

P.O. ABL-140
76873

AGRICULTURAL POLICY ANALYSIS PROJECT, PHASE II

Sponsored by the

U.S. Agency for International Development

Assisting AID Bureaus, Missions and Developing Country Governments
to Improve Food and Agricultural Policies

Prime Contractor:

Abt Associates Inc.

Subcontractors:

Harvard Institute for International Development, Harvard University

Food Research Institute, Stanford University

North Carolina State University

Abel, Daft & Earley

International Science and Technology Institute

International Food Policy Research Institute

AGRICULTURAL POLICY ANALYSIS PROJECT, PHASE II

Under contract to the Agency for International Development, Bureau for Science and Technology, Office of Agriculture
Project Office Hampden Square, 4800 Montgomery Lane, Suite 500, Bethesda MD 20814 • Telephone: (301) 913-0500
Telex: 312636 • Fax: (301) 652-7530 • Fax: (301) 652-7791

FOOD DEMAND MANAGEMENT IN INDIA

October, 1991

**APAP II
Collaborative Research Report No. 319**

Prepared for

**Agricultural Policy Analysis Project, Phase II (APAP II)
USAID Contract No. DAN-4084-Z-00-8034-00**

Author: Anil Deolalikar, Harvard Institute for International Development

Prime Contractor: Abt Associates Inc., 55 Wheeler Street, Cambridge, MA 02138 • (617) 492-7100

**Subcontractors: Harvard Institute for International Development, Harvard University, One Eliot Street, Cambridge, MA 02138 • (617) 495-2164
Food Research Institute, Stanford University, Stanford, CA 94305-6084 • (415) 723-3941
North Carolina State University, Department of Economics and Business, Box 7645, Raleigh, NC 27695-7645 • (919) 737-7187
Abel, Daft & Earley, 1410 King Street, Alexandria, VA 22314 • (703) 739-9090
International Science and Technology Institute, 1129 20th Street, NW, Suite 800, Washington, D.C. 20036 • (202) 785-0831
International Food Policy Research Institute, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036 • (202) 862-5600**

FOOD DEMAND MANAGEMENT IN INDIA

Prepared for
Asia/Near East Bureau
USAID and R&D/AGR

Agricultural Policy Analysis Project
USAID Contract No. DAN-4084-Z-00-8034-00

Abt Associates Inc.
4800 Montgomery Lane
Suite 500
Bethesda, MD 20841

Author:

Anil Deolalikar

Harvard Institute for International Development
One Eliot Street
Cambridge, MA 02138

October 1991

TABLE OF CONTENTS

List of Tables and Figures	ii
List of Acronyms	iii
Executive Summary	iv
1. Physical Access to Food	1
1.1 Self-Sufficiency in Foodgrains	1
1.2 How was Self-Sufficiency in Cereals Achieved?	1
1.3 Trends in Per Capita Availability of Foodgrains	2
1.4 Trends in Per-Capita Availability of Other Foods	7
2. Economic Access to Food	13
3. Avoidance of Famines: The Role of Public Works Programs	16
4. Food Demand Management for the Poor: The Public Distribution System	17
5. Diet Diversification: The Role of Dairy Cooperatives	25
6. Concluding Remarks	26

LIST OF TABLES AND FIGURES

Tables

Table 1	Net Availability of Foodgrains, 1951-87	3
Table 2	Trend in average per-capita net availability of foodgrains per day (gms.), India, 1951-87	5
Table 3	Per Capita Availability of Pulses, 1970-71 to 1987-88	6
Table 4	Per-Capita Consumption of Pulses	7
Table 5	Average daily calorie availability per capita from major foods, India, 1961 to 1984-86	8
Table 6	Composition of Private Final Consumption Expenditure (at 1980-81 prices) .	9
Table 7	Per Capita Consumption Expenditure on Milk & Milk Products and Meat, Fish & Eggs, 1970-71 to 1985-86	10
Table 8	Net Availability and Imports of Oils and Fats, 1974-75 to 1989-90	11
Table 9	Index Numbers of Wholesale Prices	12
Table 10	Implicit Real Price Indices for Cereals, by Expenditure Group, 1970-71 to 1983	15
Table 11	Per Capita Monthly Consumption of Cereals, 1970-71 to 1983	16
Table 12	Growth of the PDS in India, 1950-51 to 1985-86	19
Table 13	Per-capita Income, Production of Cereals, Distribution of Foodgrains through the Public Distribution System, and the Proportion of Population below the Poverty Line, by States	20
Table 14	Regression of Per-capita Distribution of Foodgrains through the Public Distribution System, Indian States	21
Table 15	Distribution of Foodgrains through Fair-Price Shops, Rural and Urban Areas, 1977	22
Table 16	Distribution of PDS Foodgrains by Income Group in 3 States	23
Table 17	Percentage of Households Reporting Purchases of Rice and Wheat from the Public Distribution System by Per-Capita Expenditure Class, Maharashtra and Uttar Pradesh	24

Figures

Figure 1	Net Availability of Cereals, Pulses and Foodgrains	4
Figure 2	Per-Capita Income and Prices of Foodgrains, 1968-88	14

LIST OF ACRONYMS

CACP	<i>Commission for Agricultural Costs and Prices</i>
EGS	Employment Guarantee Scheme
FAO	Food and Agriculture Organization
FCI	Food Corporation of India
FPS	Fair Price Shops
NREP	National Rural Employment Program
NSS	National Sample Survey
PDS	Public Distribution System
RLEGP	Rural Landless Employment Guarantee Program

EXECUTIVE SUMMARY

Food policy and demand management have had four objectives in India: (1) increased physical access to food via attainment of self sufficiency in food production, (2) increased economic access to food via price stability, (3) avoidance of famines, and (4) improved food intake and nutrition for the poor and the vulnerable sections of society. The discussion in this paper suggest that, while demand management policies in India have been very successful in achieving the first three objectives, they have not been effective in accomplishing the fourth goal. For instance, with a skilful combination of technology and price policy. Indian policymakers have succeeded in assuring increased physical and economic access to food to the bulk of the population. Although the per-capita availability of pulses has decreased during the last three decades, there has been a small but steady increase in the per-capita net availability of cereals in the country. Further, National Sample Survey data do not confirm a decline in the per-capita consumption of edible pulses. Most importantly, there is a great deal of evidence that indicates a very rapid increase, especially during the last decade, in the per-capita availability and consumption of foods other than grains -- foods such as milk, edible oils, and sugar. Such diversification in the diet could not have been possible without fulfillment of demand for basic cereals and foodgrains.

Indian food demand management has been highly successful in another important dimension, viz., the avoidance of famines. Although conditions were ripe for widespread famine during the severe drought years of 1965-67, 1973-75 and 1987-89, famine was avoided by prompt famine relief public works programs, governments's buffer stocks, and mobilization of extra grain supplies from abroad. Indeed, emergency relief and food-for-work programs have become a permanent feature of the government's poverty alleviation program. The avoidance of widespread famines is a major achievement of Indian food policy, especially in light of the fact that famines have occurred in Sub-Saharan Africa during the 1970s and early 1980s with downward fluctuations in domestic foodgrains production that were proportionately much smaller than India has experienced.

Where Indian food demand management has failed is in improving food intake and nutrition for the poor and the vulnerable sections of society. The Public Distribution System (PDS) in India is a large, expensive, poorly targeted and inefficient food subsidy scheme. With the exception of a few states, in which rural coverage is wide, the PDS primarily serves the urban middle-class. Vulnerable groups in many states do not have any access to PDS supplies. In such a situation, the PDS is likely to actually have an adverse effect on the poor, since the scheme, because of its large procurement needs, drives open-market prices for foodgrains above the levels at which they would have been in the absence of the PDS. However, the experience of a few states, such as Kerala, Tamil Nadu and Gujarat, which have successfully managed to target the PDS to the urban and the rural poor, suggests that targeting access to the poor is administratively possible and financially feasible.

Food policy and demand management have had four objectives in India: (1) increased physical access to food via attainment of self sufficiency in food production, (2) increased economic access to food via price stability, (3) avoidance of famines, and (4) improved food intake and nutrition for the poor and the vulnerable sections of society. The accomplishment of Indian demand management policies should therefore be judged in terms of their success in achieving these goals.

1. Physical Access to Food

1.1 Self-Sufficiency in Foodgrains

Attainment of self sufficiency in food production has been an overriding objective of Indian food policy. In part, the motivation for self sufficiency was based on the belief that, given the chronic shortage of foreign exchange in India, increased dependence on food imports was tantamount to uncertain and unreliable *physical* access to food.

