



# Current status and future projection of food security and nutrition in South Asia: A comparative study

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## Abstract

The present study endeavors to explore both the conception of nutrition based food security and issues under food security (i.e. GDP growth, agricultural growth, incidence of poverty and food insecurity). It also has tried to develop a triangular linkage between food security, nutrition and human development. The study has attempted to provide a comparative analysis of nutrition status of the South Asian states including current status and future projection of nutrition based food security as well as climatic impact on food production. Additionally, the study has suggested some measures to overcome identified constraints in order to improve the food security situation in the region. In order to observe the changing pattern of different indexes on food security, data from Food and Agriculture Organization of the United Nations (FAO) and World Bank 2002-2003, 2005-2006 and 2010-12 as well as Human Development Report (HDR) 2012 and 2013 have been used.

**Keywords:** Food Security, South Asia, Nutrition, Human Development

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**Cite this article as:** Chowdhury, S.K., Bhadra, H.K., Maniruzzaman, M. and Mehedi, S. (2017), "Current status and future Projection of food security and nutrition in South Asia: A comparative study", *International Journal of Development and Sustainability*, Vol. 6 No. 3, pp. 33-53.

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## 1. Introduction

Food security is a complex and complicated phenomenon and involves a number of factors ranging from availability to access and utilization of food. The study has made an elaborative and empirical assessment of these factors (i.e. availability, access, utilization, and stability) related to nutrition and food security in the South Asian context. The very rationality of these types of assessment is that states of this region are found as vulnerable to food insecurity and the most common cause of such vulnerability is that they are more or less dependent on food import to meet their domestic needs (Mittal et al., 2009). Based on the above stated rationality the study has argued that, a comprehensive and well-coordinated effort at regional level is required to tackle the issue of food insecurity.

It not to deny that, food insecurity and malnutrition are too acute in South Asia. According to the statistics of FAO (2012) two-third of the undernourished population of Asia comes from the South Asian states. An analysis of the statistical report of FAO (2012) has revealed that in the last decade annual undernourishment reduction rate of the South Asian states was about 1.7 percent. In spite of such decreasing trends undernourished remains a major cause of concern for the region. Such alarm has indicated that ensuring food security (physical availability and economic access to food) may continue to be a major challenge for the South Asian region. Prior to make further discussions on the challenges of food security few words about what food security actually mean may be pertinent to mention here.

Food security indicates the economic access to food along with food production and food availability. A consideration of such food security dimension has revealed that food security in South Asian region is not enough. This is because agriculture in the South Asian region is caught in a low equilibrium trap with low productivity of staples, supply shortfalls, high price, low returns to farmers and areas diversification-all these factors may be a threat to food security. Considering the above mentioned points the article has selected 'current status and future projection of food security and nutrition in South Asia: a comparative study' as the title of the research.

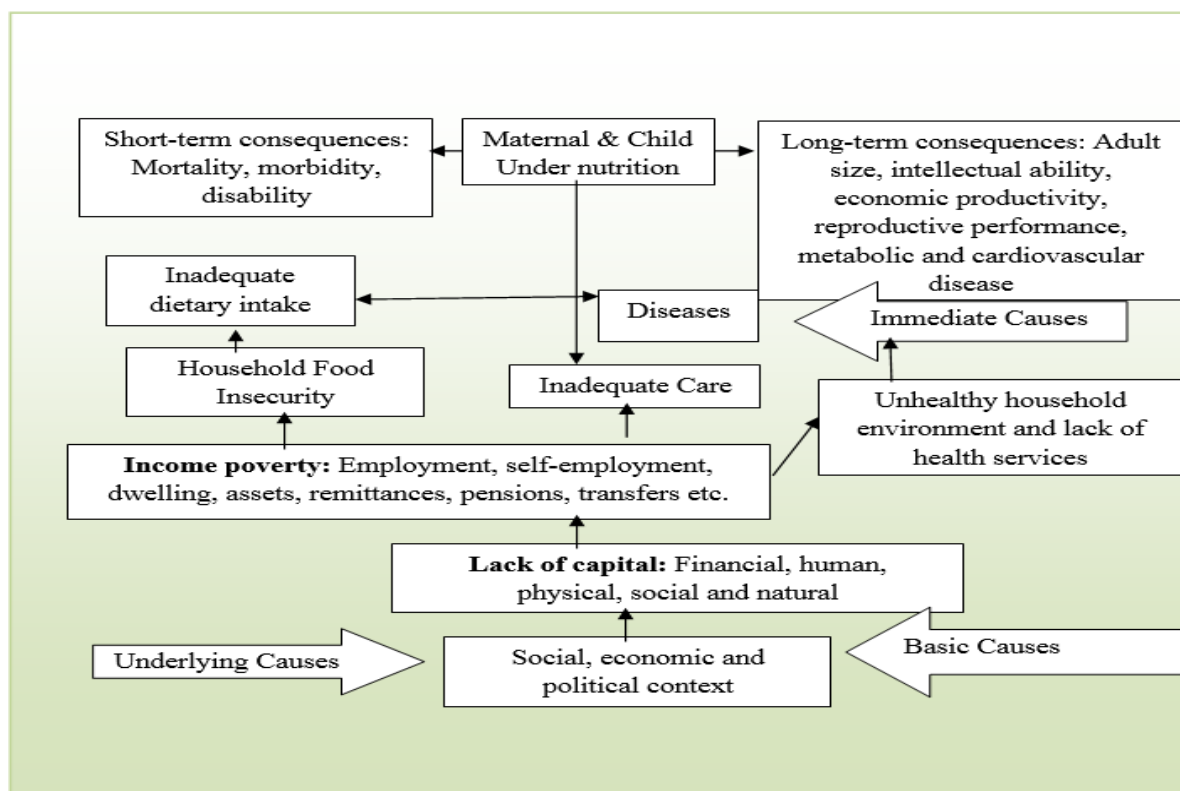
A number of researches have been conducted on nutrition and food security under different aspects (Maxwell et al., 1992; Hossain et al., 1998; Hoddinott et al., 2002; Mittal et al., 2009; Titumir and Basak, 2010; Titumir and Basak, 2011; Francesco Burchi and Pasquale De Muro, 2012; Burchi and Pasquale De Muro, 2007; Sen, 1981; Sarris, 1989; Ruel, 2002). However, most of the studies have carried out their investigations from different perspectives and approaches and used different tools and techniques in identifying and analyzing the facts. A very few studies (Maxwell et al., 1992; Titumir and Basak, 2011; Sen, 1981) have arranged the facts under a comparative analysis of the food security and nutrition status.

