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# Food Security and its Constraining Factors in South Asia: Challenges and Opportunities

Munir Ahmad, Muhammad Iqbal and Umar Farooq<sup>1</sup>

## Abstract

Significant progress in terms of increasing food supplies has been made—since 1961 cereals' supply increased 2.7, 3.4, 3.7, 5.1 and 5.4 folds respectively in Nepal, India, Bangladesh, Sri Lanka and Pakistan. Per capita availability of cereals faces either declining trend or has remained stagnated most recently. Currently per capita daily consumption ranges from 2440 calories in Pakistan to 2673 calories in Nepal—substantially lower than the world average. There is wide spread poverty in the region and is ranked low merely above the Sub-Saharan Africa (SSA) in most of the development and food security indicators. South Asia's record in reducing malnutrition is one of the world's worst. Micronutrient deficiency, '*hidden hunger*', is also pervasive in the region. These numbers highlights the fact that enhanced food availability on its own cannot guarantee good nutrition status at the household level. For example, HIES data does not show any increase in daily intake of total calories per person in Pakistan—hinting at poor access to nutritious food.

Major causes of food insecurity in South Asia include faster growth in population, fast and unplanned urbanization through rural to urban migration, reduction in arable land, declining average farm size besides skewed distribution, low productivity due to low R&D investments and land degradation, slow process of structural transformations and poor institutions, and changes in climate. The issue of global warming has emerged as a new real threat to food security. The most part of the region is already hot and growing of cereals is already under heat stress. Further increase in temperature could cross the level beyond the optimal for growing some crops which is expected to reduce the yields significantly. The adverse impacts of climate change on agriculture can be dealt with mitigation and adaptation strategies. The structure of farming and poor resource as well as poverty in rural areas could be the major hurdles to adapting to climate change. It is anticipated that South Asian countries are likely to face severe food crisis by 2050 and the issue of food security is going to be critical issue in the years to come.

The good news is that the countries in the regional have started emphasizing on assuring food security to masses by moving step forward from agricultural and food policies—targeting supply side, to food security and nutritional policies—accessibility, and utilization aspects. To effectively dealing the danger of food crisis in coming decades in the region, various strategies like: a) paradigm shift from the policy of national level self-sufficiency to regional self-reliance in staple foods; b) sharing of food production technologies and experiences; c) seed banking and exchange of genetic material; d) revising the SAARC food banking mechanism; and, e) devising more effective strategies for dealing with disasters, are suggested.

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## 1. Introduction

South Asia is the home of world's one-fifth population, has the highest concentration of world's poor (40%), and houses 45 percent of the world's undernourished population. It is among the most vulnerable regions in the world being a disaster prone area accounting for 80 percent of the total affected population and 86 percent of the total damage due to droughts (UNEP, 2003; Spijkers, 2011). Climate change has emerged another significant threat to assuring food security in the region. The temperature is projected to rise in the region by 3–4°C by the end of 21<sup>st</sup> century (Spijkers, 2011). Cereal crops are already under heat stress in South Asia (Kelkar and Bhadwal, 2007) and the yields could decrease up to 30 percent by the end of current century due to change in climate (IPCC, 2007). The monsoon rains are not only delayed in the region but have become more erratic leading to unexpected and unprecedented floods and/or droughts adversely affecting food production and distribution in the region. The frequency and intensity of floods have increased in Bangladesh, India and Pakistan displacing a large number of people in these countries adversely affecting their livelihoods and resulting in reduced food production and high food inflation. Thus, ensuring food and nutritional security to rapidly increasing population of the region remains one of the major challenges that the region would be facing in the coming decades.

Majority of the people of South Asia reside in rural areas and directly or indirectly depends on agriculture for their livelihood. The rural population in Nepal and Sri Lanka account for more than 80 percent of total population whereas over 70 percent of the people of Afghanistan; more than 67 percent population of India and Bangladesh; and nearly 60 percent people of Bhutan, Maldives and Pakistan live in rural areas (Table 1). Despite an overtime decline in percentage of population living in rural areas, South Asian countries predominately remain rural societies.

**Table 1: Rural Population (% of Total Population)**

Year	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
1985	83.04	82.50	87.06	75.65	74.51	92.61	70.66	81.37
1990	81.68	80.19	83.61	74.45	74.16	91.15	69.42	81.43
1995	80.24	78.31	79.46	73.39	74.36	89.11	68.16	81.50
2000	78.72	76.41	74.58	72.33	72.29	86.57	66.85	81.56
2005	77.11	73.19	69.04	70.77	66.25	84.82	65.27	81.62
2010	75.31	69.54	65.21	69.07	60.02	83.18	63.40	81.68
2011	74.93	68.78	64.42	68.72	58.84	82.83	62.99	81.69
2012	74.53	68.01	63.63	68.37	57.70	82.48	62.57	81.70
2013	74.13	67.25	62.86	68.01	56.58	<b>82.12</b>	62.14	<b>81.70</b>

Source: WDI (2014)

Agriculture is the dominant sector in the regional countries. Its contribution to gross domestic product (GDP) of respective countries during 1990 ranged from about 26 percent in Sri Lanka and Pakistan to about 52 percent in Nepal (Table 2). The share of the sector has declined eventually due to structural changes in all the countries but still accounts for over one-fifth of the GDP in Afghanistan and Pakistan. The contribution of the sector in India and Sri Lanka has declined to about 18 and 11 percent respectively while in Nepal more than one-third of national GDP still originates from agriculture sector (Table 2).

**Table 2: Share of Agriculture in GDP (%)**

Year	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
1985	NA	32.77	43.48	30.89	NA	51.71	28.54	27.69
1990	NA	30.25	35.28	29.02	NA	51.63	25.98	26.32
1995	NA	26.38	32.01	26.26	11.46	41.76	26.14	23.01
2000	NA	25.51	27.39	23.02	8.76	40.82	25.93	19.90
2005	31.75	20.14	23.18	18.81	7.83	36.35	21.47	11.82
2010	27.09	17.81	17.49	18.21	4.32	36.53	24.29	12.81
2011	24.51	17.71	17.12	18.37	4.09	38.30	26.02	12.10
2012	24.60	17.09	16.98	18.04	4.20	36.49	24.55	11.00
2013	23.97	16.28	17.08	17.95	NA	35.10	25.11	10.76

Source: WDI (2014)

South Asia, with over 40 percent of the world's poor and 45 percent of the under-nourished, has the highest concentration of poverty and hunger in the world (WDI, 2014). The enormity of malnutrition in South Asia can be gauged from the fact that it is the home of nearly two-thirds of the world's undernourished children. More than 56 percent of the world's low-birth weight babies are born in South Asia (FAO, 2007). South Asia's record in reducing malnutrition

is one of the world's worst. These depressing numbers seem to contradict the fact that South Asia has expanded its food production significantly and the Green Revolution has done its wonders. Therefore, there is need to find out the reasons of this pattern (Iqbal and Amjad, 2010).

The prime objectives of the paper is to document the updated status food security in South Asia region, review of factors causing food insecurity and policies adopted by different countries of the region to ensure food security and tackling malnutrition in the their respective states. Some recommendations are also put forward which can be adopted for travelling towards making South Asia a food secure and malnutrition region of the world.

This paper is organized into seven sections. Section 2 discusses the concept of food security. Section 3 analyzes food security situation in South Asia in terms of trends of food availability and other indicators. Section 4 analyzes the causes of food insecurity in the region—in terms of population growth, rural urban divide, low productivity, slow structural transformation and climate change as well as identifying potential constraints to achieve food security in future. Section 5 critically evaluates food and other policies. Regional collaboration for food security and a way forward is discussed in Section 6, and the last Section 7 concludes the paper.

## **2. What is Food Security?**

The World Food Summit in 1996 defined the food security as it “*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 a healthy and active life*”. This definition covers five fundamental aspects namely availability, access, stability, nutritional status and preferences of food. These components are influenced by physical, economic, political and other conditions within communities and even within households, and are often destabilized by shocks such as natural disasters and conflicts.

The *availability and access* are two important dimensions of food security. The *availability* indicates sufficient year round quantities of quality/nutritious food available to all individuals in the country. However, the sufficiency of food at the national level cannot assure the availability in areas having armed conflicts, non-availability of arable lands, and confronting prolonged droughts and floods. The distribution of food stuff in these areas is generally faulty. The *access* denotes the capacity to produce, buy and/or acquire appropriate nutritious food by the individuals and households (Timmer, 2000). The availability of quality food consistently in

sufficient quantities is necessary but may not guarantee food security to all people in the country. Low incomes and lack of required infrastructure could deny access to desired quantities of quality food. Therefore, *availability* and *access* elements of food security are inseparably inter-linked (Pinstrup-Andersen, 2009).

The access involves both physical access and economic access. The former refers to a place where food is available and requires efficient market infrastructure to have access of people at low cost. The latter denotes ‘entitlement’ to food (Sen, 1982) that can be ensured either by own production or having food buying capacity or having access/right to other sources of getting desired food (Staal *et al.*, 2009). Thus, there is direct relationship between poverty and food insecurity since the very poor cannot take precautionary measures against food insecurity and thus, they would be the most vulnerable (Cullet, 2003; and Herrmann, 2006).

The third element is *stability* which refers to consistent supply of nutritious food at the national level, household and individuals levels, which is directly influenced by the performance of the agriculture sector. Only a small proportion of consumers in developing countries can afford to store food for the whole year. Therefore, the stability requires better management of domestic production, food markets integration, and rational use of buffer stocks and trade (FAO, 2002). Fluctuations/shortages in food grains production have been very common in South Asia and have recently been more intensified because of the climate change phenomenon. In order to tackle unforeseen shortages and save the consumers from high food prices, the governments have been actively pursuing the policies of support/procurement prices, storage and distribution—though at a very high cost. Therefore, market infrastructure has a much more role to play.

The definition of food security also alludes to ‘*safe and nutritious food*’ which is required for healthy and active life. For this the human body has to effectively utilize the available nutrients in the food consumed (Staal *et al.*, 2009). Food preparation and health condition of an individual are critical for biological absorption of food, which is influenced by access to improved sanitation and clean drinking water as well as by knowledge of the households regarding proper food storage, processing, and basic nutrition. The *preferences for food* add a fifth dimension to food security which relate to social and religious norms. Therefore, the foods are to be socially and culturally acceptable and consistent with the religious and ethical values (Pinstrup-Andersen, 2009).

