

## The State of Food Security in Pakistan: Future Challenges and Coping Strategies

MUNIR AHMAD and UMAR FAROOQ

### 1. INTRODUCTION

Pakistan is a low income developing country. Agriculture is the most important sector of the country meeting food and fibre requirements of the fast growing population. Although the rate of population increase has considerably slowed down from over 3 percent in 1980s to 2.09 percent in 2009-10, it is still considered high.<sup>1</sup> With the current rate of population growth, the population is expected to get doubled by 2050—making Pakistan 4th largest nation by 2050 from current status of 6th most populous state of the world [Pakistan (2010)].

The total cultivated area has increased by just 40 percent during past 60 years, while there has been more than 4 times increase in population with urban expansion of over seven-fold—resulting into mega-cities<sup>2</sup> as well as rising population pressure on cultivated land. Wheat production, a major food crop, has increased five-fold during the same period—yet the country is marginal importer of wheat. Tremendous efforts are needed both advances in technology and population control to narrow the food supply-demand gap.

Reducing poverty, hunger and food insecurity are essential part of MDGs<sup>3</sup> and are pre-requisites for economic development. Food security and economic growth mutually interact and reinforce each other in the development process [Timmer (2004)]. A country unable to produce the needed food and has no resources or afford to buy food from the international market to meet demand-supply gap, is not food sovereign state [Pinstrup-Andersen (2009)]. Food security is thus fundamental to national security, which is generally ignored [Fullbrook (2010)]. The extra-ordinary rise in food prices in later part of the first decade of 21st century raised an alarm bell on food security, particularly for

Munir Ahmad <camunir@yahoo.com> is Chief of Research, Pakistan Institute of Development Economics, Islamabad. Umar Farooq <umar2parc@yahoo.com> is Chief Scientific Officer, Pakistan Agricultural Research Council, Islamabad.

<sup>1</sup>At the time of independence, Pakistan's population was only 32.5 million. It is around 170 million presently. Pakistan is still counted among the high fertility countries having a large proportion of young adults and children. The median age of population has increased from about 18 years in 1998 to 22 years in 2008.

<sup>2</sup>Currently, Pakistan is most urbanised nation in South Asia where 36 percent of country population is living in cities. The rate of urbanisation in Pakistan during 2005-2010 was 3 percent per annum. In 2005, more than half of the total urban population was living in urban areas of 8 big cities, i.e. Karachi, Lahore, Faisalabad, Rawalpindi, Multan, Hyderabad, Gujranwala and Peshawar. It is expected that by 2030, the rural-urban population ratio shall be 50:50 [Pakistan (2010)].

<sup>3</sup>MDG-1 calls for halving hunger and poverty by 2015 in relation to 1990.

the developing world. Pakistan is no exception. To achieve food-secure and pro-poor agricultural growth, Pakistan needs to adopt a comprehensive approach towards increasing productivity of all foods rather than merely concentrating upon achieving just wheat-based food security. Moreover, for benefiting from adoption of new agricultural technologies, the farm households should be able to finance expensive inputs and diversify their livelihoods through optimum farm and non-farm sectors' employment mix.

Managing food security in Pakistan also requires an understanding about its dimensions; future challenges of agricultural growth and food security; and impact of agricultural policies on food supply and income, the poor vulnerable in rural and urban areas; and what are do-able options. Thus, the main focus of this paper is to trace the pathways to achieve food and nutritional security for a growing population in Pakistan.

This paper is organised into seven sections. Section 2 discusses food security concept. Section 3 analyses food security situation in Pakistan in terms of food availability trends, its factors and nature of food security in the future. Section 4 critically evaluates Pakistan's food and other policies. Future challenges are discussed in Section 5. The ways forward are described in Section 6. Section 7 concludes the paper.

## 2. WHAT IS FOOD SECURITY?

*Food security is the people's right to define their own policies and strategies for the sustainable production, distribution and consumption of food that guarantees the right to food for the entire population, on the basis of small and medium-sized production, respecting their own cultures and the diversity of peasant, fishing and indigenous forms of agricultural production, marketing and management of rural areas, in which women play a fundamental role.*<sup>4</sup>

The history of food security dates back to the Universal Declaration of Human Rights in 1948 in which the right to food was recognised as a core element of standard of living and also to the world food crisis of 1972–1974. The food security concept continued developing overtime and approximately 200 definitions and 450 indicators are now available in the literature.<sup>5</sup>

The term “food security” refers the access to adequate amount of food for meeting dietary energy needs that implies for many as self-sufficiency as producing required food domestically [Pinstrup-Andersen (2009)]. A country is self-sufficient in food when it can manage the balance between supply and demand by producing domestically—no matter what the equilibrium price would be that could be beyond the reach of majority of the population in a developing economy.

The focus of national and global food security is generally on the supply side of the food equation—whether sufficient food is available [Pinstrup-Andersen (2009)].<sup>6</sup> The availability of food however cannot assure its access to the people. To ensure food security at the household or individual level, the access part needs to be addressed. This

<sup>4</sup>Final Declaration of World Forum on Food Sovereignty, 2001.

<sup>5</sup>Maxwell and Frankenberger (1992) listed 25 broadly defined indicators. Riely and Mook (1995) listed 73 indicators, somewhat more disaggregated than those mentioned in Maxwell and Frankenberger (1992). Chung, *et al.* (1997) note that even a simple indicator such as a dependency ratio can be used with many different permutations. They list some 450 indicators [Hoddinott (1999)].

<sup>6</sup>The term food is meant as dietary energy.

led the World Food Summit in 1996 to redefine the term as '*food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life*'. This definition encompasses five fundamental aspects: availability, access, stability, nutritional status and preferences of food. All of these components are influenced by physical, economic, political and other conditions within communities and even within households, and are often destabilised by shocks such as natural disasters and conflicts [UK Parliament (2006)].

The *availability and access* are two important dimensions of food security. The *availability* refers to sufficient quantities of quality/nutritious food available to every individuals in the country. However, even with sufficient availability of food at the country level, food availability is a serious concern in areas having armed conflicts, non-availability of arable lands, and existence of prolonged droughts—this is true for many areas in Pakistan. The distribution of food stuff in these areas is also faulty.