Shortly after independence and during the 1950s, the dependence on foodgrain imports was moderate; imports constituted between 4 and 9 percent of net domestic availability of foodgrains (Tyagi 1990a). During the mid-sixties, thanks to the drought of 1965-67, the share of imports in net domestic availability increased considerably, reaching a high of 14.1 percent in 1966. However, the rise was temporary, and by 1968, the ratio of imports to net domestic availability was back at its earlier level of below 8 percent. Self-sufficiency in foodgrains production was achieved in the late 1970s, with imports rarely constituting more than 1-2 percent of domestic availability. Indeed, in several years during the late 1970s and 1980s (e.g., 1978-80, 1985, 1987), India was a net exporter of foodgrains. Thus, the objective of self-sufficiency in foodgrains production was achieved by Indian policy makers by 1977.

1.2 How was Self-Sufficiency in Cereals Achieved?

While the availability of the Green Revolution technology of high-yielding varieties had much to do with the dramatic increases in productivity, price policy played an important role in the rapid adoption and diffusion of the new technology. During the period 1967-68 to 1974-75, the government procurement price¹ for wheat was maintained at a higher level than before and was increased at a rate faster than that of other crops. The drought of 1966-67 and 1967-68 had driven wholesale wheat prices to very high levels. Procurement prices for wheat were increased by the government at even faster rates. For instance, while the wholesale price of wheat increased by about 20 percent from 1966-67 to 1967-68, the government increased the procurement price by 30 percent. As the drought ended, the wholesale price of wheat fell by nearly 19 percent from 1967-68 to 1968-69. Yet the procurement price was raised by 8.6 percent. Even as wheat production increased phenomenally during the next five years, the

¹These are the prices at which the Government purchases foodgrains from the private sector for subsidized distribution. See Section IV below on the Public Distribution System.

procurement price of wheat was maintained at the same level (as in 1968-69) through 1973-74 (Tyagi 1990b).

The situation with rice was similar, although the timing was different. The new high-yielding technology in rice became commercially available only in the mid-1970s. The procurement price of rice remained unchanged in most states from about 1967-68 to 1972-73. The procurement price for rice was increased by a whopping 42 percent in 1973-74, by 10 percent in 1974-75, and then again by 36.4 percent in 1980-81, to sustain the momentum of growth in rice production (Tyagi 1990: 62). During the 1970s, the procurement price of rice was increased at a faster rate than that of wheat. Thus, in the early stages of the Green Revolution, Indian price policy favored wheat, but after the mid-1970s, the relative price structure was biased in favor of rice (Tyagi 1990b).

As a result of the high procurement prices, profitability in these crops soared. For instance, while the procurement price for unirrigated wheat was 29 percent *below* the average cost of production in 1955-57 in Meerut and Muzaffarnagar districts of Uttar Pradesh, it *exceeded* the average cost of production by as much as 41 percent in 1967-69 in the same districts. In the case of irrigated wheat, the procurement price exceeded the average cost of production by 8 percent in 1955-57 but by 66 percent in 1967-69 (Krishna and Raychaudhuri 1980). While profitability rates were not as high in rice, there was nevertheless a substantial increase in the profitability of paddy cultivation in the late 1960s and early 1970s (Tyagi 1990b). There is little doubt that the rapid diffusion and adoption of the high-yielding varieties of rice and wheat was associated with the increased profitability of these crops.

The high prices of rice and wheat were maintained both by reducing imports of cereals after 1967-68 and by diverting a large portion of the imports to buffer stocks instead of to current consumption. As domestic production started increasing (first of wheat and then of rice), the high procurement prices were used to rapidly build up government buffer stocks.

The high price policy was not maintained indefinitely. As wheat productivity and output soared and the proportion of area under high-yielding varieties had reached historically high levels (66 percent by 1974-75), it was felt that the momentum of productivity and output growth would not be adversely affected by lower prices. The price of wheat was, therefore, allowed to decline in real terms after 1975-76. Rice prices followed the same pattern about five years later (Tyagi 1990b). Thus, price policy played an important role in India in attaining self-sufficiency in foodgrains production and thereby guaranteeing physical access to foodgrains for the population.

1.3 Trends in Per Capita Availability of Foodgrains

Per-capita availability of food is a good indicator of physical access to food. The evidence on trend in per-capita foodgrain availability is mixed. If one looks at the average net availability of all foodgrains per-capita per day (in grams) between 1961 and 1987 (Table 1), one detects a slightly upward trend, but one that is not statistically significant even when

Table 1: Net Availability of Foodgrains, 1951-87

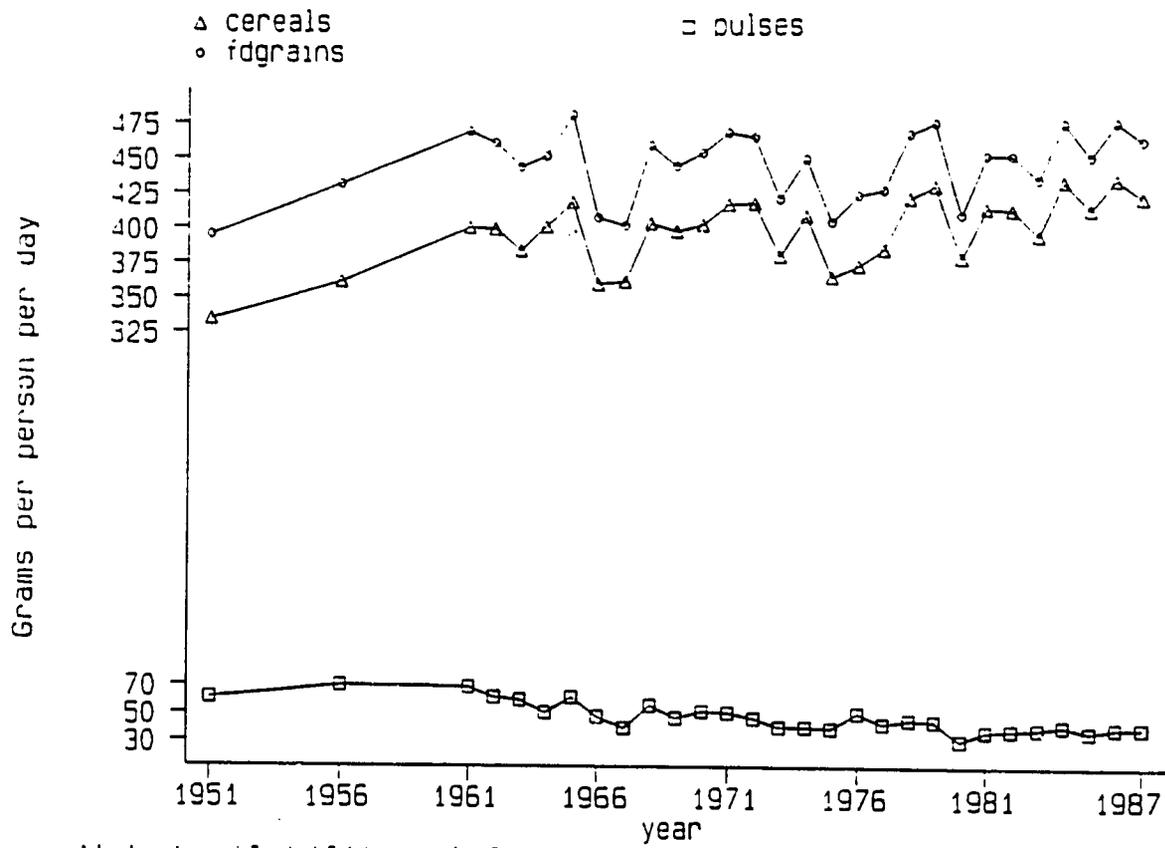
Year	Net Imports (mill.tons)	Change in Government Stocks (mill.tons)	Net Availability per capita per day			Net Imports as % of Net Availability
			Cereals (gms./day)	Pulses (gms./day)	All food-grains (gms./day)	
1951	4.80	0.59	334	61	395	9.2
1956	1.39	-0.60	361	70	431	2.2
1961	3.49	-0.17	400	69	469	4.6
1962	3.64	-0.36	399	62	461	4.8
1963	4.55	-0.02	384	60	444	6.1
1964	6.26	-1.24	401	51	452	8.0
1965	7.45	1.06	419	62	481	8.8
1966	10.34	0.14	360	48	408	14.1
1967	8.66	-0.26	362	40	402	11.7
1968	5.69	2.04	404	56	460	6.6
1969	3.85	0.46	398	47	445	4.5
1970	3.58	1.11	403	52	455	4.0
1971	2.03	2.57	418	51	469	2.2
1972	-0.49	-4.69	419	47	466	-0.5
1973	3.59	-0.31	381	41	422	4.0
1974	5.16	-0.40	410	41	451	5.3
1975	7.53	5.56	366	40	406	8.4
1976	6.91	10.74	374	51	425	6.8
1977	0.08	-0.62	386	43	429	0.1
1978	-0.82	-0.65	423	46	469	-0.7
1979	-0.32	0.36	432	45	477	-0.3
1980	-0.48	-5.78	380	31	411	-0.5
1981	0.52	-0.24	416	38	454	0.5
1982	1.58	1.33	415	39	454	1.4
1983	4.07	2.66	397	40	437	3.5
1984	2.37	7.06	436	42	478	1.8
1985	-0.35	2.66	416	38	454	-0.3
1986	-0.06	-1.58	438	41	479	0.0
1987	-0.29	-8.67	425	41	466	-0.2

Source: India, Ministry of Finance, Economic Survey, various issues.

