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Food, Nutrition and Prices: Some Macro Issues

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INTRODUCTION

It is by now well-documented that with the introduction of new technology in the mid-1960s, India could avert famines, reverse the upward trend in the relative price of foodgrains, and, by the mid-1970s, achieve self-sufficiency in foodgrains. However, these desirable goals were achieved at a cost. The new technology, limited as it was to well-endowed regions, sharpened regional disparities and did not result in significant improvements in food availability nor in its entitlement for the poor in the less developed regions. In order to promote the new technology, India allowed the price of foodgrains to be higher than the market clearing price by stocking foodgrains and incurring huge subsidies. What is worse, the per capita consumption of foodgrains levelled-off even before much improvement could be made in the nutritional status of the poor. The weakening relationship between foodgrain consumption and income at the macro level poses a dilemma. The low expansion of foodgrain demand may provide temporary relief from bouts of price inflation in wage goods but, certainly, would aggravate the problem of malnutrition.

This paper attempts to highlight the various dimensions of the food problem from the demand perspective. It seeks to quantify the relationships between food, nutrition and prices, utilising the parameter estimates of demand models provided by Radhakrishna and Ravi (1990). The following section outlines the main features of the food situation during 1986–87, including the cost of calories obtained from alternative sources. It also brings out the variations in the levels of food intake among different expenditure strata and also between rural and urban areas. Shifts in consumption patterns have also been analysed. The next section presents demand elasticities evaluated from the demand models. It also examines the proposition that substitution of non-food items for food items has weakened the relationship between food and income. The prediction model given in Radhakrishna and Ravi (1990) has been simulated by changing the values of exogenous variables. Comparisons between the base year and simulated predictions are made in the last but one section to answer the following questions: What would have been the consumption of various food items in 1986–87 had there been no change in tastes? What is the effect of relative price change on food consumption? What are the nutritional consequences of redistribution?

FEATURES OF INDIA'S FOOD SITUATION

Consumption Levels

With annual total expenditure at Rs. 1,558 billion and population at 797 million, per capita monthly expenditure worked out to Rs. 163 in 1986–87 (Table 1). The rural–urban difference in per capita expenditure was fairly large. The rural areas had a per capita expenditure of Rs. 141 per month, with two-thirds of it devoted to food, whereas the figure for urban areas was Rs. 226 per month with slightly more than half devoted to food. Although the share of food in total expenditure was lower, the urban areas had a higher per capita expenditure of 39 per cent on food because of their higher level of per capita expenditure. Further, the urban areas displayed significantly higher levels of expenditure on milk and milk products, fruits and vegetables, and other foods, and a lower level of per capita expenditure on cereals. The share of the former category in food expenditure was 46 per cent in the urban and 32 per cent in the rural areas. On the other hand, the share of cereals was as low as 28 per cent in the urban against 44 per cent in the rural areas, which pushed the expenditure on cereals in urban

Table 1: Expenditure and Population Distribution in 1986–87
(Per capita Expenditure Rs 0.00/30 days)

Commodity Groups	Rural Expenditure Groups					Urban Expenditure Groups					All India
	I	II	III	IV	All Rural Groups	I	II	III	IV	All Urban Groups	
1. Rice	15.31	22.92	26.87	30.09	23.70	14.53	18.90	20.76	22.39	20.27	22.81
2. Wheat	6.96	8.43	10.44	13.70	9.85	8.77	10.94	12.34	14.47	12.53	10.55
3. Other cereals	6.88	7.05	6.80	6.72	6.85	4.19	3.03	2.59	2.14	2.70	5.78
Total cereals	29.15	38.40	44.11	50.51	40.40	27.49	32.87	35.69	39.00	35.50	39.14
4. Pulses	3.03	5.59	6.98	10.03	6.35	3.86	5.83	7.68	9.94	7.83	6.73
Total foodgrains	32.18	43.99	51.09	60.54	46.75	31.35	38.70	43.37	48.94	43.33	45.87
5. Milk and milk products	2.98	7.34	13.52	26.78	12.54	4.81	10.60	18.07	34.49	22.17	15.03
6. Edible oils	3.27	5.14	6.88	10.06	6.30	4.76	7.57	10.61	16.13	11.70	7.70
7. Meat, egg and fish	1.84	3.36	5.34	8.89	4.83	3.02	4.97	7.23	13.07	8.82	5.86
8. Sugar and gur	1.75	3.09	4.65	7.20	4.15	2.65	4.07	5.42	7.70	5.81	4.58
9. Fruits and vegetables	4.53	6.09	8.96	13.49	8.25	5.72	9.23	13.07	21.61	15.41	10.04
10. Other foods	4.08	6.53	8.86	16.14	8.81	6.57	9.85	14.25	32.83	20.58	11.86
Total foods	50.65	75.55	99.28	143.09	91.62	58.88	84.99	112.04	174.78	127.55	100.92
11. Non-food items	16.35	28.52	46.44	108.48	49.31	20.77	37.28	60.69	168.59	98.47	62.04
Total	67.00	104.07	145.72	251.57	140.93	79.65	122.27	172.73	343.37	226.02	162.96
12. Total expenditure (billion)	128.28	151.44	296.64	421.98	998.34	29.76	43.68	114.36	371.52	559.32	1557.66
13. Share in rural/urban expenditure	0.1285	0.1517	0.2971	0.4226	1.0000	0.0532	0.0781	0.2045	0.6642	1.0000	–
14. Population (millions)	159.62	121.31	169.66	139.73	590.32	31.12	29.76	55.18	90.16	206.22	796.54
15. Share in rural/urban population	0.2704	0.2055	0.2874	0.2367	1.0000	0.1509	0.1443	0.2676	0.4372	1.0000	–