The *access* refers to the capacity to produce, buy and/or acquire appropriate nutritious food by the households and the individuals [Timmer (2000)]. Having access requires that sufficient food is consistently available in the market. But, the availability of sufficient food at country/local level does not guarantee that all people are food secure, since low incomes, lack of roads and infrastructure could deny access to desired quantities of quality food [UK Parliament (2006)]. Therefore, both availability and access parts of food security are inseparably inter-linked [Pinstrup-Andersen (2009)].

The access entails both physical access and economic access—the former refers to a place where food is available and the latter denotes 'entitlement' to food [Sen (1982)]. The former requires efficient market infrastructure to have access of people at low cost. The *entitlement* can be ensured either by own production or having food buying capacity or having access/right to other sources of getting desired food [Staaaz, *et al.* (2009)]. Therefore, 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); Herrmann (2006)].

*Stability* refers to consistent supply of nutritious food at the national level as well as stability in access to food at the household and individuals levels. It is therefore directly affected 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, besides production, 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 Pakistan. At times, the government has to import significant quantities of food items to meet the shortages. In order to meet the shortages in deficit/urban areas and save consumers from high food prices, the government has 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*' that is required for an active and healthy life. For an active and healthy life, the human body has to effectively utilise the available nutrients in the food consumed [Staaaz, *et al.* (2009)]. Biological food absorption is affected by food preparation and health condition of an individual—influenced by sanitation, clean drinking water, and knowledge of the

households regarding proper food storage, processing and basic nutrition.<sup>7</sup> Furthermore, the *preferences for food* add another dimension to food security that relate to the social and religious norms. People with equal access to food but having different food preferences based on religion, society norms, taste *etc* could demonstrate totally a different nature of food security. The foods are to be socially and culturally acceptable and consistent with religious and ethical values [Pinstrup-Andersen (2009)].

The above discussion wrapped around various dimensions of food security—availability, accessibility, stability, nutritional status and preferences, in general and in Pakistan in particular, highlights the fact that achieving food security is difficult, complex and challenging phenomenon. In view of the recent surges in food prices and policy shifts in response by various countries in panic further sparked off uncertainty that even led to the developed nations to think of “whether their own food security is in peril” [Fullbrook (2010), p. 5]. Moreover, the countries lacking food production potential and could afford to import their food needs started looking for chunk of agricultural lands across the borders to ensure uninterrupted food supply—overlooking a fundamental reality that when the locals of the host country are short of food who would guard the supply off to them? The considerations of the world are mainly confined to assuring steady supply of affordable nutritious food, but are missing the fundamental issue of ‘security’—food is basically energy for humans without which “we are all dead” and thus should be viewed as a “security good” [Fullbrook (2010), p. 6].

### 3. FOOD SECURITY SITUATION IN PAKISTAN

#### 3.1. Trends in Food Production, Availability and Food Security

Agricultural production is the foundation of food availability, especially for calories and proteins. Adequate food supply at affordable prices is the cornerstone of food security policy of all nations of the world including Pakistan. Pakistan has made significant progress in terms of increasing food supplies. Per capita availability of cereals increased from 120 kilograms in 1961 to 137 kilograms 1990-91 and further increased to 154 kilograms in 2008-9 [Ahmad, *et al.* (2010) and Table 1]; of which, more than 80 percent is accounted for by wheat alone. The government of Pakistan has tried to maintain per capita daily availability at the level of 2400 calories since early 1990s—that increased from 1754 calories in 1961 (Table 2). However, this daily average calories availability is substantially lower than the average of other developing and developed countries by 10 percent and 26 percent, respectively. The changes overtime in the composition of food intake show a shrinking share of wheat in total calories availability and a rising share of animals and other sources (Table 2). The share of wheat declined from 48 percent in 1990 to 38 percent in 2006, while the share of other cereals declined more prominently from 20 percent in 1970 to 6 percent in 2006. The share of livestock products in calorie intake increased from 12 percent in 1970 to 18 percent in 2002, which marginally declined to 15 percent in 2006. The share of other items—vegetable oil, vegetable, fruit and sweeteners, has substantially increased from 20 percent in 1970 to 37 percent in 2006.

<sup>7</sup>For example, in Hyderabad, contaminated water took 10 lives and 1000 people were hospitalised over the course of two months in 2004. Khan, *et al.* (2002) reported that 51 percent of the vegetable produce was unsuitable for human consumption due to excess chemical residues.

Table 1

*Per Capita Availability of Food in Pakistan*

Years	Per Capita Annual Availability (kg/person/annum)							Per Capita Daily Avail. (Grams)
	Food Grains	E.Oil/Ghee	Meat	Milk	Fruits	Vegetable	Total	
1990-91	137.44	9.99	13.90	60.93	47.73	23.49	293.48	804.06
1991-92	144.18	13.07	14.38	62.26	48.30	27.70	309.90	849.03
1992-93	149.93	12.50	15.48	63.09	49.06	24.45	314.51	861.68
1993-94	158.80	10.50	16.07	64.60	53.65	27.20	330.82	906.35
1994-95	138.20	12.19	16.51	66.07	55.63	28.84	317.45	869.72
1995-96	148.55	11.42	17.25	67.16	56.23	27.03	327.64	897.64
1996-97	153.95	10.46	17.87	68.58	55.34	29.98	336.19	921.06
1997-98	161.07	11.59	14.00	81.45	56.48	31.11	355.70	974.53
1998-99	167.25	12.38	14.13	81.72	56.07	29.04	360.59	987.93
1999-00	158.83	11.08	14.19	82.15	52.23	24.55	343.03	939.80
2000-01	136.51	11.48	14.42	82.92	51.31	28.65	325.29	891.20
2001-02	135.53	10.67	14.50	83.45	51.29	25.35	320.78	878.85
2002-03	142.38	10.77	14.65	84.28	50.36	26.65	329.09	901.61
2003-04	143.83	11.16	14.74	84.42	47.82	28.23	330.20	904.66
2004-05	142.58	12.35	15.19	85.50	52.64	26.17	334.42	916.23
2005-06	140.98	12.75	16.33	90.30	51.25	31.18	342.79	939.14
2006-07	144.79	12.81	16.70	94.54	50.04	29.79	348.67	955.26
2007-08	155.04	13.29	17.00	93.93	53.71	31.23	364.20	997.79
2008-09	153.99	13.45	17.50	94.81	52.88	24.06	356.69	977.22

Source: Farooq, *et al.* (2009).

