



ADB

FOOD SECURITY IN SOUTH ASIA

Developing Regional
Supply Chains for the
Food Processing Industry



United Nations Conference on Trade and Development
Asian Development Bank

6 Chapter

Regional Integration and Food Security in South Asia

6.1 Introduction

Economic theory suggests two types of benefits affecting regional integration and food security: the allocation effect and the accumulation effect. The allocation effect may not be realistic as it propagates that free trade will lead to an optimal (Pareto efficient) allocation of production factors—a situation where those that gain from trade could fully compensate those that lose from trade and still be better off—and thus the region's welfare is maximized. The accumulation effect, on the other hand, appears to be more achievable as it implies that economic integration will attract more agricultural investment because farmers and related industries (e.g. food processing) are able to specialize by becoming part of regional value chains. This may also create agglomeration and network effects that lead to a reduction in production costs, foster technological spillovers and increase productivity. All these together may increase the domestic supply of food and improve food security for the region.

Apart from arrangements on the elimination of tariffs and harmonization of agricultural policies, regional integration might also include agreements to discipline export restraints—one of the main

causes of the surge in food prices. Such agreements may prevent drying up of intraregional food trade in times of rising world food prices, when regional suppliers are tempted to reduce food exports to put a downward pressure on domestic food prices. Whether such a policy will limit food price inflation in the region depends, among other factors, on the balance between extra- and intraregional food trades.

It is being increasingly realized that the liberalization of trade among the South Asian countries can go a long way in improving the food security of the region. South Asia is a very large geographic region with varied climate, different types of natural resource endowment and diversity of production. These variations are expected to generate location-specific comparative advantages in food production. Often, when one South Asian country faces short supply in a food commodity, another country in the region has surplus production. This offers tremendous scope for stabilizing supply and prices through liberalized trade.

Further, given the trends in demand and supply, regional integration may soon become a necessity for food security in the region. South Asia is experiencing a high rate of growth in population at around 1.5%. Demand for food commodities in the region is projected to rise at a much higher rate than population growth as there is a large consumption deficit. Per capita consumption of most food items is much lower than what is required for a healthy diet and healthy living. Moreover, with rising per capita income and changes in tastes and preferences, demand patterns in South Asian countries are diversifying. Demand for variety, new products and attributes is on the rise. Demand for processed food products is rising much more rapidly than demand for raw products. These trends and shifts in demand patterns and preferences cannot be addressed through local production and processing and they open new avenues for trade and investments in agricultural commodities as well as food commodities.

Of late, realization has been growing about the benefit of increasing trade and regional integration among South Asian countries and improving food and nutrition security through free movement of agriculture and food commodities. In order to actualize such benefits there is a need to identify regional-level and country-level production, utilization and surplus and deficit of food and other agricultural products and the potential of the region to meet the growing demand. Against this backdrop, the present chapter first examines the socio-agri profiles of the South Asian countries; assesses regional as well as country-level surpluses and deficits in food and other agricultural commodities; examines intraregional trade in food commodities; and estimates the extent of price and market integration within the region and within the countries of the region.

6.2 Surplus and Deficit in Food in South Asia

To assess the surpluses and deficits in South Asian countries as well as for the region as a whole, two approaches have been followed. In the first approach, using averages over 3 years of production, trade and stock, the surplus or deficit has been computed from data available on production and consumption and related aspects, from the FAO's Food Balance Sheet for each country. The regional data is arrived at by summing up country level production, consumption, trade, stock, etc.

Hence, surplus / deficit = Production (less) food consumption, utilization as feed, seed, and processing and other utilization, (plus) import, (less) import, (less) net change in stock

While production data is available up to the year 2009 or 2010, in various countries data on utilization is not available beyond 2007. In order to estimate surplus for the latest years the food balance sheet data on various items of utilization was extrapolated for 2008 and 2009. This was done by multiplying the ratio of utilization (in various uses) to production in 2007 with production in years 2008 and 2009. The

average over 3 years of production and domestic utilization was used to estimate surplus/deficit at the country and regional level.