Note: I—Very poor; II—Moderately poor; III—Lower non-poor and IV—Higher non-poor.

areas lower than in the rural areas. Overall, the urban areas exhibited higher levels of food consumption, except for cereals, with a more diversified food basket.

Expenditure Distribution and Consumption Patterns

Total expenditure and the consumption of various items by expenditure groups are shown in Table 1. The expenditure groups were formed on the basis of the Planning Commission's 'poverty line', treating households below 75 per cent of the poverty line as very poor, between the poverty line and 150 per cent of the poverty line as lower non-poor, and above 150 per cent of the poverty line as higher non-poor.[1] As expected, consumption of food items increased as we moved from lower to higher expenditure groups and the relationship between consumption and total expenditure was stronger for milk and milk products. The higher non-poor group's per capita expenditure on milk and milk products was six times and on food three times that among the very poor group. The composition of the consumption basket varied between groups. The very poor groups of both rural and urban areas devoted as high as three-fourths of their expenditure to food while the non-poor groups devoted only about half. Foodgrains (cereals and pulses) accounted for a major part of the food expenditure among the very poor groups: 64 per cent in the rural and 53 per cent in the urban areas. On the other hand, milk and milk products, fruits and vegetables, and other food items figured prominently in the consumption of the upper expenditure groups: the share of these items of food was more than one-third. These findings suggest that the demand for foodgrains would depend on the incomes of the poor whereas the demand for milk and milk products, fruits and vegetables, and other foods would depend proportionately more on the incomes of the rich.

The rural–urban difference in the share of food in total expenditure between comparable expenditure groups varied only narrowly. But, because of higher urban inequality, the share of food in total expenditure was lower at the aggregate level in the urban areas. With respect to specific food items, their budget shares varied between comparable rural–urban expenditure groups. The rural

[1] This study employed the poverty line of the Planning Commission given for the year 1983–84. Price adjustments were made while arriving at the poverty lines for other periods by using appropriate price deflators.

areas exhibited a larger share of foodgrains, whereas the share of other food groups was higher in the urban areas. These findings suggest that given the inequalities within rural and urban and aggregate expenditure, an increase in urban share in income would reduce the demand for foodgrains and total food and also result in considerable substitution within the foodgrain group in favour of wheat and pulses at the cost of coarse cereals.

Foodgrain Intake vs. Norms

The quantities of foodgrains consumed by the expenditure groups in 1986–87 are given in Table 2. The per capita monthly consumption of cereals at 15.32 kg in the rural and 11.67 kg in the urban areas was more than the Indian Council of Medical Research's (ICMR) consumption norm of 386 gm/day (11.58 kg/month). More significantly, no expenditure group, except the urban very poor suffered from cereal deficiency; this group suffered a deficiency of 22 per cent. These results suggest that although cereal availability was sufficient to provide an adequate diet to an average Indian at the aggregate level, inequality affected about 4 per cent of the population. The consumption of pulses which averaged 1.44 kg/month in the rural areas was slightly lower than the ICMR norm of 50 gm/day (1.5 kg/month). On the other hand, the per capita consumption of pulses in the urban areas at 1.77 kg/month was nutritionally adequate. However, severe deficiency of pulses existed among the poor groups in both rural and urban areas. The consumption of pulses among the rural very poor was deficient by 55 per cent, and among the urban very poor by 42 per cent. The corresponding deficiency in pulses among the moderately poor was 16 per cent and 12 per cent, respectively, in rural and urban areas. On the whole, as much as 43 per cent of the population suffered from deficiency in pulses.

