

Food Problems and Outlook in India

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Abstract

Foodgrain production in India increased a little faster than the population growth rate over the five-decade period after the Independence, resulting in a steady increase in the per capita daily availability of foodgrains from 395 gm in 1951 to a little above 500 gm in 1995. The Union and State Governments built an elaborate system of procurement and public distribution to improve the physical access of people to food. Famines, which were recurrent during the colonial rule were avoided. Efforts were also made by the Governments to improve the economic access of poor people to food through schemes to supply foodgrains at less than economic cost and to generate short-term employment in the slack seasons of labor demand. Yet, about a quarter of the population is estimated to be under-nourished, along with the attendant problems of nutrient deficiencies, diseases and high infant mortality rates. The country attained self-sufficiency in food grains but it is now facing the problems of land degradation, water scarcity, excessive use of agro-chemicals in the intensive agriculture areas and high post-harvest losses. With the physical possibility to expand cultivation to new areas virtually exhausted and the yield gains from green revolution tapering off, the sustainability of its further growth in foodgrain production is questioned by some analysts. However, the country may be able to avert large-scale imports in the near future through better management of resources, increased investments and possible breakthroughs in technology. Yet, it would be a Herculean task to sustain increases in foodgrain production; to overcome pollution problems; and to improve the physical and economic access of food to the poorer sections of the society. This paper reviews the agricultural and food policies of the past, analyzes the present strengths and weaknesses of the country and envisions the future food scenario in India.

Introduction

India's foodgrain production is estimated to have reached a little more than 198 million tons during the period 1996-97 (Mishra, 1997). Compared with the 51 million tons produced in 1950-51, the first year of the first five-year plan, the production recorded in 1996-97, the last year of the eighth five-year plan, was nearly four times. The area under foodgrains merely went up from 97 million hectares to 126 million hectares, which represents only a 30 % increase. The average productivity of foodgrains trebled during the 46 years of planned era (1950-51 to 1996-97).

Even now, the productivity level of 1.57 tons per hectare is very low when compared with the same in other developed countries. The country's population also grew very fast. The

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estimated present population of 940 million is about 2.60 times of the base level estimate of 361 million in 1951. Despite this, the per capita availability of foodgrains went up from 144 kg per year (395 gm per day) to 185 kg per year (507 gm per day). However, the composition of the available foodgrains has undergone a change, with the share of cereals going up from 86.5% to 92.5 % and that of pulses going down from 13.5 % to 7.5 %. Among the cereals, it is the per capita availability of wheat which went up phenomenally from 24 kg to 60 kg. The new wheat varieties are credited with a higher percentage of proteins and increasing consumption of wheat has, to a large extent, closed the protein gap caused by the declining availability of pulses (Ryan and Asokan, 1977). However the Indian society is characterized by gross inequalities in the distribution of wealth and income, making the food inaccessible to the people living below the poverty line.

Intensive use of inputs

In order to increase the production and productivity of foodgrain crops, a lot of resources were invested over the last fifty years. But the share of the gross cropped area allocated to foodgrain crops witnessed a relative decline from about three-fourths in 1950-51 to about two-thirds in 1992-93. The foodgrain crops received a marginally higher support of irrigation than the non-foodgrain crops: 37.1 % of the area under foodgrain crops had the support of irrigation in 1992-93 compared with 35.7 % of the total area under all crops being irrigated in the same year. By 1994-95, 39 thousand quintals of breeders' seeds were made available from the research stations: the quantity of foundation seed produced went up to 0.473 million quintals: and the quantity of certified seeds produced has gone up to 6.50 million quintals (Table 1). About 71 million hectares of the area under foodgrains was covered by high-yielding varieties out of the 124 million hectares of the area under foodgrain crops in 1994-95. The use of chemical fertilizers increased phenomenally from a mere 69 thousand tons in 1950-51 to 13.564 million tons in 1994-95. Only 2.35 thousand tons of pesticides (technical grade material) were used in 1950-51. The consumption of pesticides reached a peak of 75.79 thousand tons (technical grade material) in 1988-89 and subsequently came down to 63.27 thousand tons in 1994-95. The use of tractors, improved tools and pumpsets also registered a rapid growth during the last three decades. In 1970-71, 17.3 million hectares were irrigated by major and medium sources of irrigation such as rivers and tanks. In the same year, 20.7 million hectares were irrigated by minor sources such as small tanks, wells, tubewells, etc. The area covered by major and medium sources of irrigation increased slowly and reached a level of 27.7 million hectares in 1994-95. But the area irrigated by minor sources grew rapidly and reached 50.2 million hectares by 1994-95. In order to energize the wells and tubewells, the electricity consumption went up from 14,489 million kilo-watt hours in 1980-81 to 70,699 million kilo-watt hours in 1993-94. The use of plastics has also been going up rapidly over the last decade period. Despite the use of many modern inputs, the proportion of the labor force used in agriculture has only decreased marginally. In terms of absolute number, the number of people employed in agriculture is steadily going up. Perhaps the average number of working hours in a day put in by the agricultural workers is decreasing over time. The impressive growth achieved in the production of foodgrains is, to a large extent, attrib-