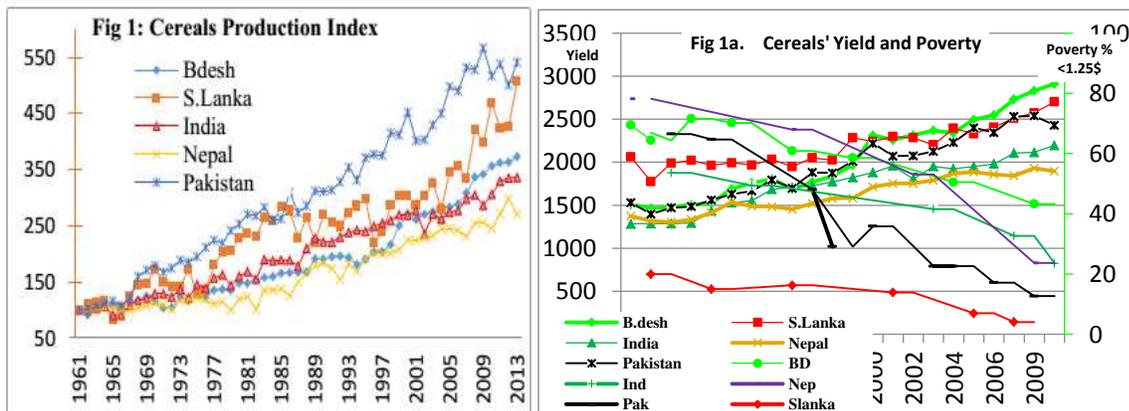
The above discussion highlights the fact that achieving food security is a complex and challenging phenomenon. Most of the countries focus on assuring stability in supply of affordable nutritious food and oversight the fundamental issue of ‘security’. Food is energy for human body without which “we are all dead” and thus it should be considered as a “security good” (Fullbrook, 2010; p.6).

### 3. Food Security Situation in South Asia

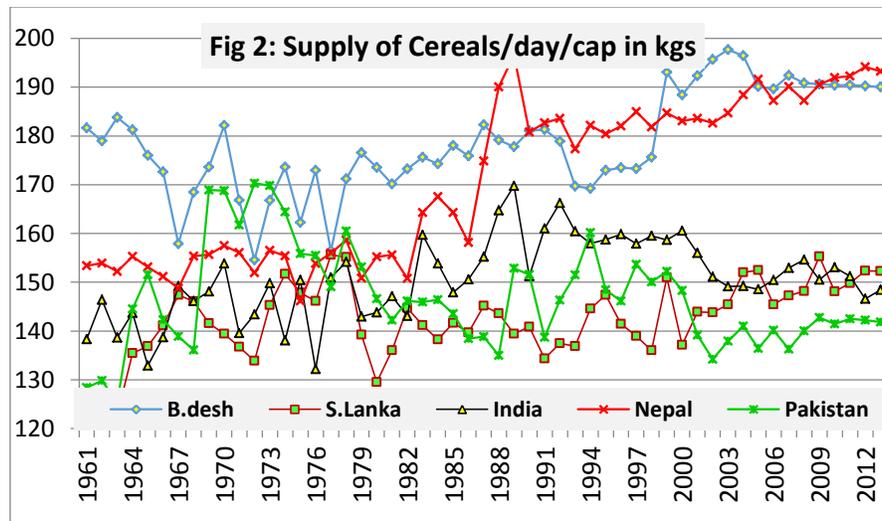
#### 3.1. Trends in Food Production, Availability and other Factors Influencing Food Security

##### Production and Availability<sup>2</sup>

Agricultural production is the foundation of food availability. Adequate food supply at affordable prices is the cornerstone of food security policy of all nations of the world including South Asia. Most of the countries in the region made significant progress in terms of increasing food supplies - since 1961 cereals supply increased by 2.7, 3.4, 3.7, 5.1 and 5.4 folds respectively in Nepal, India, Bangladesh, Sri Lanka and Pakistan (Fig 1). It is observed that increase in yield of cereals has helped in reducing poverty rates in South Asia (Fig 1a). However, the availability of cereals per capita faces either declining trend or has remained stagnated most recently (Fig 2) because increase in food production being offset by rapidly increasing population.

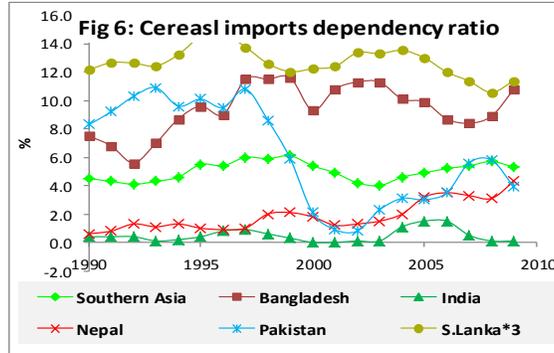
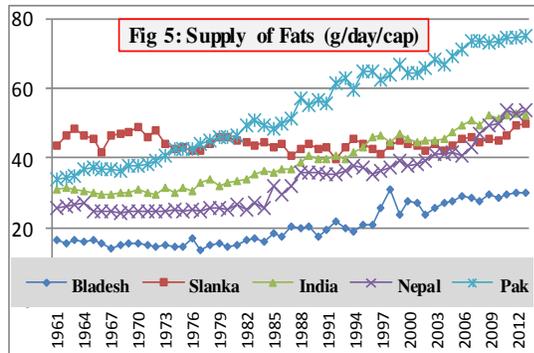
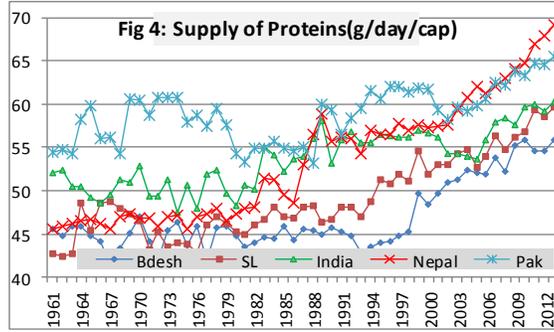
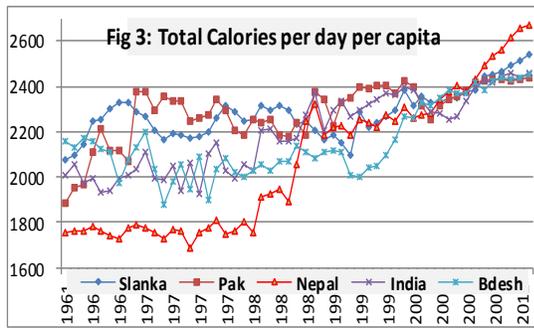


<sup>2</sup> The data for generating figures given in this section is obtained from FAO data website-FAOSTATS. <http://faostat3.fao.org/home/E>



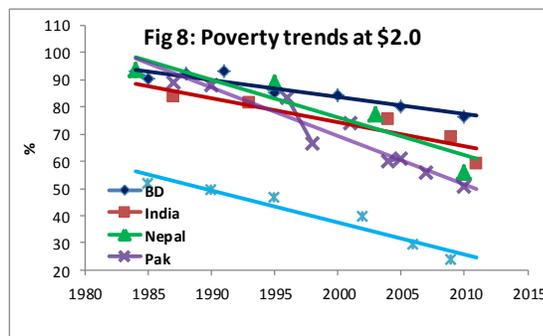
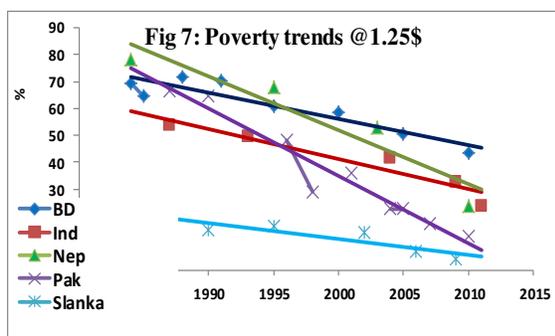
South Asia has made some progress in terms of average per capita daily intake of calories. Per capita availability of food in terms of calories in various countries of the region increased significantly since 1961 (Fig 3)—currently per capita daily consumption ranges from 2440 calories in Pakistan to 2673 calories in Nepal. The latter has made marvelous progress over the years starting from a very low base surpassing all countries in the region. The same is true for supply of protein (gram/cap/day) (see Fig 4). The availability of fat (gram/cap/day) has been higher in Pakistan relative to other countries in the region (see Fig 5). However, the daily average calories (per person) availability is substantially lower than the averages of the world (2870), North America (3617), Asia (2757) and Europe (3374). The changes overtime in the composition of food intake show a shrinking share of cereals in total calories availability and a rising share of animals and other sources<sup>3</sup>. It is important to mention here that the main South Asian countries (India and Pakistan) are net exporter of cereals—indicating that food supply is not a major issue in the region. However, the food trade within the region is quite meagre.

The dependence of food supply in the country is an important indicator of stability of food. Fig 6 shows that dependence on cereal imports of South Asia region has actually increased during the last decade and a half—Pakistan is most prominent followed by Nepal. However, Sri Lanka depends very heavily on imports ranging from 32 percent in 2008 to 44 percent back in 1996—observed consistent decline.



## Accessibility

One of the important indicators of degree of economic access to food is the proportion of people below the poverty line (FAO, 1998). Despite significant improvement in aggregate food supply, malnutrition and poverty is a widespread phenomenon in South Asian countries. The historical evidences show that poverty in the region has been declining overtime (Table 3). Pakistan has made relatively better progress in this regard after Sri Lanka in the region (Fig 7, and Fig 8). Sri Lanka is doing well under both definitions of poverty (proportion of population living below \$2.0/day and \$1.25/day), while in Bangladesh poverty remains high particularly when evaluated at \$2.0/day. Despite the reduction in poverty over time, its incidence in South Asia is still relatively higher as compared to that in other regions. Fig 9 shows that the poverty rates are inversely relate to GDP per capita in these countries—Sri Lanka has the highest level of per capita GDP in 2011 international dollar (lowest poverty) and lowest is per capita GDP is of Bangladesh and Nepal (highest poverty).