Calorie Intake

Calories derived from a rupee spent on a food item in 1986–87 are shown in Table 3. As expected, cereals were the cheapest source of calories. Hence, the lower expenditure groups derived more calories from a rupee because of their higher budget share on cereals. Within the category of cereals, rice was the most expensive source of calories: a rupee spent on rice would provide nearly

Table 2: Foodgrain Consumption in Quantity in 1986–87
(Kg/per capita/30 days)

Commodity Groups	Rural					Urban					All India
	Expenditure Groups				All Rural Groups	Expenditure Groups				All Urban Groups	
	I	II	III	IV		I	II	III	IV		
1. Rice	4.72	7.07	8.28	9.28	7.31	3.90	5.08	5.58	6.02	5.63	6.88
2. Wheat	3.26	3.95	4.90	6.43	4.62	3.49	4.36	4.92	5.77	4.99	4.72
3. Other cereals	3.40	3.49	3.37	3.33	3.39	1.63	1.18	1.01	0.83	1.05	2.78
Total cereals	11.38	14.51	16.55	19.04	15.32	9.02	10.62	11.51	12.62	11.67	14.38
4. Pulses	0.68	1.26	1.58	2.27	1.44	0.87	1.32	1.74	2.25	1.77	1.52
Total foodgrains	12.06	15.77	18.13	21.31	16.76	9.89	11.94	13.25	14.87	13.44	15.90

Table 3: *Calories Contained in One Rupee Expenditure on Food Items in 1986–87*
(Kcal/rupee)

Commodity Groups	Rural Expenditure Groups				Urban Expenditure Groups			
	I	II	III	IV	I	II	III	IV
1. Rice	1048	1048	1048	1048	913	913	913	913
2. Wheat	1623	1623	1623	1623	1379	1379	1379	1379
3. Other cereals	1675	1670	1562	1229	1471	1367	1307	1110
4. Milk and milk products	225	225	220	219	175	174	174	176
5. Edible oils	411	419	416	408	457	455	452	450
6. Meat, egg and fish	58	60	57	56	46	49	48	56
7. Sugar and gur	810	782	765	733	662	649	646	638
8. Other foods	366	358	356	343	310	293	293	271

Notes: 1. Calories contained in one rupee expenditure on a commodity group are evaluated from the NSS quantity and expenditure data on items contained in the group using the calorie values of food items given in the NSS Report No. 238, volume 1.
2. The estimates for rice, wheat and other cereals are based on the 42nd round NSS data and for the other items on the 17th round NSS data. In the case of the latter, appropriate commodity price indices have been used for deflation.
3. Quantity figures are not available for all the items included in 'other foods'. Hence, those items for which quantity figures are available are considered. This implies that calories contained in one rupee expenditure on the included items will approximate the calories contained in a rupee expenditure on the commodity group.

60 per cent lower energy as compared to wheat and coarse cereals. This suggests that the market prices of cereals did not reflect their nutritional value. Rural–urban comparisons of the calorie costs indicate that the calories derived from a rupee spent on cereals was higher in the rural areas, which was due to the lower price of cereals in these areas.

Calorie intake levels by source in 1986–87 for various expenditure groups are presented in Table 4. Cereals were the most important source of calorie supply accounting for 72 per cent of the total calorie intake in the rural areas and 59 per cent in the urban. More significantly, the very poor group derived almost its entire calorie intake from cereals: 83 per cent in the rural and 76 per cent in the urban areas. How do calorie intake levels of the various groups compare with the norms? The Planning Commission recommended 2,400 Kcal/day/person for the rural and 2,100 Kcal/day/person for the urban areas. If we adopt these norms, the calorie intake level was lower than the norm by 5 per cent in the rural areas and just met the requirement in the urban areas. It is worth observing that calorie deficiency was severe among the poor groups: the calorie intake was deficient by 35 per cent among the very poor and 13 per cent among the moderately poor group in the rural areas, and by 34 per cent and 17 per cent among the very poor and moderately poor groups, respectively, in the urban areas. The urban lower non-poor group suffered a marginal deficiency which can be ignored. The higher non-poor groups were characterised by overnutrition: calorie intake levels were higher by about 25 per cent over the nutritional norms. Clearly, redistribution would have improved the nutritional status of all the groups by simultaneously increasing the nutritional level of the lower expenditure groups and reducing overnutrition among higher expenditure groups.

The above analysis does suggest that although all the groups, except the urban very poor, consumed an adequate amount of cereals, all the poor groups suffered from calorie deficiency. It appears that the calorie deficiency was due to the shortfall in the consumption of milk and milk products, meat, egg, fish, etc., as compared to the recommended levels of the ICMR.[2] One might

[2] The ICMR norms were based on a least-cost diet exercise carried out for given prices. Needless to say, the composition of the optimum food basket varies with prices. Hence, one has to be cautious in using the commodity specific norms when the prices differ from those used in the least-cost exercise.

Table 4: Calorie Intake by Source in 1986–87
(Kcal per capita/day)

Commodity Groups	Rural					Urban				
	Expenditure Groups				All Rural Groups	Expenditure Groups				All Urban Groups
	I	II	III	IV		I	II	III	IV	
1. Rice	535	801	939	1051	828	442	575	631	681	616
2. Wheat	377	456	565	741	534	403	503	567	665	576
3. Other cereals	383	392	354	275	351	205	138	113	79	116
4. Milk and milk products	22	55	99	195	92	28	61	104	202	129
5. Edible oils	45	72	95	137	86	73	115	160	242	176
6. Meat, egg and fish	4	7	10	17	10	5	8	12	24	16
7. Sugar and *gur*	47	80	119	176	105	58	88	117	164	124
8. Other foods	142	217	294	453	275	167	247	314	582	399
Total	1555	2080	2475	3045	2281	1381	1735	2018	2638	2152

Note: The calorie intake estimates are derived by multiplying the expenditure on a commodity with the calories contained in one rupee of expenditure on it given in Table 3. These should be taken as very approximate. The expenditure on commodities is predicted from a model discussed later.

argue that the consumption patterns of the poor groups were unbalanced in favour of cereals and their nutrition levels can be improved by substituting such food items as milk or meat for cereals. However, Table 3 provides evidence contrary to the above presumption. It can be seen that cereals are by far the least expensive source of calories.