In this circumstance, the study firstly endeavors to explore both the conception of nutrition based food security and issues under food security (i.e. GDP growth, agricultural growth, incidence of poverty and food insecurity). It also had tried to develop a triangular linkage between food security, nutrition and human development. The study has attempted to provide the comparative analysis of nutrition status of the South Asian states including current status and future outlook of nutrition based food security as well as climatic impact on food production. Furthermore, the study has suggested some measures to overcome identified constraints in order to improve the food security situation in the region.

The study has followed both quantitative and qualitative methods. Further in order to observe the changing pattern of different indexes on food security, data from Food and Agriculture Organization of the United Nations (FAO) and World Bank 2002-2003, 2005-2006 and 2010-12 as well as Human Development Report (HDR) 2012 and 2013 has been used.

## 2. Conceptual background: Food security and nutrition

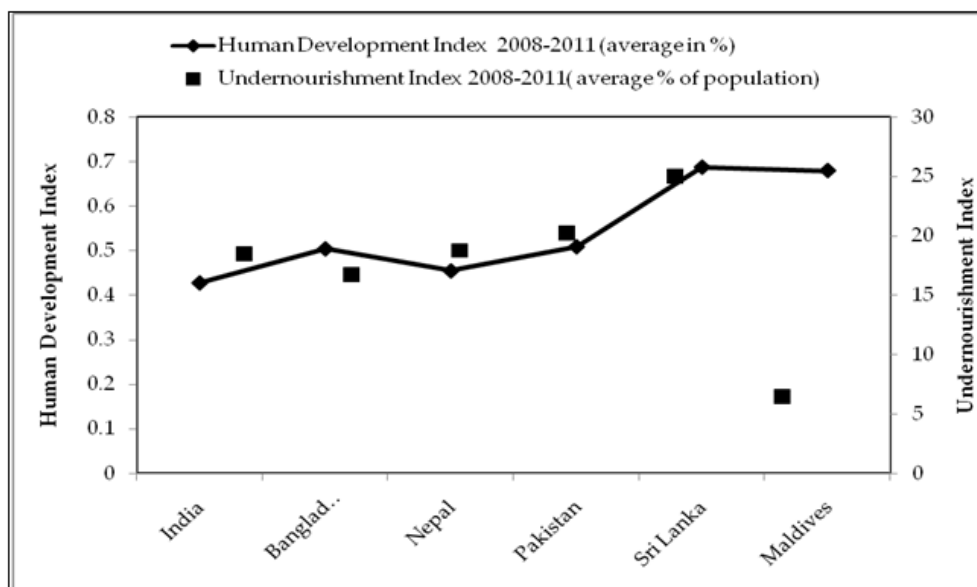
In 1974, World Food Summit, food security was defined as “availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices”. This connotation of food security has further expanded by FAO in 1983. In line with FAO (1983) food security means “ensuring that all people at all times have both physical and economic access to the basic food that they need.” Through this definition FAO actually has tried to indicate the inclusion of vulnerable people securing access to available supplies. The study has argued that lack of the availability of adequate food is a prime cause of malnutrition. An acceptance of this argument has indicated access to food as a component of nutrition. In regard to the linkage between food security and nutrition, the well-known UNICEF Conceptual Framework (Figure 1) is considered as standard.



**Figure 1.** Nutrition conceptual framework (adapted from UNICEF) (Source: Lancet, 2008)

### 3. Food security, nutrition and human development: A triangular concept

Food security, nutrition and human development are three inter-linked concepts. The study has found a strong negative relationship between human development index and food insecurity (Figure 2). Finding have indicated that those countries where food insecurity is high, there have a low human development and vice versa. Such finding in this study has been found through analyzing Pearson's rho coefficient correlation between human development index and food insecurity index which is  $-0.2695$ . This analysis has conducted on taking the average values of the two indexes during the period of 2008 to 2011.



**Figure 2.** Correlation between Human development Index and Food Insecurity (Source: Authors' Calculation, data based on FAO 2013, World Bank, 2013. Note: Data for Bhutan and Afghanistan are missing)

Sufficient level of human nutrition can hardly be possible to ensure for a country where human development indicators are performing slowly. This is because under-nutrition is related to the three components of human development index (HDI) i.e. life expectancy, income per capita and educational level. Therefore, actions which decrease the incidence of under-nourishment may have a positive impact on the HDI, given its composition. Such scenario is particularly prevalent in South Asian region where the percentage of undernourished population is very high.

It is true that the South Asian economies are now putting great emphasis on hunger reduction to promote their in GDP but the level of the decreasing rate are not equal for all the states of this region. As for instance, from 1990-1992 to 2006-08 average changes of under nutrition rate in Bangladesh was remarkably high (12 Percent) compare to other South Asian states (Global Hunger Index, 2012). On the other hand, there is no

such change occurred of under nutrition reduction for Pakistan. (Table1). At the same point in the case of Nepal and India, it was very negligible amount which was counted 2 percent and 1 percent respectively.

