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**PULSES AND OILSEEDS SCENE
IN MAHARASHTRA**

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FOREWORD

The present study was undertaken in the Agro-Economic Research Centre of the Institute. It examines the pulses and oilseeds scenario in the State of Maharashtra. These commodities of common consumption have attracted the attention of planners since the late seventies when shortages in their availability were acutely being felt and their prices were registering sharp increases.

After outlining the dimensions of the problem for the country, an attempt has been made to estimate the income elasticities of demand for these items for the country and the State of Maharashtra. This is followed by a detailed analysis for the State as well as for its seven agro-climatic zones.

It is hoped that the study will be found useful by the policy-makers and researchers.

April 30, 1994

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Table 1.1: Index Numbers of Production for Cereals, Pulses and Oilseeds in India

(Base: Triennium ending 1969-70 = 100)

Year	Cereals	Pulses	Seven Oilseeds *	All Oilseeds *
Weights out of 100	(60.05)	(8.07)	(7.90)	(10.96)
1960-61	82.6	112.3	89.9	89.8
1961-62	84.6	103.0	92.2	89.6
1962-63	81.4	101.8	95.6	94.8
1963-64	84.8	89.0	91.0	91.3
1964-65	92.3	109.5	111.5	107.2
1965-66	74.2	88.0	84.6	85.6
1966-67	77.5	73.7	84.1	86.8
1967-68	97.7	106.7	108.0	105.4
1968-69	98.2	90.2	89.9	92.4
1969-70	104.1	103.1	102.1	102.2
1970-71	114.1	104.4	122.5	116.1
1971-72	113.2	97.9	113.8	114.3
1972-73	104.3	87.6	91.3	95.3
1973-74	113.2	88.5	117.0	114.5
1974-75	106.4	88.8	114.5	114.9

contd....

* Seven Oilseeds with their weights are as follows:

Groundnut pods (4.82), Sesamum (til)-(0.62), Rapeseed and Mustard (1.73), Linseed (0.43), Castorseed (0.11), Safflower (0.09), Nigerseed (0.10).

All Oilseeds further include Coconut (1.87) and Cottonseed (1.19)

Source: Area and Production of Principal Crops in India, Director of Economics and Statistics, Ministry of Agriculture.

Table 1.1 (contd.)

Year	Cereals	Pulses	Seven Oilseeds	All Oilseeds
1975-76	128.8	115.3	130.9	123.8
1976-77	117.8	100.3	104.0	103.9
1977-78	137.3	105.8	118.9	116.5
1978-79	143.6	107.5	123.8	122.4
1979-80	119.9	76.6	106.0	108.5
1980-81	143.1	95.8	109.9	113.6
1981-82	145.5	103.7	147.4	138.8
1982-83	139.8	106.4	119.3	120.1
1983-84	167.1	116.5	150.2	138.4
1984-85	160.5	108.4	148.4	144.6
1985-86	167.5	120.1 [@]	123.5	126.7
1986-87	160.4	105.7 [@]	127.9	125.1
1987-88	156.5	99.5 [@]	144.9	139.1
1988-89	190.6	123.9	205.6	190.0

@ These indices should be 117.49, 103.29, 97.13 by our calculations. In fact, after 1980-81 indices for 'other pulses' are all overestimated.

the early seventies. Although index numbers do exceed 110 occasionally in the later years, these remain well below 120 whereas for the same years cereals reach dizzy heights of over 160. Thus pulses production shows a stagnant-mildly increasing trend. For the 'seven oilseeds' index numbers, the situation is somewhat better with indices remaining consistently higher than 115 from 1973-74 onwards, barring 3-4 years with index around 110. In the last year of 1988-89 the index is appreciably high, over 200. But the growth is not as spectacular, nor as consistent as in foodgrains. There is also a category of 'All oilseeds' and indices for the same are also presented to complete the picture. These 'all oilseeds' have the seven oilseeds of groundnut, rapeseed and mustard, sesamum, linseed, castorseed, safflower and nigerseed and additionally, the oilseeds of cottonseed and coconut. These last two crops are kept separate probably because cottonseed is really a by-product and coconut because it is a garden-crop. In the footnote to the table under consideration, we have also mentioned weights of all these oilseeds to complete the data so that one sees easily that inclusion of non-edible oilseeds of castorseed and linseed (with their low weights) does not really affect the edible aspect of these oilseeds.

The matter becomes more clear in Table 1.2 where considering 'normal' trienniums over the period, averages of these indices for these trienniums are presented which are centered on 1962-63, 1968-69, 1977-78 and 1986-87, allowing us an assessment of the sixties, seventies and eighties separately. The compound growth rate columns indicate that cereals production in every decade remains ahead of the

Table 1.2: Compound Growth Rates for Cereals, Pulses and Oilseeds in India

(Growth rates % p.a.)

Item	Production Index Numbers for Trienniums Centred on				Growth Rates for			
	1962-63	1968-69	1977-78	1986-87	Sixties	Seventies	Eighties	Overall
1. Cereals	83.60	100.00	132.90	161.47	3.03	3.21	2.19	2.78
2. Pulses	97.93	100.00	104.53	108.43 [@]	0.35	0.49	0.41 [@]	0.43 [@]
3. Seven* Oilseeds	92.93	100.00	115.57	132.10	1.23	1.62	1.50	1.48
4. All Oilseeds	91.90	100.00	114.27	130.30	1.42	1.49	1.47	1.47
5. Population (Decennial Census of 1961, 1971, 1981 and 1991 in million)	439	548	685	844	2.24	2.26	2.11	2.20

* For details of Oilseeds see note to the previous table.

[@] Triennium average should be 105.97 by our calculations giving seventies & overall rates 0.15 and 0.33 (% p.a.) respectively which are quite close to those based on actual outputs.

population growth rates of 2.24, 2.26 and 2.11 per cent per annum but pulses have less than half-a-per cent growth rate while the oilseeds growth rate is better, over one per cent, but below one and a half-per cent. This clearly brings out the gaps or the divergence between production and requirements of pulses and oilseeds. Incidentally, we note that pulses index number of 108.43 is slightly exaggerated and as mentioned in the footnote of the table, it should be 105.97 with eighties growth rate reducing to 0.15 (and not 0.41) per cent and thirty-year 'overall' growth rate reducing to 0.33 per cent (and not 0.43 per cent as in the table) per annum. But more about this in the next section.

1.3 Details of major pulses are now taken up. In Table 1.3 details of outputs and per hectare yields are presented for gram, tur, 'other' pulses and all pulses together, for the 29 years under consideration. Here we see that the total production is somewhat an up-and-down affair with a mild increasing tendency which is perhaps well-concealed. Production of gram, the major pulse in the country shows complete stagnancy, though the range appears to be between 3,500 thousand tonnes and 5,500 thousands tonnes (that is 3.5 to 5.5 million tonnes), if anything, there is a mild decreasing tendency. Tur, on the other hand, shows output over 2 million tonnes from 1980 onwards, thus indicating somewhat rising trend but the productivity keeps fluctuating around 7 quintals per hectare. 'Other pulses' comprising of udid, mung etc., have a productivity between 3 and 4 quintals, much below that of gram and tur but the stagnation is as apparent.

Table 1.3: Production and Productivities of Major Pulses in India
 (Prod. in 000 tonnes, Yield per ha in qtl)

Year	All Pulses		Gram		Tur		Other Pulses	
	Production	Yield	Production	Yield	Production	Yield	Production	Yield
1960-61	12704	5.39	6250	6.74	2066	8.49	4388	3.70
1961-62	11755	4.85	5785	6.05	1367	5.59	4603	3.76
1962-63	11528	4.75	5362	5.83	1582	6.45	4584	3.63
1963-64	10073	4.16	4502	4.81	1380	5.48	4191	3.40
1964-65	12417	5.20	5777	6.51	1890	7.33	4750	3.82
1965-66	9944	4.38	4224	5.27	1733	6.78	3987	3.28
1966-67	8347	3.77	3622	4.53	1130	4.48	3595	3.10
1967-68	12102	5.34	5971	7.23	1741	6.53	4390	3.74
1968-69	10418	4.90	4309	6.06	1816	7.18	4293	3.69
1969-70	11691	5.31	5546	7.16	1842	6.90	4303	3.71
1970-71	11818	5.24	5199	6.63	1883	7.09	4736	3.93
1971-72	11094	5.01	5081	6.42	1683	7.19	4330	3.64
1972-73	9907	4.74	4537	6.51	1928	7.95	3442	2.99
1973-74	10008	4.27	4099	5.28	1408	5.32	4500	3.46
1974-75	10014	4.55	4015	5.70	1834	7.25	4165	3.34
1975-76	13039	5.33	5880	7.07	2099	7.86	5061	3.76
1976-77	11361	4.94	5424	6.80	1725	6.72	4212	3.39
1977-78	11973	5.10	5410	6.78	1930	7.35	4633	3.59
1978-79	12183	5.15	5739	7.45	1887	7.16	4557	3.42
1979-80	8572	3.85	3356	4.80	1757	6.43	3458	2.76
1980-81	10627	4.73	4328	6.57	1958	6.89	4341	3.33
1981-82	11507	4.83	4642	5.90	2237	7.45	4629	3.57
1982-83	11857	5.19	5290	7.15	1989	6.80	4578	3.66
1983-84	12893	5.48	4751	6.63	2576	8.00	5566	4.23
1984-85	11963	5.26	4562	6.61	2585	8.19	4816	3.80
1985-86	13361	5.47	5788	7.42	2441	7.67	5132	3.82
1986-87	11707	5.06	4532	6.49	2271	7.21	4904	3.77
1987-88	11040	5.12	3622	6.24	2234	6.79	5184	4.16
1988-89	13702	5.89	5062	7.35	2666	7.56	5975	4.65

Again, the matter gets clarified if we look at the data using strategic points in time and assessing growth in sixties, seventies and eighties. This is done in Table 1.4 where details for 'all pulses' along with those for gram, tur, urid, mung and 'other pulses' - i.e. pulses other than gram and tur (but including urid and mung) are presented along with details for cereals at the bottom part of the table. Here first of all we note that gram covers 45 per cent of pulses production and tur about 15 per cent (their weights in 1967-70 triennium based index were 3.58 and 1.35 respectively so even without involvement of price, absolute outputs are also indicative of their importance in production). Between gram and tur, it is tur which indicates some growth (in fact rate is 1.99 per cent per annum) largely on account of area. Gram shows decline in every decade. For 'all pulses' growth rate in eighties is 0.18 per cent per annum whereas in Table 1.2 it is 0.41 per cent per annum. This difference could not be attributed to the fact that in that table prices act as weights. Further investigations revealed that in the source 'Area and Production of Principal Crops in India 1988-89,' Vol. 75, 'pulses other than gram and tur' have indices on page 243 which are not consistent with actual production figures for the category on pages 20-21. There is overestimation of index of this category 1980-81 onwards, though for previous years, indices appear consistent with production. Suitable corrections give indices-based growth rates for eighties and overall at 0.15 and 0.33 per cent per annum respectively, and the rates based on actual additions of outputs in the present Table 1.4 are 0.18 and 0.33 per cent per annum which are in tune.

Table 1.4 : Changes and Compound Growth Rates of Area, Production and Productivity of Important Pulses alongwith 'All Cereals'
(Area in '000 ha, Production in '000 tonnes, Yield in Qtls/ha)

Crop	Triennium Averages Centred on Growth Rates (% p.a.)							
	1962-63	1968-69	1977-78	1986-87	Six-ties	Seven-ties	Eight-ties	Over-all
All Pulses								
Area	24231 (100)	21979 (100)	23379 (100)	23044 (100)	-1.61	0.69	-0.16	-0.21
Production	11119 (100)	11404 (100)	11839 (100)	12036 (100)	0.42	0.42	0.18	0.33
Yield/ha	4.59	5.19	5.06	5.22	2.07	-0.28	0.35	0.54
Gram								
Area	9371 (38.67)	7704 (35.05)	7885 (33.73)	6865 (29.79)	-3.21	0.26	-1.53	-1.29
Production	5216 (46.91)	5275 (46.26)	5224 (44.13)	4647* (38.61)	0.19	-0.11	-1.29	-0.48
Yield/ha	5.57	6.85	6.62	6.77	3.50	-0.38	0.25	0.82
Tur								
Area	2472 (10.20)	2621 (11.93)	2609 (11.16)	3208 (13.92)	0.98	-0.05	2.32	1.09
Production	1443 (12.98)	1800 (15.98)	1847 (15.60)	2315 (19.24)	3.75	0.29	2.54	1.99
Yield/ha	5.84	6.87	7.08	7.22	2.74	0.34	0.22	0.89
Udid								
Area	-	-	2173 (9.29)	3174 (13.77)	-	-	4.30	-
Production	-	-	722 (6.10)	1265 (10.51)	-	-	6.43	-
Yield/ha	-	-	3.32	3.99	-	-	2.06	-

Table 1.4 (contd.)