Another way of estimating the deficit and surplus for the region in agro-food commodities would be to use indicators like production/consumption ratio, import/consumption ratio, ending stocks/consumption ratio, and production instability index which are estimated for the 3 years up to 2009.

The existing supply–demand scenario and the future prospects of major commodities that have important implications for food security have been analyzed. The analysis is carried out for each country and the region as a whole. However, these measures pertain to only one time

Indicators of Supply–Demand Scenario

To assess the present supply–demand scenario we have used the following indicators

(i) Production / Consumption Ratio (P/C ratio)

High : >120%

Medium : 80%–120%

Low : <80%

(ii) Ending Stocks / Consumption Ratio (S/C ratio)

Adequate : > = 15% for staple cereals like wheat and rice

> = 10% for other cereals and food stuff

Inadequate : < 15% for staple cereals like wheat and rice

< 10% for other cereals and food stuff

(iii) Production Instability Index (PII)

High : >100% more than the South Asian average –
more than double

Medium : 50%–100% more than the South Asian average

Low : < 50% more than, equal to or less than the South
Asian average

period and therefore do not completely inform us about the emerging scenario. For example, a country may possess lower production than consumption during 2007–2009. In such a case the production–consumption ratio will be less than 100. However, if production is growing much faster than consumption, this ratio may rapidly increase and may even cross 100 in the near future. To account for these dynamics, we have combined the present supply–demand scenario with medium-term growth rates (from 2001 to 2011) for each commodity to draw conclusions about the potential surplus/deficit in the region.

The estimates of South Asia's surplus for major food items are presented in Table 6.1. This covers cereals (total, rice and wheat), pulses, vegetable oil, sugar, vegetables, fruits, eggs, meat, and milk, leaving a very small fraction of total agriculture in the region.

Cereals, mainly rice and wheat, are the staple food for all countries in South Asia. The average production of cereals in the region during 2007–2009 was 286 million tons (mt). South Asia as a whole consumed 238 mt of cereal as food. Consumption of cereal in other uses like seed, feed processing was 34.2 mt. The total utilization of cereal per year in South Asia during 2007–2009 was estimated at 272.6 mt. Based on these estimates South Asia is found to have surplus of 13.4 mt of cereals which is 4.7% of cereal production in the region.

Rice and wheat account for 84% of total cereal production (rice 47.5% and wheat 36.1%) in South Asia. Total annual absorption (consumption in all uses) of rice in the region during 2007–2009 was 126 mt, comprising 115 mt of food and 11 mt of other uses. Total utilization of wheat was 103 mt, comprising 94 mt of food consumption and 9 mt of other uses. South Asia is found to have a rice surplus while it has a small deficit in wheat to the tune of 0.5% of production.

Pulses (dried leguminous vegetables) are a regular part of South Asian diets and also a major source of protein. They are consumed both by vegetarians and nonvegetarians in various forms. Generally

Table 6.1: Production and Utilization of Major Food Products in South Asia, 2007–2009
(million tons)

Item	Production	Food Consumption	Other Consumption	Total Utilization	Surplus/Deficit	Surplus/Deficit as % of Production
Cereals (excluding beer)	286.14	238.51	34.21	272.73	13.41	4.69
Rice (milled equivalent)	136.17	114.96	10.96	125.92	10.26	7.53
Wheat	103.40	94.92	9.03	103.95	(0.55)	(0.53)
Pulses + (Total)	15.98	16.58	3.10	19.68	(3.70)	(23.13)
Vegetable Oils + (Total)	8.72	11.07	4.29	15.36	(6.64)	(76.22)
Sugar (raw equivalent)	29.57	26.19	0.03	26.22	3.35	11.32
Vegetables	100.39	92.55	6.58	99.13	1.27	1.26
Fruits (excluding wine)	78.66	68.17	10.52	78.69	(0.03)	(0.04)
Eggs	3.93	3.33	0.50	3.84	0.09	2.37
Meat	8.75	8.14	0.01	8.15	0.61	6.95
Milk (excluding butter)	145.59	116.49	29.18	145.67	(0.08)	(0.05)