Table 2

*Per Capita Availability of Calories and Shares of Various Sources*

Year	Total		Wheat		Other Grains		Pulses		Animal		Others	
	Calories	%	Calories	%	Calories	%	Calories	%	Calories	%	Calories	%
1961	1754	100	742	42	342	19	114	6	260	15	296	17
1970	2203	100	984	45	438	20	77	3	257	12	447	20
1980	2124	100	967	46	304	14	49	2	261	12	543	26
1990	2410	100	1153	48	274	11	58	2	309	13	616	26
1995	2345	100	1048	45	212	9	59	3	353	15	673	29
2000	2447	100	1000	41	244	10	68	3	436	18	699	29
2001	2426	100	1000	41	256	11	58	2	436	18	676	28
2002	2419	100	999	41	275	11	59	2	437	18	649	27
2003	2320	100	945	41	108	5	61	3	322	14	886	37
2004	2231	100	897	40	107	5	62	3	321	14	844	38
2005	2271	100	914	40	108	5	63	3	325	14	861	38
2006	2423	100	930	38	110	6	65	3	330	15	888	37

Source: Ahmad, *et al.* (2010) (Table 5.7 updated).

Domestic production, net trade and food aid are the main constituents of food availability at the national level. Despite more than 3½ times increase in cereals and pulses production since early the 1960s, Pakistan has been importing significant quantities of wheat, pulses and edible oil to meet domestic needs. The share of imports in wheat consumption during the 1961-2006 has varied from 26 percent in 1961 to less than 1 percent in 2004 (Table 3). The huge food deficit during early 1960s largely reduced during 1970s as a result of Green Revolution technologies. The dependence on wheat imports however, re-emerged later because of stagnation in wheat productivity. In contrast, Pakistan has been successfully producing enough rice for domestic consumption and even its significant quantities are also exported [Ahmad, *et al.* (2010)].

Table 3

*Food Balance-Sheet for Wheat (Quantity in '000' tones)*

Year	Production	Imports	Stock Change	Exports	Total	Feed, Seed and others @ 10% of Production	Availability	Import Share
1961	3814	1080	-308	0	4586	385	4205	25.69
1970	7294	229	336	108	7751	729	7022	3.26
1980	10856	604	-1217	3	10240	1086	9154	6.60
1990	14316	2047	-691	2	15670	1432	14238	14.38
1995	17002	2500	-1399	0	18103	1700	16403	15.24
1996	16907	2500	-2539	0	16868	1691	15177	16.47
1997	16650	4088	-3487	0	17251	1665	15586	26.23
1998	18694	2023	-2181	0	18536	1869	16667	12.14
1999	17856	2006	-2061	0	17801	1786	16015	12.53
2000	21079	80	3045	80	24124	2108	22016	0.36
2007	23295	1820	-936	530	23649	2330	21320	8.54
2008	20959	3188	-1867	142	22138	2096	20042	15.91
2009	24033	0	5000	0	29033	2403	26630	0.00

Source: Ahmad, *et al.* (2010) (Table 5.8 updated).

One of the important indicators of economic access to food is the proportion of people below the poverty line [FAO (1998)]. The historical evidences show that: poverty increased during the 1960s despite rapid economic growth; it declined during 1970 through 1987-88 in spite of the growth being relatively slower; the declining poverty trends got reversed in 1990s albeit with reasonable rate of economic growth; and during 2000s poverty continued to rise in the face of uncertain economic growth. Nevertheless, the daily average availability of calories per person progressively increased over the last five decade—even though this availability has not been consistently reflected in declining poverty.

Despite significant improvement in aggregate food supply, malnutrition is a widespread phenomenon in Pakistan [Ahmad, *et al.* (2010)]. Rather, it has been argued that per capita food intake in the country has been higher than the recommended average at the national level [Khan (2003)]. Nevertheless, one third of all pregnant women were malnourished and over 25 percent babies had low birth weight in 2001-2. Malnutrition was a major problem responsible for more than 30 percent of all infant and child deaths in the country in 2001-02. The incidence of moderate to severe underweight, stunting, and wasting among children of less than 5 years of age was about 38 percent, 37 percent and 13 percent, respectively in 2001-02 [Planning Commission and UNICEF (2004)]. Malnourishment among mothers as reflected in body mass index was 21 percent in 2001-02 [Khan (2003)]. The overall undernourishment reported by FAO (2008) was about 24 percent in 2004, which is not only worst in South Asia after Bangladesh but this has been observed to be increasing over time. Micronutrient deficiency is pervasive in Pakistan, which 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 soil especially for iodine and zinc [Pakistan (2010)]. 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 in Pakistan. This indicates that despite having sufficient food available at the national level, a large chunk of our population mostly the children and the women lack access to nutritiously balanced food.

The foregoing discussion highlights the fact that enhanced food security on its own cannot guarantee good nutrition status at the household level [Fullbrook (2010)]. Thus, greater national level food availability in Pakistan 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 worsening income and landholdings inequality in the country. A rising calorie-based poverty implies that most people had declining access to nutritious food. In addition, disparities in access to education and health may also be crucial. Therefore, simply emphasising 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)].

### 3.2. Nature of Future Food Insecurity

In view of continuously rising population, the food demand in the country shall naturally increase. However, it is worth mentioning that future food demand would be different from today's because of the factors like: (a) increased proportion of older people due to age longevity; (b) greater urbanisation and emergence of big cities; (c) changes in family composition and structure; (d) changes in food consumption patterns and habits; (e) prevalence of diseases like Cardiac, Diabetic and Hepatitis etc. having special food requirements; and (f) rapid penetration of Super Markets and international Food Chains in developing countries. To target such diversions in food consumption in future, the major focus should be to incentivise the agricultural production to future needs. Thus, production system needs to be channelised towards higher production of fruit, vegetable and other high value commodities.

In Pakistan, about 68 percent of population earns their livelihood from agriculture sector to a varying extent. Livestock and crops sub-sectors contribute up to 28 percent and 24 percent towards rural households overall income, respectively. The non-farm enterprises, wages and services, remittances and other sources contribute 20 percent, 18 percent, 7 percent, and 3 percent, respectively. In rural Pakistan the economic access to food is mainly influenced by household level differences in land holding, education and employment. Decreasing size of land holdings besides inability of the economy to generate new employment limits productivity growth and rise in farm incomes.