Shifts in Consumption Patterns

Recent evidence reveals shifts in consumption patterns. We have analysed these shifts using the time series data on consumer expenditure. The data reveals a shift in consumption patterns since 1973–74. As the changes are similar for all the groups, we have illustrated the shifts in consumption patterns by considering the budget proportions of the rural very poor group as shown in Table 5. The proportion of total expenditure spent on cereals fluctuated between 56 and 60 per cent without showing any trend till 1973–74, after which it registered a declining trend. Correspondingly, there has been an increase in the proportion spent on non-food items and on some of the other food items. The proportion spent on non-food items increased from 18 to 25 per cent, and on milk and milk products from 3 to 5 per cent. Shifts in consumption patterns have also taken place within the cereal group; wheat seems to be replacing coarse cereals (Radhakrishna and Ravi 1990). For instance, the share of coarse cereals in the cereal expenditure of the rural very poor group declined from 33 per cent in 1973–74 to 17 per cent in 1986–87, while the proportion spent on wheat increased from 16 to 25 per cent. Price and taste factors must have contributed to such changes in consumption patterns. It appears that these shifts offset the positive effect of the recent decline in the price of cereals.

FOOD DEMAND FUNCTIONS

Piece-wise Linear Expenditure System

Recently, Radhakrishna and Ravi (1990) estimated the piece-wise Linear Expenditure System (LES) for seven and eleven commodity

Table 5: Trends in Budget Shares at Constant Prices for the Rural Very Poor Group

Year	Cereals	Milk and Milk Products	Edible Oils	Meat, Egg and Fish	Sugar and gur	Other Foods	Non-Food Items
1964-65	0.594	0.034	0.035	0.021	0.017	0.134	0.165
1965-66	0.602	0.033	0.032	0.017	0.019	0.137	0.161
1969-70	0.564	0.034	0.034	0.022	0.022	0.145	0.179
1970-71	0.572	0.035	0.032	0.021	0.021	0.145	0.174
1972-73	0.584	0.025	0.032	0.019	0.014	0.141	0.186
1973-74	0.587	0.031	0.031	0.020	0.018	0.132	0.180
1977-78	0.558	0.035	0.033	0.019	0.022	0.125	0.208
1983	0.505	0.039	0.036	0.015	0.026	0.141	0.237
1986-87	0.475	0.051	0.042	0.017	0.024	0.137	0.254

Note: Budget shares are expressed at 1969-70 prices.

groups.[3] Their estimates are based on nine NSS rounds from 1964–65 to 1986–87. In order to allow for possible shifts in taste in the mid-1970s, they have specified the LES as:

$$p_{it} \, q_{it} = C_i \, p_{it} + (b_i + b_i^* \, D) \, (y_t - \Sigma_j \, C_j \, p_{jt}) + E_{it}$$

$$\Sigma_i \, b_i = 1 \qquad \Sigma_i \, b_i^* = 0$$

D = 0 for 1964–65, 1965–66, 1969–70, 1970–71, 1972–73, 1973–74
D = 1 for 1977–78, 1983, 1986–87

where q_i denotes the per capita monthly consumption of the **ith** item, p_i the price of the **ith** item, y the per capita monthly expenditure, **b** and **C** the parameters and **E** is the random disturbance term. In the above specification, the **C** parameters are assumed to remain constant between the two periods but the **b** parameters are assumed to vary. The parameter estimates along with measures of goodness of fit are given in Radhakrishna and Ravi (1990). The LES gives extremely good fit to the data and is consistent with all theoretical restrictions. We shall utilise the estimates of seven commodity LES for our analysis.

Marginal Budget Shares

The marginal budget shares for period I (1964–65 to 1973–74) given by **b** and period II (1977–78) to 1986–87) given by **b** + **b*** are provided in Table 6. The results suggest shift in tastes: the marginal budget share of cereals declined and that of non-food items increased in period II for all expenditure groups. For instance, for the rural very poor group the marginal budget share of cereals was estimated to be 0.53 in period I and 0.39 in period II, the marginal budget share of non-food items to be 0.17 in period I and 0.25 in period II. The marginal budget shares of other food items increased in period II. However, the marginal share of food declined. The preceding analysis clearly brings out the weakening relationship between foodgrains/food consumption and total expenditure due to change in tastes.