Crop	Triennium Averages Centered on				Growth Rate(% p.a.)			
	1962-63	1968-69	1977-78	1986-87	Six-ties	Seven-ties	Eigh-ties	Over-all
<u>Mung</u>								
Area	-	-	2463 (10.53)	3016 (13.09)	-	-	2.28	-
Production	-	-	848 (7.16)	1173 (9.75)	-	-	3.67	-
Yield/ha	-	-	3.44	3.89	-	-	1.38	-
<u>Other Pulses (including Udid, Mung)</u>								
Area	12388 (51.12)	11653 (53.02)	12885 (55.11)	12971 (56.29)	-1.01	1.12	0.07	0.19
Production	4459 (40.11)	4329 (37.96)	4767 (40.27)	5073 (42.15)	-0.49	1.08	0.69	0.54
Yield/ha	3.60	3.71	3.70	3.91	0.50	-0.03	0.61	0.34
<u>All Cereals</u>								
Area	93268	99828	103529	101597	1.14	0.41	-0.21	0.36
Production	70048	84785	111320	132044	3.23	3.07	1.92*	2.64
Yield/ha	7.51	8.49	10.75	13.0	2.06	2.66	2.13	2.31

Figures in brackets are percentages to 'All Pulses' category.

* These figures are somewhat low. For the year 1988-89 estimates are higher. Cereals growth rate for eighties improves to over 3% p.a. if year 1988-89 is included with its Cereals production of 170252 in thousand tonnes)

Having noted mild decline in gram which is on account of area and mild increase in tur also on account of area, we see that udid and mung are showing good growth rates although their share in production in total is less than 10 per cent each. Their productivity is nearly half the other two pulses and yet area and productivity are both increasing. Their short duration and availability as a kharif or a rabi crop appear to be the attractions. But 'other pulses' including udid, mung' category has again stagnation as its feature and hence some of the other pulses are not doing as well.

This table also has cereals data presented and one sees that growth rates of over 3 per cent during sixties, seventies and 2 per cent in eighties with overall rate of 2.64 per cent present a completely different picture. This was noted on the basis of index numbers in Table 1.2. Now we note this in actuals (without weighting by prices) also. The productivity shows a steady increase from $7\frac{1}{2}$ quintals per hectare in sixties to 13 quintals/ha in the eighties. 1988-89 indicates even better performances. The share of pulses in the foodgrains output has gone down over the years from 14 to less than 9 per cent.

What could be the reasons for stagnancy in pulses? First of all, with the task of feeding the masses assuming paramount importance, this supplementary but protein-rich food was perhaps neglected. Then nothing like hybrid-high yielding seed development took place where the varieties are fertilizer-responsive, of short duration and sturdy. Further, high-yielding cereals are being taken and being recommended to be taken as single rather than mixed crops

to facilitate proper plant-protection measures. Pulses are generally raised in rainfed conditions with the exception of gram and being nitrogen-fixing, it is assumed that they do not need fertilizers. The fact that for their own growth fertilizers are helpful is overlooked and even the relatively meagre doses of fertilizers are not applied. Regarding irrigation, it is revealing that 20 per cent of gram area is irrigated but tur does not even feature in irrigated crops. Pulses as a whole get 10 per cent area irrigated while foodgrains as a whole have 33 per cent area irrigated (all 1986-87 percentages).

1.4 Regarding oilseeds, it was noted that the growth rate in every decade is over one per cent but below one and a half per cent per annum. In Table 1.5 annual data of production and productivity are presented for groundnut, rapeseed and mustard together and sesamum with their 'importance' among 'seven oilseeds' being 61 per cent, 22 per cent and 8 per cent respectively, on the basis of their weights (triennium 1967-70). This table indicates an up-and-down performance in production for groundnut (barring the terminal year 1988-89) whereas productivity indicates only slightly higher but consistent figure in the eighties. Rapeseed and mustard, on the other hand, have a productivity stagnant (and only mildly rising) but production gaining in the eighties. A feature of this crop is stagnancy of production and productivities in the seventies followed a 50 per cent increase in the eighties so that eighties growth rate of production is 6.14 per cent, area growth rate being 2 while productivity growth rate being over 4 per cent per annum, as indicated in Table 1.6. Thus the major oilseed of groundnut has stagnated - declined with

Table 1.5: Production and Productivities of Major Oilseeds in India

(Production in '000 tonnes,
Yield per hect.in Quintals)

Year	Groundnut		Rapeseed & Mustard		Sesamum	
	Production	Yield	Production	Yield	Production	Yield
1960-61	4812	7.45	1347	4.67	318	1.47
1961-62	4994	7.25	1346	4.25	372	1.65
1962-63	5064	6.95	1303	4.17	492	1.93
1963-64	5298	7.69	915	3.00	439	1.82
1964-65	6004	8.14	1474	5.07	484	1.95
1965-66	4263	5.54	1298	4.46	424	1.69
1966-67	4511	6.04	1228	4.09	416	1.49
1967-68	5731	7.59	1568	4.83	445	1.68
1968-69	4631	6.53	1347	4.69	422	1.74
1969-70	5130	7.20	1564	4.93	448	1.94
1970-71	6111	8.34	1976	5.95	562	2.31
1971-72	6181	8.23	1433	3.97	449	1.88
1972-73	4092	5.85	1808	5.45	385	1.68
1973-74	5932	8.45	1704	4.93	485	2.03
1974-75	5111	7.24	2252	6.12	392	1.75
1975-76	6755	9.35	1936	5.80	479	2.21
1976-77	5264	7.47	1550	4.96	422	1.85
1977-78	6087	8.66	1650	4.60	520	2.18
1978-79	6208	8.35	1860	5.25	514	2.15
1979-80	5768	8.05	1428	4.11	348	1.46
1980-81	5005	7.36	2304	5.60	446	1.80
1981-82	7223	9.72	2381	5.41	590	2.28
1982-83	5282	7.32	2207	5.77	552	2.49
1983-84	7085	9.40	2608	6.73	559	2.54
1984-85	6436	8.98	3073	7.71	520	2.46
1985-86	5121	7.19	2681	6.74	501	2.26
1986-87	5875	8.41	2605	7.00	448	2.07
1987-88	5673	8.42	3370	7.48	562	2.68
1988-89	9544	11.32	4412	9.07	667	2.74

(In the 1967-1970 triennium based production index, Groundnut has a weight of 482, Rapeseed & Mustard 1.73, Sesamum 0.62 in the 'seven oilseeds' weight of 7.90, excluding cottonseed and coconut weights of 1.87, 1.19).

Table 1.6: Area, Production and Productivity Changes and Compound Growth Rates for Major Oilseeds

Crop	Trienniums Centered on				Growth Rates (% p.a.)			
	1962-63	1968-69	1977-78	1986-87	Sixties	Seventies	Eighties	Over-all
1. Groundnut (Pods)								
Area	7019	7255	7168	6947	0.55	-0.13	-0.35	-0.04
Prod.	5119	5164	5853	5556	0.15	1.40	-0.58	0.34
Yield	7.29	7.12	8.17	8.00	-0.39	1.54	-0.23	0.39
2. Rapeseed & Mustard								
Area	3114	3095	3419	4069	-0.10	1.11	1.95	1.12
Prod.	1188	1493	1687	2885	3.88	1.37	6.14	3.77
Yield	3.81	4.82	4.93	7.09	4.00	0.25	4.12	2.62
3. Sesamum								
Area	2405	2462	2351	2159	0.39	-0.51	-0.94	-0.45
Prod.	434	438	485	504	0.15	1.14	0.43	0.62
Yield	1.80	1.78	2.06	2.33	-0.19	1.63	1.38	1.08

mild productivity increase while the second-most important crop has done rather well. Sesamum performance has a mild growth rate of 0.62 per cent per annum for the entire period and needs no further comment.

In Table 1.7 some 'emerging' oilseeds data are presented for seventies and eighties. These are safflower, sunflower and soyabean. Safflower is a traditional crop but has good area and production growth rates of nearly 4 per cent so that production growth rate is high at 8 per cent but level of productivity is low, between 2 and 4 quintals/ha. The crop has a weight of just 0.09 in 1967-70 triennium base index but in the new 1981-82-ending triennium base it has a weight of 0.32. Sunflower and soyabean have weights of 0.10 and 0.25 in this new base but in 1967-70 base these were either absent or clubbed with other oilseeds. In this sense these are emerging oilseeds and these have growth rates of 11 and 29 per cent per annum respectively for 20 years since 1970-71, thus having all the advantages of a new crop going through small to reasonably big magnitudes. These could contribute significantly to oilseeds production over the years.

Regarding irrigation only 15 per cent of groundnut is irrigated but 55 per cent of rapeseed and mustard receive irrigation, while 19 per cent of 'all oilseeds' receive irrigation. Thus growth in rapeseed and mustard must have been partly possible because it is irrigation-based. This is also true of groundnut in Maharashtra as we shall see later, although groundnut is a traditionally rainfed crop. Thus, like pulses, oilseeds production has also lagged on account of absence of new varieties as in case of rice and

Table 1.7: Some Emerging Oilseeds in India

(Area in '000 ha, production in '000 tonnes, yield in Qtl/ha)

Crop	Average Triennium Centered on			Growth Rates (% p.a.)		
	1972-73	1977-78	1986-87	Seventies	Eighties	Overa.
1. Safflower						
Area	545	698	957	5.07	3.57	4.10
Prod.	135	206	384	8.82	7.16	7.75
Yield	2.48	2.95	4.01	3.53	3.47	3.49
2. Sunflower						
Area	157	236	1144	8.49	19.17	15.24
Prod.	107	126	437	3.32	14.82	10.57
Yield	6.81	5.34	3.82	-4.75	-3.65	-4.04
3. Soyabean						
Area	35	209	1516	42.96	24.62	30.89
Prod.	27	202	965	49.55	18.98	29.10
Yield	7.71	9.67	6.36	4.63	-4.55	-1.36

wheat whose varieties are short (and hence sturdy), of short duration, highly fertilizer responsive and taken under irrigated conditions.

1.5 The analysis so far reveals stagnation in pulses and modest growth in oilseeds between 1 and $1\frac{1}{2}$ per cent per annum, well below the population growth well above 2 per cent per annum. Did this reflect in prices of these commodities? In Table 1.8 we have presented wholesale price index numbers of relevant categories. Over the thirty-year period, wholesale price indices have had a change of base three times, with bases of 1961-62, 1970-71 and 1981-82 and this is only appropriate, as keeping to the old base makes the commodity-basket rather outdated. These index numbers are spliced to form a consistent series with base 1970-71. In the table, the categories cover weight of 171.23 in an aggregate of weights of 1000. The year 1970 does not have a value of 100 probably because the weights of 1970-71 are financial (or agricultural) year while index numbers are for calendar years or some such 'statistical' reason. But this does not affect our analysis as we are interested in the trends. We also see that the 1970 and 1971 indices are not far removed from 100. Here we see that for every category (cereals, pulses, foodgrains and all commodities including manufactured articles etc.) price index increases. Beginning with 1971, pulse index is always above that for cereals but the margin really widens from 1980 onwards and in 1988, 1989 the respective index numbers are 325, 339 (cereals) and 628, 668 (pulses). Thus pulse prices have really shot up over the years. On the other hand, oilseeds index is below cereals index till 1972 but thereafter

Table 1.8: Index Numbers of Some of the Categories in Wholesale Prices in India (Base Year 1970-71=100)

Year (Weights)	Cereals (107.43)	Pulses (21.79)	Foodgrains (129.22)	Oil-seeds (42.01)	All Commodities (1000.00)
1961	-	-	-	-	-
1962	52.70	49.32	52.13	42.73	58.73
1963	-	-	-	-	60.93
1964	-	-	-	-	67.31
1965	-	-	-	-	72.84
1966	82.76	102.99	86.17	80.31	81.52
1967	-	-	-	-	93.77
1968	100.34	104.88	101.11	68.70	93.26
1969	100.09	94.79	99.19	84.64	95.24
1970	102.42	102.11	102.37	99.68	101.11
1971	100.90	108.10	102.11	90.80	105.00
1972	111.40	130.20	114.57	93.20	113.00
1973	128.80	166.00	135.07	144.30	131.60
1974	178.10	211.10	183.67	176.60	169.20
1975	185.70	193.40	187.00	138.80	175.80
1976	151.60	144.10	150.34	130.70	172.40
1977	161.20	197.20	167.27	188.30	185.40
1978	158.10	247.90	173.24	162.60	185.00
1979	167.00	242.80	179.78	173.40	185.90
1980	189.50	295.40	207.35	218.40	248.10
1981	213.10	349.40	236.09	256.00	278.40
1982	229.40	307.30	242.56	247.10	285.30
1983	259.80	322.40	270.35	284.30	308.50
1984	247.00	415.70	275.45	328.20	334.00
1985	255.50	457.10	289.50	289.80	353.30
1986	274.00	424.50	299.38	326.90	372.20
1987	289.30	463.40	318.66	423.30	395.70
1988	325.50	627.80	376.47	422.00	428.80
1989	338.84	667.76	394.30	364.71	444.50

(Source: Office of Economic Advisor, Ministry of Industry. Indices with base 1960-61 and 1981-82 are spliced with 1970-71 base, to form a continuous series with base 1970-71. Commodity groups here cover a weight of 171.23 only, out of 1000 for all commodities).

it is 10 to 20 points higher till 1979 but thereafter it is consistently higher by about 50 points. 'All commodities' index of is close to that/foodgrains and at times even lower till 1976 but thereafter it is higher by about 30 points but the difference rises to 75 to 100 points after 1985.