() = negative

Source: FAO Food Balance Sheet 2007. faostat3.fao.org/browse/FB/FBS/E

they are consumed as a “curry” along with rice, wheat or other cereals. Over time, pulse production in South Asia has remained either stagnant or experienced very low growth. The green revolution technology rendered pulse production much less remunerative than cereals. Thus, large areas of land historically farmed for pulses have shifted toward the production of cereals; in some places pulses have been pushed to less fertile or marginal lands. As a result, the production of pulses in the region could not keep pace with growth in population and, per capita production and consumption of pulses has witnessed a sharp decline over time. This, in turn, has caused an adverse effect on protein intake in the region. During 2007–2009, the average production of pulses in the region was close to 16 mt. The total utilization of pulses was close to 20 mt, which leaves a gap of about 4 mt between regional production and utilization. The deficit level in pulses is 23% of the recent level of production.

The quantity of vegetable oil consumed as food was 27% more than production in the region. Consumption of edible oil in other uses is around 4.29 mt. The total utilization of vegetable oil in the region was 76% more than regional production. This leaves a deficit of 6.6 mt of vegetable oil in the region. The deficit in terms of oilseed is much higher and is given by the deficit of vegetable oil divided by extraction rate of oil to oilseeds. A crude estimate shows that South Asia needs to raise oilseed production by more than 20 mt to match the deficit in the production and consumption of vegetable oil.

South Asia produced 29.6 mt of sugar (raw equivalent) as against a total utilization of 26 mt. During 2007–2009 the region on an average had 3.4 mt of surplus sugar. Vegetable production in South Asia was estimated to be 100 mt and total utilization was reported to be 99.13 mt. About 93% of the total utilization of vegetables is in the form of food. The region, at the present level of production and consumption has a surplus of 1.27 mt in vegetables. Fruit production is estimated at

78.7 mt and total consumption is also the same. About 86% of fruit production is utilized as food and the remaining 14% is in other uses. At the present level of production and consumption South Asia has a small deficit (30 thousand tons).

Among livestock products, milk is the largest item of production and consumption in the region. Total production of milk per year is 145.6 mt and total utilization is estimated to be 146 mt. About 80 per cent of total milk utilization is used as food. This production and consumption balance leaves 80 thousand tons of milk deficit in the region, leading to a deficit of 0.05% of the total production. Total egg production in South Asia during 2007–2009 was 3.93 mt, of which 3.33 mt was used as food and 0.5 mt of eggs were consumed in other forms. The total utilization was 3.84 mt, showing a surplus in egg production of 90 thousand tons. The ratio of surplus to total production was 2.37%. Meat production in the region was close to 9 mt and total utilization was 8.15 mt. South Asia shows a surplus of 0.61 mt of meat.

From the regional food balance it is concluded that South Asia has large surpluses of rice, sugar, and meat, and small surpluses of eggs and vegetables at the current level of consumption. The region shows a large deficit in vegetable oils and pulses.

6.3 Surplus and Deficit in Food in South Asian Countries

The surplus/deficit per country, based on production and consumption data, as a proportion of production in the country for various food items are presented in Table 6.2.

The following inferences can be drawn:

1. **Food Grains.** India is the largest producer of rice and wheat in the region. The next largest producer is Bangladesh for rice and Pakistan for wheat. From 2007 to 2009, Bangladesh, India,

Table 6.2: Surplus/Deficit as Percentage of Production in South Asian Countries, 2007–2009

	Bangladesh	India	Nepal	Pakistan	Sri Lanka
Rice	3.88	6.71	(13.56)	49.46	(1.68)
Wheat	(235.55)	(0.39)	0.00	11.32	–
Pulses	(199.62)	(18.41)	(2.38)	(40.21)	(765.00)
Milk	(11.94)	0.96	(1.40)	(0.36)	(313.64)
Meat	0.00	11.63	(0.36)	0.13	(3.82)
Eggs	(0.39)	3.20	0.00	(0.21)	(1.92)
Fruits	(3.41)	0.22	(8.14)	1.08	(2.06)
Vegetables	(5.76)	2.20	(2.57)	(4.49)	(23.84)
Sugar	(371.35)	19.52	(17.48)	(14.50)	(1496.90)
Vegetable Oil	(788.89)	(48.28)	(76.56)	(146.97)	(468.42)