Even though the food is predominantly produced in rural areas of Pakistan, yet a majority of the poor have lower economic access to food as compared to urban areas [World Bank (2008); Staatz, *et al.* (2009)]. Reliance on markets to obtain food for most of the food insecure people both in urban and rural areas is a common feature. The dependence of the urban poor on food markets is very well-known and documented, while the reliance of most of the rural food insecure among landless, marginal and small sized farmers' classes is rarely acknowledged [Staatz, *et al.* (2009)]. In addition to landless rural inhabitant (45 percent) more than 30 percent of the cultivators are net buyers of food staples—accounting 62 percent of the rural population who are either partially or totally dependent on market for food needs [Ahmad (2010)].

Unfortunately, the government efforts in providing relief to consumers and the subsidy involved in food staples are rarely meant for these rural households. Furthermore, the access to factors affecting the biological food absorption including sanitation, clean drinking water, and knowledge regarding proper food storage, processing, basic nutrition, and health facilities, infrastructure etc. is very poor in rural areas. The access to these indicators in food insecure rural areas is even overwhelming shocking. Therefore, improving market infrastructure, arranging safety net programs, provision of better education and health facilities could be the central elements of any strategy to reduce chronic food insecurity in both rural and urban areas in future.

#### 4. FOOD SECURITY POLICIES AND THEIR IMPLICATIONS

It is generally believed that there are *two major policy failures* that lead to uncertainty in food security and increase in poverty in the developing countries including Pakistan. These policy failures include hasty withdrawal of state from the agriculture sector under the structural adjustment programs and paying no attention to setting up essential institutional infrastructure to exploit farm-nonfarm sectors' nexus. This chaotic move resulted into reduced investment in research and development not only by the national governments of the developing countries but international donor agencies also withdrew their support [Zezza, *et al.* (2007)]. As a result of non realisation of intrinsically interlinked sectors and simultaneous policy moves—retreating from support without providing alternative pathways, agricultural productivity declined and incidence of rural poverty increased leading to greater reduction in access to food. That perpetuated further into poverty-food insecurity helix. Pakistan never had any national food policy except launching a few food security programs at the regional levels [Mittal and Sethi (2009)].

Social protection covers both the safety nets and social security programs. World Bank<sup>8</sup> in its recent publication has classified the total spending on social protection in Pakistan in two broad groups: (i) safety nets which include cash transfers, social welfare services, human capital accumulation and wheat subsidies; and (ii) social security comprising public sector spending on civil services pensions, and private sector sponsored welfare fund and cost of employees social security institutions. Asian Development Bank<sup>9</sup> decomposed the social protection spending in Pakistan into the following categories: (i) labour market programmes; (ii) social insurance programmes; (iii) social assistance and welfare programmes; (iv) micro and area based schemes (community based); and (v) child protection programmes. Detailed discussion regarding these programs is beyond the scope of this paper. However, we would touch upon briefly the safety nets in Pakistan.

Pakistan has a number of safety nets programmes implemented by various Ministries. The main two cash transfer programmes are: (i) Pakistan Bait-ul-Mal<sup>10</sup> working

<sup>8</sup>Social Protection in Pakistan: Managing Household Risks and Vulnerability. World Bank, October 2007.

<sup>9</sup>Scaling Up of the Social Protection Index for Committed Poverty Reduction. Final Report. Volume 1. Multi Country Report, Halcrow China Limited. Prepared for Asian Development Bank, November 2007.

<sup>10</sup>Pakistan Bait-ul-Mal (PBM) disburses to the destitute, needy, widows, orphans, invalids and infirm irrespective of their gender, caste, creed or race. PBM provide assistance under different programs and schemes, such as Food Support Programme (FSP) carrying major share followed by Individual Financial Assistance (IFA), International Rehabilitation through civil society wing, National Center for Rehabilitation of Child Labour (NCRCL), Vocational Training Institutes/Dastkari Schools (VTIs) [Pakistan (2010)].



under the Ministry of Social Welfare and Special Education,<sup>11</sup> and (ii) *Zakat*<sup>12</sup> and Usher schemes administered by the Ministry of Religious Affairs<sup>13</sup> [Pakistan (2010a, b)]. Other programmes including school feeding, safe motherhood and child nutrition, etc are providing assistance to about 2 million households. These programmes are being implemented by the provincial education and health departments with the assistance of WFP, WHO, UNICEF and UNESCO. Recently, Government has introduced Benazir Income Support Programme (BISP) to cater the needs of the “poorest of the poor” sections of the society. Under this program, Rs 46 billion rupees were disbursed in 2009-10, while Rs 50 billion is allocated under this scheme for the year 2010-11 [Pakistan (2010b)].

The above mentioned cash transfer programmes follow different modalities for identification of beneficiaries, targeting mechanism, coverage and outreach, due diligence and monitoring mechanism. A number of issues worth noting in these programs include: (i) most programmes are fragmented, duplicative and disjoint with no coordination mechanism; (ii) they are thinly spread and have poor coverage, and often exclude marginal and people in remote areas; (iii) at present, the main criterion used for identification of recipients is poverty which exclude transitory poverty and vulnerable shocks particularly people having low human capital and access to productive assets; (iv) absence of standardised eligibility criteria (operational definition) and lack of transparency in identification ultimately leading to inclusion of ineligible and exclusion of needy and deserving one; (v) the payments are small as they represent 10 percent to 20 percent of the consumption need of the household; (vi) the disbursements are irregular and lumpy; and (vii) the annual payments are not adjusted for inflation or cost of living [FAO (2008)].

On the supply side, various agricultural projects have been undertaken by the government of Pakistan resulting into a significant increase in the productivity of food crops. These programs include development of irrigation, roads, market infrastructure, and investment in agricultural research and extension. The empirical studies has shown that investment in research and development has paid off in terms of increasing agricultural productivity, raising family earning, nutrition which in turn supported rise in labour productivity, and better health and well being of people. Keeping in view the importance of agriculture and ensuring food security on sustainable basis, the government of Pakistan started a Special Program for Food Security (SPFS) with major support from FAO. The SPFS project was piloted initially in three villages including two sites in Punjab and one in Khyber Pakhtunkhwa with twin objectives: (1) to ensure the adequacy and access to food supply; and (2) to maintain the stability in agricultural production. The major focus of this program was on enhancing agricultural productivity and profitability of the major food crops—wheat, rice, maize and oilseeds, on a sustainable basis. The

<sup>11</sup>In July-March period, Pakistan incurred Rs 2.7 billion to 1.438 million beneficiaries in 2008-09, Rs 1.65 billion to 1.11 million beneficiaries in 2009-10 financial year and allocated Rs 2 billion for 2010-11 [Pakistan (2010a,b)].