Table 1 Progress of input use in Indian agriculture

Input	Unit	1950-51	1960-61	1970-71	1980-81	1994-95
1 Seeds						
a Breeder seed	Thousand quintals	-	-	-	5.27	39.00
b Certified seed	Million quintals	-	-	-	2.50	6.50
2 Chemical fertilizers						
a Nitrogenous (N)	Million tons	0.055	0.21	1.487	3.678	9.507
b Phosphatic (P)	Million tons	0.008	0.053	0.462	1.214	2.932
c Potassic (K)	Million tons	0.006	0.029	0.228	0.624	1.125
d Total (N+P+K)	Million tons	0.069	0.292	2.177	5.516	13.564
e Per hectare (N+P+K)	kg	0.5	1.9	13.13	31.83	75.68
3 Pesticides	Thousand tons (Technical grade material)	2.35	8.62	24.32	45.00	63.27
4 Irrigated area	Million hectares	-	-	38.00	54.1	77.9
a Major & medium	Million hectares	-	-	17.3	22.7	27.7
b Minor	Million hectares	-	-	20.7	31.4	50.2
5 Electricity	Million kwh	-	-	-	14,489	70,699

Source: Agricultural statistics at a glance (1996).

unable to equally impressive increases in the intensity of the inputs used. The total factor productivity growth in Indian agriculture is positive but has been declining over the last two decades (Evenson, 1993).

Food availability and accessibility

The net impact of the growth in foodgrain production was that the per capita availability of foodgrains has increased more than 25 %, despite a rapid growth in population over the last 46 years (Table 2). The production of oilseeds and sugarcane increased substantially in the last 15 years (Table 3). The production of milk increased from 31.6 million tons in 1980-81 to about 68 million tons in 1995-96. The number of eggs produced increased from 10 thousand billion in 1980-81 to 25 thousand billion in 1994-95. The production of fish has also doubled from 2.44 million tons in 1980-81 to 4.79 million tons in 1994-95.

Impressive achievements in the output of livestock products and edible oils have added shades of white, blue and yellow to the green revolution. The vegetable production recorded a 60% increase from 34 million tons in 1985 to 53.8 million tons in 1990. Fruit production is also growing rapidly over the last decade. Availability of food is only the necessary condition for its accessibility to poor people. Adequate purchasing power and/or subsidies are required to make the food articles accessible to people. A major portion of the income of an average Indian is spent on food, owing to low levels of income. A rural Indian spends about

Table 2 Per capita net availability of foodgrains in India
(gm per day)

Foodgrains	1951	1995
Rice	158.9	237.6
Wheat	65.7	164.4
Other cereals	109.6	63.0
Total cereals	334.2	464.9
Chickpea	22.5	14.5
Total pulses	60.7	37.0
Total foodgrains	394.9	501.9

Source: Agricultural statistics at a glance (1996).

Table 3 Production of other food articles in India

Sl. No.	Item	Units	1980-81	1994-95
1	Milk	Million tons	31.60	63.10
2	Eggs	Billion tons	10.060	24.553
3	Fish	Thousand tons	2,444.0	4,786.0
4	Total oilseeds	Million tons	9.37	21.42
5	Sugar cane	Million tons	154.25	271.23
6	Potato	Million tons	9.67	17.94

Source: Agricultural statistics at a glance (1996).