**Table 1.** Data underlying the Calculation of the 1990, 1996, 2001, and 2012 Global Hunger Index Scores (GHI)

Country	Proportion of undernourished population (%)				GHI (%)			
	90-92	95-97	00-02	06-08	1990	1996	2001	2012
Bangladesh	38	41	30	26	37.9	36.1	27.8	24.0
Nepal	21	20	18	17	26.9	24.4	23.0	20.3
Sri-Lanka	28	25	20	20	20.8	18.4	15.2	14.4
India	20	17	20	19	30.3	22.6	24.2	22.9
Pakistan	25	20	24	25	25.5	21.8	21.7	19.7

Source: Global Hunger Index (GHI), 2012

Note: Data for Afghanistan and Bhutan are missing

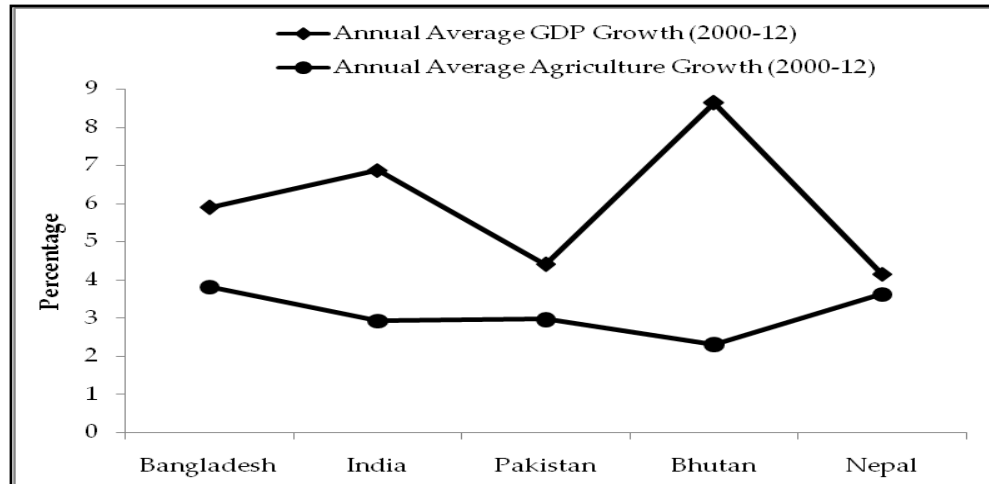
Food insecurity can influence different dimension of human development (i.e. education, health, nutrition, participation and security). So it is clear that, human development can be promoted by reducing malnutrition rate and thus ensuring food security. Good nutrition is not only a means of development but it is also an end in itself as it is a basic human need: a chronically hungry person will never reach a satisfactory state of well-being. In this context, being both an end and a means of development, food security should be taken into account in the measurement of human development, as well-being can only be achieved when there is not food insecurity.

#### 4. Issues under food security

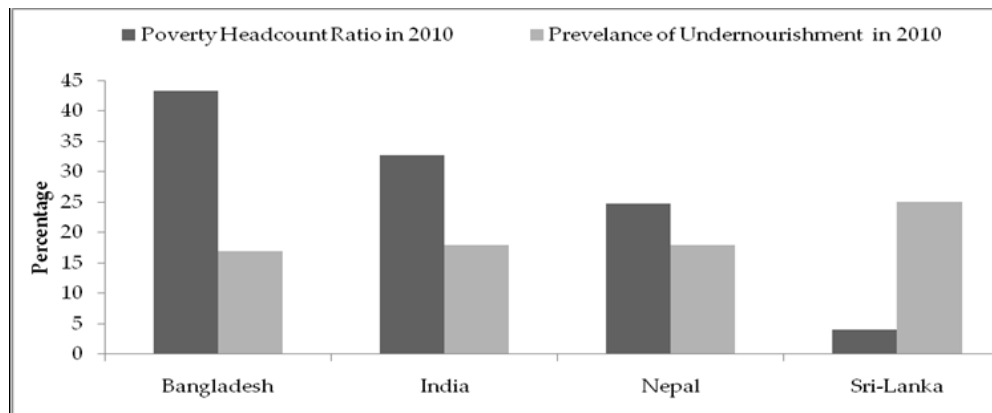
Annual agriculture growth rate, increasing population and poverty are some of the core issues under food security of South Asian nations. It has found that the annual average economic growth rate in this region is comparatively higher than agriculture growth rate due to lower investment in this sector which is totally unexpected for food security aspect. Sometimes growth rate of agriculture sector for a number of countries are following a decreasing trend. For example, in Bangladesh, growth rate of annual average GDP was 5.90 percent during the period of 2000-12, whereas growth rate of agriculture sector was only 3.80 percent. This situation was more acute for India where the growth rates of overall GDP and agriculture were 6.9 percent and 2.9 percent respectively. In Bhutan, during the same timeframe, average annual GDP growth rate and agriculture growth rates were 4.7 percent and 0.7 percent respectively (Figure 3).

South Asian region has the highest concentration of the poor and undernourished (304 million in 2000-12) despite the moderate growth rate in overall GDP (FAO, 2013). In Bangladesh, India and Nepal, due to high poverty ratio (43.3 percent, 32.7 percent and 24.8 percent) the nutrition level is also very low. Even

though, in Sri-Lanka, where headcount poverty is only 4.1 percent but the prevalence of undernourishment rate is very high (25 percent) (Figure 4).