<sup>12</sup>Zakat provides financial assistance such as *Guzara* allowance, educational stipends, health care, social welfare/rehabilitation, Eid grans and marriage assistance through regular and other *Zakat* programmes and national level schemes [Pakistan (2010)].

<sup>13</sup>In July-March period, Pakistan disbursed Rs 1.421 million to 0.538 million beneficiaries during 2008-09, Rs 0.404 million to 0.538 million beneficiaries in 2009-10 financial year. More than half of the *Zakat* fund is disbursed through regular *Zakat* programmes [Pakistan (2010a,b)].

project was first up scaled to 109 villages in May 2002 under the name of Crop Maximisation Program (CMP-I) and then extended to 1012 villages all over Pakistan in 2008 (called CMP-II), totally sponsored by the Government of Pakistan. The results of the SPFS were encouraging at two sites in Punjab on the basis of which 109 villages brought under this net in the name of CMP-I. The performance of CMP-I was dismal [Ahmad and Iqbal (2006)]. Despite that the CMP-II was initiated in 1012 villages in Pakistan with a target to extend it to 13000 villages. The success of this program is also being seriously questioned by the stakeholders and professionals.

The major focus of Pakistan's food security has remained on supply side that mainly revolved around maintaining wheat self-sufficiency only. The production and marketing of other food crops is left on market forces. Government procures and maintains operational as strategic reserves of wheat and resells through flour mills after covering the cost of storage, handling, and other incidentals. The annual cost of subsidising wheat is massive as the leakages in procurement system, storage and the milling sector have significant hidden costs. Given these leakages, the benefits accrued to intended beneficiaries do not commensurate with the subsidy involved. Other food related subsidies were also provided for addressing the food security of poor urban sections of the society include food items sold through Utility Stores Corporation (USC) at subsidised prices. Rs 36.9 billions were spent on various food related subsidies in 2009-10, while Rs 27.044 billions are allocated for the current fiscal year [Pakistan (2010c)].

Ahmad, *et al.* (2006) evaluated various seasonal phases of wheat marketing over the period 1996-97 to 1999-2000. Using partial equilibrium analysis<sup>14</sup> the study showed that total producer welfare loss was Rs 37.96 billion including policy cost to government amounted to Rs 11.05 billion. The overall financial loss was about Rs 3.37 billion, reflecting mainly the difference between gain to the millers, and the subsidy provided by the government—a gap apparently unaccounted for in the system. The study also highlights the fact that the consumers are subsidised at the expense of the farmers, and the millers absorb almost all the subsidy provided by the government to implement wheat policy.

Ahmad, *et al.* (2010) concluded that marketing costs incurred by government-owned departments are significantly higher than that of incurred by the private traders. Corruption is pervasive in commodity marketing, particularly in the public sector. Rent-seeking activities increase transaction costs and uncertainty, discourage marketing investment and participation—ultimately leading to negative fiscal impact for the government.

To supplement the above conclusions, we analyse the current government intervention in food marketing where government tried to achieve wheat self-sufficiency in 2008-09. The support price for wheat was raised from Rs 650/40-kg to Rs 950/40-kg besides providing heavy subsidy on fertiliser. As a result, Pakistan has been enjoying self-sufficiency in wheat for the last two years. The country also has a history of

<sup>14</sup>They analysed quantities—production, home consumption, feed, seed, and wastage; government procurement and open market sales; imports and marketed consumption; prices—government support, issue price, wholesale price, import parity price, government's import price; and costs—government storage cost and private storage cost.

carrying-over high wheat stocks: 3.552 million tons in 2000-01; 3.683 million tons in 2001-02; and 4.223 million tons during 2009-10 while procured another 6 million tons slot from 2009-10 wheat crop—resulting into a stock of 10 million tons with the public stores. Historically, the government of Pakistan has been releasing wheat on average more than 5 million tons of annually from its stocks. This indicates that the carryover stock for 2010-11 shall be more than 5 million tones.

Managing nearly half of national wheat production procured by the government heavily costs to the national exchequer (about Rs 30 Billion per annum). Government borrowing for maintaining wheat reserves accounts more than Rs 414 billion—Punjab and PASSCO are major credit takers. What monetary damage has been done due to this poor food stocks management policy is a question which an ordinary student of development studies can ask. A simple comparison of the value of wheat lying in public sector stores and the amount of bank loans shows that the credit amount is much higher than the value of wheat stored, i.e., total value of wheat is equal to Rs 262.5 billion *vis-à-vis* bank loan of Rs 414 billion. It means the provincial and federal governments would not be able to pay the loan from the stored wheat even if they export its each and every grain (Table 4).

Table 4

*Policy Decision Regarding Export of Wheat from Pakistan 2010-11*

Items	Punjab	Sindh
Wheat procurement price paid by the government (Rs/40-kg)	950	950
Incidental charges (Rs/40-kg)	70	70
Annual wheat storage charges paid by the government (Rs/40-kg) (Based on Rs 2 billion per month for storing 10 million tons of wheat)	250	250
Wheat cost at PASSCO/Provincial Food Department's Stores (Rs/40kg)	1270	1270
Export parity price at Karachi in f.o.b. terms (Rs/40-kg or Rs/ton)	1070 (26750)	1170 (25500)
Government release price for export purposes (Rs/40-kg or Rs/ton)	1000 (25000)	1000 (25000)
Loss to the government at release price (Rs/40-kg or Rs/ton)	270 (6750)	270 (6750)
Loss to national exchequer by allowing export of 1 million ton (Rs)	6.75 Billion	6.75 Billion
Loss to Punjab government by allowing export of 3.5 million ton (Rs)	23.625 Billion	Not Applicable
Total value of wheat lying in government stores at its release price (Rs)	262.5 Billion	
Total amount of credit payable by provinces, PASSCO and TCP (Rs)	414 Billion	
Total government earning by exporting 3.5 million ton (Rs)	75 Billion	

*Note:* Figures in parentheses are on per ton basis.