We see clear patterns in the behaviour of marginal budget shares across the expenditure groups. Since the patterns are similar

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[3] For the use of piece-wise LES in demand studies see Radhakrishna and Murthy (1980) and Ahmed and Ludlow (1988).

Table 6: Marginal Budget Shares (bs) of the LES for Seven Commodity Groups

Commodity Groups	Very Poor		Moderately Poor		Lower Non-Poor		Higher Non-Poor	
	Period I	Period II	Period I	Period II	Period I	Period II	Period I	Period II
(Rural)								
Cereals	0.533	0.387	0.348	0.227	0.222	0.096	0.073	0.030
Milk and milk products	0.060	0.073	0.119	0.125	0.135	0.143	0.065	0.062
Edible oils	0.037	0.052	0.025	0.038	0.024	0.036	0.021	0.022
Meat, egg and fish	0.028	0.033	0.033	0.038	0.033	0.040	0.017	0.018
Sugar and gur	0.030	0.033	0.034	0.037	0.037	0.034	0.035	0.022
Other foods	0.145	0.174	0.141	0.162	0.137	0.158	0.075	0.074
Non-food items	0.167	0.247	0.300	0.373	0.411	0.492	0.715	0.772
(Urban)								
Cereals	0.390	0.287	0.177	0.096	0.085	0.040	0.008	0.007
Milk and milk products	0.082	0.092	0.140	0.146	0.143	0.147	0.069	0.062
Edible oils	0.055	0.066	0.039	0.063	0.047	0.051	0.015	0.015
Meat, egg and fish	0.040	0.045	0.039	0.040	0.047	0.050	0.026	0.021
Sugar and gur	0.040	0.038	0.037	0.033	0.026	0.023	0.010	0.008
Other foods	0.189	0.198	0.185	0.189	0.213	0.206	0.183	0.128
Non-food items	0.204	0.274	0.363	0.433	0.440	0.484	0.689	0.759

Note: Period I includes 1964–65, 1965–66, 1969–70, 1970–71, 1972–73, 1973–74.
Period II includes 1977–78, 1983, 1986–87.

Source: R. Radhakrishna and C. Ravi (1990). *Food Demand Projections for India.* Centre for Economic and Social Studies: Hyderabad (monograph).

for both periods, we confine our discussion to the estimates pertaining to the latter period. Table 6 shows that the marginal budget share of cereals fell from 0.39 to 0.03 between the very poor and non-poor higher groups in the rural areas, and from 0.29 to 0.01 in the urban areas. In contrast, the marginal budget share of non-food items rose from 0.25 to 0.77 in the rural areas and from 0.27 to 0.76 in the urban areas. Clearly, while the cereal group dominates the budgets of the poor, non-food items dominate the budgets of the rich. These patterns imply that changes in income distribution will affect demand. It is worth observing that in terms of patterns in marginal budget shares across the strata, the higher non-poor group stands out distinctly both in rural and urban areas. The marginal budget shares of milk and milk products, meat, egg and fish, etc., follow a pattern as one moves from the very poor to the lower non-poor, and the pattern changes between the lower non-poor and higher non-poor. The marginal budget shares of milk and milk products and of edible oils increase; those of meat, egg and fish, sugar and *gur* and other food items remain more or less constant as one moves from very poor to non-poor lower groups, and, in contrast, they *all* decline between the lower and higher non-poor groups. In general, a rupee transferred from the higher to lower group would reduce the demand for non-food items and increase the demand for food items.

Propensity to Consume Calories

We have computed the average and marginal propensities to consume calories using the calories contained in one rupee of expenditure given in Table 3, and the demand models of Radhakrishna and Ravi (1990).[4] The results shown in Table 7 refer to 1986–87 prices, based on the parameter estimates of the two periods. It should be stressed that propensities computed from period II LES are 1986–87 estimates and are historical in nature, while those computed from period I LES are contrafactual as they have been evaluated at 1986–87 prices from period I LES.

What is the effect of changed taste on propensities to consume calories? Table 7 clearly shows that changed tastes had a depressing

[4] For the derivations of calorie demand function from the LES, see Radhakrishna (1984).

Table 7: *Marginal and Average Propensity to Consume Calories at 1986–87 Prices*

Expenditure Groups	Period I		Period II	
	Marginal Propensity	Average Propensity	Marginal Propensity	Average Propensity
Rural				
1. Very poor	805	851	624	696
2. Moderately poor	571	733	408	599
3. Lower non-poor	416	618	254	509
4. Higher non-poor	171	438	106	363
Urban				
1. Very poor	575	569	456	520
2. Moderately poor	335	476	240	426
3. Lower non-poor	225	395	171	350
4. Higher non-poor	84	244	66	230

effect on calorie intake uniformly across all the expenditure groups. For instance, for a rupee value of consumption, the effect of change in tastes was a decline of 155 calories in the case of the rural very poor and 49 calories in the case of the urban very poor. What would be the implication of this finding on the poverty line defined as the expenditure corresponding to a given calorie intake level? The answer is obvious: it would raise the poverty line.