**Figure 3.** Average Annual Growth Rate 2000-2012(Source: Authors’ calculation based on World Bank, 2013)



**Figure 4.** Incidence of Poverty and Food Insecurity(Source: Authors’ calculation, Data Based on World Bank, 2013,Note: data for Pakistan, Bhutan, Maldives and Afghanistan are missing)

### 5. Current status of food security

Currently there are acute shortages of food in the South Asian region. In spite of an increase in annual average cereal production (kg per hectare) from 2631.87 in 2008 to 2831.12 in 2011 (World Bank, 2013) the current level of production can hardly meet the increasing demand. Accordingly some countries cannot ensure all food items for their population at a time yet. Consequently, prevalence of food deficit has a

negative impact on the nutrition level of the people of South Asian state. In fact the under nourishment reduction rate of South Asian economies are not as remarkable as desired (Table 2).

**Table 2.** Undernourishment Status in South Asia

Country	Proportion of Undernourished in Total Population %				
	1990-92	1999-01	2004-06	2007-09	2010-12
Bangladesh	34.6	18.4	15.1	16.1	16.8
India	26.9	21.3	20.9	19.0	17.5
Nepal	25.9	24.5	21.7	20.1	18.0
Pakistan	26.4	24.0	22.8	20.8	19.9
Sri Lanka	33.9	28.7	27.9	25.7	24.0

Source: FAO, 2012.

Note: Data for Bhutan, Maldives and Afghanistan are missing

In South Asia region, approximately 39 percent children (age under five years) are stunted. The nutritional status of this region is very low and progress in this regards is also very slow (Table 3). In fact, malnutrition is become a concentrated phenomenon in this region because of acute food shortage. Here four basic components (underweight, stunting, wasting and overweight) are considered as proxy indicators to observe the nutritional status in this region. The percentage of overall malnutrition in India has found as highest where the values of underweight, stunting, and wasting are 43 percent, 48 percent, 20 percent respectively. The position of Bangladesh stands just after India, followed by Afghanistan, Pakistan, Nepal, Sri Lanka, Bhutan and Maldives.

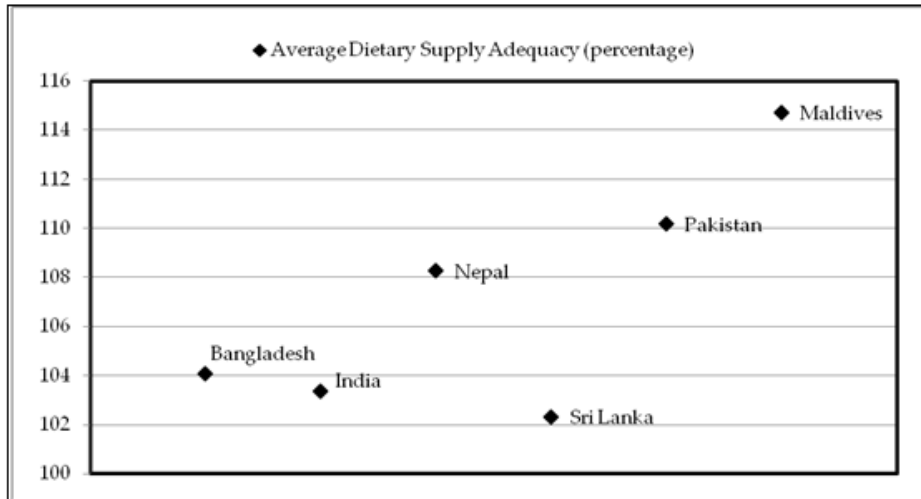
**Table 3.** Nutritional Status of South Asian Region

Country	Year	Age (month)	Underweight %	Stunting (%)	Wasting %	Over weight %
Afghanistan	2003-04	6-59	33	59	9	5
Bangladesh	2011	0-59	36	41	16	2
Bhutan	2010	0-59	13	34	6	8
India	2005-06	0-59	43	48	20	2
Maldives	2009	0-59	17	19	11	7
Nepal	2011	0-59	29	41	11	1
Pakistan	2011	0-59	32	44	15	6
Sri Lanka	2006-07	0-59	21	17	15	1

Source: UNICEF, 2013

Note: Underweight, stunting, wasting and overweight includes percentage of moderate & severe.

On the ranking of dietary supply in South Asian’s countries Maldives (114.71 percent) stood the highest position during the last few years (1990-2012) which was 10.61 percent higher than that of Bangladesh. Pakistan holds the second position just after Maldives. In Sri Lanka, average dietary supply adequacy was very low (102.33 percent) which was 12.38 percent and 1.76 percent lower than that of Maldives and Bangladesh (Figure 5).



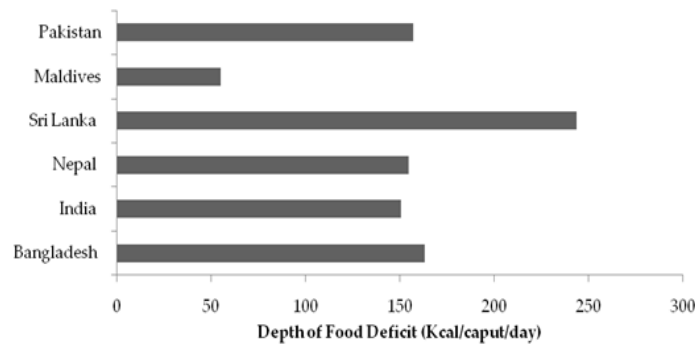
**Figure 5.** Dietary Supply Adequacy in the South Asian States (1990-2012)  
(Source: Authors’ calculation based on FAO, Food Security Indicators, 2013)

Likewise dietary supply adequacy, per capita food supply variability is also higher at Maldives compare to other South Asia countries. Per capita food supply variability at Maldives is 66.67 percent higher than Sri Lanka, 206 percent from Pakistan, 262 percent from Nepal, 57 percent from India and 59.40 percent from Bangladesh. However, it has also found that the variability of food consumption per day at Nepal is minimum which is counted only 15.36 Kcal (Figure 6).



