POLICY BRIEF 28

Demand for Foodgrains During 11th Plan and Towards 2020

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India achieved impressive growth in food production after adoption of green revolution technology which made the country self sufficient in basic foods. Per capita production of foodgrains increased from 183 kg during early 1970s to 207 kg by mid 1990s, even when country's population increased by more than 50%. After mid 1990s, foodgrain production has failed to keep pace with the population growth. Per capita production of cereals has declined by 17 kg and pulses production by 3 kg during the last decade (Table 1). This could create a serious threat to food security, as, the country identifies its food security with foodgrain security. On the other hand, some scholars feel that decline in per capita production of cereals and foodgrains is consistent with dietary diversification, as, with the increase in income, consumers shift their preference from cereals to livestock products like milk, eggs, meat and fish and horticultural products (Pingali and Khwaja 2004). This debate has created lot of confusion in the mind of policy makers to plan medium and long term food production. It is therefore highly desirable to provide credible estimate of future demand for basic food. This paper provides demand projections for foodgrains towards the end of 11th Five Year Plan and by the year 2020-21.

Table 1: Per capita production of foodgrains : 1971 to 2007

(Kg)

Year	Cereals	Pulses	Foodgrains
1971-75	164	19	183
1976-80	172	18	190
1981-85	179	17	196
1986-90	182	16	198
1991-95	192	15	207
1996-00	191	14	205
2001-05	177	12	189
2004-07#	175	12	186

Source : Economics Survey, GoI, New Delhi, various issues.
#Figures for the year 2006-07 are based on 4th advance estimate which places foodgrain production at 216 mt.

Is Importance of Foodgrains Receding?

Long term trend in consumption pattern at household level shows that per capita direct consumption of foodgrains has been declining and that of livestock products and fruits and vegetables has been going up for a fairly long time. Despite this shift in dietary pattern, foodgrains are considered to be of paramount importance for household food and nutrition security. This is because of four reasons. One, cereal and pulses are staple foods and there is no perfect substitution between staple foods and other foods. Two, due to inadequate level of intake of almost all foods, increased consumption of other foods, in most cases, fill dietary deficiency. Three, foodgrains are the major and the cheapest source of energy and protein as compared to other foods (Chand and Kumar 2006 p.360) and are thus vital for food and nutrition security of low income masses. Four, increased production and consumption of livestock products resulting from rising per capita income require high growth in use of grain as feed for livestock. Because of these reasons, foodgrains continue to be the main pillars of food security in the country and any slack in their production translates into persistent price shock and adverse impact on common people.

Factors Affecting Foodgrain Demand Over Time

Dietary pattern in the country is changing because of several reasons. The prominent among them are (i) increase in per capita income, (ii) changes in preferences due to change in taste, life-style, occupation structure and (iii) increase in urbanisation. Prices are another important factor affecting demand.

Basis for Demand Projection

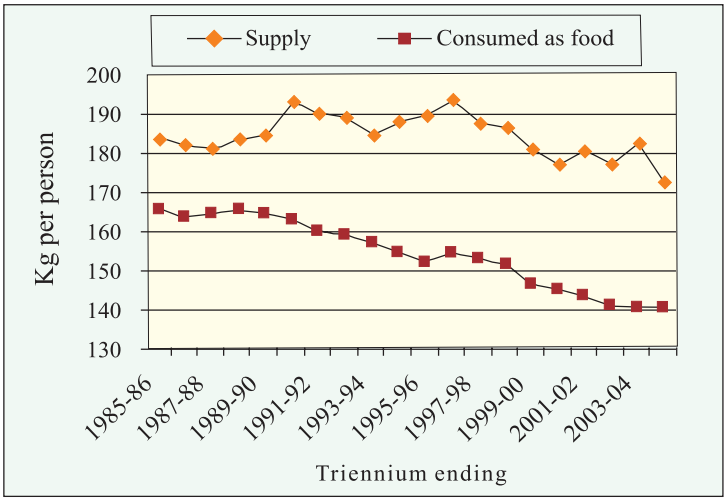
Total demand for foodgrains can be divided into two categories. One, foodgrains consumed by household at home in various forms, also referred to as "direct demand" or "demand as food". Two, foodgrains used as feed, seed and in industry and the quantity that goes as waste. This is referred to as "Other Demand" or sometime "indirect demand". Estimates of foodgrains consumed at home by households are provided by National Sample Survey Organization (NSSO) which prepares these estimates based on the nation-wide surveys consisting of large sample every five or some time six years, and, thin sample for the other years. However, no estimates are available on foodgrains going into feed, seed, industrial use and wastage. Similarly, foodgrains consumed as food outside home and in various types of bakery products, except bread, are not included in the NSSO estimates.