64 % of his income on food compared to 57 % spent by his urban counterpart (Reddy, 1993). In India, even the magnitude of poverty is assessed based on the consumer expenditure surveys of the National Sample Survey Organization (NSSO). Households are categorized according to per capita monthly expenditure and the average caloric intake in each expenditure class is estimated. If the mean calorie intake is less than 2,400 kilo calories per day in rural areas and 2,100 kilo calories per day in urban areas, which corresponds to a monthly per capita expenditure of Rs.49 in rural areas and Rs.56 in urban areas at 1973-74 prices, all families falling in that expenditure class are considered to be below the poverty line. The estimates of poverty are found to be higher in rural areas than in urban areas. The percentage of the population below the poverty line declined steadily from 48% in 1977 to 18% in 1996. But the new Government adopted a revised definition of poverty line and estimated that the people below the poverty line accounted for 37 % in 1996.

Food intake and deficiencies

According to the diet surveys, rural diets were found to be dominated by cereals and millets (59%), followed by vegetables (11.9%), milk and its products (11.3%). Relatively, the urban diets were richer, with cereals and millets accounting for 41%, followed by milk and

milk products (19.4%) and vegetables (17.1%). Pulses occupy the fourth position in both the rural as well as the urban diets. Protective foods like fruits, fish and meat occupy only a small proportion of Indian diets. The average dietary intake per day is around 2,280 kilo calories, which is close to the recommended level. There is, however, a wide between-states variation. Intake is as low as 1,871 kilo calories in the state of Tamilnadu and as high as 2,760 in Punjab (Table 4). As many as 13 out of the 18 states for which data were analyzed showed marginal to substantial deficits of calorie intake. The overall intake of protein is around 62 gm/day, a level close to the recommended level of 60 gm and 7 out of the 18 states reported protein deficiency. The overall mean intake of vitamin A is around 350 μg per day, which is much below the recommended level of 600 μg per day. Its intake is inadequate in all but three states of the country. A direct relationship was found between the income level and the protein and calorie intake in both the rural and urban areas of the country. When the average intake of different nutrients was studied for the two periods, 1975-79 and 1988-90, it was found that there were very few changes in the intake levels of any nutrient at the aggregate level in the intervening period. However, the disaggregated data showed that the energy intake of landless agricultural laborers belonging to the lowest income bracket showed an increase of 136 kilo calories per day during this period, while in the other groups the

Table 4 Average intakes of energy, protein and Vitamin A in different states of India

State	Energy (kcal/day)	Protein (gm/day)	Vitamin A (μg /day)
NNMB			
Andhra Pradesh	2,340	55.7	286
Gujarat	2,375	69.3	286
Karnataka	2,431	65.4	269
Kerala	2,140	52.9	297
Madhya Pradesh	2,614	82.5	374
Maharashtra	2,221	61.7	311
Orissa	2,700	61.4	524
Tamilnadu	1,871	45.6	240
Uttar Pradesh	2,115	69.6	207
West Bengal	2,426	53.4	1,078
FNB			
Bihar	2,055	55.5	301
Goa	2,129	63.2	70
Jammu & Kashmir	2,259	64.3	660
Mcghalaya	2,018	66.0	217
Punjab	2,760	85.0	642
Rajasthan	2,115	71.0	258
Sikkim	2,051	54.0	613
Tripura	1,967	45.1	128
Recommended dietary intake	2,400	60.0	600

Source: National Nutrition Monitoring Bureau (NNMB) Reports, 1981-91, and Food and Nutrition Board (FNB) Reports 1980-86.