**Figure 6.** Per Capita Food Supply Variability (2000-2010)  
(Source: Authors’ calculation based on FAO, Food Security Indicators 2013. Note: Data for Bhutan and Afghanistan are missing)

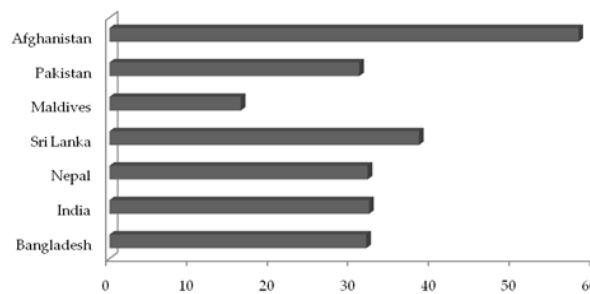




**Figure 7.** Depth of Food Deficit 1990-2012(Kcal/Caput/Day)(Source: Authors’ Calculation, Data Based on FAO, Food Security Indicators 2013.Note. Data for Bhutan and Afghanistan are missing)

High food deficit (gap between demand and supply) has been found in Sri Lanka which was 243.76 (kcal/caput/day) during the period of 1990-2012 and this was more than 4 times higher than Maldives. Food deficit in Maldives was only 55.14 (kcal/caput/day) and that was the lowest rate among the South Asian countries. Analyzing FAO data from 1990 to 2012, it has observed that on an average food deficit was 163.52 (kcal/caput/day) for Bangladesh, 150.70 (kcal/caput/day) for India, 154.9 (kcal/caput/day) for Nepal and 157.28 (kcal/caput/day) for Pakistan.

So it may be said that food security status in the South Asian region is very poor. This is because South Asian states are facing severe food insecurity due the inadequacy of dietary supply. Moreover, per capita food supply is also very low in most of the states of this region. Prevalence of food security indicators are not at a sufficient level in most of the countries. Afghanistan is most vulnerable to food insecurity in this region. From 1990-2012, average food insecurity prevalence in Afghanistan was 58.15 percent (Figure 8). In the case of Bangladesh, India and Nepal, it was marked as 31.84 percent, 32.2 percent and 32.01 percent respectively. The prevalence of food insecurity was comparatively low in Maldives which was counted 16.28 percent for the same mentioned period.



**Figure 8. Status of Food Insecurity 1990-2012** (Source: Authors’ Calculation, Data Based on FAO, Food Security Indicators 2013)

## 6. Future outlook of food security

Food security outlook of future is hardly possible to determine without estimating the future growth of total population. South Asia-Bangladesh, India, Nepal, Pakistan, Bhutan, Sri-Lanka, Maldives and Afghanistan-has a total population over one and half billion (Titumir and Basak, 2010).

A vast majority of poor population is living in this region and thus this is an area with major concern related to food security (Titumir and Basak, 2010). Ensuring adequate food supply is almost a tough job as population continues to grow at an arithmetical rate. The annual growth rate is 2.62 percent in Afghanistan which is highest among all other South Asian states, whereas in Sri Lanka, it is only 0.7 percent. The annual growth rate of population in South Asian countries is given Table 4.

**Table 4.** Population Growth (annual percentage) in South Asia in 2008

Bangladesh	India	Nepal	Pakistan	Sri-Lanka	Maldives	Bhutan	Afghanistan
1.4	1.3	1.7	2.2	0.7	1.7	1.6	2.62

Source: World Bank, 2013.

If the annual population growth continues at a business as usual rate, our estimates has suggested that, the total population will be 1856.50 million in 2020, 2144 million in 2030, 2479 million in 2040, 2870.30 million in 2050, 3327.93 million in 2060, 3864.20 million in 2070, 4493.80 million in 2080, 5234.63 million in 2090 and 6108.50 million in 2100 in South Asia.

The projected population for the eight countries of South Asia is given Table 5. In 2100, the total population of this region will be more than the total population of the present world. Therefore, huge amount of food will be necessary for future generation to meet their food demand.

**Table 5.** Population (million) in South Asia

Year	Banglades	India	Nepal	Bhutan	Maldives	Pakistan	Sri Lanka	Afghanistan
200	152.75	1124.7	28.11	0.68	0.305	162.48	20.01	26.27
202	191.65	1347.7	35.59	0.84	0.387	220.35	22.16	37.78
203	220.24	1533.5	42.12	0.99	0.458	273.92	23.76	48.97
204	253.09	1744.9	49.86	1.16	0.542	340.51	25.48	63.48
205	290.83	1985.5	59.01	1.36	0.641	423.29	27.32	82.29
206	334.21	2259.3	69.85	1.59	0.759	526.20	29.29	106.7
207	384.07	2570.8	82.67	1.87	0.898	654.13	31.41	138.3
208	441.35	2925.2	97.85	2.19	1.063	813.15	33.68	179.2
209	507.18	3328.6	115.80	2.56	1.258	1010.80	36.11	232.3
210	582.83	3787.5	137.10	3.01	1.489	1256.60	38.72	301.2

Source: Titumir and Basak 2010.

Under the above projection of future population of South Asian states, we consider rice and wheat as two main crops for measuring the future outlook of food security. Both rice and wheat is the source of carbohydrate which is very essential to meet the daily energy intake.

In the South Asia, among other cereal produces, rice and wheat contributed 66.20 percent and 1.62 percent in Bangladesh, 17 percent and 9 percent for India, 21.55 percent and 8.87 percent for Nepal, 18.12 percent and 2.20 percent for Bhutan, 6.02 percent and 48.90 percent for Afghanistan and 6 percent and 16.70 for Pakistan respectively (Titumir and Basak, 2010).

In Bangladesh, per capita rice consumption rate is highest (153.03 Kg per person per year) among all other South Asian states (Table 6).