() = negative

Source: FAOSTAT.fao.org

and Pakistan consumed less rice than they produced, leaving a surplus. Sri Lanka and Nepal had a small deficit of rice. India's production and domestic use of wheat were also closely balanced with 0.31 mt of deficit. Pakistan shows the highest surplus of wheat in South Asia. Nepal was self-sufficient in wheat with 1.5 mt of production. Sri Lanka does not produce any wheat but it consumes close to 1 mt, leading to a deficit of the same magnitude. The case of the Maldives is similar, as it shows a deficit of 20 thousand tons of wheat. All the South Asian countries, except the Maldives, consumed more pulses than they produced.

2. **Livestock Products.** India showed surplus production of milk whereas all other countries in the region showed consumption exceeding production. Average annual production in India was 107.6 mt, while Pakistan produces 33.3 mt of milk and consumes 33.40 mt. Milk production in Sri Lanka is below 0.2 mt whereas consumption was 0.8 mt. Both Maldives and

Nepal showed a milk deficit of 20 thousand tons each. India showed a surplus in meat, producing 5.3 mt and consuming 4.70 mt during 2007–2009, while Bangladesh and Pakistan are just balanced. Nepal showed a small deficit and Sri Lanka consumes 4% more than what it produced. The magnitude of surplus of meat in India was 62 thousand tons. Except India, all South Asian countries showed greater consumption of eggs over production. India showed a surplus production over consumption of 0.10 mt which corresponds to 3.2% of total egg production in the country. Egg production and consumption in Bangladesh is about 250 thousand tons. Pakistan produces and consumes a little more than 500 thousand tons of eggs.

3. **Horticultural Products.** Bangladesh produces 3.56 mt of fruit and consumes 3.68 mt, leading to a deficit of about 120 thousand tons. Fruit production in India exceeded domestic consumption by 0.14 mt. Pakistan produces 6.5 mt of fruit and consumes almost all of it. Sri Lanka, Maldives, and Nepal show a deficit of 10 thousand tons–90 thousand tons of fruit. Vegetable production and consumption exceeds production and consumption of fruits in India, Sri Lanka and Nepal, whereas it is lower in Bangladesh and Pakistan. India has surplus 1.95 mt of vegetables, or 2.2% of its total production. Bangladesh shows a deficit with production at 3.36 mt and consumption at 3.56 mt. Nepal produces 70 thousand tons more vegetables than it consumes. Pakistan, Sri Lanka, and Maldives show small to moderate deficits in vegetables.
4. **Sugar.** In South Asia sugarcane is produced on a large scale in India and Pakistan while some production takes place in Bangladesh and Nepal. During 2007–2009 India produced 25.5 mt of raw sugar with a surplus of close to 20% of production. Pakistan produced 14.5% less than its domestic

use. Thus, Pakistan and all other countries in the region except India, have production deficit in sugar when compared to domestic absorption. Sugar deficit is a little more than 0.5 mt in Bangladesh, Pakistan, and Sri Lanka each. Nepal shows deficit of 20 thousand tons. Maldives does not produce any sugar, therefore its entire domestic use consisting of 10 thousand tons is a deficit.

5. **Vegetable Oil.** All South Asian countries consume more vegetable oil than they produce. Domestic use of vegetable oil in India is 48% more than domestic production. Nepal shows a deficit of 76%, and Pakistan uses 147% more vegetable oil than it produces. The deficits in vegetable oil are very high in Sri Lanka and Bangladesh. Sri Lanka consumes more than five times its domestic production and Bangladesh more than eight times. India produced 7.4 mt of vegetable oil and consumed about 11 mt leaving a deficit of more than 3.5 mt. Pakistan's deficit is 1.52 mt, while Bangladesh's is 1.17 mt. Sri Lanka has a deficit of 330 thousand tons while Nepal shows deficit of 50 thousand tons.