Official estimates of net availability of foodgrains for human consumption are derived from total production, adjusted for trade and change in stock, after setting aside fixed percentage of production for seed, feed, wastage and industrial use. These estimates presume that 12.1% wheat, 7.6% rice and 22.1% percent

gram (pulses) go for other uses and as waste (Government of India, 2002). This ratio for total foodgrains is taken as 12.5%. Official estimates have been using the same ratios since 1951 even though foodgrains usage in different forms has undergone lot of changes over the last 56 years. An indication of this is available from the growing gap between per capita direct demand for foodgrains and domestic supply (Fig.1) which shows annual growth rate of 4.08 percent.

After considering all these aspects, estimate of foodgrain demand in other uses was prepared based on long time series representing per capita food supply and direct demand. The difference in the two series has been treated as demand in other uses and its growth rate was used to project demand for foodgrains in other uses. Year

Figure 1 : Trend in per capita supply and consumption of foodgrains as household food



Source: Computed by using data from
a. Level and Pattern of Consumer Expenditure, NSSO Household Consumer Expenditure Surveys, various Rounds. NSSO, New Delhi.
b. Agricultural Statistics at a Glance, Ministry of Agriculture, GOI, New Delhi.

2004-05, which is the most recent quinquennium survey year of NSSO on Consumer expenditure, has been used as the base period for making demand projections.

Per capita demand projections for year 2011-12 and 2020-21 were prepared separately for rural and urban population and for rice, wheat and coarse cereals based on the changes observed between 1993-94 and 2004-05, and by using income elasticity of demand for various foodgrains. Total change in per capita foodgrain consumption during 1993-94 and 2004-05 was considered to be sum of two components (a) change due to growth in per capita income and (b) change in demand due to shift in tastes and preferences. The latter was computes by taking difference between total change in demand and change in demand due to increase in income. Increase in demand due to increase in income was estimated by multiplying growth in per capita income during 1993-94 to 2004-05 by income elasticity of demand.

Per capita demand in future period (tn) was estimated from per capita demand in base year (to), as under:

$$Dt_n = D_t0[(1+ \mu y * Y_g)^{**(n)} + \Delta P_R]$$

Where Dt_n is per capita demand in future year (n) ; D_0 is per capita demand in base year; μy is income elasticity of demand; Y_g is growth rate in per capita income; and ΔP_R is rate of change in demand due to shift in preferences and taste.

Past Trend and Projections

As mentioned before, demand for foodgrains was projected by taking into account population growth, composition into rural and urban population, growth in per capita income in rural and urban areas and change in taste and preferences. According to the estimates of National Commission on Population published by the Census Office, India's rural population is projected to increase from base level of 774 million during 2004-05 to 838.7 million by 2011-12 and to 904 million by 2020-21 while urban population is

Table 2: Base year and projected population: million

A. Number of persons: million	Period		
	2004-05	2011-12#	2020-21#
Rural	774.4	838.7	904.0
Urban	310.6	361.6	428.9
Total	**1085.0**	**1200.3**	**1332.9**
B. Annual Growth rates	**1993-94 to 2004-05**	**2004-05 to 2011-12**	**2011-12 to 2020-21**
Rural	1.599	1.12	1.85
Urban	2.65	2.21	1.93
Total	1.88	1.43	1.19

Source: Population Projections for India and States 2001-2006, Report of the Technical Group on Population Projections contributed by the National Commission on Population, office of the Registrar General and Census Commission, New Delhi, May 2006.

projected to grow from 310.6 million to 361.6 million and 428.9 million in the same period (Table 2). These increases in population involve slowdown in growth rate of population.

During the last 10 years per capita income in the country increased at the trend rate of 4.97%. It is assumed that Indian Economy in next 5 to 15 years would grow at average rate of 9%, which implies

Table 3: Recent and projected growth rates in income

Particulars	1993-94 to 2004/05	2004-05 to 2011-12	2011-12 to 2020-21
Net National Product at factor cost	6.85	9.00	9.00
Per capita income			
Rural	2.27	3.46	3.58
Urban	7.75	11.81	12.19
Total	**4.97**	**7.57**	**7.81**

Source: 1. National Accounts Statistics, CSO, Ministry of Statistics and Programme Implementation, GOI, New Delhi.
2. Population Projections for India and States 2001-2006, Report of the Technical Group on Population Projections contributed by the National Commission on Population, office of the Registrar General and Census Commission, New Delhi, May 2006.
 # Projected figures.

7.57% growth in per capita income during 11th Plan and 7.81 percent growth rate beyond that. Growth rate in urban income would be more than 3 times the growth rate in per capita income of rural people (Table 3).