**Table 3: Percentage of Population Living in Poverty [\$2.0/day (a); and \$1.25/day (b) in 2005 PPP]**

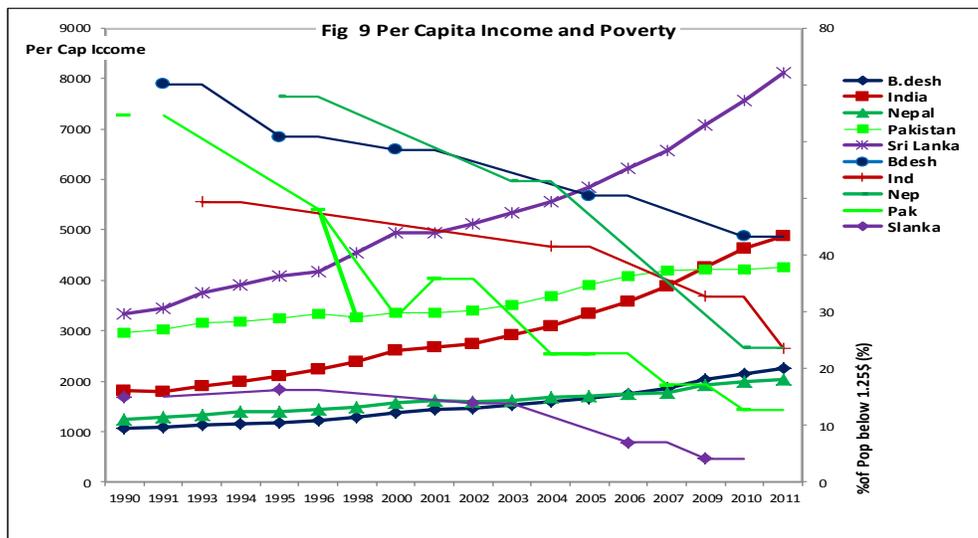
Year	Bangladesh		India		Nepal		Maldives		Pakistan		Sri Lanka	
	a	b	a	b	a	B	a	b	a	B	a	b
1984	93.1	69.5			93.6	78.2						
1985	90.6	64.4									51.7	20.0
1987			83.7	53.6					89.2	66.5		
1988	92.3	71.6										
1990									88.2	64.7	49.5	15.0
1991	93.0	70.2										
1993			81.7	49.4								
1995	85.5	60.9			89	68.0					46.7	16.3
1996									83.3	48.1		
1998							37.0	25.6	66.5	29.1		
2000	84.4	58.6										
2001									73.9	35.9		
2002											39.7	13.9
2003					77.3	53.1						
2004			75.6	41.6			12.2	1.5	60.3	22.6		
2005	80.3	50.5							61.0	22.6		
2006											29.1	7.0
2007									55.8	17.2		
2009			68.8	32.7							23.9	4.1
2010	76.5	43.3			55.9	23.7			50.7	12.7		
2011			59.2	23.6								

Source: World Bank <http://data.worldbank.org/products/wdi>

International Food Policy Research Institute's Global Hunger Index (GHI)<sup>4</sup> (2014) shows that South Asian countries rank very low among 120 countries— Sri Lanka is ranked at number

<sup>4</sup> GHI is an indicator that measures progress being made in eradicating hunger and malnourishment. The index ranks nations from the best the worst countries with a score of 0 and 100 respectively. A score of a country less than 4.9 implies low hunger, score between 5.0 and 9.9 reflect moderate hunger, whereas higher score are indicative of serious problem (10 to 19.9), alarming (20 to 29.9) and extremely alarming (30 or more).

83 (the lowest), while Bangladesh and Pakistan stand at 101 (Table 4). However, the proportion of people affected by hunger is declining in South Asia (Fig 10).

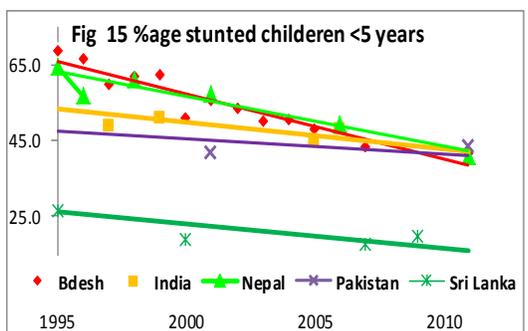
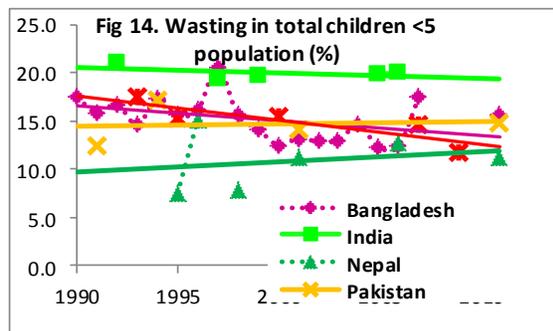
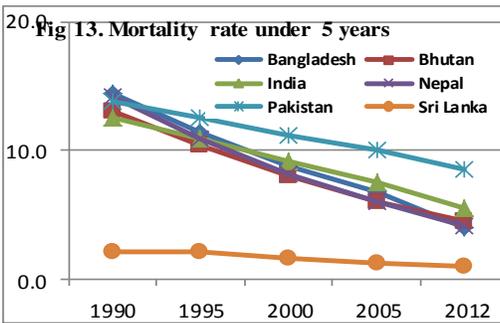
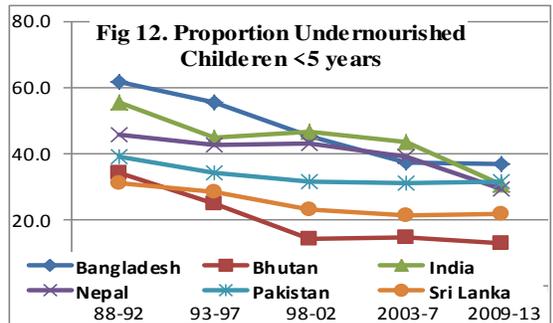
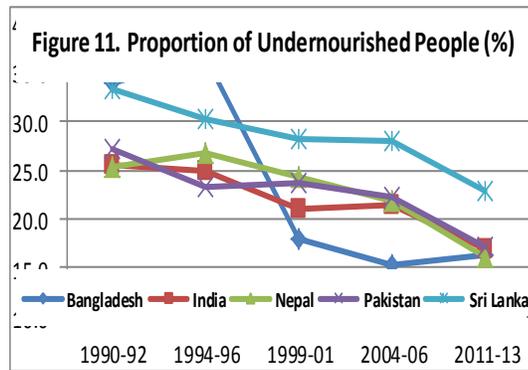
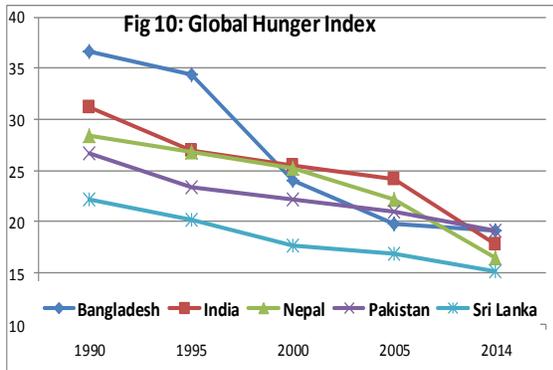


### Absorption/Nutrition<sup>5</sup>

Considering food absorption and its nutrition implication, parameters like undernourishment, underweight and mortality rate among children under 5 years of age also show poor performance on account of food security. Overall undernourished population is also high - Bangladesh reduced undernourished population faster than other countries in the region, which observed to be rising in recent years (Fig 11). Pakistan performance in reducing the percentage of undernourished children below 5 years has been lowest in the region during the last 2½ decades –undernourishment declined from 39 to 31.6 percent among children below 5 years in Pakistan (Table 4 and Fig 12). Similarly, the mortality rate of children under-five though declined from 13.8 to 8.6 percent in Pakistan which is still the highest in the region—while Sri Lanka has the lowest that is only one percent (Fig 13). Wasting in children is relatively low and has been declining in South Asian region except Nepal where it has actually increased (Fig 14). Stunting in children is alarmingly high in the region—ranging from 40.5 percent in Nepal to 47.9 percent in India (Fig 15).

<sup>5</sup> Figures 9-14 are generated using data from von Grebmer, et al. (2014).

Country	Under weight (<5 years)		Mortality rate (<5 years)		Wasted	Stunted
	Rank	2009-13	Rank	2012	2011	2011
Bangladesh	126	36.8	74	4.1	15.7	41.4*
Nepal	77	12.8	77	4.5		
India	120	30.7	85	5.6	20.0*	47.9
Nepal	116	29.1	76	4.2	11.2	40.5
Pakistan	122	31.6	107	8.6	14.8	43.0
Sri Lanka	105	21.6	21	1.0	11.8**	19.2***



Micronutrient deficiency is regarded as ‘hidden hunger’ reflecting a combination of dietary deficiency, poor maternal health and nutrition, high burden of morbidity and low micronutrient content of the soils especially for iodine and zinc (Government of Pakistan, 2010).

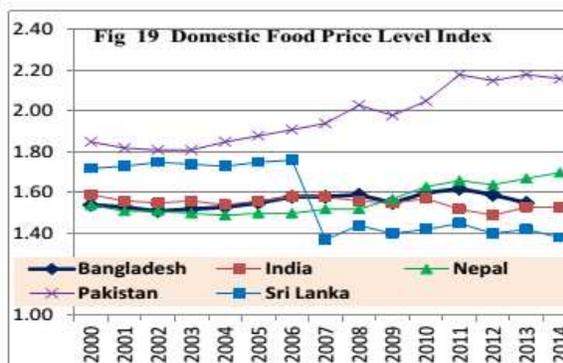
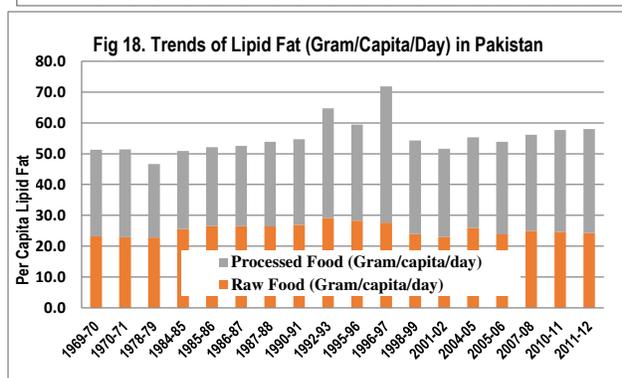
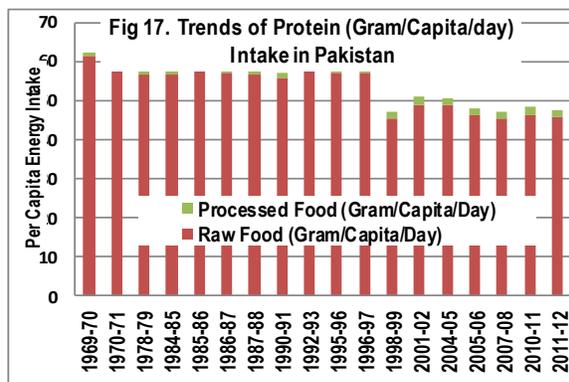
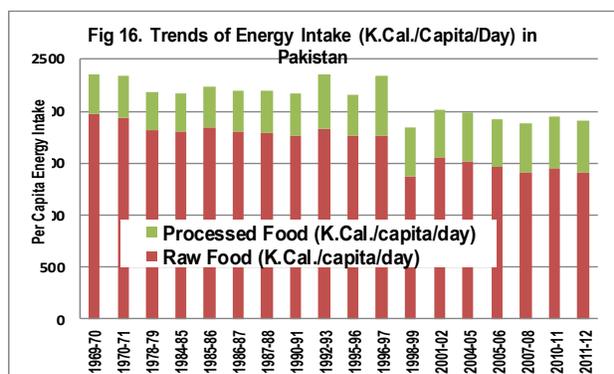
Micronutrient deficiency is also pervasive in the region. For example in Pakistan, about 62 percent of children under 5 years of age were anemic in 2011 (Government of Pakistan, 2011). The prevalence of deficiency of iron, vitamin A, zinc, and vitamin D among children are 43.8, 54, 39.2 and 40 percent respectively. Pregnant women were 51 percent anemic, and 37, 46, 47.6, and 68.9 percent were deficient in iron, vitamin A, zinc, and vitamin D in Pakistan, respectively (Government of Pakistan, 2011). The deficiency in most of these micronutrients affects the immunity, growth, and mental development and may underlie the high burden of morbidity and mortality among women and children. This indicates that despite having sufficient food available at the national level, a large chunk of population mostly the children and the women lack access to nutritiously balanced food.