6.4 Alternative Indicators of Demand–Supply of Food and Future Potential in South Asia

An alternative method for analyzing supply–demand deficits, export surpluses and import dependency of the countries in the region can be carried out based on measures like the production–consumption ratio, inventory coverage of consumption, and import content of consumption. The potential deficits/surpluses of each country are assessed by analyzing growth trends of production, productivity (yield), and consumption in the medium-term (defined as over the last 10 years). These ratios and growth rates indicate:

1. **Rice.** The production–consumption ratio is high in Pakistan, medium in India, Nepal, Sri Lanka, and Bangladesh and low in Afghanistan (Annex III Table 1). The ending stocks–consumption ratio is adequate in Pakistan and India but inadequate in Afghanistan, Bangladesh, Nepal, and Sri Lanka. The production instability index is high for Afghanistan and Iran, medium for India, Nepal, Pakistan, and Sri Lanka. The production instability index is low for Bangladesh.

As for emerging trends, in Afghanistan, the production growth rate is almost equal to that of consumption (Annex III Table 5). The yield growth rate is stagnant. It appears that Afghanistan is largely self-sufficient in rice with no major deficits. Bangladesh has some potential for export surpluses. The growth rate of domestic production is greater than domestic consumption and the growth rate of stocks is high. The yield growth rate is also impressive. In India, production growth rate is much higher as compared to consumption. The growth rate of ending stocks is also quite high. These, combined with positive growth rate of yield, show that there is potential for export surpluses in India. In Nepal, there are major emerging deficits. The domestic production growth rate is much lower than that of consumption and the resulting supply–demand gap is met mainly through imports. There is no major stockholding in the country and the yield growth is almost stagnant. In Pakistan, the production growth rate is much higher than that of consumption. The import, export, and stocks growth rates are also quite high. These, combined with high growth rates of area and yield, show that there is large potential for exports in Pakistan. In Sri Lanka, the production growth rate is much higher than that of consumption. The stock growth rates are also high, leading to a high growth rate in exports. These trends, together with high growth rate of area indicate that there is a definite potential for exports in Sri Lanka.

The broad inference is that there exists some export surplus of rice in Pakistan and India. There is potential for export surplus in Bangladesh and Sri Lanka while Afghanistan is in dire need of imports.

2. **Wheat.** The production–consumption ratio (Annex III Table 2) is medium in Afghanistan, Bhutan, India, Nepal, and Pakistan, low in Bangladesh and Sri Lanka combined with high import–consumption ratios. Ending stocks–consumption ratio, are adequate in Bangladesh, India, Iran, Pakistan, and Sri Lanka but inadequate in Afghanistan, Nepal, and Bhutan. All the major importers such as Bangladesh and Sri Lanka hold high level of stocks showing predominantly precautionary or transactional motives of stockholding. The production instability index is high for all countries except India, Nepal, and Pakistan.

As for emerging trends, in Afghanistan, the production growth rate is much less than that of consumption (Annex III Table 6). The resulting supply–demand gap is met mainly through imports. Stocks are built mainly because of precautionary motives. The area and yield growth rates are promising. It appears that major deficits will continue in this country for some time. In Bangladesh, the growth rate of domestic production is very much lower than that of domestic consumption. Supply is augmented through imports. These trends, together with the fact that area growth rate is negative (although the yield growth rate is positive) show that deficits are likely to continue for some time. Bhutan has no domestic production of wheat and is completely dependent on imports. In India, the production growth rate is slightly higher compared to consumption. The growth rate in imports is high. Although the growth rate in stocks is high, the growth rates of area and yield are not significant. These trends indicate that there is hardly any potential for export surpluses to emerge in India. In

Nepal, domestic production growth rate is almost equal to that of consumption. There is no stockholding in the country. The area and yield growth rates are stagnant. The inference is that there are no major deficits presently but they may emerge in the future. In Pakistan, production growth rate is higher than that of consumption. There is steady growth in stockholding and exports. The growth rates of area and yield are also satisfactory. These trends indicate that there is a definite potential for wheat exports in Pakistan. In Sri Lanka, there is no wheat production and the country is completely dependent on imports. The stocks are mainly held for precautionary purposes. It appears that the deficits in Sri Lanka are likely to continue for a long time.

Overall, it appears that there is inadequate export surplus of wheat in the region to meet the import requirements of Bangladesh and Sri Lanka. Afghanistan also needs a stable import supply.