Demand Elasticities

Expenditure elasticities for 1986–87 for various groups evaluated at their mean expenditures are presented in Table 8. As one would expect, expenditure elasticities vary between groups and conform to the inference drawn on the basis of marginal budget shares. As we move from lower to higher groups, expenditure elasticities for food items (including calorie elasticity) decline and the elasticity for non-food items increases. It is notable that calorie elasticity is lower than food elasticity. This is because rising expenditure is associated with a shift in food consumption away from calorie-intensive commodities.

The own-price elasticities given in Table 9 possess correct signs and display the expected pattern across expenditure groups. The effect of a 10 per cent increase in prices on calorie consumption is shown in Table 10. The conclusions suggested by the price effects

Table 8: *Expenditure Elasticities at 1986–87 Prices Computed from the LES for Seven Commodity Groups*

Commodity Groups	Rural Expenditure Groups					Urban Expenditure Groups				
	Very Poor	Mode-rately Poor	Lower Non-Poor	Higher Non-Poor	Rural Aggregate	Very Poor	Mode-rately Poor	Lower Non-Poor	Higher Non-Poor	Urban Aggregate
Cereals	0.886	0.608	0.318	0.151	0.447	0.839	0.363	0.194	0.059	0.255
Milk and milk products	1.644	1.797	1.544	0.580	1.094	1.517	1.671	1.403	0.619	0.892
Edible oils	1.076	0.774	0.755	0.545	0.724	1.102	1.029	0.825	0.325	0.560
Meat, egg and fish	1.218	1.205	1.089	0.509	0.866	1.168	0.983	1.182	0.555	0.759
Sugar and gur	1.254	1.172	1.084	0.779	0.992	1.142	0.980	0.726	0.364	0.570
Other foods	1.003	0.934	0.928	0.470	0.757	0.974	0.925	1.019	0.682	0.797
Food	0.994	0.863	0.745	0.401	0.681	0.983	0.816	0.796	0.475	0.628
Non-food items	1.018	1.374	1.543	1.793	1.606	1.044	1.411	1.375	1.549	1.496
Calories	0.926	0.703	0.496	0.282	0.547	0.897	0.566	0.471	0.288	0.442

Note: These elasticities are evaluated from the period II LES at the mean total expenditure levels of the expenditure groups.

Table 9: Uncompensated Price Elasticities at 1986–87 Prices

Commodity Groups	Rural Expenditure Groups					Urban Expenditure Groups				
	Very Poor	Moderately Poor	Lower Non-Poor	Higher Non-Poor	Rural Aggregate	Very Poor	Moderately Poor	Lower Non-Poor	Higher Non-Poor	Urban Aggregate
Cereals	−0.832	−0.581	−0.279	−0.194	−0.431	−0.633	−0.289	−0.171	−0.051	−0.203
Milk and milk products	−1.323	−1.311	−0.988	−0.670	−0.888	−0.887	−0.989	−0.984	−0.491	−0.646
Edible oils	−0.889	−0.599	−0.500	−0.618	−0.616	−0.660	−0.633	−0.598	−0.252	−0.396
Meat, egg and fish	−0.998	−0.913	−0.708	−0.577	−0.710	−0.689	−0.597	−0.835	−0.422	−0.541
Sugar and gur	−1.027	−0.888	−0.703	−0.875	−0.839	−0.672	−0.593	−0.518	−0.275	−0.395
Other foods	−0.853	−0.752	−0.657	−0.561	−0.660	−0.649	−0.632	−0.772	−0.567	−0.624
Non-food items	−0.865	−1.022	−0.992	−1.229	−1.109	−0.712	−0.906	−0.980	−1.034	−1.008

Note: These elasticities are evaluated from the period II LES at the mean expenditure levels of the expenditure groups. Aggregate elasticity of an item is computed from the groups' elasticities by averaging them, using their shares in the consumption of the item as weights.

Table 10: Percentage Change in Calorie Consumption Due to a 10 per cent Rise in Prices

Price of Commodity Groups	Rural					Urban				
	Expenditure Groups					Expenditure Groups				
	I	II	III	IV	All Groups	I	II	III	IV	All Groups
1. Cereals	−7.16	−5.06	−2.72	−1.62	−3.66	−5.27	−2.68	−1.73	−0.56	−1.66
2. Milk and milk products	−0.05	−0.18	−0.40	−0.52	−0.33	−0.25	−0.35	−0.52	−0.51	−0.47
3. Edible oils	−0.31	−0.35	−0.31	−0.32	−0.32	−0.53	−0.54	−0.58	−0.32	−0.43
4. Meat, egg and fish	−0.03	−0.05	−0.08	−0.08	−0.06	−0.14	−0.12	−0.08	−0.10	−0.11
5. Sugar and gur	−0.30	−0.36	−0.38	−0.51	−0.41	−0.38	−0.37	−0.37	−0.21	−0.29
6. Other foods	−1.04	−1.10	−1.05	−1.00	−1.03	−1.48	−1.30	−1.38	−1.38	−1.42
All food prices	−8.89	−7.10	−4.94	−4.05	−5.81	−8.04	−5.37	−4.66	−3.08	−4.90
7. Non-food items	−0.37	−0.07	−0.02	−1.22	−0.33	−0.93	−0.29	−0.06	−0.20	−0.48
All prices	−9.26	−7.03	−4.96	−2.83	−5.48	−8.97	−5.66	−4.72	−2.88	−4.42