The foregoing discussion highlights the fact that enhanced food availability on its own cannot guarantee good nutrition status at the household level (Fullbrook, 2010). For example, analysis of household surveys since 1970 show that daily intake of total calories per person has actually declined in Pakistan—with exception of a few years (Fig 16<sup>6</sup>). The same is true for intake of proteins (Fig 17). However, intake of fats is rising trend in Pakistan (Fig 18). Thus, greater national level food availability in the country has not been translated into actual increase in calorie-rich food intake at the regional or household level reflecting reduced access to nutritious food. This could be due to low incomes and worsening landholdings inequality in the country. A rising calorie-based poverty implies that most people had declining access to nutritious food. This could be mainly due to high income inequality and rising domestic level prices. Fig 19 (also see Annex 5)<sup>7</sup> shows that the domestic level food price index is not only high but it shows an extremely diverging trend from other South Asian Countries. In addition, disparities in access to education and health by various segments of the society, especially the poor may also be crucial for achieving food security. Therefore, simply emphasizing on increasing food supplies cannot ensure food security. In such circumstances stable nutritious food supply and its distribution is considered to be critical issue (Pinstrup-Andersen, 2009).

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<sup>6</sup> Figures 15 to 17 are generated using data from Household Income and Expenditure Surveys (HIES) conducted by the government of Pakistan since 1970..

<sup>7</sup> The data for generating Fig 18 is obtained from FAO data website-FAOSTATS. <http://faostat3.fao.org/home/E>



The major reason of poor performance in Pakistan appears to be the low allocation of resources to health and sanitation. Sri Lanka has made excellent performance in providing improved sanitation to its public—the coverage is over 92 percent, while in other countries it ranges between 36 percent in India to 57 percent in Bangladesh and Pakistan stands at 3<sup>rd</sup> position with less than 50 percent (Annex 1). Currently, Pakistan spends the lowest share of GDP (1.01percent) on health when compared to other South Asian countries, while Nepal spends the highest share of its GDP (2.6 percent). However, Sri Lanka is spending highest in terms of per capita expenditures in 2011 international dollar (304\$), while Bangladesh the lowest which is only 95\$/capita. Similarly, per capita real expenditures (in 2011\$) on health is observed to be rising, except in Pakistan where it has been declining since 2007 (see Annexes 2 and 3). This indicates that why Pakistan is performing poor in terms of absorption/nutritional aspect of the food security.

#### 4. Causes of Food Insecurity in South Asia

##### 4.1 Population Growth

The South Asian countries account for over 22 percent of total population of the world with India alone has over 1.2 billion people (over 17%) to it. The shares of Pakistan and

Bangladesh in world's population stand at 2.5 and 2.4 percent, respectively. The population growth rate has slowed down overtime in almost all the countries with Sri Lanka attaining a population growth rate of 1.3 percent (Table 5). Bangladesh, India, Nepal, and Pakistan also have moved in that direction though Pakistan still has a high rate of population growth which stood at over 2 percent in 2011. Though population growth has slowed down it is still high deducting the fruits of output growth and resulted in marginal improvements on per capita basis despite the fact that expansion in food production and general economic growth are somewhat satisfactory.

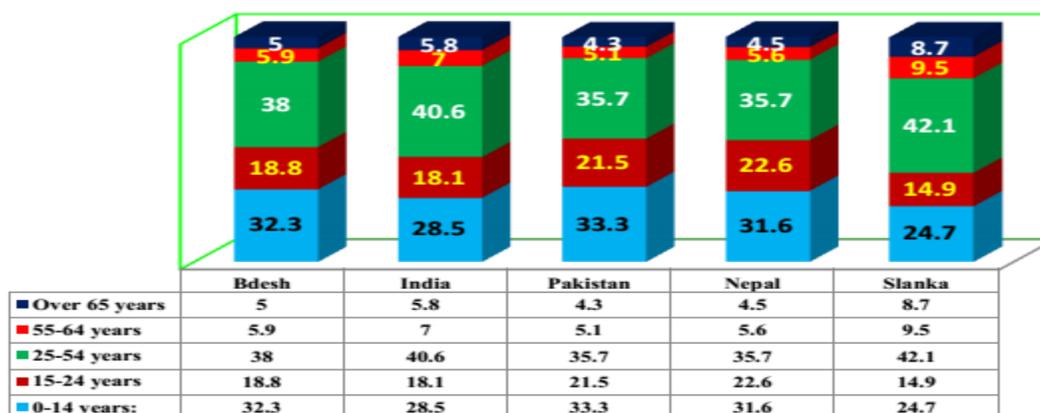
On the other hand the age structure of Pakistan indicates that more than 59 percent of our population is below the age of 24 years - 33.3 percent below the age of 14, and 21.5 percent are between the ages of 15-24 years (see Fig 20) This implies high fertility rate and consequently high dependency ratio requiring heavy resources for human resource development and fast creation of jobs.

**Table 5: Population Growth Rates in SAARC Region**

Year	Afghanistan	Bangladesh	Bhutan	India	Nepal	Maldives	Pakistan	Sri Lanka
1990	1.9	2.2	1.3	2.1	2.1	2.5	2.7	1.5
1995	1.9	1.6	1.3	2.1	2.5	2.0	2.5	1.1
2000	1.9	1.4	1.3	1.8	2.5	1.5	2.3	1.3
2005	1.9	1.3	1.3	1.5	1.4	1.5	1.9	0.9
2006	2.0	1.3	1.9	1.4	1.4	1.8	1.8	1.2
2007	2.0	1.3	1.9	1.5	1.4	2.0	1.8	0.8
2008	2.0	1.3	1.9	1.4	1.4	1.5	2.1	0.9
2009	2.0	1.3	1.8	1.4	1.4	1.6	2.1	1.2
2010	1.9	1.3	1.8	1.4	1.4	2.3	2.1	1.0
2011	1.9	1.3	1.8	1.3	1.4	1.7	2.1	1.1

Source: WDI (2014)

**Fig 20. Age Structure in South Asian Countries (%)**



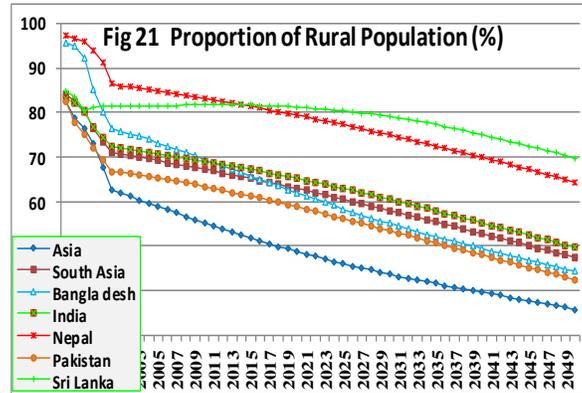
#### ***4.2 Rural Urban Divide and Food Inflation***

The urban poor are generally more vulnerable to food insecurity resulting from shocks like high inflation, weather shocks and other disasters. Despite high population growth in rural areas the reduction in the percentage of rural population in almost all the countries points to an accelerated migration from rural to urban areas. Sri Lanka remained an exception till recently, and however is expected to decline significantly by 2050 (Fig 21<sup>8</sup>). There are pull and push factors working to facilitate rural to urban migration (Iqbal and Rashid, 2012). The pull factors include higher wages, better employment opportunities, and greater availability of health and education services in the urban areas. The push factors forcing the rural people to leave for cities include factors like displacement by conflict, disasters, droughts, floods, landlessness, land degradation, and continuously declining farm size. These factors breed in to urban poverty.

The rural to urban migration and natural growth of cities itself are resulting into fast expansion in cities. The fast growth of cities increases net food buyers on the one hand and reduces arable land by converting productive agricultural land and water resources to residential and industrial uses on the other. Therefore, the process of fast and unplanned urbanization is a potential threat to food security in the region. The majority of rural and urban households are net buyers of food who are negatively affected by higher prices. The urban poor suffer the most. However, the rural households may benefit depending on whether they are net sellers or buyers of staple food items, the extent of wage adjustment to higher food inflation and mode of payment of wages. More than two-third of the south Asian people still lives in rural areas, and a large chunk of which is landless—works as tenant farmers or wage workers in agriculture or non-agriculture sectors. Given the structure of farming, the proportion of hired labour use in agriculture of South Asian countries is limited, and therefore this segment of rural society also suffers the most from high food inflation.

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<sup>8</sup> The data for generating this figure is obtained from FAO data website-FAOSTATS. <http://faostat3.fao.org/home/E>



The land ownership in most of the countries of the region is highly skewed—around 65 percent of the farming families in Pakistan and 96 percent farm households in Bangladesh cultivate landholdings of two hectares (5 acres) or smaller in sizes. Majority of these farm households are net buyers of food and the rest of them generate only a limited marketable surplus. For example in Pakistan about 27 percent farming households are net wheat buyers - about 17 percent do not grow wheat, and 10 percent are deficit in wheat. The results of a recent study show that the farm households operating landholdings of size  $\leq 12.5$  acres are food insecure (Ahmad, *et al.*, 2015). Therefore, small size farms rarely benefit from rising food inflation.

#### 4.3 Low Agricultural Yields and Factor Productivity

*“No country has been able to sustain a rapid transition out of poverty without raising productivity in its agriculture sector” Timmer (2005)*

#### Yields

An important reason for the persistent food insecurity in the region is low productivities in agriculture (crops and livestock sectors) in South Asia as compared to many of the developed countries. The yields of wheat and rice are observed to be significantly lower in South Asian countries as compared to top producers in the world (Table 6). The yield gaps vary from 1 to 71 percent in case of wheat and below 1 percent to 64 percent for rice. Moreover, huge productivity gaps are also observed for various crops (including wheat and rice) within South Asian countries. The major factors behind these gaps are the differentials of technological advancements and the policy support measures in these economies. Further, the rate of growth in productivity of important crops has been declining in the past decades. Table 7 shows that yields of wheat and

rice, the two major food crops in the region, has been on the decline during the last one and half decade - indicating that the Green Revolution has lost its potential.