change was not so significant. The dietaries of preschool children also showed some improvement, resulting in enhanced energy intake : about 75 kilo calories in the case of children between 1 to 3 years and 140 kilo calories in the case of children in the 4 to 6 years age group. Yet, the National Nutrition Monitoring Bureau data revealed caloric inadequacy in a greater proportion of children (60%) than adults (44%). Among the rural children, only about 10% had normal weights and a majority of them exhibited mild or moderate malnutrition, while 8.7% were severely malnourished. In case of rural adults, one half had normal nutritional status while the rest suffered from different degrees of chronic energy deficiency. Haemoglobin surveys among pregnant women revealed that as many as 87.5% were anemic (Hb < 11 g %). Multicentric studies by the Indian Council of Medical Research showed that anemia is not confined to pregnant women alone, but affects other segments of the population as well. Surveys have shown that about 30 % of infants born in the country had a low birth weight, and this situation has not improved over the years. The mean birth weights of infants showed a significant relation with the nutritional status of mothers. The infant mortality rate declined from 129 per 1,000 live births in 1971 to 80 in 1991. The under -5 mortality rate also came down steadily from 53 per 1,000 children in 1970 to 35 per 1,000 in 1987. Again, these mortality rates are consistently higher in rural areas than in urban areas. The maternal mortality rate in the country is estimated at 3.5 per 1,000 live births as compared to 0.24 for industrialized countries and about one-sixth of these deaths are due to anemia. Sample surveys conducted by the Director General of Health Services in 216 districts of 25 states in India indicated that 167 million people are considered to be at the risk of iodine deficiency disorders, of whom 54 million have goitre. The available data show that expectation of life at birth increased from 50.5 years in 1975 to almost 60 years in 1990 for males, while the corresponding figures for females showed a rise from 49 to almost 62 years. The data presented so far indicate that people in India still suffer from shortage of quality foods, which is causing several nutritional disorders and affecting the improvement of health, survival and longevity.

Agricultural and food policies of Governments

India did not have a declared comprehensive agricultural policy till now. Efforts were initiated in 1989 to develop and adopt a National Policy on Agriculture. But despite repeated modifications, the policy draft has not yet received the assent of parliament. The Union and State Governments have, however, pursued an assortment of policies to achieve certain objectives. Land reforms aimed at reducing the concentration of land ownership have met with only a partial success. The Union Government has established a Commission on Agricultural costs and prices in 1965 to estimate the cost of production of some important agricultural commodities and to suggest the minimum support prices for the same. The minimum support prices act as the floor prices for these commodities as the Government undertakes to buy them at the support prices through its procurement agency, the Food Corporation of India (FCI). The FCI also maintains the buffer stocks and releases the grains to the network of fair price shops established under the public distribution system at the issue prices determined by the Union Government. The issue prices are generally lower than the economic

cost of the grains, requiring that the Union Government subsidizes the difference between the economic cost and the issue price (Tyagi, 1990). However the disquieting feature of the public distribution system is that the network of fair price shops is weaker in rural areas than in urban areas and in poorer states than in richer states. The Union Government recently initiated a scheme to supply 10 Kg of foodgrains per month to the families below the poverty line at a price which is only one-half of the economic cost. But there are no sufficient fair price shops to serve the poor in the poorer states. The State Governments invested heavily in the major and medium irrigation projects and the capital costs are not being recovered from the beneficiaries. Even the maintenance costs are not fully recovered from the farmers in several of the states. State Governments are also supplying electricity to agriculturists at very low rates by charging higher rates from domestic and industrial users of electricity. The Union Government is subsidizing the fertilizers by selling them to farmers at affordable prices but paying the fertilizer companies the difference between the costs of production and the sale prices. The Union and State Governments are also supplying credit to farmers at interest rates which are lower than those charged to industries and business establishments. The Union and State Governments also take care of the costs of research, education and extension activities in this sector. Despite all this visible support to agriculture, the larger policies of the Government have only led to the relative impoverishment of the people dependent on agriculture and transfer of investment resources from agriculture to industry, business and service sectors. The chief instruments of this policy were protection to domestic industry with high tariffs, overvalued exchange rate of rupee and restrictions on the internal movement and export of agricultural commodities. As a consequence, the investment levels and net capital formation in the agricultural sector steadily declined after 1978. While the share of the agricultural sector in the Gross Domestic Product dropped to 27 % in 1996-97 (Pre-budget economic survey, 1997), the proportion of labor force dependent on agricultural sector for livelihood is still as high as 62%. Thus the agricultural policies pursued so far have resulted in the adequate supply of agricultural commodities, but not in protecting the relative living standards of the farmers. The basic aim was to keep down the cost of wage goods, particularly the food. During the colonial period, famines occurred with regular frequency. The last one to occur was in 1943, when about three million people in the Bengal perished due to shortage of food and lack of purchasing power. In the last 50 years, there were a few periods of shortages but they were not allowed to take shape as famines due to the crisis management steps taken by the Government. However the food situation is characterized by chronic malnutrition, nutritional disorders and unbalanced diets for large sections of poor people. Shortage of quality foods, lack of purchasing power and ignorance about balanced nutrition are the dark spots of an otherwise bright situation.