Notes:

1. Net production is taken as 87.5 of gross production, 12.5 per cent being provided for feed, seed requirements and wastage.
2. Data on change in stocks with traders and producers are not known. The estimates of net availability should, therefore, not be taken to be strictly equivalent to consumption.
3. The figures of net imports from 1981 onwards are based on imports and exports on Government of India account only.

Figure 1



Net Availability of Cereals, Pulses and Foodgrains

STATA™

allowance is made for the two severe drought years of 1966 and 1967 (Figure 1, Table 2). However, when foodgrains are separated into cereals and pulses, significant time trends are observed in both components (Table 2). Net per-capita cereal availability has been increasing at a rate of less than one percent per year, while net per-capita availability of pulses has been decreasing at a rate slightly greater than 2 percent per annum.

The decline in availability (and, therefore, consumption) of pulses is worrisome, since pulses are an important -- in many cases, the only -- source of protein in the Indian diet. Not only are pulses an important source of necessary dietary protein in and of themselves, but, when combined in the right proportion with cereal grains, they provide protein of much higher quality than an all-cereal diet would provide. The complementarity between cereals and pulses is extremely important. Indeed, much of the protein supplied by an all-cereal diet is useless without proper complement from other sources, such as pulses. The Indian Council of Medical Research recommends that cereals and pulses be combined in an approximate ratio of 4 to 1. The data in Table 1 suggest that in recent years the ratio of cereals to pulses in the average Indian diet is of the order of 10 to 1.

Independent Variable	All Foodgrains		Cereals		Pulses	
	Parameter	T Ratio	Parameter	T Ratio	Parameter	T Ratio
Intercept	6.044	135.51	5.857	136.26	4.341	45.28
Time	0.005	1.12	0.009	2.15	-0.021	2.24
Time squared (x 1000)	-0.084	-0.81	-0.126	1.25	0.070	0.32
Dummy for 1966	-0.091	1.68	-0.087	1.67	-0.111	-0.96
Dummy for 1967	-0.108	1.99	-0.087	1.65	-0.274	2.37
R-squared	0.290		0.504		0.733	
F-Ratio	2.45		6.11		16.50	
No. of obs.	29		29		29	

Notes: Dependent variables in each regression are the natural logarithm of average per-capita availability per day (in grams).

Of course, there are a number of reasons for the net availability figures to be underestimated, particularly in more recent years. First, the estimates of per-capita net availability of foodgrains in India are obtained by netting gross production by a constant dissipation factor of 12.5 percent for seed, feed and wastage. This factor has not been officially revised despite widespread speculation that it has dropped substantially in recent years because (a) seed requirements (as a proportion of gross output) are much lower with the introduction of high-yielding varieties, and (b) wastage is likely to have declined as a result of improved storage facilities and timely transportation of foodgrains (Sarma and Roy 1979). Second, the net availability figures do not account for stocks held by private traders and producers. As a consequence of the generally comfortable food situation in recent years (as compared to the 1960s), private stocks may have declined, thereby making more foodgrains available. Third, increased adoption of parboiling and technological advances in rice milling are likely to have increased the extraction of milled rice from paddy. Failure to incorporate these changes is likely to bias rice availability figures downward over time. Tyagi (1990a,b) has argued that if the netting factor is adjusted (downwards) accordingly, the per-capita availability of foodgrains during the 1980s works out to between 450 and 492 grams per day. However, these adjustments show increased per-capita availability of cereals over time, but not of pulses.

A breakdown of per-capita availability of pulses by type of pulse is instructive in understanding the secular and sizeable decline in per-capita availability of pulses over time.

Table 3 shows the per-capita availability of the six major pulses consumed in India between 1970-71 and 1987-88. These data show that the main pulses accounting for the decline in per-capita availability are gram and peas, both of which are the primary sources of animal (livestock) feed. With the increasing substitution of bullocks by tractors for draft power, there has been a significant decline in the amount of feed provided to bullocks (Tyagi 1990b). In addition, the custom of feeding gram to livestock may be declining as the relative price of gram has risen sharply in recent years (Sarma and Roy 1979). If one considers the pulses that are typically used for human consumption (viz., tur, moong and urad *dal*), Table 3 shows a positive growth in per-capita availability.

Table 3: Per Capita Availability of Pulses, 1970-71 to 1987-88 (grams per capita per day)					
Year	Gram	Peas & Beans	Tur	Moong	Urad
1970-71	25.8	3.9	9.4	3.5	3.3
1971-72	24.7	3.2	8.2	2.7	2.6
1972-73	21.6	2.2	9.2	2.5	2.9
1973-74	19.0	0.7	6.5	3.7	3.5
1974-75	18.2	2.2	8.3	3.0	3.0
1975-76	26.1	2.4	9.3	3.5	3.4
1976-77	23.5	1.9	7.5	3.5	3.0
1977-78	23.0	1.5	8.2	3.7	3.2
1978-79	23.8	1.5	7.8	3.6	3.0
1979-80	13.6	0.9	7.1	2.8	3.1
1980-81	17.2	1.2	7.8	3.9	3.8
1981-82	18.0	1.2	8.7	4.1	2.9
1982-83	20.1	1.3	7.6	4.4	3.8
1983-84	17.7	1.4	9.6	5.1	4.4
1984-85	16.6	1.2	9.4	3.8	4.2
1985-86	20.7	1.5	8.7	4.2	4.4
1986-87	15.9	1.4	8.0	3.8	4.4
1987-88	12.5	1.4	7.7	4.4	4.5

Source: Tyagi (1990b), p. 147.

The various rounds of the National Sample Survey (NSS) provide additional evidence on trends in pulse consumption over time. The NSS data, reported in Table 4, indicate no decline in pulse consumption per capita between 1970-71 and 1983. Indeed, there is evidence of an

increase in pulse consumption in the late 1970s and early 1980s in both rural and urban areas. Thus, concern over the alleged decline of pulse consumption in India may have been considerably overstated.

Year	Rural	Urban	National Total
1970-71	0.96	1.01	0.97
1971-72	0.85	0.93	0.87
1972-73	0.88	0.82	0.87
1977-78	1.01	1.07	1.02
1983	1.02	1.13	1.04

Source: India, Department of Statistics, National Sample Survey Organisation, *The National Sample Survey: Tables on Consumer Expenditure*, various years.

1.4 Trends in Per-Capita Availability of Other Foods

Food balance sheets produced by the Food and Agriculture Organization (FAO) provide details on the per-capita availability of foods other than grains in India. The FAO food balance sheets (Table 5) suggest an increase in the per-capita availability of starchy roots, meat, eggs, and sweeteners between 1961 and 1984-86. For example, average daily calories available from eggs increased by four times (albeit from a very small level) during this period. There appears to be no clear time trend in the per-capita availability of poultry, milk, vegetable oils, and fruit during the same period.

In addition, national income accounts provide estimates of final consumption expenditure on several food groups. The data in Table 6 indicate that the *proportion* of total private consumption expenditure spent on milk/milk products and other foods (viz., coffee, tea, spices, and meals in restaurants) increased between 1970-71 and 1988-89. The proportion of total expenditure spent on oils/oilseeds and meat/eggs/fish remained constant during the same period. Since total private consumption expenditure per capita increased in real terms over this period, even a constant share of total expenditure implies an increased (absolute) level of per-capita real expenditure on an item. Thus, per-capita consumption of milk/milk products, meat/eggs/fish, oils/oilseeds and other foods certainly increased during the twenty years since 1970-71.