Table 6: South Asian Countries' Wheat and Rice Paddy Yields gaps from the Highest Yields Realized in the World (%)

Country	Yield (kgs/Hect)	Bangladesh	Sri Lanka	India	Nepal	Pakistan
		Wheat				
		3014		3154	2290	2787
Austria	5374	-44		-41	-57	-48
Canada	3594	-16		-12	-36	-22
France	7254	-58		-57	-68	-62
Germany	7998	-62		-61	-71	-65
USA	3172	-5		-1	-28	-12
China	5055	-40		-38	-55	-45
<b>Yield Difference Within Region</b>						
Bangladesh	3014	-		5	-24	-8
India	3154	-4		-	-27	-12
Nepal	2290	32		38	-	22
Pakistan	2787	8		13	-18	-
<b>Rice</b>						
		4376	3889	3623	3171	2437
Brazil	5007	-13	-22	-28	-37	-51
Philippines	3885	13	0	-7	-18	-37
Thailand	2915	50	33	24	9	-16
Viet Nam	5573	-21	-30	-35	-43	-56
China	6710	-35	-42	-46	-53	-64
<b>Yield Differences Within Region</b>						
	kgs/Hect	Bangladesh	Sri Lanka	India	Nepal	Pakistan
Bangladesh	4376		-11	-17	-28	-44
S. Lanka	4376	13		-7	-18	-37
India	3889	21	7		-12	-33
Nepal	3623	38	23	14		-23
Pakistan	3171	80	60	49	30	

Source: Data obtained from FAO data website-FAOSTATS. <http://faostat3.fao.org/home/E> FAO data

**Table 7. Growth Rates of Wheat and Rice Yields (%)**

	Bangladesh	Sri Lanka	India	Nepal	Pakistan
<b>Growth Rates of Wheat Yield</b>					
1960s	4.79		3.98	-0.50	4.01
1970s	8.81		1.05	3.95	4.19
1980s	-2.27		2.97	1.68	1.17
1990s	3.12		2.21	2.70	3.42
2000s	2.80		1.28	2.00	1.52
<b>Growth Rates of Rice Yield</b>					
1960s	-0.09	2.11	0.99	0.06	5.19
1970s	2.61	2.84	1.75	-0.11	0.44
1980s	3.07	1.64	3.23	2.22	-1.30
1990s	3.05	1.44	0.91	1.90	3.02
2000s	2.12	0.83	1.26	1.21	-1.01

Source: Data is obtained from FAO data website-FAOSTATS. <http://faostat3.fao.org/home/E>

### **Total Factor Productivity (TFP)**

The Total Factor Productivity (TFP) refers to shifting of the production frontier upwards in case of progress, and downwards as a result of regress. Research and development (R&D) efforts, flow of information, better infrastructure, availability of funds and farmers' managerial capabilities are the prime movers of TFP. Empirical studies show that the TFP estimates for all crops differ widely and range from -1.21 for Sri Lanka to 2.42 for Nepal during 1981-2001. However, TFP growth for rice and wheat exhibited mostly declining trend or only a marginal improvement (Annex 4). However, 2012 Global Food Policy Report of IFPRI (IFPRI, 2013) shows that aggregate TFP continued to increase in India since 1981, and Nepal experienced jump from -2.36 percent in 1991-2000 to 3.02 in 2001-2009, while the other countries in the region face declining trend in aggregate TFP (Fig 22).

The agricultural TFP in South Asia has been higher than the Southeast Asia while it is significantly lower than the East Asia (Table 8). The TFP growth sourced from increased schooling (22%), improved nutrition (14%) and introduction of modern varieties (64%), while in East Asia improvement in nutrition contributes 33 percent towards TFP. This suggests that South Asia has a lot of room to improve its TFP by improving the nutritional status and education in addition to technological inventions.

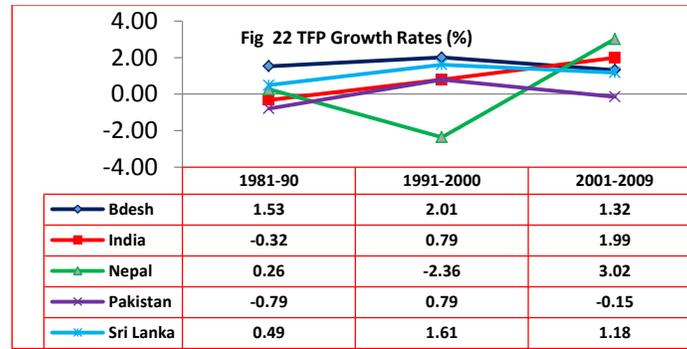


Table 8. Growth Accounting, 1960-200

	Actual TFP	Proportion Due to:		
		Increased Schooling	Increased Nutrition	Green Revolution
South Asia	1.96	0.22	0.14	0.64
Southeast Asia	1.05	0.17	0.21	0.62
East Asia	3.24	0.13	0.33	0.54

Source: Avila and Evensen (2010)

The reasons for deceleration TFP growth rates can be attributed to low investments in R&D activities that declined in most of the countries—both developed and developing including those in South Asia. However, the neglect of agricultural R&D was widely realized the world over particularly after World Bank’s World Development Report on Agriculture. This resulted in increased allocation to agricultural R&D in the recent years (Table 9).

#### 4.4. Structural Transformations and Institutions

The performance of agriculture is also influenced by the policy targeted institutional reforms including those introduced in agricultural extension, education, agricultural credit, and in the functioning of input and output markets (Saris, 2001). The existing institutions in Pakistan have further deteriorated the disparity between the rich and the poor in general and among large and small farmers in particular by offering greater access to the influential and the well-off. Furthermore, the globalization, integrated value chains, fast changing technology and institutional innovations and global warming have changed the perspective role of agriculture (Byerlee, 2009). The multiple roles of agriculture including generating economic growth, reducing poverty and income inequality, ensuring food security, and provision of environmental services need to be recognized (Wickramasinghe, 2014).

Table 9: Allocations to Agricultural R&D in South Asia and Other Developed World

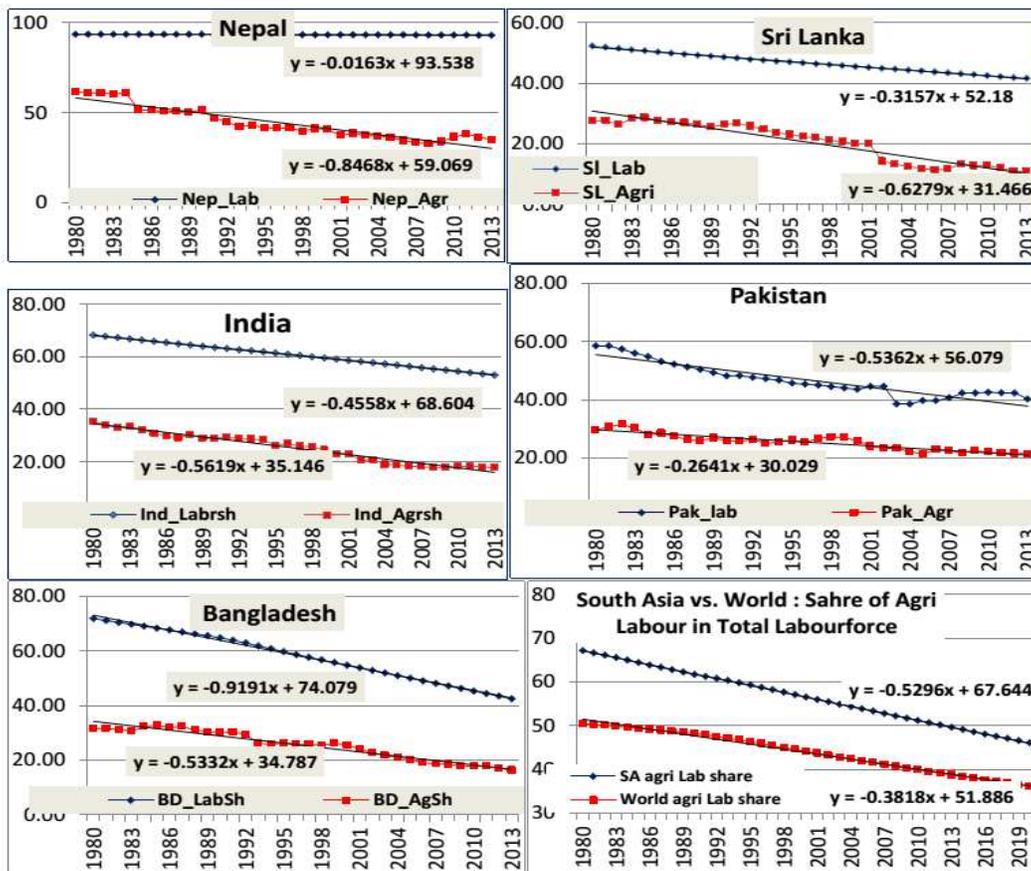
Region/ country	Agri. expenditure (bilns 2005 US\$)			Per capita agri. expenditure (2005 constant US\$)			Ratio of agri. expenditure to agricultural GDP (%)			Share of agricultural in total expenditure		
	1980	1995	2012	1980	1995	2012	1980	1995	2012	1980	1995	2012
<b>South Asia</b>			0.11			3.61			3.45			4.26
Bangladesh	0.19	0.24	0.86	2.34	1.99	5.73	2.74	2.53	5.92	13.0	4.93	8.92
Bhutan	0.01	0.03	0.04	26.60	60.16	60.70	19.53	23.98	20.36	31.9	19.69	11.18
India	1.77	3.50	13.41	2.53	3.66	10.98	2.62	3.13	6.17	7.2	5.26	6.51
Maldives	0.00	0.02	0.01	11.64	72.46	25.28	6.99	46.24	12.43	8.8	12.07	1.33
Nepal	0.06	0.08	0.19	4.09	3.97	6.97	3.93	3.96	5.10	16.4	9.64	8.96
Pakistan	0.10	0.06	0.90	1.23	0.49	5.03	0.98	0.31	2.57	2.14	0.46	2.91
Afghanistan	0.18	0.24	0.41	11.87	12.99	19.68	9.44	8.69	9.45	5.77	5.29	5.47
Australia	1.34	1.77	1.00	90.98	97.74	60.00	6.99	9.77	7.00	1.78	1.24	1.00
Canada	2.25	3.41	2.00	91.68	116.30	70.00	9.99	14.69	13.00	2.20	1.93	1.00
Israel	0.63	0.61	0.00	168.01	113.96	32.00	24.79	33.54	9.00	1.97	1.49	0.00
Japan	15.06	10.55	19.00	129.90	84.76	148.00	20.85	16.55	34.00	3.49	1.69	2.00
New Zealand	1.14	0.27	1.00	363.66	73.39	158.00	19.88	5.14	12.00	5.42	1.07	1.00
Korea	1.34	8.03	10.00	35.70	179.82	202.00	6.58	27.36	39.00	5.59	11.59	5.00
USA	18.17	11.80	16.00	78.93	44.02	49.00	12.59	8.43	10.00	1.49	0.64	1.00

Source: IFPRI (2013)

The South Asian economies are experiencing structural transformations and the role of agriculture in economic development is changing fast - its share in national GDPs is declining faster than proportion of labour seeking livelihood from this sector (see Fig 23) for comparison. A very small proportion of farms experiencing fast modernization, while majority of the farmers are resource poor and operate in low-input, low-output scenario (Ahmad, 2003). For example, Nepal is an extreme case where share of agriculture declined from about 62 percent in 1980 to 35 percent in 2013, while the total labour force share involved in agriculture remained almost the same during the same period, i.e. over 93 percent. On the other hand, Bangladesh performed well where share of total labour force in agriculture declined from 72 percent in 1980 to around 43 percent in 2013 - though declined significantly but the share is still quite high. The share of agricultural labour force in South Asia declined faster than the world.

