

# Sustainable food production, income generation and consumer protection in India \*

## Introduction

Foodgrain production in India remained a matter of critical concern for nearly two decades after Independence. Despite major investments in irrigation, infrastructure, rural development programmes, and policy initiatives in land reforms, public distribution, rural credit, etc. dependence on food imports continued to grow. Rapid increase in population growth implied near-stagnation in per capita foodgrain availability. There was a real threat of further deterioration. The introduction and rapid spread of high-yielding varieties since late

cent. While non-agriculture had grown significantly faster, and its share in GDP showed rapid increase, agriculture was not growing as rapidly to unleash strong linkage multipliers and reduce employment dominance of agriculture. Table 2 also shows a somewhat disturbing trend of a perceptible decline in growth of foodgrain production in the post-1990 period. More shall be said on this later because this is a trend that has to be monitored closely from the sustainability angle. The table shows that till 1990, foodgrain production was driving the agricultural sector growth - a natural consequence of highly targetted investment and policy regime pursued since independence. Since 1990, the non-foodgrain sector appeared to have taken over.

Table 3 shows what is perhaps the most critical aspect of the agricultural structure in context of food security and poverty. It shows that nearly four-fifth of the holdings are of less than 2 hectares in size. Over time, these numbers are expected to grow further. For this vast number, farming is the mainstay for subsistence. Studies have shown that most of the marginal (having less than one hectare) farmers are net buyers of food.

**Table 1. Population and agriculture**

Period	Total population (million)	Growth rate	Share of rural population	Agricultural share in gross domestic product (GDP)
1951	361.1	1.25	82.7	50.1
1961	439.2	1.96	82.0	47.3
1971	548.2	2.20	80.1	41.5
1981	683.3	2.28	76.7	36.3
1991	846.3	2.10	74.3	31.0
1997	934.2*	1.90		

\* 1996 estimate

1960s made a dramatic and qualitative change in this scenario. The need for imports was quickly eliminated, food self-sufficiency was achieved and the country became a marginal net exporter of food.

Table 1 provides a brief historical outline of the population-agriculture nexus. Population growth increased through 1981, reaching nearly 2.3 per cent per annum in the 1971-81 decennium. Despite sharply declining share of agriculture in the gross domestic product (GDP), more than two-third of the population remained dependent on agriculture. In table 2, which shows the growth in GDP and its components, it is indicated that even though agricultural growth has continued to accelerate, it still falls short of target by 4 to 6 per

**Table 2. Growth in agriculture and foodgrain production**

Period	Gross domestic product (GDP)	Agriculture	Non-agriculture	Foodgrains
1950/51 to 1965/66	3.76	2.24	5.32	2.91
1966/67 to 1978/79	3.69	2.82	4.32	3.27
1979/80 to 1990/91	5.42	3.44	6.45	3.38
1991/92 to 1995/96	6.24	3.57	7.31	2.53
1950/51 to 1995/96	3.93	2.40	5.02	2.70

## Growth performance

Table 4 provides more detailed information on production of major foodgrains over the last 50

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**Table 3. Farm size distribution, 1990-1992**

Size category	No. of holdings		Area operated	
	(million)	(Percentage)	(million ha)	(Percentage)
<1 ha	62.1	59.0	24.6	14.9
1-2 ha	19.8	19.0	28.7	17.3
2-4 ha	13.9	13.2	38.3	23.2
4-10 ha	7.6	7.2	45.0	27.2
>10 ha	1.7	1.6	28.9	17.4
Total	105.3	100.0	165.6	100.0

**Table 4. Production of foodgrain**

Year	Rice	Wheat	Coarse cereals	Pulse	Total foodgrains	Growth rate
1950-1951	20.58	6.46	15.38	8.41	50.82	-
1960-1961	34.58	11.00	23.74	12.70	82.02	3.22
1970-1971	42.22	23.83	30.55	11.82	108.42	1.72
1980-1981	53.63	36.31	29.02	10.63	129.29	2.08
1990-1991	74.29	55.14	32.70	14.26	176.39	3.54
1997-1998*	83.52	66.38	31.15	13.08	194.13	1.23
* Estimate 1997-1998						

years. The data shows the major strides achieved in wheat and rice production. Coarse cereals, and particularly pulses have lagged behind. Adverse implications of the latter in terms of food security for the poorest of rural poor, and on nutrition well-being of a predominantly vegetarian population have been widely discussed and suitable R&D and other measures are being used to address this imbalance. The table also shows the phenomenon of a deceleration in foodgrain production growth since 1990. The numbers are different from those presented in table 2 because of different sources but the trend is very clear.

