with huge population nothing will work until or unless the population will be controlled. From the above discussion policy recommendation broadly covers the area of population control, increasing agricultural production, providing subsidies to agricultural inputs, stabilizing prices of food grain, managing stock properly, liberalizing trade, managing the environment, managing risk and addressing health related causes for under nutrition as policy measures.

6.1 Policies to Population Control

Although we have been able to double our food production still we are running behind our targeted food production. Of course, question comes is it not food verses population?

To discuss about the question we can take the examples of Leather and Foster. As mentioned by Leather and Foster that if the population grows by 50 percent, and population characteristics cause a food demand to grow by 5 percent per capita, total demand grows by more than 50 percent- the demand will be 57 percent as calculated by the author (Leather and Foster: 2005:183). From above examples it is clear that without controlling population addressing the issue of food security is totally impossible especially for an overpopulated country like Bangladesh. More importantly growth of population among the down trodden population is the key factor to be taken into consideration with utmost sincerity for ensuring food security.

With the above discussion if we calculate the amount of food needed for the total population by 2050, what will happen? As per statistics, if population grows at the current rate by the end of 2050 total population will be 217.54 million (BBS: 2007a:140). Taking the current rate of consumption of food we get, in 2050 the amount of food will be needed 49.82 million metric tons. At present we can produce around 30 million metric tons of rice with the cropping intensity 1.81. So, for the added population to meet the demand of food in 2050 cropping intensity will

have to be increased up to 3.02 as calculated by the researcher remaining other things constant which is nearly impossible, because soil health is already in jeopardy due to unscrupulous use of chemical fertilizers and pesticides, so only way to remain population under control. Considering the present birth and death rate for ensuring food security for all the growth of population should not be allowed more than 1 percent, even all other aspects of food security is improving at the current rate. So, control of population is the first and most important task.

For this The Chinese Glory Certificate System can be accepted and strictly implemented. In Bangladesh to control population the following incentives can be provided:

- Couple with one child may get free and priority medical care for the child, priority admission to kindergartens and other government schools,
- Priority should be given in allotting government lands and accommodations,
- Parents with single children should get priority regarding government incentives.

6.2 Macro policy interventions

As a policy measure macroeconomic intervention including growth of GDP, overall development through industrialization, trade liberalization, maintaining low level of inflation should be ensured. Development in some of the industrial sectors like RMG, pharmaceuticals and ship building is satisfactory. With the improvement in macroeconomic indicators we will be able to invest more which will create more job facilities and reduce poverty which will eventually ensure food security of the poor.

6.3 Ensuring optimum use of land and water resources

Bangladesh already faces formidable challenges of keeping up the present momentum of food production in a declining land and water resource. For ensuring food security proper use of land can be done with the implementation of following steps:

- Creation of land database for planned management of agricultural, residential, commercial and industrial lands, and

- ❖ Vertical expansion of land for the maximum utilization of land. Indiscriminate use of land for housing should be stopped rather to start community living even in the rural area
- ❖ Water productivity has to be increased through dissemination of water saving technologies, on-farm water management training and wherever possible promoting rain water harvest.

Promote growth of food production: To promote agricultural growth following steps can be taken as policy measures:

- ❖ Ensuring quality seeds and sufficient fertilizers, pesticides and supply of electricity at subsidized rate to the farmers as per their requirement,
- ❖ Providing agricultural loan, fishery loan and bank loan for small business without collateral at a minimum rate of interest with 1 year moratorium period and ensuring optimum price of the produced goods and
- ❖ Adopting High Yielding Varieties (HYV).

Investment for technology generation: Investment in agricultural research can contribute in the following manner:

- ❖ Yielding potential to available chemical fertilizers and pesticides;
- ❖ Adaptation to growing period, drought tolerance; disease and pest resistance;
- ❖ Improvements in quality, palatability and consumer acceptance; storage, transport and other handling qualities with available technology;
- ❖ Changes in labor requirements in production and processing in relation to the available mechanical technology.

Improving access to food to the disadvantaged: Lowering food prices can be done providing subsidies for the agricultural inputs, investing in rural transport and information systems and mechanization in agriculture with improved technology with sufficient marketing facilities. Improvements in customs facilitation, logistics performance and efficient grain storage can enhance producer responses as well as benefiting consumers. Sufficient social safety net programs, creation of sufficient job facilities and raising wages of labor and the implementation of public food distribution system can ensure access to food by the poor.

Preserving Bio-diversity and cropping diversity: Preserving bio-diversity will help to meet the demand of dietary requirement with optimum production. With the implementation of Integrated Pest Management (IPM) and environment friendly agricultural technology we can preserve our bio-diversity which will help to diversify our food basket. In the process of preserving bio-diversity and maintaining cropping diversity emphasis should be given on the production of vegetables, pulses, fruits etc. other than rice and wheat. Fish, cattle, and poultry production should also be encouraged. Mitigation to Climate Change and natural calamities: Institutional capacity must be strengthened so that we can adapt with the vulnerability of climate change and natural calamities. This should be included in mainstreaming climate change adaptation in government policy discourse, mobilization of trained manpower, awareness building, and incorporation and upgrading of university curricula on disaster management and climate studies and research.