**Table 6.** Rice Consumption Rate (Kg per person per year)

Crop/ Country	Bangladesh	India	Pakistan	Sri-Lanka	Nepal	Afghanistan
Rice	153.02	72.56	17.96	96.37	88.72	16.70

Source: Titumir and Basak, 2010.

If the population increase at such business as usual scenario then in the South Asian region Bangladesh and Nepal will face 0.77 million ton and 0.08 million ton shortage of rice (as main food) in 2020. Up to 2100, the annual shortage of rice for Bangladesh and Nepal will be reached to 45.7 million ton and 9.76 million ton (Table 7 and Figure 9).

**Table 7.** Projection on Paddy Rice Demand & Production in Bangladesh & Nepal

Year/ Country	Bangladesh		Nepal	
	Demand (million ton)	Production (million ton)	Demand (million ton)	Production (million ton)
2020	44.87	44.10	4.83	4.75
2030	51.56	50.00	5.72	5.30
2040	59.25	55.40	6.77	5.80
2050	68.09	61.30	8.01	6.30
2060	78.25	67.50	9.48	6.81
2070	89.92	72.30	11.20	7.30
2080	103.30	79.20	13.30	7.82
2090	118.70	84.70	15.70	8.40
2100	136.50	90.80	18.60	8.84

Source: Authors' calculation based on FAOSTAT and World Bank data, 2009

Empirical evidence indicates that, Bangladesh is more vulnerable to food insecurity than that of Nepal. Up to 2070 annual rice deficit in Bangladesh will be 17.62 million ton, whereas in Nepal it will be 3.9 million ton.

Annual demand and production will be comparatively balanced in India, Pakistan, Sri-Lanka and Afghanistan. In 2020 to 2060, there will be average 14.29 million ton surplus of rice production in India. During the same period, average surplus of rice production in Pakistan will be 2.15 million ton. On the other hand from 2070 to 2100 both India and Pakistan will face acute shortage of rice production (42.54 million ton and 7.93 million ton respectively).

The scenario is totally different in the case of Sri Lanka and Afghanistan. In Sri Lanka from 2020 to 2100 average annual surplus will be 1.38 million ton and in Afghanistan, average annual deficit of rice production will be 2.94 million ton (Table 8).

**Table 8.** Projection on Demand & Production of Paddy Rice in India, Pakistan, Sri Lanka & Afghanistan

Year/ Country	India		Pakistan		Sri-Lanka		Afghanistan	
	Demand	Production	Demand	Production	Demand	Production	Demand	Production
2020	149.60	167.00	6.05	9.30	3.27	3.80	0.97	0.400
2030	170.23	190.10	7.52	10.75	3.50	4.30	1.25	0.415
2040	193.70	213.50	9.35	12.00	3.76	4.80	1.62	0.420
2050	220.40	232.40	11.60	13.20	4.03	5.30	2.10	0.430
2060	250.79	253.20	14.50	14.52	4.32	5.80	2.73	0.435
2070	285.37	274.50	18.00	15.57	4.63	6.30	3.53	0.440
2080	324.71	295.80	22.30	17.20	4.97	6.70	4.58	0.445
2090	369.48	319.80	27.80	18.40	5.33	7.30	5.94	0.450
2100	420.42	339.70	34.50	19.70	5.71	7.70	7.70	0.460

Source: Authors' calculation based on FAOSTAT and World Bank data, 2009

In South Asia more than 100 million tons of wheat are produced annually (Titumir and Basak, 2010). The wheat producing countries are India, Pakistan, Afghanistan, Nepal and Bangladesh in order of degree of production. Afghanistan is the highest per capita wheat consumer (Table 9).

**Table 9.** Per Capita wheat consumption (Kg per person per year) in South Asia

Country	India	Pakistan	Afghanistan	Bangladesh	Sri Lanka	Nepal
Wheat	67	128	180	22	52	44

Source: Titumir and Basak, 2010.

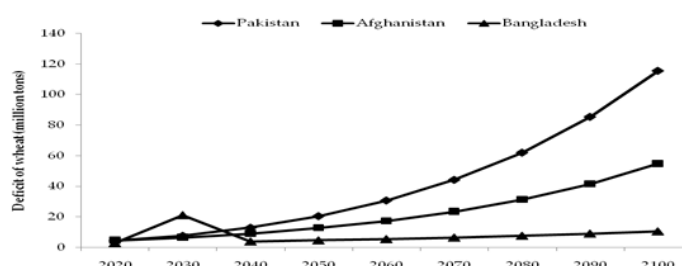
Based upon the data of wheat for last 47 years, we conduct a simulation exercise for the estimating future demand and production level of wheat. The projected situation is more vulnerable in terms of wheat compared to that of rice production, if the business as usual situation persists (Table 10). Projection indicates a daunting challenge for Pakistan and Afghanistan in meeting future demand.

**Table 10.** Projection on Demand and Production of Wheat (in million ton) in Pakistan and Afghanistan

Year/ Country	Pakistan		Bangladesh		Afghanistan	
	Demand	Production	Demand	Production	Demand	Production
2020	30.46	26.00	4.55	1.68	7.34	2.80
2030	37.87	30.20	5.23	1.88	9.52	3.00
2040	47.07	34.10	6.01	2.08	12.30	3.20
2050	58.52	38.00	6.91	2.25	16.00	3.30
2060	72.74	42.00	7.94	2.45	20.70	3.40
2070	90.43	46.20	9.13	2.65	26.90	3.50
2080	112.40	50.40	10.50	2.83	34.80	3.60
2090	139.70	54.30	12.10	3.02	45.20	3.70
2100	173.70	58.20	13.80	3.25	58.60	3.80

Source: Authors' calculation based on FAOSTAT and World Bank data, 2009.