There are some that argue that this deceleration has dangerous portends for food security and that renewed effort is needed to put the foodgrain production growth back on its previous track. Others are somewhat less alarmed on two counts - declining cereal consumption trends discernible from household consumption studies, and the possibility of much higher income growth from non-foodgrain (high-value) products which, in an open economy, offers better command over world food stocks in addition to more efficient and sustainable use of agricultural resources. Latest government pronouncement, however, talks about doubling foodgrain output in ten years and significant increase in expenditure outlays for agriculture including R&D over the next five years. The strategy to achieve this emphasizes the

backward and rainfed regions so that equity goals are also promoted. In effect, a dual strategy is implied - a liberalized market environment promoting transfer of resources to high income crops and enterprises driven by comparative advantage, and a targeted foodgrain production strategy for areas where these still offer growth opportunities. Food production continues to receive very high priority in terms of direct state support to agriculture.

It is well known that production growth over the last thirty years has come increasingly from productivity improvements. Data presented in table 5 illustrates this phenomenon. In view of the closing land frontier, the importance of accelerating the rate of technical change becomes obvious. What is worrisome on this front is the fact that the north-western part

of the country, which played a pivotal role in generating food surpluses till the end of 1980s, is now showing signs of deceleration in productivity growth. It is argued that high-intensity agriculture has led to excessive mining of soil and water resources. Some empirical studies show that total factor productivity growth in wheat and rice production is slackening (see next section). This has been receiving priority research attention. Moreover, the current thrust on low-productivity regions is intended to ensure that the overall production growth remains at the level of about 3 per cent. The realization that all this must come through technical change is reflected in significantly enhanced allocations for agricultural research in the Ninth Five Year Plan.

The final picture on foodgrains availability is presented in Table 6. It shows that between 1951 and 1997, per capita foodgrain availability increased by over 25 per cent - a significant achievement in the face of more than 250 per cent increase in population. The sobering factors are (a) continuing high levels of poverty and (b) substantially low productivity levels by international standards.

### **Resource use**

Table 7 presents a profile of land utilization

Period	Area growth	Yield growth	Production growth
1950/51- 1965/66	0.37	1.85	2.21
1966/67-1978/79	- 0.26	3.19	2.92
1950/51-1995/96	0.13	2.51	2.65

information on historical trends in this regard. These very high growths, coupled with large expansion in irrigation have sustained high production growth over the last 30 years.

Year	Production (million tons)	Availability/day (gms)
1951	50.8	395
1961	82.0	469
1971	108.4	469
1981	129.6	455
1991	178.4	510
1997	198.8	512

## Poverty

How have these developments affected poverty? India was an impoverished country at the time of independence 50 years ago, and since then poverty alleviation has been a priority theme in development planning. Table 10 shows where we stand today. Nearly 55 per cent of the population was below the poverty line in 1973, covering about 315 million people. In 1993, the percentage dropped to 36, but the numbers involved remained more or less the same. High population growth undermined the absolute impact of development on poverty. The table also shows that more than three-fourth of the poor reside in rural areas. This underscores the importance of even faster agricultural performance in the future if the massive problem of poverty is to be solved.

	1950/51	1960/61	1970/71	1980/81	1990/91
Cultivated area (million ha)	118.7	133.2	140.3	140.0	142.2
Cropped area (million ha)	131.9	152.8	165.8	172.6	185.5
Net irrigated area (per cent)	17.6	18.5	31.1	38.7	47.4
Cropping intensity (per cent)	111.1	114.7	118.2	123.3	130.4
Per cent area under					
Cereals	61.1	60.2	61.4	60.8	55.6
Pulses	15.6	15.5	14.0	13.2	13.4
Foodgrains	76.7	75.7	75.4	73.9	69.0
Non-foodgrains	23.3	24.3	24.6	26.1	31.0

Rural poverty is driven by inequities in resource endowments including education and skills. It has been shown in

for crop production over time. As mentioned earlier, area expansion came to an end by 1970. Since then, there has been only vertical expansion of area through increased cropping intensity, mainly driven by development of irrigation. The table also shows that more than two-third of the cropped area is currently allocated to foodgrains (cereals and pulses). In 1950/51, it used to be more than three-fourth. This shows that these crops have been substituted by non-foodgrains, particularly after 1980/81. Pulse crops as a group have lost their share and the adverse impact on nutrition has been a matter of concern, as also their impact on soil health. These leguminous crops are an important organic source of nitrogen in the soil. Among non-foodgrains, oilseeds and horticultural crops have been the notable gainers in recent years because of favourable relative prices.