There is lot of disagreement on income elasticity of demand. Recent studies are veering round to the conclusion that income elasticity of demand for cereals is either close to zero or negative. This is also consistent with long term changes in demand for cereals

Table 4: Expenditure elasticities of cereals

Food item	Rural	Urban
Rice	0.064	0.016
Wheat	-0.056	-0.080
Coarse cereals	-0.151	-0.165
Pulses	0.309	0.214

Source: Kumar (1998), Food Demand and Supply Projections for India, Agricultural Economics Policy Paper 98-01, Indian Agricultural Research Institute, New Delhi.

which shows decline over time even among the poor income groups. Elasticities based on Food Characteristic Demand System estimated by Kumar (1998) fall in this category and are used to estimate and incorporate income effect (Table 4).

Direct Demand as Food

Trend in per capita consumption of cereals and pulses during 1973-74 to 2004-05 is presented in Table 5 separately for rural and urban population. Per capita consumption of cereals in rural areas followed a moderate decline between 1973-74 and 1983. After this, cereal intake shows a very sharp decline in both rural as well as urban areas. The Table also shows that per capita consumption of cereals is much lower in urban areas as compared to rural areas. At all India level, per capital consumption of cereals declined from 154.24 kg per person per year during 1973-74 to 132.58 kg during 2004-05. Disaggregated data shows that percent decline was much larger for coarse cereals as compared to rice and wheat. Second, gap between wheat and rice consumption was narrowing down.

Table 5: Trend in per capita direct consumption of cereals and pulses as food, kg/year

	Commodity	1973-74	1983	1993-94	2004-05	2011-12#	2020-21#
A.	**Rural**						
	Rice	83.95	80.67	85.41	79.68	76.70	73.37
	Wheat	42.83	54.26	53.53	52.23	51.18	49.81
	Coarse cereals	56.82	45.14	24.09	15.52	12.15	9.50
	Total cereals	183.60	180.07	163.03	147.44	140.04	132.68
	Pulses			9.25	8.58	8.41	8.36
	Foodgrain			172.28	156.01	148.45	141.04
B.	**Urban**						
	Rice	65.46	64.73	64.36	59.04	56.21	53.04
	Wheat	52.56	58.64	57.43	56.53	54.71	52.34
	Coarse cereals	19.71	14.11	7.55	5.39	4.35	3.49
	Total cereals	137.73	137.48	129.33	120.96	115.27	108.87
	Pulses			10.46	10.03	10.40	11.50
	Foodgrain			139.80	130.99	125.68	120.37
C.	**Rural +Urban**						
	Rice	79.98	76.87	79.92	73.77	70.53	66.83
	Wheat	44.91	55.30	54.55	53.46	52.24	50.62
	Coarse cereals	48.86	37.76	19.77	12.62	9.80	7.57
	Total cereals	173.76	169.94	154.24	139.86	132.58	125.01
	Pulses			9.56	8.99	9.01	9.37
	Foodgrain			163.80	148.85	141.59	134.39

Rice also includes rice products like chira, khoi, lawa, muri, rice powder etc.
Wheat also includes maida, suji, rawa, sewai, noodle, bread
Source : NSSO, Household Consumption of Various Goods and Services In India, and related reports for different rounds.
 # Projections

Per capita direct demand for rice in rural areas, which declined from 85.41 kg during 1993-94, to 79.68 kg during 2004-05, is projected to further decline to 76.7 kg by 2011-12 and 73.37 kg by 2020-21. Per capita demand for wheat is projected to follow very small decrease as compared to rice and coarse cereals. For the country as a whole, per capita consumption of cereals is projected to decline from 139.86 kg in the base year to 132.6 kg and 125 kg by 2011-12 and 2020-21. Demand for pulses is projected to remain at 9 kg during 11th Plan but then expected to increase slightly.

Based on these projections, and population projections, demand for foodgrain is expected to rise to 84.7 million tonne for rice and 62.7 million tonne for wheat towards the end of 11th Plan (Table 6). Food demand for coarse cereals is projected to decline from 13.7 million tonne in the base year to 11.8 million tonne by 2011-12 and 10.1 million tonne by 2020-21. Direct demand for all cereals for food is projected to be 159.1 million tonne by the year 2011-12 and 166.6 million tonne by 2020-21. Demand for foodgrains is projected to be 179 million tonne by 2020-21. These projections involve around 0.95 percent annual growth in foodgrains used as food at household level.