Projection indicates that in 2100 Pakistan will face acute shortage of wheat production (115.5 million tons). In the same year Afghanistan and Bangladesh will face deficit of wheat production of 54.8 million tons and 7.98 million tons (Figure 9).



**Figure 9.** Annual deficit of wheat production in Pakistan, Afghanistan and Bangladesh  
(Source: Authors' calculation based on FAOSTAT and World Bank data, 2009)

In 2020, wheat production will be highest in India 98.10 million tons whereas in Nepal and Sri Lanka, the production will be only 1.71 million tons and 0.011 million tons. Projection indicates that from 2020 to 2100, Sri Lanka is comparatively more vulnerable to shortage of wheat production than that of India and Nepal.

In 2100, total demand and production of wheat in Sri Lanka will be 2.17 million tons and 0.017 million tons. During the same juncture of time the total wheat production in India and Nepal will be 232.20 million tons and 4.20 million tons respectively (Table 11).

However, from 2020 to 2050 there will be surplus of wheat production (1.92 million tons) in India. India will face shortage of approximately 22.2 million tons of wheat to feed her citizen during 2060-2100. In Nepal

the scenario is also quite similar. From 2020 to 2030, there will be 0.06 million tons of surplus wheat production in Nepal but from 2040 to 2100 this state will require 0.91 million tons of wheat to ensure national food security.

**Table 11.** Demand & production of Wheat (in million tons) in India, Sri Lanka and Nepal

Year/ Country	India		Sri Lanka		Nepal	
	Demand	Production	Demand	Production	Demand	Production
2020	97.52	98.10	1.24	0.011	1.69	1.71
2030	111.00	112.80	1.33	0.012	2.00	2.10
2040	126.30	130.20	1.43	0.012	2.37	2.35
2050	143.70	145.10	1.53	0.013	2.80	2.62
2060	163.50	159.60	1.65	0.014	3.32	2.93
2070	186.00	175.90	1.76	0.015	3.93	3.21
2080	211.70	191.00	1.89	0.016	4.65	3.52
2090	240.90	206.20	2.03	0.016	5.50	3.84
2100	274.10	232.20	2.17	0.017	6.51	4.20

Source: Authors' Calculation based on FAOSTAT and World Bank data, 2009.

From 2020 to 2100 there will be no surplus of wheat production in Sri Lanka, rather the state will face acute shortage of wheat production (1.65 million tons).

Projection indicates that from 2020 to 2100 the South Asian states will face severe shortage of food (rice and wheat). Such deficiency of staple food may cause the deterioration of nutrition status of most of the South Asian state's citizen unless proper steps are not taken at the right time. Therefore, it is very urgent to increase the growth of agricultural production to meet the increasing demand for food.

### 6.1. Factors affecting Food security

Food security in the South Asian region is affected by several factors and very key among these factors is climate change, low level agricultural growth, and rise of food price. The projections of future climate change indicate that South Asian food security is likely to be severely affected by global warming during this century. Most of the states of this region depend on agriculture and agriculture related production. Thus agriculture production systems make a vital contribution to the reduction of hunger through ensuring food security.

FAO's definition of food security comprises four aspects of food security: availability, stability, access and utilization<sup>1</sup>. In this section the study has analyzed the factors of food insecurity through covering major three portion of food security (availability, stability and access to food).

<sup>1</sup> The Food and Agricultural Organization (FAO) defines food security as a "situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary need and food preferences for an active and healthy life."

### 6.1.1. Impact of climate change on food availability

Climate change affects the agriculture and food production in a critical way. Food is not available at sufficient level in most of the South Asian states. The impacts of climate change on food production have been quantified in various studies under various sets of assumptions. As for instance, Basak et al., 2010; and Karim et al., 1996 have carried out assessment on the impacts of climate change and variability on rice production in Bangladesh (Titimir and Basak, 2010). Further the decision Support System for Agrotechnology Transfer (DSSAT) model has predicted significant reduction in *boro* rice yield due to climate change. Yield reductions of over 20 percent and 50 percent have been predicted for the years 2050 and 2070 respectively (Basak et al., 2009). Accordingly Karim et al. (1996) projected a negative effect of climate change on the rice yields. The estimated impacts on rice yield vary between -6 to +14 percent depending on different climate change scenarios (Titimir and Basak, 2010).

Temperature rise of 1.5°C and 2 mm increase in precipitation could result in a decline in rice yields by 3 to 15 percent. Sorghum yields would be affected and yields are predicted to vary from +18 to -22 percent depending on a rise of 2 to 4°C in temperatures and increase by 20 to 40 percent of precipitation (IPCC, 2001). Wheat yields in central India may drop by 2 percent in a pessimistic climate change scenario (GoI, 2004). For states like Bhutan the study has found that upland crop production can be highly sensitive to variations in climate. This is because climate change may cause the cultivating zone to shift upwards to unsuitably steep slopes if temperatures increase by 2°C (NEC, 2000). Such casual effects can best be cited in the case of Sri Lanka where food productions are likely to be adversely affected due to climate change (Titimir and Basak, 2010). Likewise the climatic impact on cereal crops production in Pakistan is already found at the margin of stress (Titimir and Basak, 2010). As such food productions are predicted to decrease in near future by 6-9 percent in sub-humid, semiarid, and arid areas with 1°C increase in temperature (Sultana and Ali, 2006).

All the above it is almost clear that, availability of food is severely affected by climate change. Sudden rise of global temperature is a serious threat to crop production in South Asian region. So the question arises as how to tackle such threat to food production? Is international food aid would be a best way to ensure food security and nutrition in South Asia? Based on such queries the next section has dealt with whether foreign aid would be a possible instrument of ensure food security and nutrition or not.