Use of modern inputs such as improved seeds, chemical fertilizers, pesticides, farm machinery, etc. have played an important role in this growth process. Tables 8 and 9 contain

table 3 that 59 per cent of farms have less than 1 hectare of land. More than 26 per cent of the rural workforce is landless. In addition, rural literacy in general and female literacy in particular lags significantly behind the urban population. This constrains occupational mobility towards higher paying options. Moreover, unlike China, India has not followed rural industrialization aggressively enough and non-farm employment opportunities in the countryside are non-existent. This is a big challenge for social sustainability and is at the top of the policy agenda.

## Futuristic scenario

What are the future projections? Table 11 provides estimates of needed demand growth. It shows that cereals, rice and pulses are the commodities where growth rates will need to be maintained or accelerated. Analysis of the resource base scenario suggests that this will need to come from rainfed systems, which will continue to dominate. R&D efforts in this area are being

intensified and a massive programme for watershed development is contemplated to address both efficiency and sustainability concerns. Since the country has clearly opted for high domestic self-sufficiency in foodgrains, the success of these interventions will be critical.

The needed growth rates in non-foodgrains are much higher, particularly for fruits, vegetables and livestock products. These sectors are receiving attention in the emerging policy scenario, from both demand and farm income perspectives. There is some apprehension that this may affect food.

**Table 8. Use of modern inputs**

		1961	197	1981	1991	1997
Fertilizer (NPK)	kg/ha	1.9	13.6	31.9	69.3	76.0
Pesticides	kg/ha	na	147	317	404	na
Tractors	No./th.ha	0.2	0.8	3.1	8.1	9.7*
* 1993						

**Table 9. Coverage of modern varieties of cereals**

Crop	% of MV area to total area		
	1970-1971	1980-1981	1991-1992
Rice	14.9	48.2	65.5
Wheat	35.5	75.7	88.3
Sorghum	4.6	23.1	54.8
Pearl millet	15.9	38.7	47.5
Maize	7.9	27.1	47.5

**Table 10. Population below poverty line**

Year	Rural		Urban		Total	
	No. (million)	%	No. (million)	%	No. (million)	%
1973	258.8	56.4	55.8	49.0	314.6	54.9
1983	250.4	45.6	68.2	40.8	318.6	44.5
1993	244.4	37.3	73.5	32.4	318.0	36.0

**Table 11. Future growth in demand**

Commodity	Growth (%)
Rice	2.15
Wheat	1.54
Coarse cereals	1.23
Pulses	3.33
Milk	4.09
Oil and fats	3.60
Vegetables	3.64
Fruits	3.97
Meat, fish, eggs	5.80
Sugar	2.49

A recent study looks at the demand- supply scenario for 2020 based on alternative assumptions for total factor productivity growth. The results are presented in table 12. The constant TFP growth assumption implies continuance of the trend observed since 1970s, the deceleration scenario projects the trend noted in the last decade. This analysis indicates that if the historical growth trend in TFP (of around 1.2 to 1.4 per cent per annum) is maintained, the country will be able to sustain food security. Otherwise, the position will call for imports. On the other hand, results of another study are reported in table 13.

Using different assumptions regarding demand elasticities and taking account of rapid growth in the livestock sector, these demand projections suggest a completely different picture. Large cereal deficits are implied if this scenario unfolds. In any case, both studies underscore supply side management and the need for accelerating total factor productivity growth.

### Can this be sustained?

There are clearly challenges ahead. There is also a lot of unexploited potential and many opportunities. The following sections briefly describe these. Nevertheless, there is consensus that very aggressive and innovative policies and programmes are needed now.