Future outlook

The food situation in India shows some disturbing indicators on both the supply side as well as the demand side. The supply of food is already constrained by the declining area under food crops in per capita terms and by the gradual flattening of the yield curves of the food crops. The unabated growth in population and the surging demand for quality and vari-

ety of foods from the neo-rich are threatening to make the country "food-deficit" once again. World Watch Institute predicted that India will join the club of its more illustrious neighbors in Asia in becoming an import-dependent country and will import more than 20 % of its food-grain requirements by 2030 (Gardner, 1996). But similar predictions in the mid-sixties that India is a hopeless case of food deficit moving towards a famine by 1975, were proved wrong (Paddock and Paddock, 1967). The past experience of averting famines and attaining a modicum of self-sufficiency has generated a sense of complacency and an exaggerated faith in its ability to feed itself for all times to come ! In fact, the current mood is so buoyant that policy makers are chasing a mirage of becoming an exporting nation for many agricultural products in the post-GATT era of open markets. A target of 4.5 % growth rate was set for the agricultural sector in the ninth five-year plan (1997-2002) which started on 1st April, 1997. The highest medium-term growth rate ever achieved by the sector in the past is less than 3 %. The new economic policies followed since 1991 have reduced the protection to domestic industry and corrected the distortions in exchange rate, which together might benefit agriculture in an indirect sense. But no full-scale liberalization of agricultural sector is in sight even after six years of reforms. The Union Government is not willing to remove restrictions on exports of agricultural commodities due to an apprehension of a steep price rise of exported commodities and the State Governments are not ready to risk allowing a free movement of agricultural commodities for fear of endangering the local food security. There are many State Governments which run their own schemes of subsidized foodgrains at the cost of the farmers by virtually sealing the state borders. Due to such restrictive policies, farmers get unremunerative prices but consumers end up paying more and the main beneficiaries are the corrupt officials and politicians, besides those who are served by the quixotic subsidy schemes. While there is a great deal of euphoria about the opportunities in the global market, there is no integrated national market for most of the agricultural commodities. A recent study by Mc Kinsey & Co Inc., the leading business consultancy firm, predicted that the turnover of the food industry in India would go up from the present level of Rs.800 billion to Rs.2,250 billion by 2005. It suggested cutting down the number of intermediaries between the producer and consumer by one half which is expected to result in a saving of about 50 % of marketing costs. It estimated an investment potential of Rs.1,400 billion in the food industry over the next eight years. Through restructuring and modernization of the food chain, it is certainly possible to add value to the food crop outputs. As long as the value addition is larger than the costs of modernization and the profits are shared between the industry and the farmers, these investments would be fruitful. Special efforts are required to upgrade the quality of food products so that they are acceptable in the international markets with respect to pesticide residues and other quality specifications. If all the required investments are made in the infrastructure and food processing sectors, India may be able to make a dent on the international markets in case of a few selected food products. But if the quantitative restrictions are removed with respect to imports and exports along with reduction in import duties, the country may face difficulties in case of edible oils and sugar, as the domestic prices of these commodities are higher than the international prices. But in case of India, any export or import of agricultural commodities will be confined to a few commodities and to limited quantities. The production and processing of agricultural products will have to aim at