The behaviour is summarized in Table 1.9 with the help of compound growth rates. From the table one can see that after a 10 per cent rate in the sixties, cereals prices register 5½ per cent growth rate in the seventies, rising to 7 per cent in the eighties. The pulses growth rate is 11 per cent in the sixties and remains high, between 9 and 10 per cent per annum over the rest of the period. For oilseeds growth rates are similar to those for pulses till the seventies but in the eighties there is a sharp fall to 3 per cent as we commented upon a spurt in the production, especially in rapeseed and mustard. All commodities index rises steadily between a narrow range of 7.36 to 8.88 per cent over the three decades.

Table 1.9 : Index Numbers of Some of the Categories in Wholesale Price Index Numbers for India and Compound Growth Rates of Prices Over the Decades

	Price Index Numbers at				Growth Rates(% p.a.)			
	1962	1969*	1978*	1987*	Six- ties	Seven- ties	Over- all	
1. Cereals (107.43)	52.70	100.95	162.10	296.27	9.73	5.40	6.93	7.15
2. Pulses (21.79)	49.32	100.68	229.30	505.23	10.73	9.58	9.17	9.75
3. Foodgrains (129.22)	52.13	100.89	173.43	331.50	9.89	6.20	7.46	7.68
4. Oilseeds (42.01)	42.73	84.34	174.77	390.73	10.20	8.43	3.27	9.26
5. All Commo- dities including other commo- dities (1000)	58.73	96.54	185.43	398.90	7.36	7.52	8.88	7.96

(Figures in brackets below crop names are their respective weight in the wholesale Price Index)

*These are triennium averages centered on the years mentioned.

2. DEMAND FOR PULSES AND EDIBLE OIL - ANALYSIS OF CONSUMER EXPENDITURE

2.1 In the production of foodgrains, cereals dominate while pulses (and oilseeds) have a secondary role. Consumer outlay on cereals is also higher as cereals constitute bulk of the food intake. But as incomes increase, increase in proportion of expenditure on pulses and edible oil is relatively higher than increase in the proportion for the cereals. This means that if incomes are increasing, then the pressure of demand for pulses and oilseeds increases on two counts, of population increase and incomes increase.

There are also other items of consumer expenditure where income increases play even a bigger role. These can be other food items like sugar, meat, fish, eggs etc. or non-food items like clothing, education, housing, entertainment etc. How are all these items related to increases in income compared to pulses and oilseeds?

These are important questions and a modest attempt is made here to answer these by looking into the National Sample Survey (NSS) data on consumer expenditure for Maharashtra, for the country as a whole and three other states to put the matters in perspective.

2.2 NSS has been collecting data on consumer expenditure in every round beginning from 1950-51 (first round) upto the 26th round. From the 27th round (1972-73) the consumer expenditure survey was decided to be undertaken quinquennially, beginning from the first quinquennial survey in 1972-73. Yet

consumer expenditure survey was also undertaken in the 28th round to meet ad hoc requirements. The fourth quinquennial survey (43rd round) was conducted in 1987-88 but from 42nd round itself it was decided to conduct survey every year for other years also, though on a smaller scale.

We have chosen 1987-88, the fourth quinquennial survey year for expenditure analysis, to calculate elasticities of expenditure of pulses and edible oil along with some major commodity groups. To get a better idea of elasticities over time, we also chose 23rd round between July 1968-69 for analysis. Thus we have two years which are nearly 20 years apart. Year 1968-69 is a 'normal' year for agricultural production for Maharashtra and it is one of the three years from 1967-68 to 1969-70 which form the base years for the index numbers of agricultural production for the state. Year 1987-88 also appears to be a normal year for pulses as well as for foodgrains in the state (though 1986-87 is not, with its pulses and foodgrains production lower than 1987-88 productions as well as production for the two preceding years of 1984-85 and 1985-86) and similarly for major edible oilseed of groundnut.

Along with Maharashtra, consumer expenditure is analysed for four other entities - all India, Karnataka (a neighbouring state with not much irrigation) as well as the two states of Punjab and U.P., the two leaders in agricultural growth. To get the idea of the place of pulses and edible oil among various commodities consumers spend on, eight

categories of expenditure are selected. Cereals, pulses (and pulse products), foodgrains (addition of the former two), edible oil and total food (which includes foodgrains and all other food items). Further a special category of 'non-foodgrains food' is also created, obtained by subtracting foodgrains expenditure from total food expenditure. This category then includes edible oil and all 'other food items' of milk, meat, fish, eggs, sugar etc. This special category is made because items in these have elasticities often exceeding unity and edible oil is closer to these items. 'Non-food' category has other expenditures on items like clothing, footwear, consumer durables, education, entertainment, repair of dwellings etc. The last category being the total expenditure. Thus the eight categories are: (i) cereals, (ii) pulses, (iii) foodgrains, (iv) edible oil, (v) non-foodgrains food (including edible oil), (vi) total food, (vii) other expenditure (non-food expenditure) and (viii) total expenditure. The NSS data has about 25 items of which barring food total, non-food total and total expenditure, all are items exclusive of each other. We have regrouped them into eight categories for our purpose. Edible oil includes all edible oils as well as oilseeds.

2.3 Thus we refer to NSS data from 23rd round of 1968-69 (Report Number 228) and 43rd round of 1987-88 sub-sample I (Report No. 372). The dimensions of these data for rural-urban components for all India and Maharashtra are as follows:

	1968-69		1987-88	
	Rural	Urban	Rural	Urban
a) <u>All-India</u>				
No. of households	9,116	9,458	41,597	22,703
No. of persons	47,859	44,926	224,032	109,365
b) <u>Maharashtra</u>				
No. of households	519	1,033	2,849	2,741
No. of persons	2,839	5,031	14,872	13,036

The basic information regarding all India, Maharashtra and three other states of Karnataka, Punjab and U.P. is presented in Tables II.1 to II.20 at the end of this chapter for the two years, for rural and urban components separately. The information covers per person consumer expenditure for 30 days by per person expenditure classes (these classes are 13 in 1968-69 and 12 in 1987-88). There are many interesting features in these tables but we shall restrict ourselves by concentrating only on the main features and especially on pulses and edible oil categories. Then again, we will refer mainly to all India and Maharashtra data for brevity.

Although our aim is to find out how for a given proportion of increase in income (total expenditure), expenditure on specific category is affected in proportionate terms, first let us have a quick look at the per person expenditure for eight commodity categories for India and the

four states. This statewise per person expenditures are presented in Tables 2.1 to 2.4 for rural and urban components and for the two years under consideration. From Tables 2.1 and 2.2 for rural area we see that for 1968-69 per person expenditure for 30 days is Rs. 33 for India and Rs. 32 for Maharashtra. Punjab stands out with Rs. 57 per person expenditure. For urban area, India averages to Rs. 46 per person expenditure with Maharashtra figure a high of Rs. 52 and Punjab Rs. 50. But with the likelihood of spatial price variations even within the same year, a higher expenditure does not necessarily mean higher quantities even though reference year is same. But one can compare percentage shares of various categories. Foodgrains naturally has a large share of over 45 per cent with pulses share of 4.70 per cent and oilseeds share 3.28 per cent of total expenditure for rural India. Maharashtra shows similar percentages but Punjab presents a different picture. For urban India, foodgrains share is lower at 29 per cent, lowest being for Maharashtra at 20 per cent (but absolute value for Maharashtra is also lowest). Shares of pulses and edible oil get reversed in urban India at 3 and 4.5 per cent of total expenditure.

Tables 2.3 and 2.4 for nearly twenty years later at 1987-88 have total expenditure (per person for 30 days) at Rs. 177 for rural India (in 1968-69 it was Rs. 33) whereas for urban India ^{it} is Rs. 271 (in 1968-69 it was Rs. 46) both 5 to 6 times the old level. Thus the level has certainly increased. With prices increasing to 3½ to 4 times over these years, there is increase in real terms also (price increases

Table 2.1 : Average Per Person Expenditure (in Rs.) for 30 Days by
Categories - NSS 23rd Round
(July 1968 - June 1969) ; Rural

S.No.	All India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	13.92 (41.90)	12.28 (38.23)	14.30 (45.83)	12.69 (22.23)	12.56 (37.96)
2 <u>Pulses</u>	1.56 (4.70)	1.56 (4.86)	1.14 (3.65)	1.65 (2.89)	2.60 (7.86)
3 Foodgrains (1+2)	15.48 (46.60)	13.84 (43.09)	15.44 (49.49)	14.33 (25.10)	15.16 (45.81)
4 <u>Edible Oil</u>	1.09 (3.28)	1.37 (4.27)	0.78 (2.50)	1.53 (2.68)	1.32 (3.99)
5 Non-foodgrains Food	9.22 (27.75)	9.28 (28.89)	8.07 (25.86)	24.13 (42.27)	8.68 (26.23)
6 Total Food (3+5)	24.70 (74.35)	23.12 (71.98)	23.51 (75.35)	38.46 (67.37)	23.84 (72.05)
7 Other Expenditure (Non-food)	8.52 (25.65)	9.00 (28.02)	7.70 (24.68)	18.63 (32.63)	9.25 (27.95)
8 Total Expenditure (6+7)	33.22 (100.00)	32.12 (100.00)	31.20 (100.00)	57.09 (100.00)	33.09 (100.00)

Note : Non-foodgrains food is inclusive of edible oil.

Table 2.2 : Average Per Person Expenditure (In Rs.) for 30 Days by
Categories - NSS 23rd Round
(July 1968 - June 1969) : Urban

S.No.	All India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	11.62 (25.24)	8.98 (17.25)	13.06 (30.44)	13.76 (27.27)	11.11 (27.05)
2 Pulses	1.56 (3.39)	1.63 (3.13)	1.48 (3.45)	1.42 (2.81)	2.09 (5.09)
3 Foodgrains (1+2)	13.18 (28.63)	10.61 (20.38)	14.54 (33.89)	15.19 (30.10)	13.20 (32.14)
4 Edible Oil	2.05 (4.45)	2.72 (5.22)	1.27 (2.96)	1.79 (3.55)	1.86 (4.53)
5 Non-foodgrains Food	17.40 (37.79)	22.44 (43.10)	14.75 (34.38)	16.63 (32.96)	14.19 (34.55)
6 Total Food (3+5)	30.58 (66.42)	33.05 (63.48)	29.29 (68.28)	31.82 (63.06)	27.38 (66.67)
7 Other Expenditure (Non-food)	15.46 (33.58)	19.01 (36.52)	13.61 (31.72)	18.64 (36.94)	13.69 (33.33)
8 Total Expenditure (6+7)	46.04 (100.00)	52.06 (100.00)	42.90 (100.00)	50.46 (100.00)	41.07 (100.00)

Note : Non-foodgrains food is inclusive of edible oil.