### Potential

- (a) Despite the progress achieved, productivity levels for most foodgrain crops are way below world averages. In general, there is a consensus that for a number of crops and regions, there are large yield gaps. Through proper policies and investments, this slack can be exploited.
- (b) It has been assessed that for most modern inputs (fertilizers, water, agro-chemicals) the use efficiency is very low. These arise from lack of information, infrastructural or institutional bottlenecks. Addressing these constraints will boost factor productivity and production.

		Constant TFP growth	Deceleration
Rice	Demand	122.1	122.1
	Supply	134.0	120.5
	Gap	11.9	-1.6
Wheat	Demand	102.8	102.8
	Supply	127.3	107.6
	Gap	24.5	4.8
Coarse cereals	Demand	40.9	40.9
	Supply	48.0	42.3
	Gap	7.1	1.4
Pulses	Demand	27.8	27.8
	Supply	30.3	30.3
	Gap	2.5	2.5
Foodgrains	Demand	293.6	293.6
	Supply	339.6	300.7
	Gap	46.0	7.1

- (c) Frontier technologies offer immense potential for breaking productivity barriers. These are now receiving greater attention in the R&D programmes.
- (d) Post-harvest losses account for a fair proportion of the produce. Better post-harvest technologies including processing can retrieve these losses and augment supplies.
- (e) For a long time the incentive structure for agriculture was distorted due to closed economy and protection. In the current liberalized context, as factor and product markets are properly aligned with world prices, comparative advantage will be better

expressed and trade will enable improved management of food systems.

- (f) With appropriate policies and programmes, it will be possible to bring down population growth and achieve higher income growth. Both these factors will bring down cereal demand. However, if livestock product consumption escalates, this scenario may not offer much leeway.

## Challenges

- (a) Plateauing of yields in the green revolution areas, which provided bulk of the traded foodgrains in the past, threatens future prospects. It has not been possible to push potential yield ceilings.
- (b) The above and other factors are leading to a slackening of total factor productivity growth for foodgrains. If this trend is not reversed, stress will develop both on production and prices front.
- (c) Technology gaps in foodgrain production between developing and developed (exporting) countries is growing. This will have adverse impact on food self-reliance.
- (d) Degradation in natural resources particularly land and water, poses a major threat to future production potential. High population pressure, rapid urbanization, and failure of most interventions to address resource degradation, are factors that cause concern.

	Feed coefficients					
	Feed demand	Total cereal demand	Feed demand	Total cereal demand	Feed demand	Total cereal demand
<b>Baseline</b>						
1990 actual	1.69	147.11	9.57	159.93	12.76	165.76
2020 (3.0 per cent PCY growth)	3.82	278.48	20.16	335.47	26.46	364.21
2020 (5.5 per cent PCY growth)	6.79	351.15	32.53	485.17	41.41	557.69
<b>Poverty removed</b>						
1990	1.85	154.83	10.39	169.61	13.98	176.67
2020 (3.0 per cent PCY growth)	4.16	292.58	21.69	358.06	28.54	392.39
2020 (5.5 per cent PCY growth)	7.42	370.42	34.76	525.70	44.09	613.40
<b>Well-fed India</b>						
1990	5.51	146.28	18.94	170.51	24.73	183.62
2020 (3.0 per cent PCY growth)	6.60	301.89	20.89	406.83	39.02	461.08
2020 (5.5 per cent PCY growth)	12.56	362.08	48.62	616.15	58.16	756.74

- (e) Food production also faces competition for resources. Even within agriculture, crop diversification is claiming land and other resources. Urbanization and high incomes are driving resources to non-agricultural uses.
- (f) Over the last decade, there has been a slackening of investment in agriculture. This poses a serious threat to future production prospects. Populist programmes aimed at short-term poverty alleviation are cutting into public investments.
- (g) While trade liberalization offers opportunities, the associated WTO provisions also pose challenges. For a large and poor country such as India, there is a perceived trade-off between global integration and national interest.

## Income generation

Food and nutrition are basically driven by incomes. It has been shown that nearly one-third of the population is below the poverty line. Hence income generation in rural areas has to be the centerpiece of any development strategy. The following paragraphs describe the initiatives and imperatives in this context.