Table 7 reports the *levels* of per-capita consumption expenditure (in constant 1970-71 prices) on two food groups -- milk/milk products and meat/fish/eggs -- over the period 1970-71 to 1985-86. The data show an almost 20 percent growth in per-capita real consumption on both food groups. Detailed data on net per-capita availability of oils and fats are available after 1974-75 from the FAO food balance sheets (Table 8). These show an increase in net per-capita

Table 5: Average daily calorie availability per capita from major foods, India, 1961 to 1984-86

Year	Rice	Wheat	All		Starchy		Poultry	Meat	Eggs	Milk	Sweetene	Veg.Oil	Fruit	Total
			Cereals	Pulses	Roots									
1961	712	234	1,335	219	23	1	6	1	89	194	138	31	2,066	
1962	719	248	1,327	194	20	1	6	1	87	185	135	31	2,017	
1963	660	237	1,285	186	21	1	6	1	86	182	135	31	1,965	
1964	713	266	1,347	163	23	1	6	1	84	184	144	31	2,013	
1965	741	276	1,409	188	28	1	6	1	79	194	110	32	2,079	
1966	552	280	1,160	148	30	1	6	1	80	191	133	32	1,813	
1967	527	285	1,193	127	31	1	6	2	75	168	147	32	1,812	
1968	629	282	1,315	173	37	1	5	2	80	159	119	31	1,954	
1969	651	293	1,299	149	38	1	5	2	81	182	136	31	1,956	
1970	651	303	1,314	168	40	1	5	2	75	193	144	30	2,004	
1971	658	305	1,344	155	41	1	5	2	81	203	133	31	2,028	
1972	680	382	1,411	142	43	1	5	2	81	186	122	30	2,055	
1973	613	354	1,269	140	41	1	5	2	80	178	154	30	1,932	
1974	650	322	1,346	119	39	1	5	2	84	195	127	29	1,978	
1975	569	351	1,240	131	41	1	5	3	83	187	149	29	1,903	
1976	640	326	1,323	155	45	1	5	3	86	192	135	30	2,010	
1977	610	358	1,311	145	41	1	5	3	87	195	152	30	2,006	
1978	694	376	1,411	137	40	1	5	3	86	213	159	31	2,123	
1979-81	683	380	1,369	120	42	1	6	4	66	185	130	29	1,712	
1983-85	649	444	1,395	133	42	1	6	4	91	212	141	34	1,826	
1984-86	692	450	1,414	138	40	1	7	4	94	212	134	34	1,875	

Percentage of Total Calories Derived from:

Year	Rice	Wheat	All		Starchy		Poultry	Meat	Eggs	Milk	Sweetene	Veg.Oil	Fruit	Total
			Cereals	Pulses	Roots									
1961	34.5	11.3	64.6	10.6	1.1	0.0	0.3	0.1	4.3	9.4	6.7	1.5	100.0	
1962	35.6	12.3	65.8	9.6	1.0	0.0	0.3	0.1	4.3	9.1	6.7	1.5	100.0	
1963	33.6	12.1	65.4	9.5	1.1	0.0	0.3	0.1	4.4	9.3	6.8	1.6	100.0	
1964	35.4	13.2	66.9	8.1	1.2	0.0	0.3	0.1	4.1	9.1	7.1	1.5	100.0	
1965	35.7	13.3	67.8	9.0	1.3	0.0	0.3	0.1	3.8	9.3	5.3	1.5	100.0	
1966	30.5	15.5	64.0	8.1	1.6	0.0	0.3	0.1	4.4	10.5	7.3	1.8	100.0	
1967	29.1	15.7	65.8	7.0	1.7	0.0	0.3	0.1	4.1	9.3	8.1	1.7	100.0	
1968	32.2	14.5	67.3	8.9	1.9	0.0	0.3	0.1	4.1	8.1	6.1	1.6	100.0	
1969	33.3	15.0	66.4	7.6	2.0	0.0	0.3	0.1	4.1	9.3	7.0	1.6	100.0	
1970	32.5	15.1	65.6	8.4	2.0	0.0	0.3	0.1	3.7	9.6	7.2	1.5	100.0	
1971	32.4	15.1	66.3	7.6	2.0	0.0	0.3	0.1	4.0	10.0	6.6	1.5	100.0	
1972	33.1	18.6	68.7	6.9	2.1	0.0	0.3	0.1	3.9	9.1	5.9	1.4	100.0	
1973	31.7	18.3	65.7	7.2	2.1	0.0	0.3	0.1	4.1	9.2	8.0	1.5	100.0	
1974	32.9	16.3	68.0	6.0	2.0	0.0	0.3	0.1	4.2	9.8	6.4	1.5	100.0	
1975	29.9	18.5	65.2	6.9	2.2	0.0	0.3	0.1	4.3	9.8	7.8	1.5	100.0	
1976	31.8	16.2	65.8	7.7	2.2	0.0	0.3	0.1	4.3	9.5	6.7	1.5	100.0	
1977	30.4	17.8	65.3	7.2	2.1	0.0	0.3	0.1	4.3	9.7	7.6	1.5	100.0	
1978	32.7	17.7	66.5	6.5	1.9	0.0	0.2	0.1	4.0	10.0	7.5	1.4	100.0	
1979-81	39.9	22.2	80.0	7.0	2.5	0.1	0.4	0.2	3.9	10.8	7.6	1.7	100.0	
1983-85	35.5	24.3	76.4	7.3	2.3	0.1	0.3	0.2	5.0	11.6	7.7	1.9	100.0	
1984-86	36.9	24.0	75.4	7.4	2.1	0.1	0.4	0.2	5.0	11.3	7.1	1.8	100.0	

Source: FAO food balance tapes.

availability of oils and fats of over 40 percent between 1974-75 and 1989-90. Per-capita availability of edible vegetable oils increased by more than 50 percent during these 15 years.

Percentage of private final consumption expenditure on: ^a	1970-71	1980-81	1985-86	1988-89
Food, Beverages and Tobacco	62.6	58.9	56.4	54.4
Food	57.2	54.5	52.6	50.5
Cereals and Bread	23.4	20.4	18.9	17.1
Pulses	3.2	2.8	2.8	2.2
Sugar and Gur	6.5	5.2	5.6	5.5
Oils and Oilseeds	5.1	4.7	4.3	5.4
Fruits and Vegetables	7.4	7.0	6.2	6.4
Milk and milk products	5.8	7.7	8.5	7.8
Meat, Eggs and Fish	2.9	2.7	3.0	2.8
Other foods ^b	2.9	4.0	3.3	3.3
Notes: ^a The numbers in each column do not add up to 100, since the expenditure items are not exhaustive.				
^b Includes coffee, tea, spices, other foods, and meals in restaurants.				
Source: India, Central Statistical Organisation, <i>National Accounts Statistics</i> , 1989 and 1990.				

Tyagi (1990b) reports that the per-capita consumption of edible oils has been increasing at an annual rate of 5.15 percent, while the per-capita consumption of white sugar has been increasing at a rate of 4.65 percent, during the last ten years. The growth in consumption has continued despite an increase in the prices of both sugar and edible oils relative to cereals (Table 9). Obviously, such diversification in the diet could not have taken place if the demand for basic cereals had not been fulfilled. Thus, the available evidence suggests that there has been significant diversification of the Indian diet, with greater consumption of foods other than grains in recent years.

**Table 7: Per Capita Consumption Expenditure on Milk & Milk Products and Meat, Fish & Eggs,
1970-71 to 1985-86**

(At 1970-71 prices)

Year	Milk and Milk Products	Meat, Fish and Eggs
1970-71	41.56	14.08
1971-72	42.77	14.06
1972-73	42.82	14.01
1973-74	43.02	13.90
1974-75	44.11	14.58
1975-76	46.77	14.47
1976-77	46.62	14.41
1977-78	46.94	13.97
1978-79	45.58	14.12
1979-80	45.40	14.25
1980-81	46.63	15.11
1981-82	45.82	14.76
1982-83	46.99	14.63
1983-84	47.44	15.72
1984-85	47.81	16.82
1985-86	50.01	16.84

Source: India, Central Statistical Organisation, *National Accounts Statistics*, various issues.

Table 8: Net Availability and Imports of Oils and Fats, 1974-75 to 1989-90

Year	Net Availability per person per day (gms.)			Total Oils and Fats	Net Imports of Veg.Oils as % of Net Availability
	Edible Vegetable Oils	Inedible Vegetable Oils	Total Vegetable Oils		
1974-75	11.56	1.29	12.85	15.48	0.84
1975-76	12.79	1.10	13.89	16.52	4.60
1976-77	15.04	1.42	16.46	19.32	27.80
1977-78	15.81	1.40	17.21	19.92	28.99
1978-79	15.67	1.51	17.18	19.75	25.22
1979-80	15.26	1.26	16.52	19.12	31.51
1980-81	15.10	1.51	16.61	19.53	29.21
1981-82	16.41	1.62	18.03	20.96	19.13
1982-83	15.15	1.51	16.66	19.67	26.83
1983-84	17.21	1.86	19.07	21.70	30.88
1984-85	18.00	1.86	19.86	22.41	22.79
1985-86	15.62	1.59	17.21	19.78	22.93
1986-87	15.86	1.95	17.81	20.38	27.70
1987-88	18.22	2.00	20.22	22.79	31.06
1988-89	18.22	2.08	20.30	22.90	5.69
1989-90	17.07	2.19	19.26	21.89	14.50

Source: FAO food balance tapes.

Table 9: Index Numbers of Wholesale Prices

(Base: 1970-71 = 100)

Year	Cereals	Edible Oils	Sugar
1970	101.3	99.1	99.6
1971	100.9	88.7	117.0
1972	111.4	92.6	146.4
1973	128.8	135.9	157.9
1974	178.1	171.8	165.9
1975	185.7	149.7	170.8
1976	151.6	125.6	172.8
1977	161.2	179.2	163.3
1978	158.1	160.8	149.9
1979	167.0	181.0	160.1
1980	189.5	216.7	233.8
1981	213.1	259.9	264.6
1982	229.4	259.3	264.6
1983	259.8	291.3	227.2
1984	247.0	324.9	241.2
1985	255.5	290.0	274.8
1986	274.0	350.2	303.6
1987	289.3	460.8	310.3
1988	325.4	451.0	333.2

Source: Tyagi (1990b), p. 152.