The above discussion clearly indicates the following major flaws in the existing wheat policies: (a) producers hardly benefit from these policies both in terms of sustainable increase in production and better marketing opportunities; (b) benefits to consumers were also partial, as the major chunk of benefit goes into the pockets of the flour millers; (c) serious distortions in wheat and wheat flour prices through undue government interventions in terms of un-targeted subsidies; (d) considerable inefficiencies in managing wheat surpluses as the quantities procured were beyond the storage capacities available with the government departments—hiring private storage facilities at a huge cost to the nation; (e) exchequer being additionally burdened by

providing highly subsidised wheat flour to the public and schemes like “cheap bread”; (f) generated massive inefficiency in flour milling sector; and (g) target population is generally not effectively being dealt with and in particular the rural poor lack access to most of the safety nets.

## 5. FUTURE CHALLENGES

As discussed above, both supply- and demand-side issues of food security need to be addressed to achieve sustainable food security. Pakistan has enormous potential to further develop its agriculture sector upon which about 2/3rd of population is directly or indirectly depends for their livelihood. However, Pakistan economy is experiencing structural transformations and the role agriculture in economic development is changing fast—its share in national GDP is declining faster than proportion of labour seeking livelihood from this sector, and a very small proportion of farms experiencing fast modernisation, while majority of the farmers are resource poor and operate in low-input, low-output scenario. Therefore, Pakistan has to adapt three-prong strategy—developing farm and non-farm sectors as well as reducing polarisation within agriculture sector either by helping the inefficient farmer to approach the frontier or helping them to finding alternative livelihood in the non-farm sector. However, in this section we shall mainly discuss the production side challenges.

At current rate of population growth, Pakistan needs to increase substantial food production to feed a growing population with some modest surpluses for export. Substantial increase in crop productivity has to be targeted using lesser land and water resources than are available for agriculture today. One is not sure of achieving individual milestones in the fast changing dynamic world, but one thing is to be believed that agriculture must maintain a growth rate of more than 5 percent in order to ensure a rapid growth of national income, attaining macroeconomic stability, effective employment of growing labour force, securing improvement in distributive justice and a reduction in rural poverty in Pakistan.

*“Food security is possible well into the future. Science provides the tools, agricultural research the modality, intellectual insight the design of the next revolutions that will help smallholder farmers improve their square yard of earth, and help the world to keep pace with population growth”*(Austin, undated).

### 5.1. Sources of Growth in Agriculture

Three major factors that influence the supply side of food include: (1) the higher use of conventional inputs;<sup>15</sup> (2) increase in total factor productivity (TFP);<sup>16</sup> and (3) the targeted transformations in the institutional setup that assist the agriculture sector. These sources of growth are interrelated and the contribution of one is dependent on the effectiveness of the other.

*Higher Use of Inputs and Farm Size:* Two major *inputs* in agriculture are land and water. The prospects of allocating more of these vital inputs are limited. Rather, both land

<sup>15</sup>This pertains to the economies of size and indicates the movement of the producer along the best practice production frontier.

<sup>16</sup>That refers to shifting of the production frontier upwards by R&D efforts.

and water resources are facing declining trend in supply caused by land degradation<sup>17</sup> and fast expansion of cities. The chances for bringing unused or marginal lands under cultivation are also meager because the quality of such lands is poor and the investment to increase productivity in these lands may be uneconomical and unsustainable [Fullbrook (2010)]. The intensive use of land (cropping intensity) is another source of increasing agricultural output that too has reached even in the vicinity of 200 percent in certain irrigated areas indicating no chance of going beyond that. Similarly, the use of inputs like *fertilisers and pesticides* cannot be increased beyond certain limits because of national health and environmental concerns. Furthermore, due to increasing prices of fertiliser, energy and declining water availability the already declining rate of growth in use of chemicals has turned into negative in recent years. However, alternative sources of nutrients need to be explored and popularised. The use of biocides is observed to be declining in a number of countries and a few of them are even returning to organic farming.

The other inputs include *farm machinery*—tube-wells, tractors and implements, the supply of which once increased significantly is now facing the declining rate of change in growth. The available farm machinery is more suited to large farms, and thus the farm machinery research has to be redirected to explore and improvise mechanisation suited to small farmers (i.e. reverse mechanisation favouring small farmers). The machines required for harvesting and post-harvest handling and small scale value addition are yet to be developed and popularised.

As regards the *farm size*, Pakistan has a highly skewed distribution of farm lands.<sup>18</sup> 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 unequally. The poor small farmers use 30 percent to 50 percent less of various factors of production than the use at rich farmers—leading to lower land productivity, greater poverty and food insecurity. All inputs combined have been contributing towards agricultural output growth ranging from 25 percent-50 percent during 1990s in Punjab [see Ahmad (2003); and Ali and Byerlee (2000)]. Thus in future, there are only limited chances of inputs intensification and increasing the agricultural output—approaching upper bound through these resources.

*Increase in Total Factor Productivity (TFP)*: 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 differ widely and range from 0.37 percent to 2.3 percent dominating the share of TFP in output growth. The studies have also shown the signs of declining TFP growth because of deteriorating land and water resources [Ahmad (2003); Ali and Byerlee (2000)]. There is strong empirical evidence

<sup>17</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 percent to 80 percent, and as a result from slight to moderately affected patchy lands agricultural output declined by more than 30 percent [see Ahmad (2003)].

<sup>18</sup>In 2000, about 58 percent of total farmer had less than 5 acres land and operating only 16 percent of total available cultivated area. In contrast, only 6 percent farms having more than 25 acres of land were operating 32 percent of the total cultivated area. The situation in some provinces is rather more serious.

that high levels of research and development (R&D) investments lead to high productivity and eventually to increased economic performance. A strong relationship between agricultural output and outlays on agricultural research and extension exists in Pakistan—about 32 percent rate of returns on such investment has been observed [Khan and Akbari (1986)]. Another recent study by Kiani, *et al.* (2008) found that investment in agricultural research resulted in attractive returns in Pakistan ranging from 49-78 percent—highest returns of 57-88 percent in Punjab province followed by that in Sindh (24-48 percent). While R&D activities are important, these must be supported by favourable policy instruments, human resource development, necessary physical and institutional infrastructure etc.