Table 2.3 : Average Per Person Expenditure (in Rs.) for 30 Days by
Categories - NSS 43rd Round
(July 1987 - June 1988) : Rural

S.No.	All India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	42.68 (24.15)	31.07 (18.04)	37.48 (23.36)	27.34 (10.52)	36.64 (23.06)
2 Pulses	7.18 (4.06)	8.75 (5.08)	7.55 (4.70)	8.08 (3.11)	8.14 (5.12)
3 Foodgrains (1+2)	49.86 (28.21)	39.83 (23.12)	45.03 (28.06)	35.42 (13.63)	44.78 (28.18)
4 Edible Oil	8.65 (4.89)	10.00 (5.80)	6.29 (3.92)	12.11 (4.66)	8.48 (5.34)
5 Non-foodgrains Food	59.47 (33.65)	57.38 (33.31)	54.54 (33.99)	110.96 (42.68)	52.51 (33.04)
6 Total Food (3+5)	109.33 (61.87)	97.21 (56.43)	99.57 (62.05)	146.38 (56.31)	97.30 (61.23)
7 Other Expenditure (Non-food)	67.39 (38.13)	75.06 (43.57)	60.90 (37.95)	113.58 (43.69)	61.61 (38.77)
8 Total Expenditure	176.72 (100.00)	172.27 (100.00)	150.47 (100.00)	259.96 (100.00)	158.91 (100.00)

Note : Non-foodgrains food is inclusive of edible oil.

Table 2.4 : Average Per Person Expenditure (in Rs.) for 30 Days by
Categories - NSS 43rd Round

(July 1987 - June 1988) : Urban

S.No.	All India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1	Cereals 37.44 (13.79)	33.76 (10.76)	36.39 (14.70)	26.45 (9.12)	32.43 (15.48)
2	<u>Pulses</u> 9.16 (3.37)	11.64 (3.71)	9.49 (3.83)	8.77 (3.02)	8.72 (4.16)
3	Foodgrains (1+2) 46.60 (17.17)	45.40 (14.47)	45.88 (18.54)	35.23 (12.14)	41.15 (19.65)
4	<u>Edible Oil</u> 13.86 (5.11)	18.24 (5.81)	9.46 (3.82)	15.71 (5.42)	11.81 (5.64)
5	Non-foodgrains Food 100.26 (36.93)	120.89 (38.53)	85.97 (34.73)	119.89 (41.33)	78.96 (37.70)
6	Total Food (3+5) 146.86 (54.10)	166.30 (53.01)	131.85 (53.27)	155.12 (53.47)	120.10 (57.34)
7	Other Expenditure (Non-food) 124.62 (45.90)	147.45 (46.85)	115.68 (46.73)	134.96 (46.53)	89.35 (42.66)
8	Total Expenditure (6+7) 271.48 (100.00)	313.74 (100.00)	247.53 (100.00)	290.08 (100.00)	209.44 (100.00)

Note : Non-foodgrains food is inclusive of edible oil.

considered briefly in the next section). But important aspects are lower shares for foodgrains from earlier 44 per cent to 23 to 28 per cent for rural India and Maharashtra (but Punjab lowest at 14 per cent). For urban India foodgrains share is lower from earlier 20 to 29 per cent to 15 to 17 per cent for India and Maharashtra (in 1968-69 it was 20 to 29 per cent). Thus with increased incomes in real terms, importance of foodgrains has reduced in the consumer expenditure both for urban and rural categories.

Shares of pulses and edible oil are now 4 to 6 per cent for India and Maharashtra for rural and urban categories and the increased share is more pronounced for edible oil. Substantial increases in shares of 'other expenditure' i.e. non-food expenditure and the non-foodgrains food category should also be noted.

2.4 In the above section we have said that prices of consumption goods have increased $3\frac{1}{2}$ to $4\frac{1}{2}$ times over the period 1968-69 to 1987-88 and this may be briefly explained. From the Economic Survey of Maharashtra, 1989-90, we have consumer price index numbers for industrial workers for Bombay, Sholapur, Nagpur, Pune, Jalgaon, Nanded and Aurangabad cities quoted for year 1966-67, 1971-72, 1975-76 and six years in the eighties including 1987-88. This index number has base year as 1960. Using these data we estimated index for 1968-69 for all these centres and using 1987-88 indices as given we averaged these over the cities mentioned to arrive at index numbers for Maharashtra as a whole. Thus for industrial workers the

consumer price indices for relevant years can be put as:

Consumer Price Index Numbers for Industrial Workers
(Maharashtra)

	1968-69	1987-88	Ratio (1987-88/ 1968-69) x 100
Food	181.54	813.57	448.15
General (all items)	167.31	743.71	444.51

Thus the general price index (industrial workers) is nearly 4½ times in 1987-88, an annual compound growth rate of over 8 per cent per annum. For India as a whole, similar estimates are:

Consumer Price Index Numbers for Industrial Workers (India)

	1968-69	1987-88	Ratio (1987-88/ 1968-69) x 100
Food	196	750	382.65
General (all items)	177	719	406.21

Thus at all India level also, 1987-88 level for industrial workers is nearly 4 times, with compound growth rates near to 8 per cent per annum. There are price index numbers for agricultural labourers. For Maharashtra and all India the index numbers are (base 1960 = 100) as follows:

For agricultural labourers

	1968-69	1987-88	Ratio (1987-88/ 1968-69) x 100
<u>Maharashtra</u>			
Food	203.2	682	335.62
General (all items)	185.4	622	335.49
<u>India</u>			
Food	203.2	681	335.14
General (all items)	187	629	336.36

The compound growth rates are over 6½ per cent per annum. There is also another series called consumer price index numbers for 'urban non-manual employees' published by CSO. The relevant figures for India and Maharashtra are as follows: (Index numbers for separate food category not put out, base year 1960 = 100).

	1968-69	1987-88	Ratio x 100
Maharashtra	154	636	412.99
India	161	647	401.86

The compound growth rates being 7.75 and 7.60 per cent per annum respectively. A more detailed treatment of the cost of living is not necessary because we are not treating these indices as deflators, these are only to indicate the extent

of price increases. In what follows, we examine how at different levels ^{of} incomes proportions of amounts spent change for a given year, to obtain income elasticities.

2.5 In obtaining income elasticities of demand we do not consider incomes (or expenditures, strictly speaking) over years but total expenditure on given categories over various expenditure groups for the same year. Thus we use the cross section data. Before going into calculations of elasticities themselves, it is worthwhile examining changes in shares of pulses and edible oil (and other categories) as total expenditure (proxy for income) levels increase. If proportion expended on a category remains steady over expenditure groups, elasticity would be close to unity. If the proportion reduces as total expenditure levels increase, it is below unity and if the proportions keep on increasing, elasticity would be greater than unity. For the 1968-69 data this aspect is presented from Tables 2.5 to 2.8 only for India and Maharashtra for brevity, for rural and urban areas separately.

From Table 2.5 we see that over the 13 expenditure groups, for India rural, expenditure on cereals and foodgrains categories reduces steadily from 59 to 20 per cent for cereals and 62 to 23 per cent for foodgrains (which includes cereals and pulses). For pulses, the share increases steadily from 3 per cent to 5 per cent over first 10 groups and then dips steadily to 3 per cent over the last three (high income) groups. For edible oil, a steady increase in share is observed from 1.67 per cent to 3.43 per cent over first 9 groups and

Table 2.5 : Average Per Person Expenditure (in Rs.) for 30 Days by Expenditure Classes and Categories

1968 - 69; India - Rural

S. No.	Expenditure Size Groups						
	Less than 8	8-11	11-13	13-15	15-18	18-21	21-24
1 Cereals	3.36 (56.19)	5.67 (58.63)	7.01 (58.08)	8.25 (59.35)	9.35 (56.43)	10.85 (55.61)	12.10 (53.68)
2 Pulses	0.18 (3.01)	0.31 (3.21)	0.46 (3.31)	0.58 (4.17)	0.87 (5.25)	1.05 (5.38)	1.17 (5.19)
3 Foodgrains (1+2)	3.54 (59.20)	5.98 (61.84)	7.47 (61.89)	8.83 (63.53)	10.22 (61.68)	11.90 (60.99)	13.27 (58.87)
4 Edible Oil	0.10 (1.67)	0.25 (2.59)	0.30 (2.49)	0.41 (2.95)	0.53 (3.20)	0.64 (3.28)	0.74 (3.28)
5 Non-foodgrains food	1.22 (20.40)	2.05 (21.20)	2.44 (20.22)	2.79 (20.07)	3.51 (21.18)	4.26 (21.83)	5.30 (23.51)
6 Total Food (3+5)	4.76 (79.60)	8.03 (83.04)	9.91 (82.10)	11.62 (83.60)	13.73 (82.86)	16.16 (82.83)	18.57 (82.39)
7 Other Expenditure (Non-food)	1.22 (20.40)	1.64 (16.96)	2.16 (17.90)	2.28 (16.40)	2.84 (17.14)	3.35 (17.17)	3.97 (17.61)
8 Total Expenditure (6+7)	5.98 (100.00)	9.67 (100.00)	12.07 (100.00)	13.90 (100.00)	16.57 (100.00)	19.51 (100.00)	22.54 (100.00)

Figures in brackets are percentages to total expenditure

(Contd.)

Table 2.5 : (Contd.)

1968 - 69 : India-Rural

S. No.	Expenditure Size Groups						Overall
	24-28	28-34	34-43	43-55	55-75	75 and above	
1 Cereals	13.12 (50.72)	15.09 (48.87)	16.20 (42.69)	18.17 (37.88)	19.41 (30.98)	24.68 (20.24)	13.92 (41.90)
2 Pulses	1.39 (5.37)	1.53 (4.95)	1.93 (5.09)	2.36 (4.92)	2.72 (4.34)	3.63 (2.98)	1.56 (4.70)
3 Foodgrains (1+2)	14.51 (56.09)	16.62 (53.82)	18.13 (47.77)	20.53 (42.80)	22.13 (35.32)	28.31 (23.22)	15.48 (46.60)
4 Edible Oil	0.89 (3.44)	1.06 (3.43)	1.27 (3.35)	1.51 (3.15)	1.98 (3.16)	4.07 (3.34)	1.09 (3.28)
5 Non-foodgrains food	6.41 (24.78)	8.00 (25.91)	11.07 (29.17)	14.79 (30.83)	20.87 (33.31)	37.99 (31.16)	9.22 (27.75)
6 Total Food (3+5)	20.92 (80.87)	24.62 (79.73)	29.20 (76.94)	35.32 (73.63)	43.00 (68.64)	66.30 (54.38)	24.70 (74.35)
7 Other Expenditure (Non-food)	4.95 (19.13)	6.26 (16.10)	8.75 (23.06)	12.65 (26.37)	19.65 (31.36)	55.63 (45.62)	8.52 (25.65)
8 Total Expenditure (6+7)	25.87 (100.00)	30.88 (100.00)	37.95 (100.00)	47.97 (100.00)	62.65 (100.00)	121.93 (100.00)	33.22 (100.00)

Table 2.6 : Average Per Person Expenditure (in Rs.) for 30 Days by Expenditure Classes and Categories

1968-69 ; India-Urban

S. No.	Expenditure Size Groups						
	Less than 8	8-11	11-13	13-15	15-18	18-21	21-24
1 Cereals	2.21 (40.55)	4.14 (43.17)	6.00 (49.30)	6.90 (49.01)	7.77 (46.75)	8.78 (44.82)	9.90 (40.23)
2 Pulses	0.09 (1.65)	0.36 (3.75)	0.63 (5.18)	0.83 (5.89)	0.73 (4.39)	0.91 (4.65)	1.13 (5.00)
3 Foodgrains (1+2)	2.30 (42.20)	4.50 (46.92)	6.63 (54.48)	7.73 (54.90)	8.50 (51.14)	9.69 (49.46)	11.03 (48.76)
4 Edible Oil	0.11 (2.02)	0.27 (2.82)	0.45 (3.70)	0.58 (4.12)	0.72 (4.33)	0.98 (5.00)	1.10 (4.86)
5 Non-foodgrains food	1.09 (20.00)	2.56 (26.69)	3.02 (24.82)	3.65 (25.92)	4.66 (28.04)	5.80 (29.61)	6.77 (29.93)
6 Total Food (3+5)	3.39 (62.20)	7.06 (73.62)	9.65 (79.29)	11.38 (80.82)	13.16 (79.18)	15.49 (79.07)	17.80 (78.69)
7 Other Expenditure (Non-food)	2.06 (37.80)	2.53 (26.38)	2.52 (20.71)	2.70 (19.18)	3.46 (20.82)	4.10 (20.93)	4.82 (21.31)
8 Total Expenditure (6+7)	5.45 (100.00)	9.59 (100.00)	12.17 (100.00)	14.08 (100.00)	16.62 (100.00)	19.59 (100.00)	22.62 (100.00)

Figures in brackets are percentages to total expenditure

Contd.