2. Economic Access to Food

Self-sufficiency in food production and increased *physical* access to food do not necessarily assure increased consumption of foodgrains. The latter depends critically on people's (especially the poor's) *economic* access to food. In turn, economic access depends on both the behavior of consumer food prices and the employment and income opportunities for the poor.

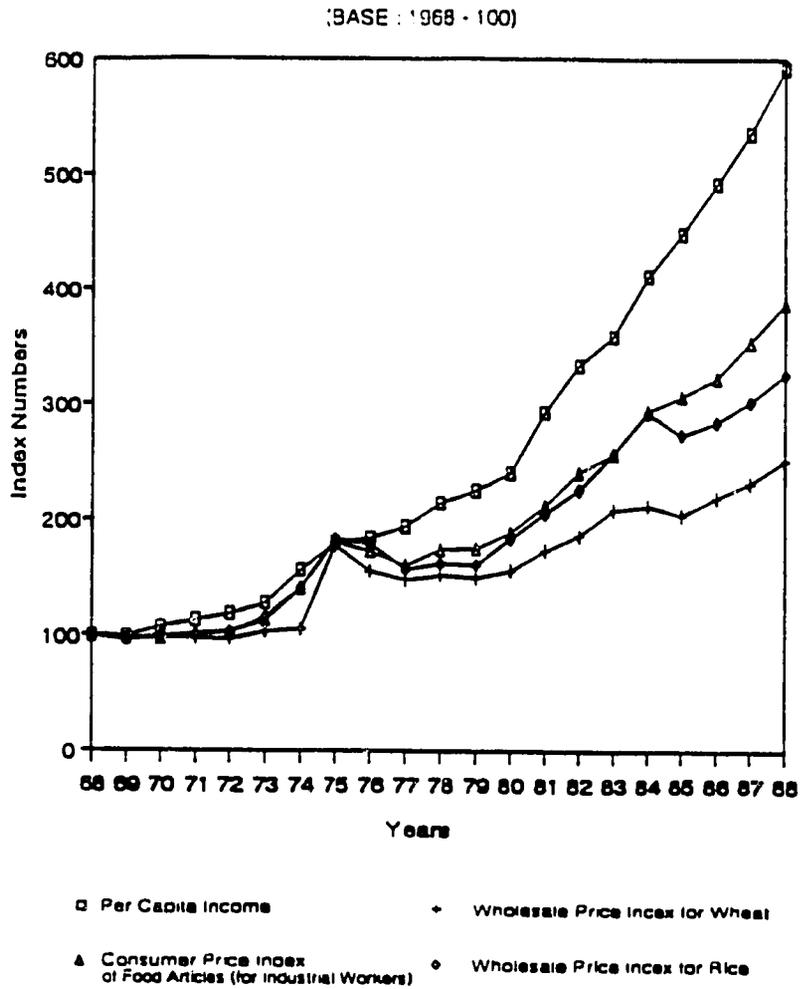
An indicator of economic access to food is real income adjusted for the prices of foodgrains. In the 1970s, it is estimated that as much as 12.9 percent of per-capita income was required to buy a quintal of wheat; in 1980 the same quantity of wheat needed an outlay of only 7 percent of per-capita income. By 1984, the ratio had fallen further to 6.4 percent (Tyagi 1990a). This observation is reflected in Figure 2 which plots growth in per-capita income, the consumer price index of food articles (for industrial workers), and the wholesale price index of rice and wheat from 1968 to 1988. The graph shows that not only have food prices risen consistently slower than per-capita income since 1968, but that the prices of rice and wheat -- the two most important staples in the Indian diet -- have risen slower than the general consumer food price index. Thus, economic access to food has improved during the last two decades in India, at least *for the average consumer*.

The trend in food prices faced by low-income consumers can be observed by comparing different rounds of the National Sample Survey (NSS) data. Table 10, which shows the implicit cereal price paid by different expenditure quartiles in urban and rural areas for three NSS rounds (viz., 1970-71, 1977-78 and 1983), reveals a small (3-6 percent) increase in the relative (to the general consumer price index) price of cereals for rural consumers and a decrease of about 7-9 percent for urban consumers. During the period 1970-71 to 1983, the national wholesale price of cereals (relative to the general consumer price index) decreased by about 15 percent. Thus, the decline in national wholesale cereal prices overstates the decline in relative cereal prices actually experienced by urban consumers and completely masks the *increase* in relative cereal prices faced by rural consumers.

However, these results may arise because of the manner in which the NSS defines implicit prices paid by households. The implicit price, which is calculated as the reported value of food purchases divided by the reported quantity, is actually a unit value, and confounds quality variations with genuine price variation. Table 11, which reports the per capita monthly consumption of different cereals in urban and rural areas in four NSS rounds, indicates a much bigger shift from coarse grains to wheat in rural than in urban areas between 1970-71 and 1983. Since wheat is significantly more expensive than coarse grains, this shift would tend to increase the implicit price of cereals paid by rural consumers much more than that paid by urban consumers. Thus, the increase in the relative (implicit) price of cereal among rural consumers observed in Table 10 may reflect diet diversification and improved food quality among rural consumers instead of higher prices *per se*.

Figure 2

Per-Capita Income and Prices of Foodgrains, 1968-88



Source: Tyagi (1990b), p. 54.

Table 10: Implicit Real Price Indices for Cereals, by Expenditure Group, 1970-71 to 1983

Group	1970-71	1977-78	1983
RURAL^a			
Consumer cereal prices, overall	100.0	97.1	103.4
Quartile 1 (bottom)	100.0	101.8	105.9
Quartile 2	100.0	98.9	106.0
Quartile 3	100.0	97.4	104.7
Quartile 4 (top)	100.0	95.5	103.2
URBAN^b			
Consumer cereal prices, overall	100.0	91.3	93.2
Quartile 1 (bottom)	100.0	91.9	92.1
Quartile 2	100.0	91.1	93.5
Quartile 3	100.0	89.0	91.6
Quartile 4 (top)	100.0	89.2	92.9
Cereal prices, national wholesale ^c	100.0	86.9	85.1
Notes:	^a All rural prices have been deflated by the consumer price index for agricultural laborers. ^b All urban prices have been deflated by the consumer price index for industrial workers. ^c National wholesale cereal prices have been deflated by the national (all commodities) wholesale price index.		
Sources:	India, Department of Statistics, National Sample Survey Organisation, <i>The National Sample Survey: Tables on Consumer Expenditure</i> , various years; India, Ministry of Agriculture, Directorate of Economics and Statistics, <i>Bulletin on Food Statistics</i> , various issues.		

Cereal	Rural				Urban			
	1970-71	1973-74	1977-78	1983	1970-71	1973-74	1977-78	1983
Rice	6.85	6.90	7.12	6.63	5.53	5.38	5.48	5.32
Wheat	2.78	3.52	4.05	4.46	4.12	4.32	4.87	4.82
Coarse grains	5.72	4.67	4.08	3.71	1.71	1.62	1.27	1.16
Total cereals	15.35	15.09	15.25	14.80	11.36	11.32	11.62	11.30

Source: India, Department of Statistics, National Sample Survey Organisation, *The National Sample Survey: Tables on Consumer Expenditure*, various rounds.

3. Avoidance of Famines: The Role of Public Works Programs

An important component of food demand management in a developing country must include prevention of a situation in which a drought or natural calamity results in widespread famine and a complete collapse of food demand in a large section of the population.

There is a long history of famines in India, but the most recent major one was in 1943 in Bengal, which is estimated to have claimed roughly 1.5 million people (Sen 1986). Although conditions were ripe for widespread famines during the severe drought years of 1965-67 and, to a smaller extent, in 1973-75, 1979, and 1987, large-scale famines were successfully averted by the government's buffer stocks, mobilization of extra grain supplies from abroad, and prompt famine relief public works programs. The avoidance of widespread famines since Independence must surely count as a major achievement of India's food policy. This is especially the case when one considers that famines have occurred in Sub-Saharan Africa during the 1970s and early 1980s with downward fluctuations in domestic food grains production that were proportionately much smaller than India had experienced (Sen 1986).

As Sen (1981, 1986) has noted, famines are caused by the inability of a large section of the population to command food. While a disastrous crop failure generally precedes a famine, it is not a necessary condition. In a monetized economy, famine can occur even without a decline in food availability. A drought can reduce the demand for agricultural labor and for nonagricultural services provided by artisans and traders, thereby adversely affecting the employment opportunities and income of noncultivating groups. Even if enough foodgrains supplies are available, these sections of the population have no purchasing power left to buy food. Therefore, a governmental response to a drought should include not only mobilization of extra foodgrain supplies but also scarcity relief works that generate employment and purchasing power for the vulnerable population.