The current structure of agriculture sector induces people to move out of agriculture to find more productive jobs. Unfortunately, economies of South Asia are unable to absorb rural labour in other sectors. There is need to adapt three-prong strategy - developing farm and non-farm sectors as well as reducing polarization within agriculture sector either by helping the inefficient farmers to approach the frontier or helping them to finding alternative livelihood in the non-farm sector (Ahmad and Farooq, 2010).

**Fig 23. Graphical Presentation of Share of Agricultural Labour in Total Labour Force**

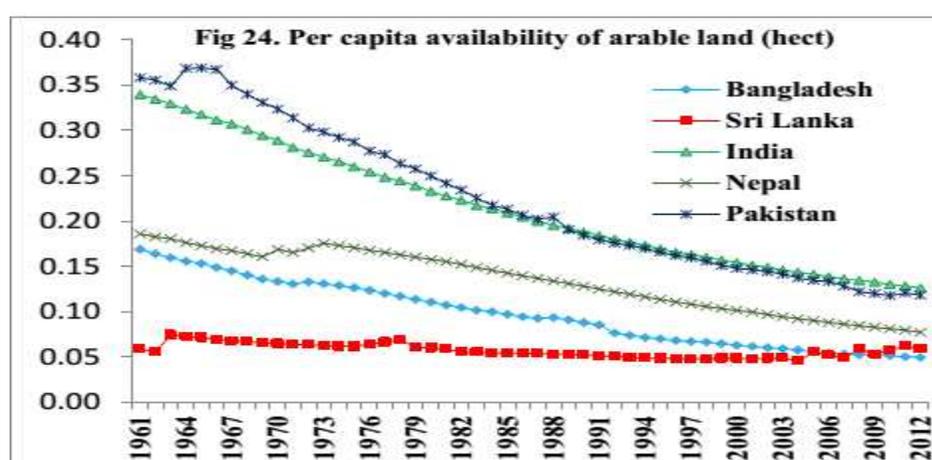


#### 4.5. Access to Land and Water Resources

Two primary *inputs* in agriculture are land and water. The prospects of allocating more of these vital inputs are limited because of fast expansion of cities and land degradation<sup>9</sup>. South Asian

<sup>9</sup> Because of poor response towards inputs applied in such lands, the farmers use lower doses of inputs as compared to normal healthy lands. Reduced levels of inputs use on such lands vary from 12 to 80 percent, and as a

countries are experiencing steady decline in per capita availability of arable lands because of fast population growth and diversion of prime farm land for non-farm use in the (Fig 24). Pakistan (0.36 Ha) and India (0.34 Ha) have had 2-3 times higher per capita arable land than Bangladesh (0.17 Ha), Sri Lanka (0.06 Ha) and Nepal (0.19 Ha) in 1961, while presently per capita arable land in all these countries is respectively as 0.12, 0.13, 0.05, 0.06, 0.08 hectares. This indicates a major concern about ensuring the food security in the region. The chances for bringing unused or marginal lands under cultivation are also meager because of two reasons: firstly, the fertility of these lands is poor and the investment to increase productivity of such lands may be uneconomical and unsustainable (Fullbrook, 2010).



The average *farm size* in South Asia varies from 1.47 acres in Bangladesh to 6.4 acres in Pakistan—which is the largest farm size in the region. Interestingly, there is huge variation in farming structure/distribution of land among the farming families across the region (Table 10). In Bangladesh all of the farm households operate landholding of size  $\leq 12.5$  acres of land accounting for 100 percent of the farm area, while in Pakistan about 90 percent of the farm households are operating landholding of size  $\leq 12.5$  acres of land accounting for only 48 percent of the farm area and remaining 52 percent of farm lands are owned by 10 percent of the farm households - pointing to Pakistan having highly skewed distribution of farm lands in the region. Basically the ownership of this major factor of production determines the access to input and output markets. Therefore, the benefits of agricultural development are also shared rather more

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result from slight to moderately affected patchy lands agricultural output declined by more than 30percent (see Ahmad, 2003).

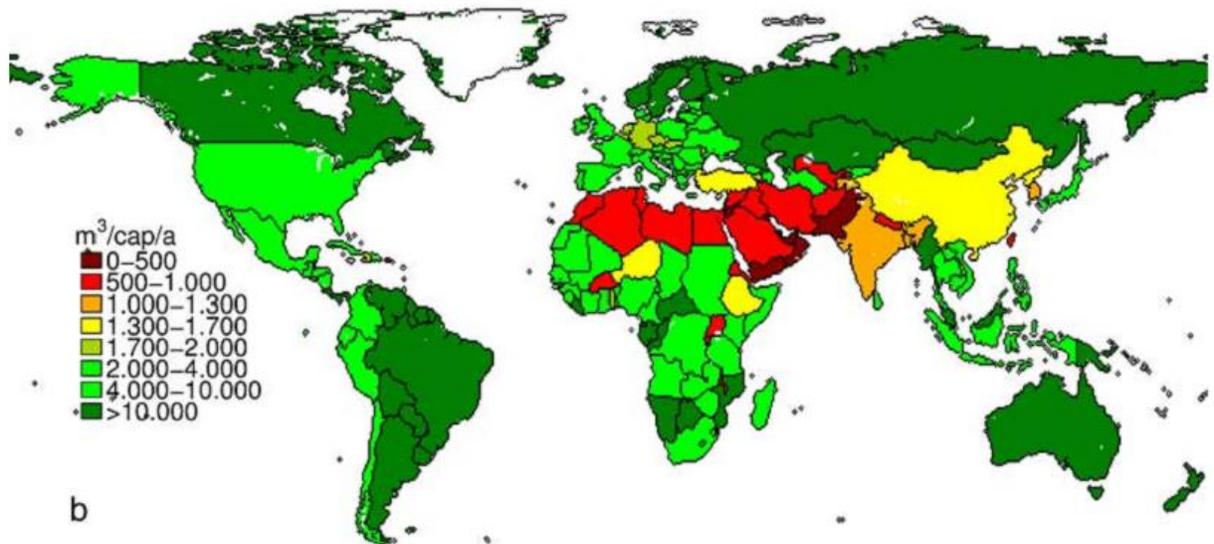
unequally. The poor small farmers use 30 - 50 percent less of various factors of production than used by the rich farmers - leading to lower land productivity, greater poverty and food insecurity (Ahmad, 2003).

**Table 10. Average Farm Size by Categories of Farms in South Asia**

	Farm Categories	≤ 2.5 acres	(>2.5 to 5 acres	>5 to 12.5 acres	>12.5 to 25 acres	>25 to 50 acres	>50 acres	Average F. Size Acres	Farms ≤12.5 acres
Bangladesh	F. Size Acres	0.88	3.34	7.86				<b>1.47</b>	
	Farms (%)	84.39	11.17	4.45				100	100
	Area (%)	50.83	25.37	23.8				100	100
India	F. Size Acres	0.96	3.51	7.34	16.55	32.44	91.14	<b>2.85</b>	
	Farms (%)	67.1	17.91	11.8	2.49	0.58	0.13	100	96.81
	Area (%)	22.5	22.08	30.37	14.45	6.57	4.02	100	74.95
Nepal	F. Size Acres	0.98	3.37	6.84	15.91	35.7		<b>1.68</b>	
	Farm (%)	79.96	14.78	4.95	0.29	0.03		100	99.68
	Area (%)	46.78	29.72	20.15	2.74	0.6		100	96.65
Pakistan	F. Size Acres	1.16	3.43	7.44	16.69	31.89	122.66	<b>6.4</b>	89.54
	Farm (%)	43.52	21.22	24.79	6.79	2.55	1.12	100	
	Area (%)	7.89	11.36	28.81	17.69	12.71	21.54	100	48.05
Sri Lanka	F. Size Acres	1.05	3.05	6.48	15.54			<b>2.04</b>	
	Farm (%)	68.53	23.71	6.66	1.1			100	98.9
	Area (%)	35.17	35.36	21.12	8.36			100	91.64

Sources: Agriculture Census, Nepal, 2011-12; Agriculture Census, Bangladesh, 2008; Source: Agriculture Census, Sri Lanka, 2002; Source: Agriculture Census, India, 2010; and Source: Agriculture Census, Pakistan, 2010

A study by Rockström *et al.* (2009) presents a very bleak picture for Pakistan in terms of water shortage and potential of increasing food production through area expansion by 2050. In terms of area, very low potential left since most arable land is already in use, while freshwater will be the most fundamental constraint in food production in coming decades—Pakistan is shown in dark brown world map shown in Fig 24. The study further concludes that Pakistan is among those countries that are “*approaching the end of the road unless income growth in the meantime allows them to import the food required*” (P65). India and Nepal are also water deficient and the situation will become more alarming by 2050.



**Figure 24: Countries color coded according to water availability for food self-sufficiency. Those with <1,300 m<sup>3</sup>/capita/year are in deficit. Details can be seen from Rockström et al. (2009)**

#### 4.6 Climate Change

The global warming has emerged now as a new threat to agriculture the world over. It has a direct and devastating impacts on agriculture sector since it heavily relies on climatic factors (Parry *et al.*, 1999). The impact of even a single climate- or weather-related event could ruin the long-term gains in economic development (FAO, 2008). The intensity of the impact on a particular country/region depends on the current levels of temperature and/or precipitation patterns and the biological tolerance limits for crops, per capita income, the proportion of economic activities linked to agriculture and the existing land use pattern (Benhin, 2006).

South Asian is highly vulnerable to climate change because of its growing dependence on agriculture for food and fiber needs. The changing pattern of climate is projected to decrease the availability of freshwater, while the coastal areas will be at greatest risk due to increased flooding from the sea and rivers. Cyclones and floods in Bangladesh and coastal parts of India are quite frequent. Recurring droughts are a common feature in the arid and semi-arid parts of India and Pakistan. India witnessed severe drought in large parts of the country in 2009, Pakistan continues to experience the worst floods since 2010. These floods in several districts of country and the recent drought in Thar district of Sindh province of Pakistan resulted in displacement of millions of people and inflicted heavy damages to human lives, crops, livestock, housing, and agricultural as well as other infrastructure in the affected area. During March-April of this year

(2015), unexpected and prolonged rains reduced the yield of wheat up to 30 percent in most of the wheat areas of Pakista.