Table 2.6 : (Contd.)

1968-69 : India-Urban

S. No.	Expenditure Size Groups						Overall
	24-28	28-34	34-43	43-55	55-75	75 and above	
1 Cereals	10.32 (39.83)	11.76 (37.85)	12.40 (32.34)	13.46 (27.64)	13.71 (21.48)	12.91 (11.18)	11.62 (25.24)
2 Pulses	1.17 (4.52)	1.36 (4.38)	1.58 (4.12)	1.83 (3.76)	2.04 (3.20)	2.47 (2.14)	1.56 (3.39)
3 Foodgrains (1+2)	11.49 (44.35)	13.12 (42.23)	13.98 (36.46)	15.29 (31.40)	15.75 (24.67)	15.38 (13.32)	13.18 (28.63)
4 Edible Oil	1.28 (4.94)	1.57 (5.05)	2.00 (5.22)	2.57 (5.28)	2.96 (4.64)	3.86 (3.34)	2.05 (4.45)
5 Non-foodgrains food	8.29 (32.00)	10.45 (33.63)	13.94 (36.36)	18.69 (38.38)	25.70 (40.26)	48.04 (41.60)	17.40 (37.79)
6 Total Food (3+5)	19.78 (76.34)	23.57 (75.86)	27.92 (72.82)	33.98 (69.77)	41.45 (64.93)	63.42 (54.92)	30.58 (66.42)
7 Other Expenditure (Non-food)	6.13 (23.66)	7.50 (24.14)	10.42 (27.18)	14.72 (30.23)	22.39 (35.07)	52.06 (45.08)	15.46 (33.58)
8 Total Expenditure (6+7)	25.91 (100.00)	31.07 (100.00)	38.34 (100.00)	48.70 (100.00)	63.84 (100.00)	115.48 (100.00)	46.04 (100.00)

Table 2.7 : Average Per Person Expenditure (in Rs.) for 30 Days by Expenditure Classes and Categories

1968-69 : Maharashtra-Rural

S. No.	Expenditure Size Groups						
	Less than 8	8-11	11-13	13-15	15-18	18-21	21-24
1 Cereals	4.11 (54.51)	5.86 (57.06)	4.82 (38.97)	7.11 (53.34)	7.91 (48.11)	9.07 (46.87)	10.66 (47.50)
2 Pulses	0.57 (7.56)	0.47 (4.58)	0.34 (2.75)	0.52 (3.90)	0.90 (5.47)	0.98 (5.06)	1.07 (4.77)
3 Foodgrains (1+2)	4.68 (62.07)	6.33 (61.64)	5.16 (41.71)	7.63 (57.24)	8.81 (53.59)	10.05 (51.94)	11.73 (52.27)
4 Edible Oil	0.11 (1.46)	0.36 (3.51)	0.23 (1.86)	0.57 (4.28)	0.69 (4.20)	0.86 (4.44)	0.87 (3.88)
5 Non-foodgrains Food	1.50 (19.89)	1.85 (18.01)	3.75 (30.32)	3.20 (24.01)	4.29 (26.09)	5.16 (26.67)	6.18 (27.54)
6 Total Food (3+5)	6.18 (81.96)	8.18 (79.65)	8.91 (72.03)	10.83 (81.25)	13.10 (79.68)	15.21 (78.60)	17.91 (79.81)
7 Other Expenditure	1.36 (18.04)	2.09 (20.35)	3.46 (27.97)	2.50 (18.75)	3.34 (20.32)	4.14 (21.40)	4.53 (20.19)
8 Total Expenditure (6+7)	7.54 (100.00)	10.27 (100.00)	12.37 (100.00)	13.33 (100.00)	16.44 (100.00)	19.35 (100.00)	22.44 (100.00)

Figures in brackets are percentages to total expenditure,

Contd....

Table 2.7 : Contd.

1968-69 ; Maharashtra-Rural

S. No.	Expenditure Size Groups						Overall
	24-28	28-34	34-43	43-55	55-75	75 and above	
1 Cereals	11.32 (43.79)	13.04 (42.53)	14.58 (38.36)	16.17 (33.22)	17.83 (27.20)	25.48 (24.13)	12.28 (38.23)
2 Pulses	1.42 (5.49)	1.82 (5.94)	1.92 (5.05)	2.49 (5.12)	2.64 (4.03)	3.26 (3.09)	1.56 (4.86)
3 Foodgrains (1+2)	12.74 (49.28)	14.86 (48.47)	16.50 (43.41)	18.66 (38.34)	20.47 (31.39)	28.74 (27.22)	13.84 (43.09)
4 Edible Oil	1.24 (4.80)	1.20 (3.91)	1.59 (4.13)	2.02 (4.15)	2.33 (3.55)	5.32 (5.04)	1.37 (4.27)
5 Non-foodgrains- food	7.78 (30.10)	8.99 (29.32)	10.83 (28.49)	15.69 (32.24)	18.21 (27.78)	30.51 (28.89)	9.28 (28.89)
6 Total Food (3+5)	20.52 (79.38)	23.85 (77.79)	27.33 (71.90)	34.35 (70.58)	38.68 (59.01)	59.25 (56.11)	23.12 (71.98)
7 Other Expenditure	5.33 (20.62)	6.81 (22.21)	10.68 (28.10)	14.32 (29.42)	26.87 (40.99)	46.35 (43.89)	9.00 (0.28)
8 Total Expenditure (6+7)	25.85 (100.00)	30.66 (100.00)	38.01 (100.00)	48.67 (100.00)	65.55 (100.00)	105.60 (100.00)	32.12 (100.00)

Table 2.8 : Contd.

1968-69 ; Maharashtra-Urban

S. No.	Expenditure Size Groups						Overall
	24-28	28-34	34-43	43-55	55-75	75 and above	
1 Cereals	8.55 (32.58)	9.95 (31.73)	9.24 (24.06)	10.02 (19.80)	9.77 (15.23)	9.03 (7.74)	8.98 (17.25)
2 Pulses	1.27 (4.84)	1.71 (5.45)	1.58 (4.11)	1.95 (3.85)	1.98 (3.09)	2.14 (1.84)	1.63 (3.13)
3 Foodgrains (1+2)	9.82 (37.42)	11.66 (37.18)	10.82 (28.18)	11.97 (23.66)	11.75 (18.32)	11.17 (9.58)	10.61 (20.38)
4 Edible Oil	1.48 (5.64)	1.97 (6.28)	2.19 (5.70)	3.05 (6.03)	3.85 (6.00)	4.82 (4.13)	2.72 (5.22)
5 Non-foodgrains food	9.27 (35.33)	11.97 (38.17)	14.71 (38.31)	21.66 (42.81)	30.05 (46.84)	54.07 (46.37)	22.44 (43.10)
6 Total Food (3+5)	19.09 (72.75)	23.63 (75.35)	25.53 (66.48)	33.63 (66.46)	41.80 (65.16)	65.24 (55.95)	33.05 (63.48)
7 Other Expenditure (Non-food)	7.15 (27.25)	7.73 (24.65)	12.87 (33.52)	16.97 (33.54)	22.35 (34.84)	51.36 (44.05)	19.01 (36.52)
8 Total Expenditure (6+7)	26.24 (100.00)	31.36 (100.00)	38.40 (100.00)	50.60 (100.00)	64.15 (100.00)	116.60 (100.00)	52.06 (100.00)

Table 2.8 : Average Per Person Expenditure (in Rs.) for 30 Days by Expenditure Classes and Categories

1968-69 : Maharashtra Urban

S. No.	Expenditure Size Groups						
	Less than 8	(8-11)	(11-13)	(13-15)	(15-18)	(18-21)	(21-24)
1 Cereals	(50.20)	(38.44)	(39.83)	(35.79)	(35.62)	(36.68)	(36.68)
2 Pulses	(5.20)	(7.81)	(4.98)	(4.83)	(4.16)	(4.13)	(4.13)
3 Foodgrains (1+2)	(55.40)	(46.25)	(44.81)	(40.63)	(39.78)	(40.81)	(40.81)
4 Edible Oil	(6.20)	(7.34)	(5.90)	(5.90)	(6.51)	(6.22)	(6.22)
5 Non-Foodgrains food	(30.40)	(34.37)	(33.29)	(35.02)	(33.57)	(34.59)	(34.59)
6 Total Food (3+5)	(85.80)	(80.62)	(78.09)	(75.65)	(73.35)	(75.40)	(75.40)
7 Other Expenditure (Non-food)	(14.20)	(19.38)	(21.91)	(24.35)	(26.65)	(24.60)	(24.60)
8 Total Expenditure (6+7)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Figures in brackets are percentages to total expenditure.

Contd...

Table 2.3 : Contd.

1968-69 : Maharashtra-Urban

S. No.	Expenditure Size Groups						Overall
	24-28	28-34	34-43	43-55	55-75	75 and above	
1 Cereals	8.55 (32.53)	9.95 (31.73)	9.24 (24.06)	10.02 (19.80)	9.77 (15.23)	9.03 (7.74)	8.98 (17.25)
2 <u>Pulses</u>	1.27 (4.84)	1.71 (5.45)	1.58 (4.11)	1.95 (3.85)	1.98 (3.09)	2.14 (1.84)	1.63 (3.13)
3 Foodgrains (1+2)	9.82 (37.42)	11.66 (37.18)	10.82 (28.18)	11.97 (23.66)	11.75 (18.32)	11.17 (9.58)	10.61 (20.38)
4 <u>Edible Oil</u>	1.48 (5.64)	1.97 (6.28)	2.19 (5.70)	3.05 (6.03)	3.85 (6.00)	4.82 (4.13)	2.72 (5.22)
5 Non-foodgrains food	9.27 (35.33)	11.97 (38.17)	14.71 (38.31)	21.66 (42.81)	30.05 (46.84)	54.07 (46.37)	22.44 (43.10)
6 Total Food (3+5)	19.09 (72.75)	23.63 (75.35)	25.53 (66.48)	33.63 (66.46)	41.80 (65.16)	65.24 (55.95)	33.05 (63.48)
7 Other Expenditure (Non-food)	7.15 (27.25)	7.73 (24.65)	12.87 (33.52)	16.97 (33.54)	22.35 (34.84)	51.36 (44.05)	19.01 (36.52)
8 Total Expenditure (6+7)	26.24 (100.00)	31.36 (100.00)	38.40 (100.00)	50.60 (100.00)	64.15 (100.00)	116.60 (100.00)	52.06 (100.00)

then it falls and rises moving between 3.15 to 3.34 per cent. Thus elasticities for pulses and edible oil should be higher than cereals and foodgrains. For 'non-foodgrains food' category which includes apart from edible oil, milk, meat, fish eggs etc. proportion of expenditure increases steadily from 20 to 33 per cent before falling to 31 per cent in the last group, indicating even higher elasticity, perhaps exceeding unity. In the 'total food' category due to a major share of foodgrains, the elasticity would be below the 'higher than unity' elasticity for non-foodgrains food. The 'other expenditure' category which has all non-food items like education, clothing, consumer durables, repair of housing, narcotics (bidi, paan etc.) the share fluctuates between 16 to 20 per cent over first 9 income groups but then increases rapidly to as high as 46 per cent over the last four groups, indicating much higher elasticities, given the higher influence of top income groups. For urban India the movements are perhaps even sharper. Proportion spent on cereals after rising from 40 to 49 per cent over first four groups decreases steadily / decline to 13 per cent is consistent with cereals group. For pulses we see initial sharp increase from 2 to 6 per cent over first four groups then a steady decline all the way to .2 per cent, indicating a pattern different from the rural India, indicating a somewhat lower elasticity. For edible oil, consistent increase from 2 to 5.28 per cent share of total expenditure upto the tenth income group is observed, which dips to 3.34 per cent over last three income groups, the behaviour is somewhat similar to rural India. For the non-foodgrains food category, the to 11 per cent. For foodgrains the behaviour of an initial rise in share from 42 to 54 per cent with steady

behaviour is similar to rural India, with proportion expended rising steadily from 20 to 42 per cent all the way. For the non-food expenditure ('other expenditure') category after high 38 and 26 per cent shares for the lowest two groups expenditure proportion is steady-mildly increasing from 20 to 21 per cent over next 5 groups but thereafter it increases from 24 to 45 per cent over remaining 6 groups, indicating high greater than unity elasticity even higher than that for rural India.