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

*Targeted Transformations and Institutional Setup Assisting the Agriculture Sector:* The third major factor contributing towards agricultural growth is the policy targeted institutional reforms including agricultural extension, education and credit, and improvement in the functioning of input and output markets [Saris (2001)]. The existing institutions have further deteriorated the disparity between the rich/large and the poor/small farmers in rural Pakistan by offering greater access to influential and well-off farmers. Moreover, the agricultural price policies in Pakistan remained anti-producers and tended to slow down the growth. Under the Structural Adjustment and Stabilisation Programmes (SAP) the government of Pakistan removed all the input subsidies during the 1990s resulting into many fold increase in input prices and thus greater cost of production—squeezing the profitability of the a sector in general and of poor farmers in particular. While implementing the directives from IFIs the state’s role was quickly reduced/withdrawn without redirecting enhanced public sector focus on rural development to neutralise the policy effects on agriculture. The negative effects became more pronounced when the private sector investments lagged behind as well.

## 5.2. Constraints

The major hurdle to develop the agriculture sector of Pakistan in general and food grains production in particular is the lack of holistic policy approach—intervening in one or more commodities leaving others on the behest of market forces used to result in frequent supply and demand imbalances in other commodities. Efforts in correcting these divergences turned often bad for the others. Such partial policy dynamics reduced the process of commercialisation and specialisation in agriculture and also decelerated the growth in agricultural productivity, particularly in food grains. The analysis of a recently published study by Falkenmark, Rockström and Karlberg (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 in Figure 1. 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”* (p. 65).

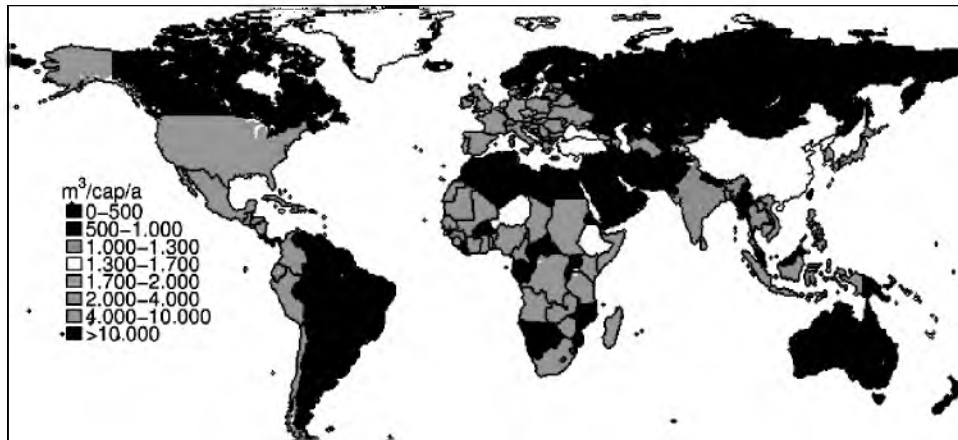


Fig. 1.

Figure 1 Countries colour 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.* (2008) cities in Falkenmark, *etc.* (2009).

Other factors influencing the food security in Pakistan are the outcomes of both partial policies and the neglect of R&D activities including: (a) fluctuating food grains production—generally below the domestic requirements; (b) the slow pace of varietal development in pulses, oilseeds and fodder crops with non-existence of seed marketing system for these crop groups; (c) the almost dependence of vegetables sector on imported seed; (d) poor marketing infrastructure unable to insure timely availability of quality inputs;<sup>19</sup> (e) low genetic potential of available varieties and slow varietal replacement because of unaffordable high prices of certified seed; (f) presence of serious governance issues in food procurement, marketing and distribution system; and, (g) inability of poor farmers to respond to food price hikes due to simultaneous rise in input prices and having no or very small marketable surplus available with them on output side to finance to.<sup>20</sup>

## 6. WAY FORWARD

*“A precautionary approach would put food first because if it is not secure, even sovereign, then the security of society is put at risk. Putting food first, will require the reordering of priorities and recognition of the fundamental value of food in securing life and supporting society. As food secures life and the mission of*

<sup>19</sup>Major area of wheat now falls in rotation of various *kharif* crops like cotton, rice, sugarcane. A period of 1-4 weeks is available to the farmers between harvesting *kharif* crops and wheat planting. During this period farmer is pretty busy in disposing off previous crops as well as struggling for procuring inputs for wheat while market intermediaries (commission agents) do not clear their accounts on previous crops or delay the payments of their sale proceeds. Shortages in the availability of inputs like seed and phosphatic fertiliser finally converge at using low quality and levels of these vital inputs.

<sup>20</sup>Most of the food marketable surplus is generated by medium and large farmers. This is because 58 percent of farming population operates <5 acres of land and they are cultivating only 18 percent of total cultivated area. The farmers having 5 to 12.5 acres represent 28 percent of farming population and operate 30 percent of total cultivated area. In this way, farmers operating <12.5 acres represent 86 percent farmers and are cultivating 48 percent of total cultivated area in the country.

*national security is to secure society and defend its existence, it follows that food forms an intrinsic element of national security but one that is generally overlooked... Putting food first will strengthen the security in food security, thereby contributing to the comprehensive, sustainable security and well-being of citizens and society” [Fullbrook (2010), p. 7].*

The major hindrance in achieving food security in developing countries including Pakistan is the high levels of poverty, and thus poverty reduction is a most powerful tool to improve food security that can be achieved through equitable economic growth [Smith, *et al.* (2000)]. Smith, *et al.* (2000) further suggests various ways to achieve pro-poor growth: (1) by enabling the poor to participate in the growth process and increasing their access financial and productive resources and providing them physical and market infrastructure; (2) investing in human capital of the poor—provision of health and education that enables them to take advantage of new opportunities; and, (3) investing in the social capital of the poor—network, norms, and trust among members of communities that help coordinate and cooperate for members’ mutual benefit in the community [Moser (1996)]. In Pakistan most of the poor live in rural areas and are directly and/or indirectly dependent on the performance of agriculture sector. Besides improving food security of urban population, food security of rural households can be improved by increasing agricultural productivity.