domestic consumers as there is no serious demand constraint in the Indian market. There are many and various constraints on supply. The major ones are land degradation due to soil erosion and soil salinity and water scarcity because of the over-exploitation of groundwater. Both the soil fertility and water availability are on the decline and they may not be able to sustain even the present productivity levels for long. The deterioration of soil fertility has occurred due to the lack of incorporation of organic sources of nutrients and exclusive dependence on subsidized chemical fertilizers. Fertilizer subsidies need to be restructured in favor of bio-fertilizers, organic manures, phosphoric and potassic fertilizers rather than the present practice of subsidizing nitrogenous fertilizers, which farmers are prepared to buy at market prices and use on their own initiative. Similarly water and electricity must be priced high enough to reflect their scarcity and economic costs to promote their efficient use. Environment-friendly practices like vermiculture, green manuring and biological pest control should receive encouragement and subsidies. The excessive use of chemical fertilizers and pesticides is leading to the problems of pollution and pesticide residues in the agriculturally intensive areas. This situation can be alleviated only through the withdrawal of some subsidies to chemical fertilizers and pesticides and retracting them toward organic farming practices. The price adjustments have to be made in a phased manner so as to ensure a smooth transition to eco-friendly practices without adversely affecting production levels. More than 60 % of the cropped area in India is rainfed. Watershed management programs are being implemented presently by involving different stake-holders actively. These programs are to be intensified further to prevent soil erosion and to recharge the water tables. Conservation and development of land and water resources and infrastructure development require heavy public investments. Policy initiatives are also needed to revitalize the agricultural credit and marketing systems. Above all, agricultural research and extension systems should receive better financial support and suitable reward-punishment systems to generate and disseminate relevant production technologies. Since technology is the mainspring of growth in today's world, research and extension systems deserve prime attention and support of the policy makers.

During the post-green revolution period (1967-68 to 1991-95), India achieved a growth rate of 2.67 % per annum in foodgrain production. Even if this growth rate falls to 2 % per annum, India's foodgrain production would reach 325 million tons in 2030. Some recent estimates showed that the rate of growth in population slowed down to 1.6 % per annum between 1991 and 1996 as against the 1.8 % growth rate recorded earlier. If this trend continues, India may be able to bring down the population growth rate to less than 1% per year by 2030. In that event, the population of the country may be around 1.30 billion by 2030. If these projections about foodgrain production and population growth materialize, the per capita availability of foodgrains may be around 220 kg per year in 2030. This quantity should be sufficient to meet the energy requirements of the people, even if one-fourth of it is used as feed-grain for rearing livestock and poultry. But if either the population growth remains higher than 1% or the foodgrain production does not reach the level of 325 million tons by 2030, the country may have to depend on imports to meet the demand. To maintain a steady growth in food grain production, the investments in agriculture and agribusiness are to go up substantially; the policies are to be redesigned drastically; and the whole agriculture sector has

to be managed carefully. It would be a big challenge to keep up the growth in foodgrain production and at the same time maintain the productivity of agricultural resources unhampered.

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References

- Evenson, R. E. (1993): Total Factor Productivity growth in Indian Agriculture, paper presented at the National workshop on 'Agricultural Research Evaluation: Methods and Applications' at the National Academy of Agricultural Research Management Hyderabad, 17-19 August.
- Gardner, Gary (1996): Asia is losing ground. *World Watch*, 6, 19-27.
- Mishra, Chaturanan (1997): Union Minister for Agriculture, Government of India, releasing the official estimates of foodgrain production during 1996-97 to the press and reported in the daily news paper 'Business Standard' dated 26 June.
- Paddock, W and Paddock, P. (1967): *Famine-1975*, Weidenfield and Nicolson, London.
- Reddy, Vinodini *et al.* (1993): Nutrition trends in India, National Institute of Nutrition. Indian Council of Medical Research. Hyderabad. 46 pp.
- Ryan, J. G. and Asokan, M. (1977): Effect of green revolution in wheat on production of pulses and Nutrients in India, *Indian Journal of Agricultural Economics*, 4, 8-15.
- The Ministry of Agriculture (1996): *Agricultural Statistics at a glance*. Directorate. of Economics and Statistics, Department of Agriculture and Cooperation, Government of India. 140 pp.
- The Ministry of Finance (1997): Pre-budget economic survey presented by the Finance Minister to the Parliament on 26 February and published by the daily newspaper 'The Economic Times' on 27 February.
- Tyagi, D. S. (1990): Increasing access to food through interaction of price and technology policies-the Indian experience In: *Increasing Access to Food-the Asian experience*. edited by Tyagi, D. S and V. S. Vyas, Sage publications., New Delhi. 455 pp.