For Maharashtra, the relevant data for 1968-69 are presented in Tables 2.7 and 2.8 for rural and urban areas.

For cereals, the fall in proportion is consistent all the way, falling from 54 to 24 per cent for Maharashtra rural, a behaviour similar with the all India level. For pulses, the proportion indicates by and large a mild rising tendency. For example, the share of pulses at overall level is 4.86 per cent and even higher shares are recorded in first, and from fifth to eleventh group but these higher than average figures after initial increase are steadily declining from ninth group onwards. For edible oil similar mild increasing shares are observed. (For rural India consistent rise upto nine groups and then consistent fall was observed.) For the 'non-foodgrains food' of edible oil, milk, fish etc. a consistent increase from first to seventh groups is observed from 19 to 27 per cent (barring the third group) and thereafter the percentages remains high between 28 to 32 per cent but fluctuate. For other (non-food) expenditure, the proportion is steady-middle fluctuating around 20-21 per cent over first nine groups

then it falls and rises moving between 3.15 to 3.34 per cent. Thus elasticities for pulses and edible oil should be higher than cereals and foodgrains. For 'non-foodgrains food' category which includes apart from edible oil, milk, meat, fish, eggs etc. proportion of expenditure increases steadily from 20 to 33 per cent before falling to 31 per cent in the last group, indicating even higher elasticity, perhaps exceeding unity. In the 'total food' category due to a major share of foodgrains, the elasticity would be below the 'higher than unity' elasticity for non-foodgrains food. The 'other expenditure' category which has all non-food items like education, clothing, consumer durables, repair of housing, narcotics (bidi, paan etc.) the share fluctuates between 16 to 20 per cent over first 9 income groups but then increases rapidly to as high as 46 per cent over the last four groups, indicating much higher elasticities, given the higher influence of top income groups. For urban India the movements are perhaps even sharper. Proportion spent on cereals after rising from 40 to 49 per cent over first four groups decreases steadily / decline to 13 per cent is consistent with cereals group. For pulses we see initial sharp increase from 2 to 6 per cent over first four groups then a steady decline all the way to .2 per cent, indicating a pattern different from the rural India, indicating a somewhat lower elasticity. For edible oil, consistent increase from 2 to 5.28 per cent share of total expenditure upto the tenth income group is observed, which dips to 3.34 per cent over last three income groups, the behaviour is somewhat similar to rural India. For the non-foodgrains food category, the to 11 per cent. For foodgrains the behaviour of an initial rise in share from 42 to 54 per cent with steady

behaviour is similar to rural India, with proportion expended rising steadily from 20 to 42 per cent all the way. For the non-food expenditure ('other expenditure') category after high 38 and 26 per cent shares for the lowest two groups expenditure proportion is steady-mildly increasing from 20 to 21 per cent over next 5 groups but thereafter it increases from 24 to 45 per cent over remaining 6 groups, indicating high greater than unity elasticity even higher than that for rural India.

For Maharashtra, the relevant data for 1968-69 are presented in Tables 2.7 and 2.8 for rural and urban areas.

For cereals, the fall in proportion is consistent all the way, falling from 54 to 24 per cent for Maharashtra rural, a behaviour similar with the all India level. For pulses, the proportion indicates by and large a mild rising tendency. For example, the share of pulses at overall level is 4.86 per cent and even higher shares are recorded in first, and from fifth to eleventh group but these higher than average figures after initial increase are steadily declining from ninth group onwards. For edible oil similar mild increasing shares are observed. (For rural India consistent rise upto nine groups and then consistent fall was observed.) For the 'non-foodgrains food' of edible oil, milk, fish etc. a consistent increase from first to seventh groups is observed from 19 to 27 per cent (barring the third group) and thereafter the percentages remains high between 28 to 32 per cent but fluctuate. For other (non-food) expenditure, the proportion is steady-middle fluctuating around 20-21 per cent over first nine groups

but thereafter the last four groups show a rapid, consistent increase from 28 to 44 per cent (this was also the pattern in earlier tables.)

For urban Maharashtra (Table 2.8), for cereals proportion reduces steadily from 52 to 8 per cent, indicating lower elasticity than rural India and Maharashtra. For pulses after initial increase upto the third group, proportion decreases upto seventh, again increasing in eighth and ninth groups but declining steadily thereafter indicating a rather poor elasticity for pulses. For edible oils also, the proportion appears to fluctuate between 5 and 6 per cent before dipping to lowest 4 per cent for highest income group. This also suggests a low elasticity. For 'non-foodgrain food' and non-food categories percentage share appears to rise steadily all the way with one or two exceptions, indicating more than unity elasticity.

Thus one may summarise the behaviour of expenditure proportions over expenditure groups as consistently falling for cereals, rising upto more than half expenditure groups but dipping thereafter for pulses, and a steadier increase for edible oils. But for urban Maharashtra pulses and edible oil shares fluctuate and even fall. Thus elasticities for pulses and edible oil are expected to be much higher than that for cereals and close or over unity for oilseeds but urban Maharashtra is expected to show rather low elasticities than rural and urban categories, cereals, pulses and oilseeds elasticities for rural areas would be higher than those for urban area

and urban India and rural Maharashtra. Between rural

2.6 Now let us look at the Tables 2.9 to 2.12 for the year 1987-88 and examine the effect of increasing total expenditure on proportions expended on specific categories. Here we have 12 expenditure classes, one less than those in 1968-69. Further, intervals adopted are unequal, with urban income (i.e. total expenditure per capita) having larger intervals to distinguish even between high income groups. The behaviour is similar to the one summarised at the end of the previous section. Steady fall for cereals, rise over first three-four groups and then steady fall for pulses and edible oil, consistent increase in proportions for non-foodgrains food category and other expenditure (non-food) category but the former dipping over the last two-three groups and the latter accelerating at the higher and higher levels. This behaviour suggests lower elasticities than those for 1968-69 especially for cereals, pulses, edible oil and even non-foodgrains food. The urban category is again expected to show lower than rural elasticities, notably for 'non-foodgrains food' because the dip in proportion starts rather early compared to the 1968-69 level. For Maharashtra, there is no increase in proportion expended even over first two three groups, but then the proportion falls all the way. Thus for 1987-88 we should expect, by and large, lower elasticities.

2.7 Now we come to the elasticity estimation itself. For this purpose we refer to four pioneering articles by N. Sreenivasa Iyengar and the references are given in (1) to (4) at the end of the present chapter. One can also refer to Basic Statistics by A.L.Nagar and Das, and for some of the

Table 2.9 : Average Per Person Expenditure (in Rs.) for 30 Days by Expenditure Classes and Categories

1987-88 : India-Rural

S. No.	Expenditure Size Groups					
	Less than 65	65-80	80-95	95-110	110-125	125-140
1 Cereals	23.49 (43.73)	31.20 (42.59)	34.88 (40.03)	38.42 (37.46)	40.69 (34.64)	42.12 (31.77)
2 Pulses	2.61 (4.86)	3.60 (4.91)	4.43 (5.08)	5.03 (4.90)	5.78 (4.92)	6.21 (4.68)
3 Foodgrains (1+2)	26.10 (48.59)	34.80 (47.51)	39.31 (45.11)	43.45 (42.37)	46.47 (39.57)	48.33 (36.45)
4 Edible Oil	2.67 (4.97)	3.80 (5.19)	4.69 (5.38)	5.60 (5.46)	6.45 (5.49)	7.16 (5.40)
5 Non-Foodgrains Food	13.41 (24.97)	19.64 (26.81)	25.56 (29.33)	30.99 (30.22)	37.86 (32.23)	44.84 (33.82)
6 Total Food (3+5)	39.51 (73.56)	54.44 (74.32)	64.87 (74.44)	74.44 (72.58)	84.33 (71.80)	93.17 (70.27)
7 Other Expenditure (Non-food)	14.20 (26.44)	18.81 (25.68)	22.27 (25.56)	28.12 (27.42)	33.12 (28.20)	39.41 (29.73)
8 Total Expenditure (6+7)	53.71 (100.00)	73.25 (100.00)	87.14 (100.00)	102.56 (100.00)	117.45 (100.00)	132.58 (100.00)

Figures in brackets are percentages to total expenditure.

Contd...

Table 2.9 : Contd...

1987-88 ; India-Rural

S. No.	Expenditure Size Groups						Overall
	140-160	160-180	180-215	215-280	280-385	385 and above	
1 Cereals	43.92 (29.42)	45.24 (26.66)	46.07 (23.46)	47.92 (19.74)	51.08 (15.90)	62.30 (9.91)	42.68 (24.15)
2 Pulses	6.73 (4.51)	7.33 (4.32)	8.37 (4.26)	9.63 (3.97)	11.22 (3.49)	16.80 (2.67)	7.18 (4.06)
3 Foodgrains (1+2)	50.65 (33.92)	52.57 (30.98)	54.44 (27.72)	57.55 (23.71)	62.30 (19.39)	79.10 (12.59)	49.86 (28.21)
4 Edible Oil	8.06 (5.40)	8.89 (5.24)	9.94 (5.06)	11.67 (4.81)	13.86 (4.31)	25.01 (3.98)	8.65 (4.89)
5 Non-foodgrains Food	51.85 (34.73)	61.12 (36.02)	72.30 (36.82)	90.33 (37.21)	115.34 (35.90)	183.18 (29.14)	59.47 (33.65)
6 Total Food (3+5)	102.50 (68.65)	113.69 (67.01)	126.74 (64.54)	147.88 (60.91)	177.64 (55.29)	262.28 (41.73)	109.33 (61.87)
7 Other Expenditure (Non-food)	46.80 (31.35)	55.98 (32.99)	69.62 (35.46)	94.89 (39.09)	143.68 (44.72)	366.24 (58.27)	67.39 (38.13)
8. Total Expenditure (6+7)	149.30 (100.00)	169.67 (100.00)	196.36 (100.00)	242.77 (100.00)	321.32 (100.00)	628.52 (100.00)	176.72 (100.00)

Table 2.10 : Average Per Person Expenditure (in Rs.) for 30 Days by Expenditure Classes and Categories

1987-88 : India-Urban

S. No.	Expenditure Size Groups					
	Less than 90	90-110	110-135	135-160	160-185	185-215
1 Cereals (2+)	25.66 (34.23)	31.00 (30.75)	34.01 (27.80)	35.57 (24.17)	36.88 (21.37)	37.06 (18.56)
2 Pulses	3.72 (4.96)	5.20 (5.16)	5.76 (4.71)	6.93 (4.71)	7.81 (4.53)	8.55 (4.28)
3 Foodgrains (1+2)	29.38 (39.19)	36.20 (35.91)	39.77 (32.51)	42.50 (28.88)	44.69 (25.90)	45.61 (22.84)
4 Edible Oil	4.49 (5.99)	6.25 (6.20)	7.61 (6.22)	9.26 (6.29)	10.90 (6.32)	12.54 (6.28)
5 Non-Foodgrains Food	24.96 (33.29)	35.71 (35.43)	45.50 (37.19)	56.76 (38.57)	67.19 (38.94)	81.08 (40.60)
6 Total Food (3+5)	54.34 (72.48)	71.91 (71.34)	85.27 (69.69)	99.26 (67.45)	111.88 (64.84)	126.69 (63.45)
7 Other Expenditure (Non-food)	20.63 (27.52)	28.89 (28.66)	37.08 (30.31)	47.90 (32.55)	60.67 (35.16)	72.99 (36.55)
8 Total Expenditure (6+7)	74.97 (100.00)	100.80 (100.00)	122.35 (100.00)	147.16 (100.00)	172.55 (100.00)	199.68 (100.00)

Figures in brackets are percentages to total expenditure.

Contd.

Table 2.10 : Contd....