## 7. International food aid to ensure food security and nutrition

In this section the study has argued that most of the South Asian countries hardly could ensure sufficient food for their daily livelihood due to economic limitations, and that is why it is now urgent to accelerate international food aid to ensure food security and nutrition. However there exists a lot of controversy about food aid, it is one of the oldest forms of foreign aid. In fact, food security interventions/ food aid can improve the sustainability of livelihood systems and food security outcomes.

The current understanding of other international and domestic resources that are available to tackle under-nutrition is very limited, and it is not possible to draw conclusion on how well aid targets countries where the financial gap is wider. It may be the case that countries receiving less basic nutrition Official Development Assistance (ODA) are more able to address their nutrition issues independently with other resources, while countries with higher volumes of basic nutrition ODA need more international support. On the contrary, this skewed distribution may reflect donors' priorities rather than need, or a lack of global awareness, or recipient country's differential success in attracting resources for nutrition programs.

In South Asia, India and Bangladesh is the largest recipient ODA nutrition aid respectively attracting USD 20.7 million and USD 17.1 million on averages over 2009-2011. Basic nutrition ODA proportions do not match the estimated burden of stunting (Table 12).

**Table 12.** Comparative under nutrition status in South Asia

Country	Black et al. (2008)		WHO (latest available year)	
	% stunted (<5 children)	Stunted (million)	% stunted (<5 children)	% Wasted (<5 children)
India	51	61206	47.9	20.0
Bangladesh	50.5	8786	71.1	17.5
Pakistan	41.5	8763	70.5	14.8
Afghanistan	53.6	2967	59.3	8.6
Nepal	57.1	2078	40.5	11.2

Source: Mariella Di Ciommo, 2013.

**Table 13.** Recipients of basic nutrition ODA, emergency and development food aid (2009–2011 average disbursements)

Basic Nutrition Aid		
Country	USD Million	% country allocable ODA
India	20.7	7.1
Bangladesh	17.1	5.8
Emergency Food Aid		
Country	USD million	% country allocable ODA
Pakistan	223.4	7.9
Afghanistan	151.0	5.3
Development Food Aid		
Country	USD million	% country allocable ODA
Bangladesh	103.9	6.5
Afghanistan	98.1	6.1

Source: Authors' calculation based on DAC & CRS dataset 2013



Aid to India accounted for 7.1 percent of country-allocable ODA to basic nutrition and Bangladesh accounted for 5.8 percent. There also exists a gap between Pakistan and Afghanistan in terms of ODA emergency food aid. Pakistan receives a high amount of ODA emergency food aid (USD 223.4 million) than Afghanistan (151.0). Food aid is clearly a valuable tool for ensuring the basic nutritional needs of people affected by humanitarian crises-earthquakes, hurricanes, droughts, wars, and so forth.

## 8. Conclusion and policy options

The study has made a comparative study on nutrition and food security status of South Asia. The discussion and analysis of the study are very important regarding its empirical assessment on current status and future outlook of food security in the South Asia region. Analysis has indicated that, current status of food security is very poor in this region, particularly due to low level of agricultural production. As for instance from 1990-2012, six states of South Asia region (Bangladesh, India, Nepal, Sri Lanka, Maldives and Pakistan) face acute food deficit of 925.31 (Kcal/caput/day). Accordingly the future projection has indicated that the total population of this region will be 1856.50 million in 2020 to 2870.30 million in 2050. As such, if proper steps associated with food security are not taken, a major part of the population will be deprived from food and will remain hunger and undernourished. Policy support for agricultural research and development may a way of enhancing efficient agricultural technologies to increase the level of production. Further a policy support for accelerating the growth in agriculture is considered in this study as very important because the empirical investigation has already indicated that, from 2020 to 2100 at approximately 3139.15 million tons on rice and 1909.49 million tons of wheat will be produced in the South Asian region. Simultaneously projection has indicated that, during the same juncture of timeframe, the total demand for rice and wheat will be 3450.31 million tons and 2672.94 million tons respectively in eight countries of this region. Thus there may be a shortage of rice and wheat of 311.15 million tons and 763.44 million tons from 2020 to 2100.

The study has identified low level of agricultural production, sudden and chronic rise of domestic food price and climate change as some of the core factors for the decreasing trends of food production. Furthermore this study has found that domestic food price index is partially affected by the impact of climate change. It may be worthy to mention in this regard that South Asian food price level index has rose to 11.9 percent in 2007-2012 from 11.2 percent in 2000-2006. It is notices that 0.7 percent rise of food price level index from 2000-2006 to 2007-2012. Such rise of food price affects the purchasing capabilities of the poor people severely.

In regard to the impact of climate change the study has found that it is affecting the availability, access and stability of food supply in this region. As a policy option however, social protection system to protect households' food security is considered as a major step to avert the severe impact if climate change on food supply, there needs a greater comprehensiveness in this regard. On the other hand availability and access to food demand on factors like livelihood security and income level. Despite such dependency, there are still gaps to combine all these factors together. The existing policies related to ensure availability and access to food are not implementing properly and this in turn raising concern on affordability and accessibility to food.

As such the study has argued that, chronic and seasonal food insecurity in the South Asian region may best be solved by proper initiatives at governmental level. Moreover international food aid could also serve as a way of avoiding seasonal food insecurity.

Dependency on food aid is increasing dramatically and this is true for most of the states of the South Asian region. Such dependency on international food aid and imports also affects the national development. As such, comprehensive initiatives at the regional level are urgent both to increase level of agricultural production and to avert the impact of seasonal food insecurity. Such comprehensiveness of initiatives at regional level also helps to reduce the dependency on food aid through effectively ensuring self-sufficiency at national level.

## Acknowledgement

This research is supported by Jayanta Kumar Basak, Assistant professor and Chairman, Department of Environmental Science and Disaster Management at Noakhali Science and Technology University, Bangladesh.

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