India has a well-developed surveillance system for rapid assessment of an impending crop loss disaster. The progress of the monsoon is followed on a weekly basis by a senior-level committee of the Ministry of Agriculture as well as by state governments. At the same time, data on wholesale and retail prices of essential commodities are collected and monitored on a weekly basis from a number of markets around the country. Any unusual behavior in prices can result in an immediate policy response.

At the same time, India has had a long history of scarcity relief programs. Programs such as the Rural Manpower Program, the Crash Scheme for Rural Employment, Pilot Intensive Rural Employment Program, and the Food-for-Work program have been in operation for over three decades. In 1980 and 1983, respectively, two national programs -- the National Rural Employment Program (NREP) and the Rural Landless Employment Guarantee Program (RLEGP) -- were introduced to end the multiplicity of relief works programs. Both programs are aimed at providing wage employment to the rural poor, particularly during the lean agricultural season and in times of drought. Both have a food-for-work component; a portion of the wages are paid in the form of food grains to workers (at the rate of two kilograms of foodgrains per day). In addition, the state of Maharashtra has been running its own rural employment program since 1972 -- the Employment Guarantee Scheme (EGS). The EGS is one of the most successful rural employment programs in the developing world (Lieberman 1984, Deolalikar 1987). While all of these rural works programs -- viz., the NREP, the RLEGP and the EGS) -- are in continuous operation, they are escalated steeply during times of natural calamities. For instance, during the 1987-88 drought, *additional* employment for more than 600 million mandays was generated under the NREP and the RLEGP at an additional cost of Rs. 8,421 million (Tyagi 1990a). These programs have played a critical role in preventing deaths from hunger and starvation during times of drought. The drought of 1987-88, which was the most severe drought of this century in many parts of India (e.g., Gujarat and Rajasthan), never developed into a famine largely because of public relief efforts (Chen 1991). According to Dreze (1989), "... relief works certainly went a very long way towards providing an insurance against starvation (at least to the able-bodied and their dependents; others were, in principle, covered by gratuitous relief)" during the 1970-73 drought in Maharashtra.

4. Food Demand Management for the Poor: The Public Distribution System

One of the important ways in which Indian food policy makers have managed food demand has been through the Public Distribution System (PDS). The PDS is essentially a food subsidy scheme that was initiated with the First Five-Year Plan in 1950-51.² Although the objectives of the PDS include stabilization of prices of basic foodgrains and an equitable

²The PDS was actually initiated by the British administration in India for managing food rationing during the Second World War. However, the scheme was abolished in 1947.

distribution of foodgrains across regions and states, its most important stated goal has been to provide essential commodities to the vulnerable sections of the population at reasonable prices.

Under the PDS, foodgrains are procured, stored and transported to regional depots by the Food Corporation of India (FCI) and individual state agencies, such as the civil supplies departments or corporations.³ The procurement or support price is set by the Commission for Agricultural Costs and Prices (CACAP). The procured foodgrains are distributed through a retail network of private, cooperative and government-owned fair-price shops (FPSs) around the country. Prices for consumers (often called issue prices) are set taking into consideration marketing costs, open market prices, fiscal burden, and the paying capacity of consumers. The difference between the issue price and the sum of the procurement price and the cost of marketing is the subsidy element that is financed from the general exchequer.

Table 12 shows the growth of the PDS since the 1950s. The number of FPSs increased almost twenty-fold between the mid-1950s and the mid-1980s, while the distribution of foodgrains nearly doubled. The success of the PDS, however, can hardly be judged by the growth of FPSs. It is more important to see if the PDS has helped create and support food demand in that section of the population that could not otherwise have afforded an adequate consumption of foodgrains.

An examination of the inter-state distribution of grains via the PDS suggests little correlation between the scale of the PDS and the extent of poverty in a state (Table 13). Indeed, states such as Bihar and Madhya Pradesh, which have the largest proportions of population below the poverty line, have among the lowest per-capita distribution of PDS foodgrains in the country. On the other hand, Kerala, which had only 26 percent of the population below the poverty line in 1983-4, had the highest per-capita supply of PDS foodgrains in the country (nearly 62 kgs.) in the quinquennium ending 1988. The Union Territories (in particular, Delhi) accounted for 22.2 per cent of grains supplied under PDS in 1984 (Subbarao 1989), although their share in the country's population was merely 1.6 percent and their share in the population under poverty even smaller. The data in Table 13 also do not suggest a strong correlation between state per-capita income and PDS supplies.

Using the state-level data in Table 13, a regression analysis was performed on the per-capita supply (distribution) of foodgrains under the PDS to understand the determinants of PDS allocation. The results, reported in Table 14, are surprising; they suggest that, even after controlling for per-capita foodgrains production, the extent of poverty in a state is associated significantly (at the 5 per level) with *reduced* per-capita distribution of foodgrains via the PDS for that state! The estimated coefficient on per-capita grains production is negative in the regression, suggesting that the PDS does indeed operate as a redistributive mechanism by distributing foodgrains more heavily in low- than in high-production areas.

³Until 1965, procurement from internal sources was very limited. The PDS operated largely with imported food grains.

**Table 12: Growth of the PDS in India,
1950-51 to 1985-86**

Year	No. of fair price shops (in '000s)	Distribution of foodgrains (million tons)
1950-51		7.55
1951-52		7.87
1952-53		6.69
1953-54		4.6
1954-55		2.15
1955-56		1.64
1956-57	18	2.08
1957-58	38	3.05
1958-59	46	3.98
1959-60	52	5.16
1960-61	51	4.94
1961-62	48	3.98
1962-63	51	4.37
1963-64	60	5.18
1964-65	102	8.67
1965-66	110	10.08
1966-67	136	14.09
1967-68	143	13.17
1968-69	140	10.22
1969-70	139	9.39
1970-71	122	8.84
1971-72	121	7.82
1972-73	165	11.4
1973-74	201	11.41
1974-75	222	10.79
1975-76	240	11.25
1976-77	236	9.17
1977-78	239	11.73
1978-79	239	10.18
1979-80	244	11.63
1980-81	284	14.99
1981-82	283	13.01
1982-83	278	14.77
1983-84	284	16.21
1984-85	302	13.33
1985-86	315	15.45

Source: India, Ministry of Agriculture, Directorate of Economics and Statistics, *Bulletin on Food Statistics*, various issues.

Table 13: Per-capita Income, Production of Cereals, Distribution of Foodgrains through the Public Distribution System, and the Proportion of Population below the Poverty Line, by States

State	% below poverty line 1983-4	% of Population consuming less than 1,500 calories per capita per day, 1971-72		Per capita Distribution quinquennium ending 1988 (Kgs.)	Per capita Income at current prices 1985-86	Per capita Production of Cereals quinquennium ending 1988 (Kgs.)
		Rural	Urban			
Bihar	51.35	8.66	4.75	9.95	1,643	123.22
Madhya Pradesh	50.30	4.67	3.56	9.19	1,960	208.27
Uttar Pradesh	46.48	3.16	4.22	7.18	2,003	225.22
Orissa	44.76	8.9	3.4	13.34	1,954	182.45
Tamil Nadu	44.08	14.75	18.86	31.08	2,514	157.19
West Bengal	43.84	9.61	5.92	32.75	2,767	156.68
Maharashtra	41.50	6.16	8.13	22.70	3,549	122.18
Andhra Pradesh	38.67	6.84	6.49	23.29	2,205	165.27
Karnataka	37.49	7.69	10.15	23.17	2,264	153.05
Rajasthan	36.63	1.88	2.52	18.59	2,106	163.85
Gujarat	27.62	10.2	6.4	21.80	2,775	83.50
Kerala	26.05	18.24	27.79	61.89	2,140	42.60
Haryana	15.19	0.35	5.46	10.04	3,748	468.72
Punjab	10.87	0.77	3.41	9.46	4,479	886.97
All India	40.40	6.63	6.98	21.74	2,734	179.46

Source: Tyagi (1990b), pp. 89-91, and Bapna (1990), p. 134.

When the variable representing the overall spread of poverty in a state is replaced by two variables separately indicating the proportion of population consuming on average fewer than 1,500 calories per capita per day in the rural and urban areas of a state, the regression results change appreciably.⁴ The coefficient on the extent of urban undernutrition is positive and significant, suggesting that the PDS does respond positively to inadequate calorie intake, but only in the urban areas of a state.