1987-88 : India-Urban

S. No.	Expenditure Size Groups						Overall
	215-255	255-310	310-385	385-520	520-700	700 and above	
1 Cereals	38.31 (16.37)	39.73 (14.19)	40.92 (11.90)	41.31 (9.40)	42.57 (7.17)	50.59 (4.24)	37.44 (13.79)
2 Pulses	9.96 (4.25)	10.94 (3.91)	11.94 (3.47)	12.74 (2.90)	14.95 (2.52)	17.06 (1.43)	9.16 (3.37)
3 Foodgrains (1+2)	48.27 (20.62)	50.67 (18.10)	52.86 (15.37)	54.05 (12.30)	57.52 (9.69)	67.65 (5.66)	46.60 (17.17)
4 Edible Oil	14.52 (6.20)	16.79 (6.00)	18.87 (5.49)	21.11 (4.80)	25.19 (4.24)	32.48 (2.72)	13.86 (5.11)
5 Non-foodgrains Food	96.85 (41.37)	116.05 (41.46)	138.21 (40.19)	172.14 (39.18)	222.54 (37.49)	315.27 (26.48)	100.26 (36.93)
6 Total Food (3+5)	145.12 (62.00)	166.72 (59.56)	191.07 (55.56)	226.19 (51.48)	280.06 (47.18)	383.92 (32.15)	146.86 (54.10)
7 Other Expenditure (Non-food)	88.96 (38.00)	113.19 (40.44)	152.81 (44.44)	213.15 (48.52)	313.50 (52.82)	810.33 (67.85)	124.62 (45.90)
8 Total Expenditure (6+7)	234.08 (100.00)	279.91 (100.00)	343.88 (100.00)	439.34 (100.00)	593.56 (100.00)	1194.25 (100.00)	271.48 (100.00)

Table 2.11 : Average Per Person Expenditure (in Rs.) for 30 Days by Expenditure Classes and Categories

1987-88 : Maharashtra-Rural

S. No.	Expenditure Size Groups					
	Less than 65	65-80	80-95	95-110	110-125	125-140
1 Cereals	18.81 (32.89)	22.21 (30.37)	25.47 (29.16)	27.93 (27.26)	30.27 (25.69)	30.68 (23.10)
2 Pulses	4.20 (7.34)	5.20 (7.11)	6.13 (7.02)	7.39 (7.21)	7.90 (6.70)	8.59 (6.47)
3 Foodgrains (1+2)	23.01 (40.23)	27.41 (37.48)	31.60 (36.18)	35.32 (34.47)	38.17 (32.39)	39.27 (29.56)
4 Edible Oil	4.04 (7.06)	4.64 (6.34)	5.90 (6.75)	6.94 (6.77)	8.07 (6.85)	8.59 (6.47)
5 Non-Foodgrains- Food	18.44 (32.24)	24.97 (34.14)	30.96 (35.44)	36.32 (35.45)	42.39 (35.97)	48.78 (36.72)
6 Total Food (3+5)	41.45 (72.48)	52.38 (71.63)	62.56 (71.62)	71.64 (69.92)	80.56 (68.36)	88.05 (66.29)
7 Other Expenditure	15.74 (27.52)	20.75 (3.76)	24.79 (28.38)	30.82 (30.08)	37.29 (31.64)	44.78 (33.71)
8 Total Expenditure (6+7)	57.19 (100.00)	73.13 (100.00)	87.35 (100.00)	102.46 (100.00)	117.85 (100.00)	132.83 (100.00)

Figures in brackets are percentages to total expenditure.

Contd...

Table 2.11 : Contd...

1987-88 : Maharashtra-Rural

S. No.	Expenditure Size Groups						Overall
	140-160	160-180	180-215	215-280	280-385	385 and above	
1 Cereals	32.11 (21.56)	34.54 (20.40)	35.88 (18.32)	36.77 (15.35)	37.23 (11.48)	52.25 (5.85)	31.07 (18.04)
2 Pulses	9.34 (6.27)	9.73 (5.75)	10.82 (5.52)	11.49 (4.80)	12.11 (3.74)	17.36 (1.94)	8.75 (5.08)
3 Foodgrains (1+2)	41.45 (27.83)	44.27 (26.15)	46.70 (23.84)	48.26 (20.15)	49.34 (15.22)	69.61 (7.79)	39.83 (23.12)
4 Edible Oil	10.28 (6.90)	11.14 (6.58)	13.07 (6.67)	14.61 (6.10)	17.42 (5.37)	28.59 (3.20)	10.00 (5.80)
5 Non-Foodgrains Food	58.02 (38.95)	62.69 (37.02)	74.98 (38.27)	89.13 (37.21)	125.56 (38.73)	164.63 (18.42)	57.38 (33.31)
6 Total Food (3+5)	99.47 (66.78)	106.96 (63.17)	121.68 (62.11)	137.39 (57.35)	174.90 (53.94)	234.24 (26.21)	97.21 (56.43)
7 Other Expenditure (Non-food)	49.49 (33.22)	62.36 (35.83)	74.22 (37.89)	102.17 (42.65)	149.32 (46.06)	659.39 (73.79)	75.06 (43.57)
8 Total Expenditure (6+7)	148.96 (100.00)	169.32 (100.00)	195.90 (100.00)	239.56 (100.00)	324.22 (100.00)	893.63 (100.00)	172.27 (100.00)

Table 2.12 : Average Per Person Expenditure (in Rs.) for 30 Days by Expenditure Classes and Categories

1987-88 : Maharashtra-Urban

S. No.	Expenditure Size Groups					
	Less than 90	90-110	110-135	135-160	160-185	185-215
1 Cereals	19.63 (26.82)	24.69 (24.77)	28.18 (23.01)	28.68 (19.36)	31.11 (18.06)	31.14 (15.55)
2 Pulses	5.42 (7.40)	6.82 (6.84)	7.90 (6.45)	9.14 (6.17)	10.35 (6.01)	9.97 (4.98)
3 Foodgrains (1+2)	25.05 (34.22)	31.51 (31.62)	36.08 (29.46)	37.82 (25.53)	41.46 (24.06)	41.11 (20.52)
4 Edible Oil	5.64 (7.70)	7.43 (7.46)	10.06 (8.21)	10.84 (7.32)	12.72 (7.38)	15.41 (7.69)
5 Non-foodgrains Food	27.82 (38.01)	38.62 (38.75)	49.97 (40.80)	41.20 (28.42)	69.52 (40.35)	91.34 (45.60)
6 Total Food (3+5)	52.87 (72.23)	70.13 (70.37)	86.05 (70.25)	79.92 (53.95)	110.98 (64.41)	132.45 (66.12)
7 Other Expenditure (Non-food)	20.33 (27.77)	29.53 (29.63)	36.44 (29.75)	68.22 (46.05)	61.32 (35.59)	67.86 (33.88)
8 Total Expenditure (6+7)	73.20 (100.00)	99.66 (100.00)	122.49 (100.00)	148.14 (100.00)	172.30 (100.00)	200.31 (100.00)

Figures in brackets are percentages to total expenditure.

Contd...

Table 2.12 : Contd...

1937-88; Maharashtra-Urban

S. No.	Expenditure Size Groups						
	215-255	255-310	310-385	385-520	520-700	700 and above	Overall
1 Cereals	34.08 (14.52)	34.99 (12.50)	37.56 (10.90)	37.01 (8.45)	40.82 (6.94)	50.82 (4.55)	33.76 (10.76)
2 <u>Pulses</u>	11.55 (4.92)	12.27 (4.38)	13.22 (3.84)	14.62 (3.34)	16.52 (2.81)	18.56 (1.66)	11.64 (3.71)
3 Foodgrains (1+2)	45.63 (19.44)	47.26 (16.88)	50.78 (14.73)	51.63 (11.79)	57.34 (9.74)	69.38 (6.22)	45.40 (14.47)
4 <u>Edible Oil</u>	17.24 (7.34)	19.77 (7.06)	22.13 (6.42)	25.45 (5.81)	29.70 (5.05)	36.22 (3.24)	18.24 (5.81)
5 Non-foodgrains- Food	100.48 (42.81)	123.06 (43.95)	147.29 (42.74)	184.12 (42.03)	244.80 (41.60)	312.16 (27.97)	120.89 (38.53)
6 Total Food (3+5)	146.11 (62.25)	170.32 (60.83)	198.07 (57.47)	235.75 (53.82)	302.14 (51.35)	381.54 (34.18)	166.30 (53.01)
7 Other Expenditure (Non-food)	88.61 (37.75)	109.66 (39.17)	146.58 (42.53)	202.31 (46.18)	286.28 (48.65)	734.71 (65.82)	147.45 (47.00)
8 Total Expenditure (6+7)	234.72 (100.00)	279.98 (100.00)	344.65 (100.00)	438.06 (100.00)	588.42 (100.00)	1116.25 (100.00)	313.74 (100.00)

statistical aspects of the lognormal distribution the book Topics in Statistical Methodology by Suddhendu Biswas is also relevant. Income Inequality and Poverty ; Methods of Estimating and Policy Applications by Kakwani N.C., also gives a thorough coverage.

It is well known that income (and its proxy total expenditure in the present case) has a highly skew distribution and so are expenditures on specific commodities. The extent of inequality can be brought out by 'Lorenz curves' which have percentage of persons below a given level of income related to the proportion of income of these persons in total income of all individuals. As the income (or expenditure classes) imply individuals are arranged in ascending order of their income, the proportion of income of these persons for a given income cannot exceed proportion of these persons in total number of persons. If proportions of persons below given income levels are plotted on the X axis and proportion of income of these persons on Y axis, points representing cumulative proportion of persons and cumulative proportion of income of these persons will all lie below the diagonal (0,0), (1,1) of a unit square. The extent of departure of this curve from the diagonal represented by the area between the diagonal and the 'Lorenz' curve would then indicate the extent of inequality. Methods exist to express this departure in numerical terms called 'Gini's coefficient of concentration'. These coefficients can be used successfully to calculate the elasticities.

2.8 These Lorenz curves are plotted in Charts 1 to 4 for

CHART 1(A)

ALL INDIA (RURAL) 1987-88

LORENZ CURVE

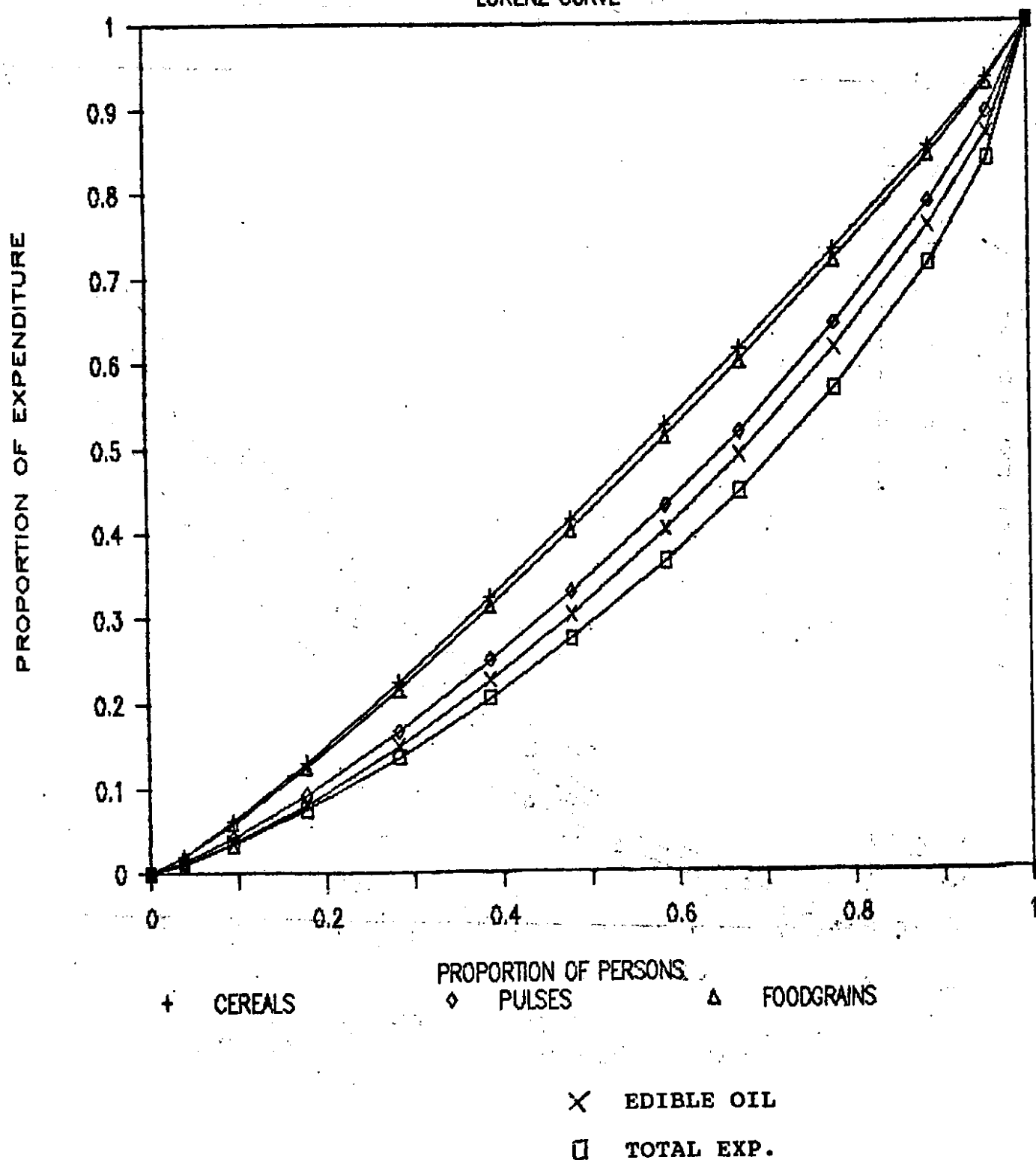


CHART 1(B)