It is predicted that a rise in temperature may reduce yields of rice, wheat, and other cereals as well as certain cash crops significantly (ICRIER *et al.*, 2009). Cereal crops production are already under heat stress in South Asia (Kelkar and Bhadwal, 2007). Further increase in temperature could cross the level beyond the optimal for growing some crops. Therefore, the crops yields could decline up to 30 percent by the end of this century (IPCC, 2007). Climate change is expected to reduce the growing season length for major cereals in all major agro-ecological zones. As a result the yields in Pakistan could decline by 6-11 percent in case of wheat and 15-18 percent for basmati rice by 2080, which are the main cereals produced in the country. Sivakumar and Stefanski (2011) reported that an increase of 1°C in temperature would reduce wheat yield by 5-7 percent in Pakistan. A more recent study estimated that every 1°C increase in temperature only during the November and December—the sowing months would result in reduced yield of wheat by 7.4 percent in Pakistan (Ahmad, et al., 2014). The wheat sowing has generally been delayed 2-3 weeks throughout the country to avoid higher temperature level (above the normal) from mid-October to early-November (Ahmad, *et al.*, 2013). Had this adaptation strategy of shifting the sowing time of wheat not been adopted, the wheat yield losses in various areas of the country could have been much higher. Another study also indicates a significant negative impact of rise in temperature on both basmati and coarse rice in Pakistan (Ahmad *et al.*, 2014a). Production of these crops is an important component of food security in the region. One of the major challenges the South Asian would be facing in the coming decades is assuring food security to rapidly increasing population under changing climate.

The adverse impacts of climate change on agriculture can be dealt with mitigation and adaptation strategies. Mitigation requires considerable efforts and resources as well as cooperation from those countries which are the source of cause and are resourceful. South Asian countries however face difficulties as they are short of resources and lack appropriate infrastructure to efficiently and effectively employ mitigating strategies. However, despite immediate employment of mitigation strategies the global warming will continue for decades to come and these strategies do not have abilities to reverse impacts of the past, current and/or of

unavoidable emissions in future (IPCC, 2007; Chambwera and Stage, 2010). Therefore, the looming threats can only be tackled through adaptation, which is a shorter term action to cope with the potential adverse impacts of changing climate on agricultural production and reduce the risk of various key vulnerabilities on human and natural systems as well as on food security (OECD, 2009); Mendelsohn and Dinar, 1999; Schneider, et al., 2007; Gebrehiwot and van der Veen, 2013;\_ Chambwera and Stage, 2010). The adaptation is therefore one of the fundamental policy options to moderate the impacts of climate change (Adger *et al.*, 2003; Kurukulasuriya and Mendelsohn, 2008). The non-adjustment of agricultural systems and practices will hit hard the farming community particularly in developing countries—affecting farm productivity as well as income, food and livelihoods security (Kandlinkar and Risbey, 2000; and Hassan and Nhemachena, 2008). The structure of farming and poor resource as well as poverty in rural areas could be the major hurdles to adapting to climate change. Furthermore, under the climate change uncertainties the conventional methodologies of plant breeding may not be helpful. Therefore, the scientists now need to address

## **5. Agricultural and Food Security Policies**

The public sector has been quite active in the South Asian countries to undertake initiatives and programmes aimed at food security through supply side and demand side measures. These include policy measures and initiatives like price policy—intervention in markets mainly through support price and input subsidies, establishment of procurement and distribution system, infrastructure development, agricultural research and development, and safety-nets.

### **Price Policies**

The South Asian countries dominantly persuaded policy interventions aimed at cost reduction and supply of food items to consumers at low prices. The two favorite means used to achieve the objectives included: 1) fixing of support/procurement prices for important agricultural commodities; and 2) providing input subsidy. The support/procurement prices were coupled with procurement and distribution activities performed by public sector enterprises which often resorted to district/province boundary restrictions and even forced procurement for effective implementation of the policy. The input subsidy covered items like material inputs (fertilizer, seed, pesticides, irrigation water); agricultural machinery, equipment, and implements;

electricity and institutional credit etc. The output price offered the minimum support prices lower than the international prices thus depressing the national outputs and profits of the farming communities.

### **Public Distribution Systems**

Like several developing economies, South Asian countries have a long history of establishment of Public Distribution System for provision of cheap food to the poor. An earlier version was rationing of food grains and other important food items under which the needy eligible households can buy a certain maximum quantity at controlled price – lower than that in the open market. Overtime, all the countries in the region instituted sizeable Public Distribution Systems (PDS) to meet the minimum needs of the poor (FAO, 1998). The PDS are run through domestic procurement at pre-announced prices and often resorting to forced purchases and imports. The PDS involved massive subsidies and incidental costs. For example, incidental costs of private traders are much lower than those of the state- owned enterprises in Pakistan (Salam, 2003). Sri Lanka had to switch from cheap food delivery to food stamps programme due to heavy cost involved in the earlier system. Similarly, India re-launched the PDS as Targeted Public Distribution System (TPDS) in 1997 due to high misuse of resources and widespread mismanagement (Kattumuri, 2011). Nepal's food distribution system has a very limited capacity to distribute cheap food in remote areas of the country. The system is criticized for poor funding and inability to reach the poorest (Baidya, 2004). All this suggests that the initiatives were in the right direction however, due to poor implementation only limited benefits reached the poor. The price differential and incidental costs involved not only increased the burden on the government exchequers but also led to leakage and rent seeking (Iqbal and Rashid, 2012).

### **Safety nets**

The countries in the region have adopted safety nets mainly aimed at enhancing individual and household level access to food. These programmes cover a range of initiatives including more importantly cash transfers and food related programmes among them. In Pakistan, Benazir Income Support Programme (BISP) was initiated in 2008 to provide cash transfers to the identified vulnerable households. The payments initially amounted PKR 1000/month but recently increased to PKR 1500/month paid on a quarterly basis. Its coverage extended to 5 million families in 2010 and accounted for 3 percent of national GDP. BISP

launched new initiatives offering microfinance up to PKR 300,000 for small businesses to selected households (*Waseela-e-Haq*), technical training to one member of selected households (*Waseela-e-Rozgar*), and also provides life insurance PKR 100000 to the main earner of the selected households (*Waseela-e-Sehat*). Among other safety nets in the country, Food Support Programme (FSP) and Child Support Programme (CSP) sponsored under Pakistan *Bait-ul-Mal* are more important. The National Rural Support Programme (NRSP), Pakistan Poverty Alleviation Fund (PPAF), and Khushali Bank are the development schemes providing microfinance for community development programmes and NGO projects.

The important initiatives under safety net in India include Integrated Child Development Scheme (ICDS) initiated during 1975, Mid-day Meal Scheme (1995), Food for Work Programme (1970s), National Rural Employment Guarantee Scheme in 2006-07 (NREGS). The ICDS is implanted through states and serves infants, mothers, and preschool children (3-6 years) by providing nutrition supplements, health and nutrition education to mothers, immunization, and preprimary teaching. Under the Mid-day Meal Scheme targeted children in primary school age to improving nutritional status, school enrollment, and attendance. Under the Work for Food made food grain available to poor landless households for working in public construction projects. Later, drawing upon Work for Food programme and various variants of it including Maharashtra Employment Guarantee Scheme and Employment Assurance Scheme, the National Rural Employment Guarantee Scheme was initiated by merging various schemes. Under this scheme one able body person from each household was provided 100 days employment at minimum wage rate.

In Sri Lanka, Samurdhi and the Public Assistances Program are the major safety nets. In addition, Microfinance Services also cover about 8 percent of the population – the second highest in South Asia. Samurdhi is a large cash transfer program implemented through encashment stamps useable only at the public owned cooperative stores that sell at higher prices than the open market. The Public Assistance Program is targeted towards the elderly and disabled poor, families without breadwinner, poor women and orphans.

These programmes are often criticized on basis of poor implementation, transfers in insufficient amounts to impact poverty, promoting dependency, flawed selection, misuse by the

government officials and the influential, and serving political objectives. However, the countries of the region can learn from experiences of the others.

## **6. Regional Collaboration for Food Security: A Way Forward**

Nearly 40 percent of the world's hungry lived in South Asia, even before the food price crisis of 2008. Hunger silently stalks the entire region, from the steep mountain slopes of Nepal to the dry, arid plains of southern Afghanistan. Although large scale famines have largely been kept at bay, millions of poor people in Bangladesh, unable to afford two meals a day and left literally clutching at straws. On the other hand, a declining trend in per capita food production and supply is observed in most of the South Asian Countries except India and Pakistan. In this context, The achievement food security in the regional as well as member states context, SAARC should extend its cooperation in food production within the member states and promote the following:

### ***a) Paradigm Shift From the Policy of Country Level Self-sufficiency to Regional Self-reliance in Staple Foods***

At present all South Asian countries are following the policy of self-sufficiency with little consideration to self-reliance. The key feature of self-sufficiency policy is that food consumed is produced within the borders of a country. It considers the diets that are simple and natural should be produced domestically. While under self-reliance policy, food is bought wherever it is cheapest from the international market to supplement domestic food supplies. In other words, there is a need to promote regional trade in food commodities. The advocates of self-reliance (e.g. Knandreas, 2006) argue that trade could contribute to the promotion of food in a number of ways like augmenting domestic supplies to meet consumption needs, reduce supply variability, lowering price instability, fostering economic growth using global resources more efficiently by allowing production in the areas having due comparative production advantages. In summary, an agreement among South Asian countries may be signed for exporting exportable surpluses of food grains (wheat, rice, pulses) out of the region only after ensuring that no member country is interested in buying it.

### ***b) Sharing Food Production Technology***

Wide yield gaps in case of wheat, rice, pulses exist from the top yields realized elsewhere in the world as well as within the South Asian countries. The presence of such yield gaps are indicative of existence of unrealized potential through improving yields of food grains by sharing

production technologies. This also implies that merely entering into technology sharing network for these crops can bring a considerable boost in production of these valuable food grains for attaining and sustaining broader food security in the region.

***c) Seed Banking, Exchange and Genetic Materials***

South Asia is prone to climate change and other natural disasters resulting in heavy losses to agricultural production, human lives, private properties, infrastructure, and biodiversity. For instance, devastation occurred in India and Sri Lanka in 2004 by the tsunamis; earthquake in 2005 severely affected several areas in Pakistan, India and Afghanistan; Cyclone Sidr caused the worst natural disasters in Bangladesh during 2007; Pakistan suffered from devastating floods since last several years; and the glacial recession in Himalayas has created floods in rivers systems traversing the South Asian region like Nepal, India, Bangladesh and China adversely affecting cereal production in the region. In view of various forecasts on climatic changes, the region may suffer from such event more frequently than before. This underscores the challenges faced by the South Asian countries in ensuring food security. However, it is encouraging that the governments of SAARC countries are committed to the goal of ensuring food security. The member states, during 15<sup>th</sup> SAARC Summit, affirmed their resolve to ensure food security at regional level. In this regards several initiatives have agreed including establishment of food bank, seed bank, and gene bank. Unfortunately, the progress in operationalizing these banks has been slow. The decisions on modalities and development of needed infrastructure require a lot of political commitment and mutual trust.