Effective stock management: Ensuring procurement is most important to create sufficient buffer stock. For ensuring procurement following steps should be taken:

- Price of food grain should be fixed in such a way so that the producer gets maximum benefits, allowing maximum scope of operation for private traders,
- Number of goodowns and stocking capacity of goodowns should be increased so that sufficient food grain can be procured at the peak season to meet the demand of conducting relief and other subsidized state operated programs,
- Procurement process should be free from corruption. Any lapses by the personals involved in the process of procurement should be taken seriously,
- Lastly, small farmers should be provided with loans at a low interest rate so that they are not compelled to sell their product immediate after harvesting at low prices.

Lowering and stabilizing price of food grain: Management of food grain through efficient cereal stock policy, effective trade and tariff policy, development of non-cereal food market with appropriate market intervention strategy can play a vital role. Lowering food prices through price control directly or reduction of import tariff may be another effective mechanism. Taxes or subsidies can be another effective tool for

stabilizing food markets. To do that market should be free from syndicates and illegal hoarding.

Liberalizing trade: Ensuring functional global market in food products should be a priority in our foreign policy. Bangladesh should explore an Asian agreement on rice trade. With food import food aid will also play a vital role in ensuring food security. Raising budgetary allocation: With sufficient budget it will be possible to conduct more agricultural research which will help to introduce HYV and high technology to plant, harvest them in an improved manner.

Creating employment opportunities: With policy intervention employment can be created with the following steps:

- The capability of the people should be improved through education, training and healthcare facilities;
- Raising wages of labors employed and promoting rural and agro-based industries and enterprises.
- Undertaking productivity enhancing programs for rural, agro-based enterprises, investing in productivity enhancing technology and
- Public investment in transport and communication.

Enhancing Social Safety Net: Food based intervention can reduce the vulnerability of the poor. For this following steps can be taken:

- Support to women in income generating activities;
- Initiate special program for disaster mitigation for agriculture;
- Undertake emergency distribution from public stock;
- Encourage private sector initiatives to augment domestic food supplies;
- Undertake extensive public education and marketable skill development program; and initiate more gender responsive programs to promote women development.

Providing sanitation and health education: For ensuring quality of food proper knowledge on sanitation and health education should be ensured. For these following steps to be taken:

- Reduce prevalence of water and food borne diseases;

- ❖ Improvement in water quality, infrastructure development by public investment in water supply and sanitation facilities;
- ❖ Investment in safe storage, safe market places & safe handling facilities;
- ❖ Harmonization of standards by developing and enforcing grades, standards and quality; and enforcing proper labeling and packaging rules/standards;
- ❖ Creating food safety database and food safety research;
- ❖ Initiating awareness build-up programs and co-coordinating mechanism to control indiscriminate use of harmful additives, preservatives, emulsifiers or toxic elements in food production, processing and marketing chain.

Promoting PPP: Promoting Public Private Partnership (PPP) can play an effective role for ensuring food security. Under the PPP following tasks can be done:

- ❖ Establishment of new goodowns and cold storage so that food can be easily stored after a bumper crop;
- ❖ Small agro-based industries can be set up in the rural areas for perishable goods like fruits, vegetables, fishes etc. to ensure maximum utilization;
- ❖ Rural communication can be developed under PPP to get the maximum benefit by the producers without the interference of middleman;
- ❖ Research and investment can be done for improving agriculture technology, introducing the technology and generating HYV.

Strengthening Coordination and Monitoring: Strengthening coordination among different institutions and organizations for developing market facilities, developing infrastructure, transport network and Information Technology is essential for optimizing production, distribution and marketing and stabilizing prices of food grain. It can be done by initiating major sectoral review of agriculture.

Ensuring effective governance: For ensuring food safety and quality control many rules, regulations and laws have been promulgated by the Government but lack of proper implementation of rules and regulations seriously hampers in ensuring effective governance. Governance free

from corruption, and bureaucratic procrastination and hindrances are the precondition for implementation of any policy or programs efficiently and effectively. So, ensuring effective governance can help to ensure quality of food which is one of the key components of food security.

7.0 Conclusion:

Despite progress in some development indicators existing pervasive poverty all over the country leading to a large group of people unfed or underfed. So, investment and reforms on multiple factors including human resources development, agricultural research, building rural infrastructure, water resources management, and farm and community based agricultural and natural resources management to be ensured. Along with the above recommendations an efficient public food distribution system can play a vital role in government's food policy and make a significant contribution to the food security of households who receive transfers. Taking these into consideration, Bangladesh should concentrate on agricultural development, especially, self-sufficiency in food grain production, mitigating and adapting climate change and of course, pro-poor growth with effective population control under the implementation of a proper population policy. Solving these problems will require decisive action by the government, the private and individual households. Implementing all these efforts will help in sustainable food production as well as in ensuring food security and will ensure better nutrition, and better livelihood.

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