Table 14: Regression of Per-capita Distribution of Foodgrains through the Public Distribution System, Indian States

Independent Variable	Parameter	T-ratio	Parameter	T-ratio
Intercept	61.641	2.18	-0.213	0.02
% of Population below Poverty Line, 1983-84	-0.7968	-1.97		
% of Rural Population consuming < 1,500 calories per person per day, 1971-72			0.603	0.70
% of Urban Population consuming < 1,500 calories per person per day, 1971-72			1.306	2.45
Income per capita, 1979	0.0012	0.18	0.0041	1.08
Per capita production of cereals quinquennium ending 1988 (Kgs.)	-0.0645	-2.77	-0.0182	-1.11
R-Squared	.50		0.83	
F-Ratio	3.31		10.99	
Number of observations	14		14	

Besides inequity in coverage *across* states and regions, the PDS is plagued with inequity in the coverage of households *within* regions. Vulnerable groups in many states do not have any access to PDS supplies, while the non-poor have significant access to it. The greatest limitation of the PDS is that, with the exception of a few states, it is heavily biased toward urban areas. Unfortunately, detailed data on the distribution of PDS foodgrains by rural and urban areas is not available on a national basis. Table 15, which reports urban-rural distribution of PDS grains in 1977, indicates that nearly 60 percent of all grains distributed under the PDS was supplied to urban areas -- almost three times the urban share of India's population. The urban bias is very pronounced in some states, such as Madhya Pradesh (where the urban share in the PDS was 94 percent), Uttar Pradesh (93 percent) and Bihar (87 percent). The argument that rural households do not need PDS supplies as they have adequate access to locally-produced foodgrains is not persuasive, since nonagricultural, landless labor, and marginal farm households constitute a significant share of the rural population in states such as Bihar, Madhya Pradesh and Uttar Pradesh. In addition, these states have high levels of rural poverty and undernutrition.

⁴The data on rural and urban calorie intake (or, more appropriately, availability) by state is available from the National Sample Survey only for 1971-2.

Table 15: Distribution of Foodgrains through Fair-Price Shops, Rural and Urban Areas, 1977			
State	% distributed in rural areas	% distributed in urban areas	Total distri- bution (in '000 tons)
Andhra Pradesh	0.00	0.00	316
Bihar	13.46	86.54	546
Gujarat	35.57	64.43	388
Haryana	23.42	76.58	149
Karnataka	0.00	0.00	929
Kerala	82.18	17.82	1,465
Madhya Pradesh	6.07	93.93	318
Maharashtra	30.19	69.81	1,451
Orissa	34.94	63.93	267
Punjab	4.17	95.83	230
Rajasthan	34.67	65.33	120
Tamil Nadu	23.75	76.25	901
Uttar Pradesh	6.87	93.13	537
West Bengal	28.42	71.58	2,041
All India	27.46	57.16	11,315
Source: Ministry of Agriculture and Irrigation, <i>Commerce</i> , 15 September 1979, p. 507, as reported in Bapna (1990), p. 140.			

The 35th round of the National Sample Survey (NSS) also confirms the fact that the PDS has disproportionately benefitted urban consumers. The state sample reports of the NSS show that, in Uttar Pradesh, only 5.3 percent of rural households, but 28 percent of urban households, reported purchases from fair-price shops. In Maharashtra the situation was a little better, with 38 percent of rural households and 51 percent of urban households reporting a purchase from the PDS (Tyagi 1990b). Indeed, the only states in which PDS has a wide rural coverage are Kerala, Gujarat, and Tamil Nadu. The data in Table 15 indicate that 82 percent of the total amount of PDS grains distributed in Kerala were supplied to the rural areas.⁵

Even among urban consumers, it is unlikely that the PDS benefits the truly vulnerable sections of the population. The system is organized so that fair-price shops issue concessional

⁵Efforts to increase the rural coverage of the PDS in Gujarat and Tamil Nadu are more recent; hence, the data in Table ., which are for the year 1977, do not reflect this trend.

supplies to ration-card holders for a 15-day period. Since the poorest individuals in the urban areas are likely to be casual workers, typically in the construction or the informal sector, many of whom are temporary migrants without a residential address in the city, they are not eligible for a ration card. Furthermore, since such individuals are paid on a daily basis, they typically do not have the cash (nor the storage space) to buy (and stock) a 15-day supply of foodgrains. They therefore purchase their food requirements for the day from the open market, often at exorbitant prices.

Even in states where the PDS has wide rural coverage (with the single exception of Kerala), the PDS is ineffectively targeted to the poor. Evidence from household consumer surveys, reported in Table 16, show that, in Gujarat and Tamil Nadu, the poorest income groups did not even receive PDS supplies commensurate with their population share. For example, in Tamil Nadu, the poorest 65 percent of all households (viz., those earning less than Rs. 3,600 per annum in 1983) accounted for 50 percent of all PDS supplies, while the leakage of benefits to the richest 13 percent (viz., those earning more than Rs. 4,800 per annum) was very large (30 percent of total supplies). Only in Kerala is the PDS tightly targeted to the poor; the data in Table 14 show that 86.8 percent of PDS grains distributed in Kerala went to the poorest households, even though they constituted 59 percent of the population. The leakage of benefits to the richest 21 percent of households was relatively minor (5.6 percent of the total PDS supplies).

Annual household income	Kerala		Gujarat		Tamil Nadu	
	% of food-grains distributed	% of population	% of food-grains distributed	% of population	% of food-grains distributed	% of population
< Rs. 3,600	86.8	59	56.6	57	50.0	65
Rs. 3,600 - 4,800	7.6	20	23.5	25	20.0	22
> Rs. 4,800	5.6	21	19.9	10	30.0	13

Source: George (1984).

Since the quantities of foodgrains available under the PDS are limited, the lack of targeting in the PDS often results in reduced coverage of the truly needy. The results of the 35th round of the National Sample Survey, shown in Table 17 below, indicate that fewer than 44 percent of the households in the lowest expenditure class in Maharashtra and only 10 percent of such households in Uttar Pradesh reported purchases of rice from the PDS. The figures are even lower for purchases of wheat. It is estimated that, in Andhra Pradesh, coverage is so wide and targeting so ineffective that the PDS meets only one-third of the minimum requirements of rice for the poorest households (Subbarao 1989). A study by Radhakrishna and Indrakant (1987) concluded that the welfare gains to the poor would have been substantially increased, and the supply situation become more manageable (thus ensuring the scheme's long-run sustainability),

if the coverage had been restricted to the poorest 40 per cent (instead of 70 per cent, as was the case) in Andhra Pradesh.

Monthly Per-capita Expenditure Class	Maharashtra		Uttar Pradesh	
	Rice	Wheat	Rice	Wheat
Less than Rs. 50	43.8	33.1	10.0	8.7
Rs. 50 - Rs. 99	43.8	35.5	8.9	8.9
Rs. 100 - Rs. 149	43.2	33.1	11.6	12.5
Rs. 150 and more	38.0	30.0	15.0	16.0
All expenditure classes	42.9	34.0	9.6	9.8

Source: *Sarvekshana*, January 1988

In addition to the issue of targeting, there is the question of how the PDS influences open-market prices within a dual market system. Because the government is a major buyer of foodgrains (for the PDS) in the open market, the procurement price set by the government typically influences open-market prices. Several studies that have attempted to estimate the effect of the government's procurement on open-market prices have concluded that open-market prices that prevail in the presence of PDS procurement are higher than those that would have prevailed if there had been no PDS. One study estimated that open-market prices were higher by 13-25 percent in the case of wheat and 20-37 percent higher in the case of rice because of PDS interventions during the period 1971-72 to 1977-78 (ISI 1985). The study by Radhakrishna and Indrakant (1987) for Andhra Pradesh concluded that the open market price of rice was 20 percent higher as a result of the dual-market system in that state. If these estimates are correct, the poor benefit from a scheme such as the PDS only if they obtain their entire foodgrain requirement at a subsidized rate that is greater than the percentage increase in the open-market price resulting from the dual-market system. If the poor obtain only a portion of their total foodgrain requirements from the PDS, as is typically the case, the rate of subsidy needs to be much greater.

Tyagi (1990b) has calculated the rate of subsidy required for the poor *not* to be adversely affected by the PDS for three states -- Bihar, Madhya Pradesh and Orissa -- under the assumptions that (i) open-market prices increased by 15 percent as a result of PDS interventions, and (ii) 60 percent of the foodgrains distributed under the PDS in these states reached the poor. Tyagi found that concessional prices (charged in the fair-price shops) would have to be lower than open-market prices by 58 percent, 40 percent and 127 percent, respectively, in Bihar, Orissa and Madhya Pradesh, for the poor to benefit from the PDS. Since differences between concessional and open-market prices in these states did not even approach these levels in any of the past years, the PDS is likely to have adversely affected the poor. The situation is not likely

to be very different in other states (perhaps with the exception of Kerala), since the PDS meets only a small proportion of the total foodgrain requirement of the poor.⁶

In summary, the urban bias and the lack of income targeting in the PDS significantly reduce its effectiveness in influencing the food demand and habits of the poor. However, the experience of states such as Kerala, Tamil Nadu, and Gujarat, which have successfully managed to target the PDS to the urban and the rural poor, suggests that restricting access to the poor is not only absolutely essential to keep costs down and to improve the nutritional status of the vulnerable population but is possible through innovative methods of self-targeting.