For increasing agricultural productivity, a number of services and support institutions need to be either strengthened or to be created including developing IPRs (Intellectual Property Rights) for promoting R&D in private sector. The goals and priorities of the research have to be reformed both at the federal and provincial levels. An infrastructure of experiment stations in various ecological zones in partnership with the progressive farmers (small, medium and large, to evaluate the adaptability/applicability of the innovations under local conditions) need to be developed. Also, the same stations should be used as hub of trainings of extension people and farmers. The focus of commodity research needs to be shifted to system perspectives in order to enhance research impacts and income of the farming community.

Research policies have to be focused on cropping zones and their development to increase systems profitability. No egalitarian approach of one-size-fits-all shall apply. Basic and applied research including social sciences has to be focused on cropping systems/zones, since the zones are heterogeneous in socioeconomic, resource endowments and agronomic characteristics and the issues/problems differ significantly from each other. Moreover, the focus of commodity research needs to be shifted to system perspectives in order to enhance research impacts and income of the farming communities. In order to effectively implement this strategy, we have to reassess human resource requirements, research and extension infrastructure, and more importantly the academic curricula in the universities.

New programme interventions particularly in remote areas for training technicians in agriculture and non-agriculture enterprises also need to be initiated. Trained technicians can bring revolution in agriculture as well as in non-agriculture sectors. This is expected to increase access to food and help reduce food insecurity. In addition to human development, a well organised food assistance program in food insecure and low agricultural potential areas would enormously help reduce poverty and enhance access to food [Smith, *et al.* (2000)].



For all this to happen, the federal and provincial Ministries have to redefine their boundaries since these issues are provincial subject. The policy-makers need to think and establish system perspectives linking agriculture and non-agriculture sectors. This requires a close cooperation in policy, program formulation and implementation between Agriculture and other Ministries to foster rural and agriculture development in general and food sector in particular. For example, for proper programme planning, formulation and implementation the Ministries of agriculture, local government, water and power, labour and manpower, commerce and industry, and the environment cannot work in isolation.

All national policy initiatives must be scrutinised for their impacts on private sector investment as well as on rural wellbeing including farm and non-farm sectors.<sup>21</sup> Realising the farm-nonfarm nexus, appropriate institutional set up for coordination has to be set in place. Further, the financial institutions providing agricultural credit and microfinance need to be geared in favour of resource poor farmers and landless dominating not only the agricultural production system but also most of them are extremely poor and food insecure.

Socio-economic research could play a vital role in putting research on track for delivering specific outputs that are expected from the agricultural research system. For this purpose social sciences may be strengthened to assess research outputs in terms of sustainability, relevance/ equity, quality, comparative advantage, competitiveness, value addition potentials, resource conservation and profitability. Agricultural research system is still deficient in quickly aligning itself to the changing market situations and achieving sustainable higher quality production levels—particularly food commodities. Research planning lacks focuses on prioritising research, strategic planning, implementing demand driven research, independent assessment of research outcomes, planned promotion of viable research outcomes and developing public-private partnerships to promote/upscale technologies. Following are the priority research areas to be focused on:

- developing technologies both in terms of genetic modifications of crops that improve water productivity and bring breakthroughs in the use of saline water;
- improving systems' productivity by devising new practices for better soil fertility management, soil and water conservation, water harvesting, and integrated pest management, etc;
- cropping system based research to adjust to the climate change processes and combating natural resources degradation and improving system productivity;
- identification of factors responsible behind yield gaps and finding solutions to resolve stagnating productivity in different production systems;
- research in human food-safety issues in plant and animal origin food chain;
- developing technological packages to achieve low-cost and high quality products;
- enhancing balanced use of fertiliser and increasing organic matter availabilities; and
- encouraging small farmers' oriented corporate farming.

A few institutional initiatives may be undertaken immediately including:

- strengthening and reorganising Agricultural Policy Institute (API) so that besides farm economic analysis, I can handle macro level issues, particularly trade and policy analysis;

<sup>21</sup>This is called rural lens approach in Canada and in UK rural proofing [OECD (2007)].

- strengthening the existing (or establishing new if not existed) provincial Economic Research Institutes with bestowing additional mandate of food policy analysis; and
- establishing “*National Commission on Farmers (NCF)*”.

Role of the Government:

- Government should be proactive to the commodity crisis rather than act when the crisis already happened.
- There should be systematic commodity forecasting mechanism so that food demand-supply mechanism could more effectively be managed.
- A separate food security fund should be created, rather than diverting development resources in case the food production is below the national demands.
- Government may protect price bands in between import and export parity prices, rather than pan-territorial pricing that crowded out private sector.

## 7. CONCLUDING REMARKS

Reducing poverty, hunger and food insecurity are essential part of Millennium Development Goals. Pakistan is a low income developing country and agriculture is its most important sector due to its primary commitment of providing healthy food to her fast growing population. In past 60 years Pakistan, the total cultivated area has increased by just 40 percent, while there was more than 4 times increase in population with urban expansion of over seven-fold causing rising population pressure on cultivated land. Despite that wheat production has increased by five-fold, the country is still its marginal importer. Tremendous efforts are needed to narrow the gap between food demand due to population growth and domestic food production. Managing food security in Pakistan requires an understanding about how agricultural policies affect food supply and incomes, the poor vulnerable in rural and urban areas. The main focus of this paper is to trace the pathways to achieve/maintain food and nutritional security in Pakistan.

Unfortunately, the policy makers are only concentrating on attaining and maintaining self sufficiency in wheat production. Periodically, strong interventions are made in terms of significant increase in wheat support prices along with subsidising fertiliser prices to achieve bumper wheat crop. Such interventions seriously distort relatively profitability of cultivation of other *rabi* season food crops, e.g. other coarse grains, pulses and oilseeds.

On the other hand, the way government is managing procurement and distribution of food crops for low prices of wheat flour like offering wheat flour at subsidised prices, income support, cheap bread on *tandurs* etc., which has heavily burdened the national exchequer as well as encouraged development of different cartels and mafias, e.g. wheat flour industry, poultry hatchery and feed industry, etc. The recently adopted wheat procurement and private storage policy has heavily cost to national exchequer as only Rs 262.5 billion worth of wheat has been stored while Rs 414 billion are payable to banks.

A number of real world challenges and constraints have been highlighted for facilitating policy makers in designing a comprehensive food security policy for this country. In the way forward, some recommendations are made along with highlighting

the need of new institutions for developing a R&D based infrastructure as well as defining the role of the government in food sector of Pakistan.

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