Table 6: Total demand for foodgrains as household food: million tonne

Commodity	1993-94	2004-05	2011-12#	2020-21#
Rice	71.3	80.0	84.7	89.1
Wheat	48.7	58.0	62.7	67.5
Coarse cereals	17.6	13.7	11.8	10.1
Total cereals	137.6	151.7	159.1	166.6
Pulses	8.5	9.8	11.8	12.5
Foodgrain	146.1	161.5	169.9	179.1

Source : Table 2 and Population Projections for India and States 2001-2026, Office of the Registrar General & Census Commissioner, India.
 # Projections

Demand in Other Uses

There are large year to year fluctuations in production and total supply of foodgrains which also impact foodgrains used as food. To overcome this problem, we have taken five yearly average, ending with quienquennium (QE) rounds of NSSO, beginning with year 1987-88, to arrive at estimate of foodgrains used in various forms, other than food, and including wastage.

Per capita domestic supply of cereals (arrived at from production adjusted for change in stock and export and import) during 1983-84 to 1987-88 was 181.6 kg, out of which, 165.9 kg was consumed as food and the rest went into other uses. During 1995-96 to 1999-00, direct

food consumption declined by 15 kg, over QE 1987-88, but demand in other uses increased by almost 20 kg. Thus, between QE 1987-88 and QE 1999-00, share of other uses in domestic supply increased

Table 7: Per capita supply and demand for cereals since 1983-84: kg/year

Five Year ending Quinquennium survey	Domestic supply	Direct food consumption	Other uses	Share of other uses in domestic supply
1983-84 to 1987-88	181.6	165.3	16.2	9.0
1989-90 to 1993-94	187.8	158.6	29.2	15.5
1995-96 to 1999-00	185.7	150.4	35.3	19.0
2000-01 to 2004-05	178.1	140.2	37.9	21.3

Source: Computed by using data from
a. Level and Pattern of Consumer Expenditure, NSSO Household Consumer Expenditure Surveys, various Rounds. NSSO, New Delhi.
b. Agricultural Statistics at a Glance, Ministry of Agriculture, GOI, New Delhi.

from 9 percent to 19 percent (Table 7). Average of the recent five years show that 21.3 percent of foodgrain production was going in other uses. This was used as a base scenario and future demand for foodgrains in other uses was estimated using long term growth rate, which was estimated to be 4.08 percent per year.

According to these estimates, indirect food demand and demand in other uses for cereals would be around 60 million tonne by end of 11th Plan and 101 million tonne by 2020-21. Demand for pulses in other uses is projected to remain at the level of base year during 11th Plan, but it would increase to 6.7 million tonne by 2020-21. These projections involve around 5 percent growth in demand for foodgrain in other uses.

Table 8: Base year and projected demand for foodgrains as household food and in other uses, million tonne

Food item/type of demand	Base year 2004-05	End of 11th Plan	By 2020-21
Cereals			
Direct demand as household food	151.7	159.1	166.6
Indirect food demand and other uses	41.1	59.8	94.9
Total demand	192.8	218.9	261.5
Pulses			
Direct demand as household food	9.8	11.8	12.5
Indirect food demand and other uses	4.4	4.3	6.6
Total demand	14.2	16.1	19.1
Foodgrain			
Direct demand as household food	161.5	172.5	187.4
Indirect food demand and other uses	45.5	64.1	101.5
Total demand	207.0	235.0	280.6

Source: Earlier Tables.

Total Demand

Total demand for cereals is projected to grow to 218.9 million tonne by the end of 11th Plan and it would reach 261.5 million tonne by the year 2020-21 (Table 8). Demand for pulses in the same period would grow to 16.1 and 19.1 million tonne. Domestic demand for foodgrains is projected to reach 235.4 million tonne by the end of 11th Five Year Plan and 280.6 million tonne by the year 2020-21. It is important to mention that these projections do not include export demand.

Meeting the projected demand for foodgrains would require 1.86 percent annual growth in foodgrain production during 11th Plan. Beyond that, growth rate in foodgrain demand would increase to 2 percent despite slow down in population growth rate. As compared to these growth rates, India's foodgrain production during last 10 years (1997-98 to 2006-07) increased annually by meager 0.48 %.

Conclusions

Despite dietary diversification, involving sharp decline in per capita direct consumption of foodgrains, demand for cereals and pulses is projected to grow at about 2 percent per year on account of increase in population and growth in indirect demand. This growth rate is almost four times the growth rate experienced in domestic production of foodgrains during the last decade. This has created serious imbalances between domestic production and demand which for some time was met by liquidating stock and cutting down on export. If growth rate in domestic production of foodgrain fails to rise to the required level, it would results in decline in export of rice and eventually lead to increased dependence on import of wheat and rice and pulses for meeting domestic demand for foodgrains.

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