3. **Sugar.** For sugar (refined), the production–consumption ratio is medium for India and Pakistan and low for all other countries (Annex III Table 3). The import–consumption ratio is high for Bangladesh, Maldives, Nepal, and Sri Lanka. The production instability index is also high in all countries.

As for emerging trends, in Bangladesh, the production growth rate is much lower than that of consumption, indicating large potential deficits in the future (Annex III Table 7). In India, the production growth rate is almost equal to that of consumption. This implies that there could be no large potential deficits or surpluses in India. There is no domestic production in Maldives and the country is completely dependent on imports. In Nepal, the production growth rate is higher than that of consumption, indicating potential export surplus. In Pakistan, production growth rate is much lower than that of consumption, implying large potential deficits in the future. In Sri Lanka, production growth

rate is higher than that of consumption, showing some potential for export. For South Asia as a whole, the production growth rate is almost equal to that of consumption, showing no large potential deficits or surpluses in the region. At the global level, the production growth rate is higher than that of consumption, indicating some potential for export.

Overall, it appears that presently only India has an export surplus in sugar (refined). Large potential deficits are emerging in Pakistan. Maldives is totally dependent on imports.

4. **Pulses.** As for emerging trends, in Bangladesh, the production growth rate is much lower than that of consumption, showing large potential deficits in the future (Annex III Table 8). In India, the production growth rate is almost equal to that of consumption indicating no large potential deficits or surpluses. In Maldives, the production growth rate is much lower than consumption, showing large potential deficits in future. In Nepal, the production growth rate is much lower than that of consumption indicating large potential deficits. In Pakistan, the production growth rate is higher than consumption showing some potential for export surplus. In Sri Lanka, the production growth rate is almost equal to that of consumption, indicating no large potential deficits or surpluses. In South Asia as a whole, the production growth rate is almost equal to that of consumption, showing that there are no large potential deficits or surpluses. At the global level also, the production growth rate is almost equal to that of consumption, showing that there are no large potential deficits or surpluses.

The foregoing analysis indicates that a slight potential for exports exists only in Pakistan. All other countries in the region may face deficits or may attain self-sufficiency in pulses.

5. **Soybean Oil.** The production–consumption ratio is low for all the countries (Annex III Table 4). The ending stocks–consumption

ratio is adequate in Bangladesh but inadequate in India and Pakistan. The production instability index is very high in the region in all the countries compared to the world average but is low in Bangladesh and India when compared to the South Asian average.

As for emerging trends, in Bangladesh, the production growth rate is much higher than that of consumption (Annex III Table 9). But the growth rate of stocks is negative. Therefore, there is unlikely to be any exportable surplus but no major deficits are anticipated either. The country is likely to remain self-sufficient. In India, the production growth rate is much higher compared to consumption and there is consistent stockholding (steady growth rate). The inference is that there is potential for export surplus in India. In Pakistan, there is substantial decline in production. There is decline in consumption also, but not as precipitous as production, indicating that major deficits may emerge in Pakistan. In South Asia as a whole, the production growth rate is much higher than that of consumption. The growth rate of stocks is positive. There is potential for export surplus in the region. At the global level, the production growth rate is almost equal to that of consumption. The growth in trade and stocks is almost stagnant. These trends indicate that the supply and demand are just in balance presently at the global level and deficits are likely to emerge.

The broad inference is that there is some exportable surplus of soybean oil in the region. Production/productivity and consumption trends indicate that potential for self-sufficiency or slight export surplus exists in India and Bangladesh. Major deficits may continue in Pakistan.

From the above analyses it can be concluded that at present, export surpluses exist in the region only for rice and, to a limited extent, for

sugar. In wheat, corn, edible oils (except soybean oil), and pulses, most of the countries in the region are facing deficits and very few countries in the region show present or potential export surpluses. India and Pakistan are either self-sufficient or possess export surpluses in most commodities. Nepal, Maldives, Bhutan, and Afghanistan are facing deficits and rely on imports for most of the important commodities. Bangladesh and Sri Lanka show encouraging trends in commodities such as rice.