5. Diet Diversification: The Role of Dairy Cooperatives

Indian dairy development began in a big way in 1970 with Operation Flood, a program that integrates over 10 million milk producers, often located in hitherto isolated rural areas, into a network of dairy cooperatives and marketing unions.⁷ The program includes "... establishment of thousands of producer cooperatives that regularly collect milk in the villages, ensure its quality, provide prompt payment to producers, encourage improved management techniques, and facilitate access to veterinary services and marketed inputs. These cooperatives are linked through unions in order to use chilling plants and factories that process fluid milk into storage products more effectively and, in doing so, to use flush season production more efficiently" (Alderman 1987: 10). In addition, an important feature of Operation Flood has been an improvement in the quality of the national herd through crossbreeding.

Although Operation Flood's role in total milk production in India is limited (the output under the program represents approximately 7-8 percent of national milk production) (Doornbos *et al.* 1990), it has been a model for many other dairy development schemes in India, such as the Madhya Pradesh or the Karnataka Dairy Development Project. While a number of evaluation studies have been undertaken on Operation Flood and associated dairy schemes in India, most of these have focused on the impact of dairy cooperatives on the incomes and milk consumption of milk producers. Two of the more sophisticated econometric studies -- evaluation of a dairy project in Madhya Pradesh by Mergos and Slade (1987) and analysis of the Karnataka Dairy Development Project by Alderman (1987) -- found a significant, positive impact of the dairy schemes on the nutrient (calorie and protein) consumption of milk producers. For example, applying regression analysis to household-level longitudinal data from 62 villages -- 42 with cooperatives and 20 without cooperatives -- Alderman (1987) found that the presence

⁶As cited earlier, the PDS meets only one-third of the minimum requirements of rice for the poorest households in Andhra Pradesh (Subbarao 1989).

⁷The precursor to, and inspiration for, Operation Flood was a private dairy cooperative scheme first organized in 1946 in Anand taluka, in Kaira district of Gujarat. The scheme, called AMUL, is the largest single dairy cooperative in the developing world.

of dairy cooperatives in a village reduced the milk consumption of producer households but increased total nutrient (both calories and protein) consumption because of a strong income effect. However, he observed a decrease in the consumption of milk, total calories and protein of non-producers residing in the cooperative villages. Mergos and Slade observed no impact on the nutrient consumption of non-producers for their Madhya Pradesh sample.

Because of their design, both studies ignore the major impact that dairy development has had in India, viz., meeting (and, to an extent, generating) the expanding demand for milk and milk products in urban areas. The growth of urban incomes, combined with the high income elasticity of demand for dairy products, has resulted in a rapid expansion of demand for milk and milk products in the urban areas. The national income accounts, shown in Table 7, indicate a steady increase of about 20 percent between 1970-71 and 1985-86 in real per-capita consumption expenditure on milk and milk products.⁸ Without Operation Flood, milk prices would probably have risen, causing the poorest consumers to give up whatever little consumption of milk that they enjoy.

6. Concluding Remarks

How successful have Indian food demand management policies been? The discussion in this paper suggests that, while demand management policies in India have been very successful in some dimensions, they have not been very effective in others. For instance, with a skilful combination of technology and price policy, Indian policy-makers have succeeded in assuring increased physical and economic access to food to the bulk of the population. Although the per-capita availability of pulses has decreased during the last three decades, there has been a small but steady increase in the per-capita net availability of cereals in the country. More importantly, the evidence indicates a very rapid increase, especially in the last decade, in the per-capita availability and consumption of foods other than grains -- foods such as milk, edible oils, sugar, and the like. Such diversification in the diet could not have been possible without fulfillment of demand for basic cereals and foodgrains.

Indian food demand management has been highly successful in another important dimension, viz., the avoidance of famines. Although conditions were ripe for widespread famine during the severe drought years of 1965-67, 1973-75 and 1987-89, famine was avoided by prompt famine relief public works programs, government's buffer stocks, and mobilization of extra grain supplies from abroad. Indeed, emergency relief and food-for-work programs have become a permanent feature of the government's poverty alleviation program. The avoidance of widespread famines is a major achievement of Indian food policy, especially in light of the fact that famines have occurred in Sub-Saharan Africa during the 1970s and early 1980s with

⁸Although these figures are for the entire country, it is likely that much of the increase in milk consumption has taken place in urban areas.

downward fluctuations in domestic foodgrains production that were proportionately much smaller than India had experienced.

Where Indian food demand management has failed is in its food subsidy policies. The Public Distribution System in India is a large, expensive, poorly targeted and inefficient food subsidy scheme. With the exception of a few states, in which rural coverage is wide, the PDS primarily serves the urban middle-class. Vulnerable groups in many states do not have any access to PDS supplies. In such a situation, the PDS is likely to actually have an adverse effect on the poor, since the scheme, because of its large procurement needs, drives open-market prices for foodgrains above the levels at which they would have been in the absence of the PDS. However, the experience of a few states, such as Kerala, Tamil Nadu and Gujarat, which have successfully managed to target the PDS to the urban and the rural poor, suggests that restricting access to the poor is administratively possible and financially feasible.

REFERENCES

- Alderman, Harold. 1987. *Cooperative Dairy Development in Karnataka, India: An Assessment*. Research Report No. 64, International Food Policy Research Institute.
- Bapna, S. L. 1990. "Food Security through the P.D.S.: The Indian Experience," in D. S. Tyagi and V. S. Vyas, eds., *Increasing Access to Food: The Asian Experience*. New Delhi: Sage Publications.
- Chen, Martha A. 1991. *Coping with Seasonality and Drought*. New Delhi: Sage Publications.
- Deolalikar, Anil B. 1987. "Rural Employment Creation in India and Nepal," in *Rural Employment Creation in Asia and The Pacific*, Papers and Proceedings of the Asian Development Bank and the International Labour Organisation's Regional Workshop on Rural Employment Creation. Manila, Philippines, 24-28 November 1986.
- Doornbos, Martin, Frank van Dorsten, Manoshi Mitra and Piet Terhal. 1990. *Dairy Aid and Development: India's Operation Flood*. New Delhi: Sage Publications.
- Dreze, Jean. 1991. "Famine Prevention in India," in Jean Dreze and A. K. Sen, eds., *The Political Economy of Hunger*. Oxford: Oxford University Press.
- George, Shanti. 1985. *Operation Flood: An Appraisal of Current Indian Dairy Policy*. Delhi: Oxford University Press.
- ISI (Indian Statistical Institute). 1985. *Report of the Project on Price and Distribution Controls in India*. New Delhi.
- Krishna, Raj and G. S. Raychaudhuri. 1980. *Some Aspects of Wheat and Rice Price Policy in India*. World Bank Staff Working Paper No. 381, The World Bank, Washington, D.C.
- Krishna, Raj and Ajay Chhibber. 1983. *Policy Modeling of a Dual Grain Market: The Case of Wheat in India*. Research Report No. 38, International Food Policy Research Institute, May.
- Lieberman, S. 1984. *Maharashtra's Employment Guarantee Scheme: A Case Study of an Employment Security Program in an Indian State*. New York: The Population Council.
- Mergos, George and Roger Slade. 1987. *Dairy Development and Milk Cooperation: The Effects of a Dairy Project in India*. World Bank Discussion Paper No. 15, Washington D.C.
- Radhakrishna, R. and S. Indrakant. 1987. *Effects of Rice Market Intervention Policies in India: The Case of Andhra Pradesh*. Center for Economic and Social Studies, Hyderabad.

- Sarma, J. S. and Vasant P. Gandhi. 1990. *Production and Consumption of Foodgrains in India: Implications of Accelerated Economic Growth and Poverty Alleviation*. Research Report No. 81, International Food Policy Research Institute.
- Sarma, J. S. and Shyamal Roy. 1979. *Two Analyses of Indian Foodgrain Production and Consumption Data*. Research Report No. 12, International Food Policy Research Institute.
- Sen, A. K. 1981. *Poverty and Famine: An Essay on Entitlement and Deprivation*. Oxford: Clarendon Press.
- Sen, A. K. 1986. "Africa and India: What do We have to Learn from Each Other?" C. N. Vakil Memorial Lecture, World Congress of the International Economic Association, New Delhi.
- Subbarao, K. 1989. *Improving Nutrition in India: Policies, Programs and Impact*. World Bank Discussion Paper No. 49, The World Bank, Washington, D.C.
- Tyagi, D. S. 1990a. "Increasing Access to Food through Interaction of Price and Technology Policies: The Indian Experience" in D. S. Tyagi and V. S. Vyas, eds., 1990. *Increasing Access to Food: The Asian Experience*. New Delhi: Sage Publications.
- Tyagi, D.S. 1990b. *Managing India's Food Economy: Problems and Alternatives*. New Delhi: Sage Publications.