are obvious. The effect of the price of cereals is very large in magnitude and other price effects are almost insignificant, except for the higher non-poor group. The price effects weaken as we move from lower to higher groups. For instance, a 10 per cent increase in the price of all food items reduces the calorie consumption of the very poor group by 8.9 per cent in the rural areas and 8.0 per cent in the urban areas, while for higher non-poor groups the corresponding reductions are 4.1 per cent and 3.1 per cent, respectively.

EFFECTS OF TASTES, REDISTRIBUTION AND RELATIVE PRICES

Radhakrishna and Ravi (1990) have provided a prediction model which uses the log-normal specification for expenditure distribution and the LES for consumer demand. Predictions for the base year, i.e., 1986–87, have been made by using the actual values of the exogenous variables in the prediction model (columns 2 and 6 in Table 11). The model has been simulated by replacing the period II LES parameter estimates with those of period I (columns 3 and 7 in Table 11). The difference between the simulated predictions and base year predictions would give the effect of changed taste between periods I and II. In the second experiment, the model has been simulated by replacing the relative prices in 1986–87 with those in 1969–70 (columns 4 and 8 in Table 11). In order to examine the effect of redistribution, the model has been simulated by reducing the Gini coefficients of the expenditure distribution of rural and urban areas by 30 per cent (columns 5 and 9 in Table 11). Of the three simulation experiments, the first two deal with historical changes and the last deals with a hypothetical situation. It is important to note that the results of the simulation experiment dealing with change in tastes are only approximations since it is unlikely that the dummy variable used in the specification of the LES can represent the complex taste phenomenon adequately. In fact, the specification implies that tastes are invariant within a period but vary between periods. Hence, these results are more illustrative than final.

Taste Effect

Taste effect can be inferred from a comparison of columns 2 and 3 (for rural areas) and 6 and 7 (for urban areas) in Table 11. The results confirm the finding in the previous section that change in tastes had an unfavourable effect on food consumption. For instance, in the absence of a change in tastes per capita food consumption would have been higher by 9.2 per cent in the rural and 8.0 per cent in the urban areas. Further, cereal consumption would have been higher by 26.7 per cent in the rural and 9.1 per cent in the urban areas.

On the basis of the calorie norms of the Planning Commission, the bottom 30 per cent of the population had a per capita calorie deficiency by 794 Kcal/day in the rural areas and 563 Kcal/day in the urban areas. In the absence of taste changes the deficiency would have been only 446 Kcal/day in the rural and 374 Kcal/day in the urban areas. Thus, changed tastes aggravated the calorie deficiency of the bottom 30 per cent of the population by 348 Kcal/day in the rural areas and 189 Kcal/day in the urban areas. The estimates need to be qualified since the modelling of the taste effect is not perfect. Nevertheless, the direction of change does not require any such qualification. The findings clearly highlight the adverse effect of taste changes on the calorie intake of the poor.

Relative Price Changes

The effect of the relative price change between 1969–70 and 1986–87 can be read by comparing columns 2 and 4 (for the rural areas) and 6 and 8 (for the urban areas) in Table 11. The relative price change had a favourable effect on food consumption. For instance, it increased the per capita food consumption by 6.3 per cent and 3.9 per cent, and cereal consumption by 6 and 2.7 per cent in rural and urban areas, respectively. This stands to reason because cereal prices increased at a lower rate between 1969–70 and 1986–87. It is important to note that the positive relative price effect could not offset the negative effect of the change in tastes on food consumption.

More interesting is the effect of the relative price change on the calorie intake of the bottom groups; the results suggest that the