***d) Revisiting SAARC Food Banking Mechanism***

The idea of establishing SAARC Food Reserve was floated in 1988, but it is not operationalized yet. The prime underlying aim was to provide regional support to national food security efforts and solve regional food shortages through collective actions. In order to qualify for drawing food from the bank, the necessary condition is that the member country shall face a shortfall in the production by 8 percent lower than the average of last 3 years. However, it is not clear how the storage shortfall shall be measured. The SAARC Food Bank Board has to make final decision about releasing food from the bank. Secondly, there is no clearly specified provision for food transport mechanism, border formalities and institutional mechanism for swift

delivery of the food. The mechanism of price determination of this food is also lengthy, as it involved negotiating prices, terms and conditions of payments for each request, despite that a broad guideline is present that the charged price must be lower for the member countries than the international/market prices.

For making reforms, various measures can be considered like: the access to SAARC Food Bank should be increased in order to reduce the quantities needed for national reserves; member states may store this food at closer locations to the borders so that it could be swiftly siphoned off at the time of emergencies; authorize Nodal Points to decide and draw food grain from its own reserve using a food check; the extents of discounts (or their ranges) in release prices of the food from the banks should be decided on the basis of prevalence of poverty and per capita income.

#### *e) Coping Strategies for Disasters*

. Given that natural disasters do not always care for national boundaries. Cross-boundary issues of disaster management should be addressed through enhanced regional cooperation. For this, there is a need to expand and enhance the information and knowledge on climate change and mapping vulnerabilities, trends in internal migration and incidence of diseases in order to timely formulate various adaptive measures or disaster preparedness strategy for reducing the effects of climate change. The region can significantly reduce the adverse effects of natural disasters through establishing more effective early warning systems using technological advances and building necessary infrastructure.

### **7. Concluding Remarks**

The South Asia is predominantly rural and dependent on agriculture for people's livelihood. It is the most disaster prone region in the world. Climate change has emerged a new and a significant threat to assuring food security in the region. A projected 3-4<sup>0</sup>C rise in temperature could reduce yields of cereals up to 30 percent by the end of current century. The frequency and intensity of weather related have increased resulting into displacement of millions of people, affecting their livelihoods and lower food production and high food inflation. Thus, ensuring food and nutritional security to rapidly increasing population of the region remains one of the major challenges that the region would be facing in the coming decades.

Significant progress in terms of increasing food supplies has been made—since 1961 cereals' supply increased 2.7, 3.4, 3.7, 5.1 and 5.4 folds respectively in Nepal, India, Bangladesh, Sri Lanka and Pakistan. Per capita availability of cereals faces either declining trend or has remained stagnated most recently. Currently per capita daily consumption ranges from 2440 calories in Pakistan to 2673 calories in Nepal—substantially lower than the world average. To be noted that the main South Asian countries (India and Pakistan) are net exporter of cereals—indicating that food supply is not a major issue in the region.

There is wide spread poverty in the region and is ranked low in most of the development and food security indicators. It is the home of world's one-fifth population, 40 percent of world's poor, and 45 percent of the world's undernourished population, nearly two-thirds of the world's undernourished children, and over 56 percent of the world's low-birth weight babies are born here. South Asia's record in reducing malnutrition is one of the world's worst. Micronutrient deficiency, '*hidden hunger*', is also pervasive in the region. These numbers highlights the fact that enhanced food availability on its own cannot guarantee good nutrition status at the household level. For example, HIES data shows that daily intake of total calories per person in Pakistan has actually declined—hinting at poor access to nutritious food.

Major causes of food insecurity in South Asia include faster growth in population, fast and unplanned urbanization through rural to urban migration, reduction in arable land, declining average farm size besides skewed distribution, low productivity due to low R&D investments and land degradation, and slow process of structural transformations and poor institutions. In addition to these constraints, the issue of global warming has emerged as a new real threat to food security. Occurrence of a single climate- or weather-related event could ruin the long-term gains in economic development. The most part of the region is already hot and growing of cereals is already under heat stress. Further increase in temperature could cross the level beyond the optimal for growing some crops which is expected to reduce the yields significantly. The adverse impacts of climate change on agriculture can be dealt with mitigation and adaptation strategies. The structure of farming and poor resource as well as poverty in rural areas could be the major hurdles to adapting to climate change. It is anticipated that South Asian countries are likely to face severe food crisis by 2050 and the issue of food security is going to be critical issue in the years to come.

The good news is that the countries in the regional have started emphasizing on assuring food security to masses by moving step forward from agricultural and food policies—targeting supply side, to food security and nutritional policies—accessibility, and utilization aspects. To effectively dealing the danger of food crisis in coming decades in the region, various strategies like: a) paradigm shift from the policy of national level self-sufficiency to regional self-reliance in staple foods; b) sharing of food production technologies and experiences; c) seed banking and exchange of genetic material; d) revising the SAARC food banking mechanism; and, e) devising more effective strategies for dealing with disasters, are suggested.

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**Annex 1. Improved sanitation facilities (% of population with access)**

Years	Bangladesh	India	Nepal	Pakistan	Sri Lanka
1990	33.4	17.7	6.2	26.8	67.6
1991	34.5	17.8	7.6	27.9	68.7
1992	35.7	18.7	9.1	29.0	69.8
1993	36.8	19.5	10.5	30.1	70.9
1994	37.9	20.4	12.0	31.1	72.0
1995	39.0	21.2	13.4	32.2	73.1
1996	40.1	22.1	14.8	33.2	74.2
1997	41.3	22.9	16.3	34.3	75.3
1998	42.4	23.8	17.7	35.3	76.4
1999	43.4	24.6	19.1	36.4	77.6
2000	44.5	25.5	20.6	37.4	78.7
2001	45.6	26.3	22.0	38.4	79.8
2002	46.7	27.2	23.3	39.4	80.9
2003	47.8	28.1	24.7	40.4	82.3
2004	48.8	29.0	26.0	41.4	83.6
2005	49.9	29.9	27.4	42.4	84.9
2006	50.9	30.7	28.7	43.4	85.2
2007	52.0	31.6	30.1	44.4	86.4
2008	53.0	32.5	31.4	45.4	87.7
2009	54.0	33.4	32.7	46.4	88.9
2010	55.0	34.2	34.1	47.3	90.0
2011	56.0	35.1	35.4	47.4	91.1
2012	57.0	36.0	36.7	47.6	92.3

Source: World Development Indicators

**Annex 2: Health Expenditure, Public (% of GDP)**

Year	Bangladesh	India	Nepal	Pakistan	Sri Lanka
1995	1.28	1.10	1.41	0.86	1.60
1996	1.25	1.05	1.42	0.94	1.60
1997	1.10	1.12	1.47	0.86	1.51
1998	1.06	1.15	2.55	0.75	1.85
1999	1.05	1.18	1.76	0.73	1.72
2000	1.07	1.16	1.33	0.66	1.81
2001	1.18	1.13	1.56	0.59	1.72
2002	1.23	1.08	1.61	0.87	1.65
2003	1.13	1.04	1.49	0.70	1.65
2004	1.20	1.00	1.54	0.73	1.96
2005	1.11	1.00	1.58	0.74	1.81
2006	1.21	1.00	1.98	0.85	1.92
2007	1.15	1.02	1.95	0.85	1.76
2008	1.10	1.10	2.38	0.87	1.55
2009	1.14	1.22	2.40	0.80	1.51
2010	1.21	1.15	2.44	0.95	1.55
2011	1.20	1.14	2.76	0.92	1.38
2012	1.13	1.16	2.17	1.02	1.21
2013	1.31	1.28	2.60	1.01	1.43

### Annex 3. Health Expenditure per capita PPP (constant 2011 international \$)

	Bangladesh	India	Nepal	Pakistan	Sri Lanka
1995	30.49	62.69	54.55	77.74	101.49
1996	31.27	65.4	58.16	83.13	107.17
1997	24.35	74.08	61.52	82.85	111.34
1998	25.26	79.05	75.17	90.14	129.72
1999	26.56	80.5	69.12	95.25	134.12
2000	28.94	89	67.62	80.6	148.74
2001	32.98	98.94	70.03	77.09	149.66
2002	36.13	100.53	72.99	83.91	159.53
2003	37.24	106.34	74.39	83.91	173.19
2004	41.47	121.76	83.52	89.9	200.22
2005	45.84	127.76	87.1	110.74	206.34
2006	52.36	134.55	90.08	127.41	227.48
2007	56.81	144.3	92.5	132.68	226.12
2008	61.28	152.77	109.19	131.23	224.5
2009	65.77	167.36	111.85	120.41	227.58
2010	73.67	173.94	114.99	124.83	253.61
2011	81.69	187.01	124.49	128.1	265.48
2012	85.16	195.57	118.42	122.44	269.87
2013	95.33	214.68	134.6	126.33	304.14

### Annex 4. TFP Growth Rates in South Asian Countries

	Crops		Livestock		Aggregate	
	1961-80	1981-01	1961-80	1981-01	1961-80	1981-01
Bangladesh*	-0.23	1.06 ↑	0.75	2.65 ↑	-0.01	1.30 ↑
Pakistan*	1.48	1.32 ↓	1.17	3.98 ↑	1.18	2.54 ↑
India*	1.54	2.33 ↑	2.63	2.66 ↑	1.92	2.41 ↑
Nepal*	0.20	2.42 ↑	1.36	1.11 ↓	0.56	2.10 ↑
Sri Lanka*	-0.39	-1.21 ↓	-2.19	1.30 ↑	-0.93	-0.92 ↑
	Rice		Wheat			
Bangladesh**	1952-71	1973-89	1952-71	1973-89		
	0.98	1.15 ↑	0.93	0.83 ↓		
India***	1980-90	1990-99	1980-90	1990-99		
	3.5	2.08 ↓	2.44	2.14 ↓		

\*Avila and Evensen; \*\* Dey and Evensen (2004); \*\*\*Joshi, et al. (2003)

**Annex 5: Domestic Food Price Level Index**

	Bangladesh	India	Nepal	Pakistan	Sri Lanka
<b>2000</b>	1.54	1.59	1.54	1.85	1.72
<b>2001</b>	1.53	1.56	1.51	1.82	1.73
<b>2002</b>	1.51	1.55	1.51	1.81	1.75
<b>2003</b>	1.52	1.56	1.50	1.81	1.74
<b>2004</b>	1.53	1.54	1.49	1.85	1.73
<b>2005</b>	1.55	1.56	1.50	1.88	1.75
<b>2006</b>	1.58	1.58	1.50	1.91	1.76
<b>2007</b>	1.58	1.58	1.52	1.94	1.37
<b>2008</b>	1.59	1.56	1.52	2.03	1.44
<b>2009</b>	1.55	1.55	1.57	1.98	1.40
<b>2010</b>	1.60	1.57	1.63	2.05	1.42
<b>2011</b>	1.62	1.52	1.66	2.18	1.45
<b>2012</b>	1.59	1.49	1.64	2.15	1.40
<b>2013</b>	1.55	1.53	1.67	2.18	1.42
<b>2014</b>		1.53	1.70	2.16	1.38