- (a) Income and access to food is attempted to be provided through a number of poverty alleviation programmes. The most talked about is the public distribution system. This provides foodgrains and other essential commodities at subsidized prices to the poor. The programme is under attack by the reformists on grounds of high costs, inefficiencies, urban bias, and burden on public funds.
- (b) A number of programmes to provide direct employment to rural unemployed have been initiated in the country. These are usually linked to development of infrastructure like roads, irrigation and drainage, etc. In many cases, these programmes are tied with wages in kind to ensure food security.
- (c) There are targetted income generating programmes for the rural poor under the integrated rural development programme of the federal government. These focus on providing income-generating opportunities to the rural poor in agriculture and related sectors. Providing additional capital through credit is the main plank of these

programmes.

- (d) There is considerable emphasis on investment in social sector activities in the rural areas. These cover housing, health, education, etc. These have implications for food security and welfare. In a broad sense, these also include efforts on peoples' participation and decentralization.
- (e) There is considerable emphasis on raising rural incomes through value addition and processing at the primary level. This aims at internalizing the benefits at the village level.
- (f) Rural industrialization is another area that has gained currency, particularly in context of the Chinese experience. It is now well recognized that providing more income-enhancing options in the countryside is a desirable and efficient strategy.
- (g) Diversification away from low-valued to high-valued enterprises in agriculture has become a more attractive option as trade liberalization and exports offer new opportunities. This has become an important component of the agricultural policy. To the extent, this is in tune with comparative advantage and specialization; the growth opportunities are substantial.
- (h) It is now well recognized that infrastructure development and non-farm employment are constraining rural income growth and poverty alleviation. Accordingly, these sectors are receiving greater emphasis in the Ninth Five Year Plan.
- (i) Finally, enhancement of productivity of agriculture holds the key to rural prosperity and poverty eradication. Agricultural R&D, which was plagued by chronic underinvestment, has been given a much higher priority for future investments.

## Consumer protection

Owing largely to the persistent climate of deficits and scarcity, the focus has largely been on supply management. Some initiatives were taken before Independence to provide incentives to producers for better quality produce and to protect the consumer against unfair practices in the market place. The standardization of weights and measures and grading of farm produce were the earliest legislations. The agricultural produce markets act was aimed at streamlining marketing practices to benefit both producers and consumers. Similarly, the prevention of food adulteration act

sought to protect consumers against unscrupulous practices adopted by traders. Thus a minimum legal framework has been in existence for some time, but inadequate enforcement machinery has constrained its effectiveness.

The Bureau of Standards lays down quality standards for several marketed inputs that help farmers as consumers. It also covers a number of agricultural products, particularly processed products.

Direct protection to consumers has traditionally been provided through two mechanisms - through cooperative consumer societies, particularly in urban areas, and through public distribution of foodgrains and other essential commodities at regulated prices. In addition, price controls have also been enforced during periods of scarcity.

These programmes have focussed largely on urban dwellers. The vast majority of rural consumers are only marginally touched. Rural markets and consumers continue to remain largely unprotected. It is also obvious that these programmes protect against price increases. Quality and services have not received much attention in terms of state intervention.

It was in the 1980s that a significant consumer movement emerged in the country. The consumer protection act was passed with very comprehensive terms of reference and coverage. Consumer courts were established even at the district level. The programme is strongly backed by mass media and non-governmental organizations are actively participating in consumer awareness

and grievance redressal processes. At present these are largely urban and deal with trade and services sectors but it is expected that agriculture and rural areas will gradually fall under its ambit.

## Conclusions

Foodgrains have been at the centre of Indian agricultural policies since Independence. Attention was distracted for a brief period since the economic liberalization process was initiated in 1991. After considerable debate, its primacy has again been restored, in a somewhat different mode. There was a sense of complacency in view of the record over the last thirty years, but there is consensus now that the challenges ahead are far more difficult and need greater attention and effort.

It is also realized that income generation opportunities have widened in the wake of liberalization, but their exploitation would need new investments, institutions and policies. Public systems dealing with rural issues will need major reorientation. Poverty will remain a major concern in the foreseeable future: its face is likely to change from a rural to urban hue if income and employment opportunities do not grow very rapidly in the countryside.

Policies are in flux as the economic and political implications of globalization begin to be better understood. There is, however, a consensus that challenges for agriculture in general and food production in particular are indeed daunting. The easier options have almost been fully exploited.