Table 11: Base Year Predictions and Simulation Results

Commodity Groups	Rural Base Year Predictions	Rural Period I LES	Rural 69-70 Relative Price	Rural 30% Reduction in the Gini Coefficient	Urban Base Year Predictions	Urban Period I LES	Urban 69-70 Relative Price	Urban 30% Reduction in the Gini Coefficient
Bottom 30%								
(Per capita consumption: Rs/month)								
1. Cereals	30.08	38.48	27.00	37.19	29.82	34.62	28.25	34.90
2. Other foods	22.39	18.62	27.95	29.10	42.04	41.12	45.27	56.41
3. Total food	52.47	57.11	54.95	66.29	71.86	75.74	73.52	91.31
3. Non-food items	16.95	12.31	16.15	21.49	29.26	25.38	28.65	41.04
Total expenditure	69.42	69.42	71.10	87.78	101.12	101.12	102.17	132.35
Calorie intake *(Per capita consumption: Kcal/day)*	1606	1954	1473	1988	1537	?1726	1483	1865
Middle 40%								
(Per capita consumption: Rs/month)								
1. Cereals	41.47	52.05	39.49	43.06	36.52	40.77	35.64	37.12
2. Other foods	45.97	42.03	52.62	49.24	87.17	89.71	92.70	94.44
3. Total food	87.45	94.08	92.11	92.31	123.68	130.48	128.34	131.56
3. Non-food items	37.06	30.43	34.04	40.33	70.00	63.20	66.86	77.99
Total expenditure	124.51	124.51	126.15	132.64	193.68	193.68	195.20	209.55
Calorie intake *(Per capita consumption: Kcal/day)*	2285	2749	2241	2385	2162	2356	2148	2249
Top 30%								
(Per capita consumption: Rs/month)								
1. Cereals	49.57	63.04	47.72	48.54	39.36	39.60	39.02	39.00
2. Other foods	85.79	86.83	98.17	79.56	147.64	168.42	156.64	135.37
3. Total food	135.36	149.87	145.89	128.10	187.00	208.01	195.65	174.36
3. Non-food items	98.98	84.47	90.89	77.04	207.04	186.03	200.20	167.28
Total expenditure	234.34	234.34	236.78	205.14	394.04	394.04	395.86	341.65
Calorie intake *(Per capita consumption: Kcal/day)*	2967	3613	3017	2854	2752	2934	2785	2636
All Groups								
(Per capita consumption: Rs/month)								
1. Cereals	40.49	51.28	38.21	42.94	35.36	38.57	34.44	37.02
2. Other foods	50.84	48.45	58.88	52.29	91.77	98.75	97.65	95.31
3. Total food	91.33	99.73	97.04	95.24	127.13	137.32	132.09	132.33
3. Non-food items	49.60	41.20	45.73	45.69	98.89	88.89	95.40	93.69
Total expenditure	140.93	140.93	142.82	140.93	226.02	226.02	227.49	226.02
Calorie intake *(Per capita consumption: Kcal/day)*	2286	2770	2243	2407	2152	2341	2139	2250

Note: Expenditure is expressed at 1986–87 prices.

relative price change augmented the calorie intake levels of these groups. The increase in per capita calorie intake of the bottom group due to the relative price change was 133 Kcal/day in the rural areas and 54 Kcal/day in the urban areas. This suggests that there is ample room for policy-makers to influence the level of calorie intake among the poor by changing the relative price.

Redistribution Effect

What will be the consequences of redistribution? Table 11 suggests that redistribution (30 per cent reduction in the Gini ratio) increases food consumption at the cost of non-food items at the aggregate level. It increased the per capita food consumption of the rural areas by 4.3 per cent and the urban areas by 4.1 per cent, and cereal consumption of the former by 6.1 per cent and the latter by 4.7 per cent.

Redistribution had a sharp effect on the calorie intake of the poor. For example, it increased the per capita per day calorie intake of the lowest 30 per cent by 382 Kcal in the rural areas and 328 Kcal in the urban areas. Had there been no change in tastes, the gains of redistribution would have solved the calorie deficiency problem. However, the relative price and redistribution measures can make a substantial dent in the problem of calorie deficiency. Clearly, food-linked income transfers would be very effective.

CONCLUDING OBSERVATIONS

The shift in tastes has aggravated the calorie deficiency of the lowest 30 per cent of the population and weakened the relationship between calorie consumption and income. The causes of the change in tastes are little researched. If the acceleration in the economic growth experienced by India in the recent past projects into the future, it is likely that poverty in terms of income may decline, but poverty in terms of food consumption might persist. Though the decline in the relative price of cereals increased cereal consumption and calorie intake, these gains could not compensate for the decrease in calorie intake due to change in tastes.

Even though the deficiency in calorie intake was marginal at the

aggregate level, the poor experienced severe calorie deficiency because of inequality. If one considers the ICMR norm of cereal consumption, the poor did not suffer from cereal deficiency. Hence, calorie deficiency can be attributed to their low consumption of non-cereal foods. It should also be stressed that the ICMR norms should be used with caution since its concept of a balanced diet was based on past prices and its recommended food basket is sensitive to prices. Since cereals are the cheapest source of calories for the poor, any shift in tastes away from cereals makes calories more expensive. An important question is whether to increase the calorie consumption by concentration on price factors only, or consider non-price factors such as tastes as well

Historical experience suggests that growth would increase the incomes of the poor, but the process would be slow. Hence, significant improvements in the nutritional status of the poor cannot be achieved in the near future directly through growth. In this regard two policy interventions should be considered: (i) redistribution of income and (ii) increasing the consumption of specific food items by lowering their prices for the poor through subsidies. It should be stressed that the prevailing structural conditions may limit the scope of the former and the fiscal crisis may rule out the latter. Needless to say, there are no soft policy options for improving the nutritional status of the poor.

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