ALL INDIA (RURAL) 1987-88

LORENZ CURVE

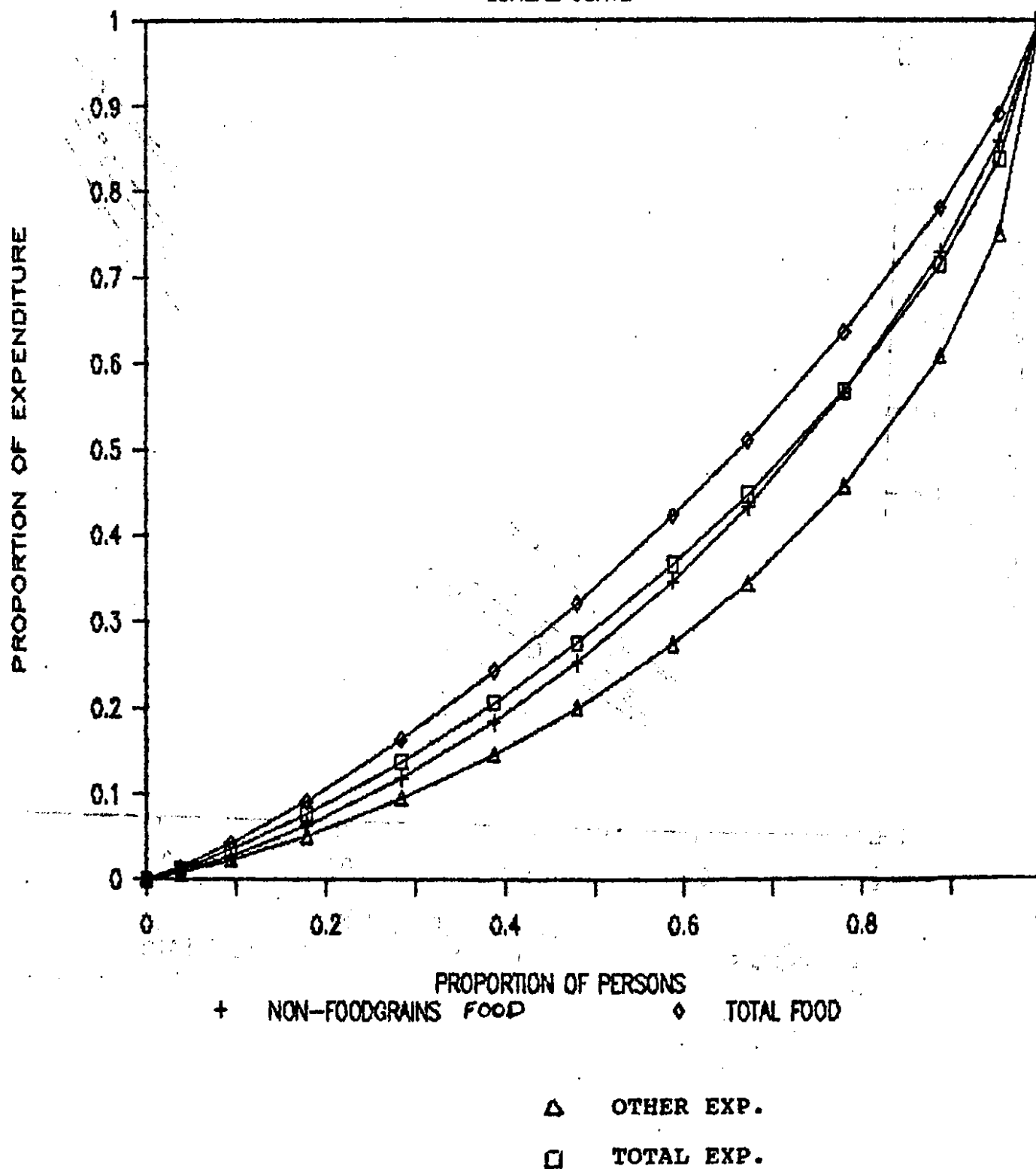


CHART 2(A)

ALL INDIA (URBAN) 1987-88

LORENZ CURVE

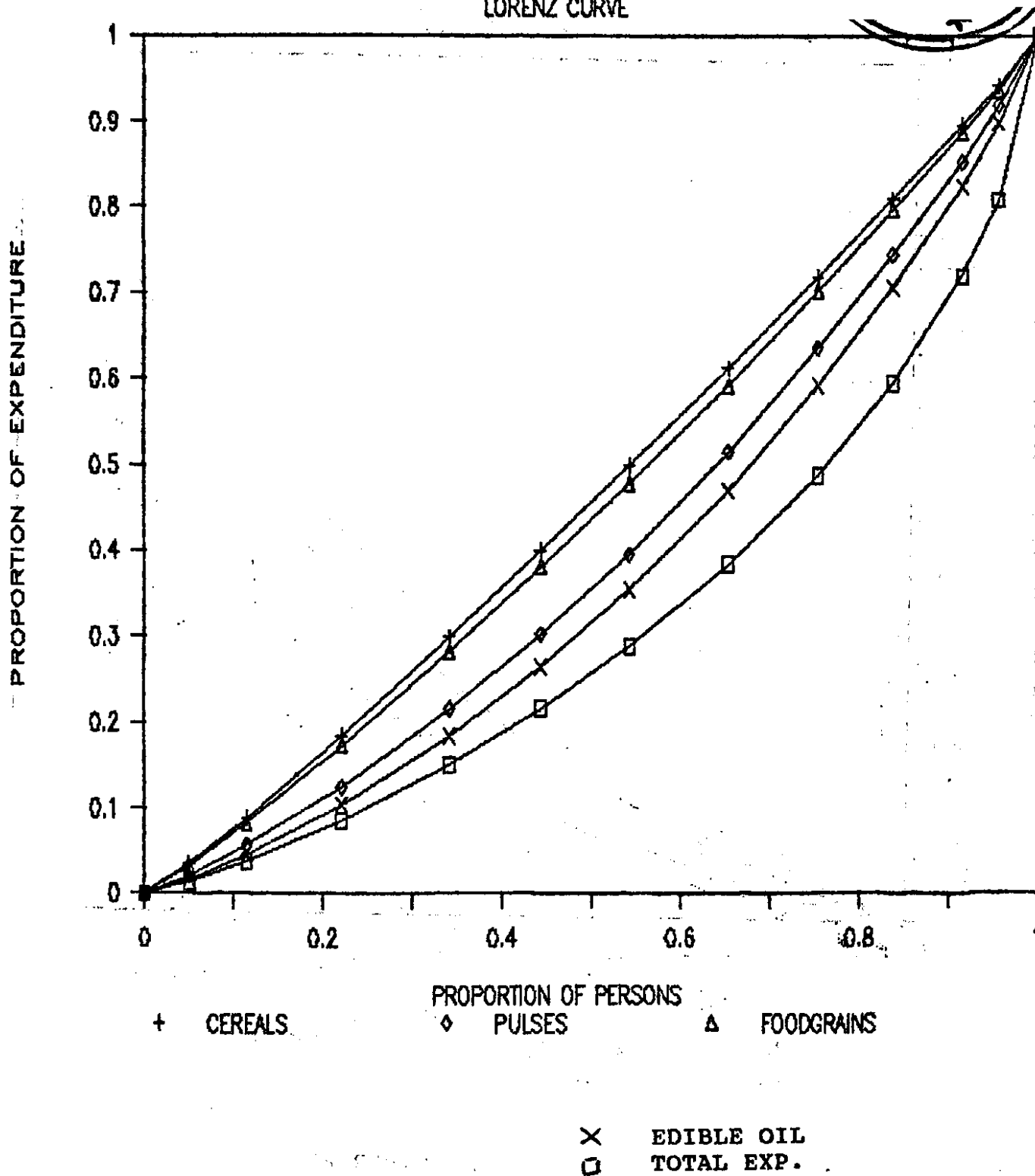
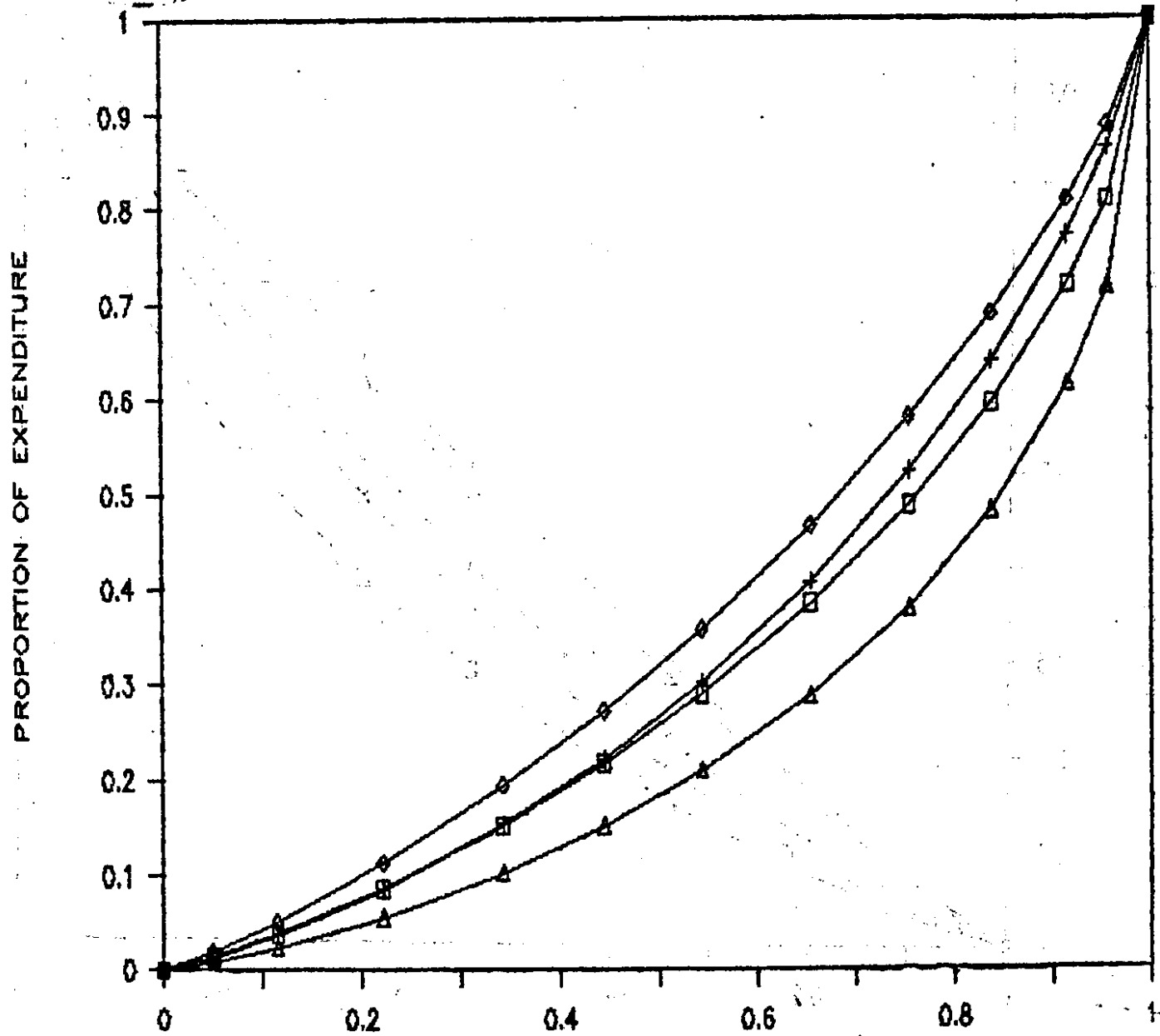


CHART 2(B)

ALL INDIA (URBAN) 1987-88

LORENZ CURVE



PROPORTION OF PERSONS
+ NON-FOODGRAINS FOOD ♦ TOTAL FOOD

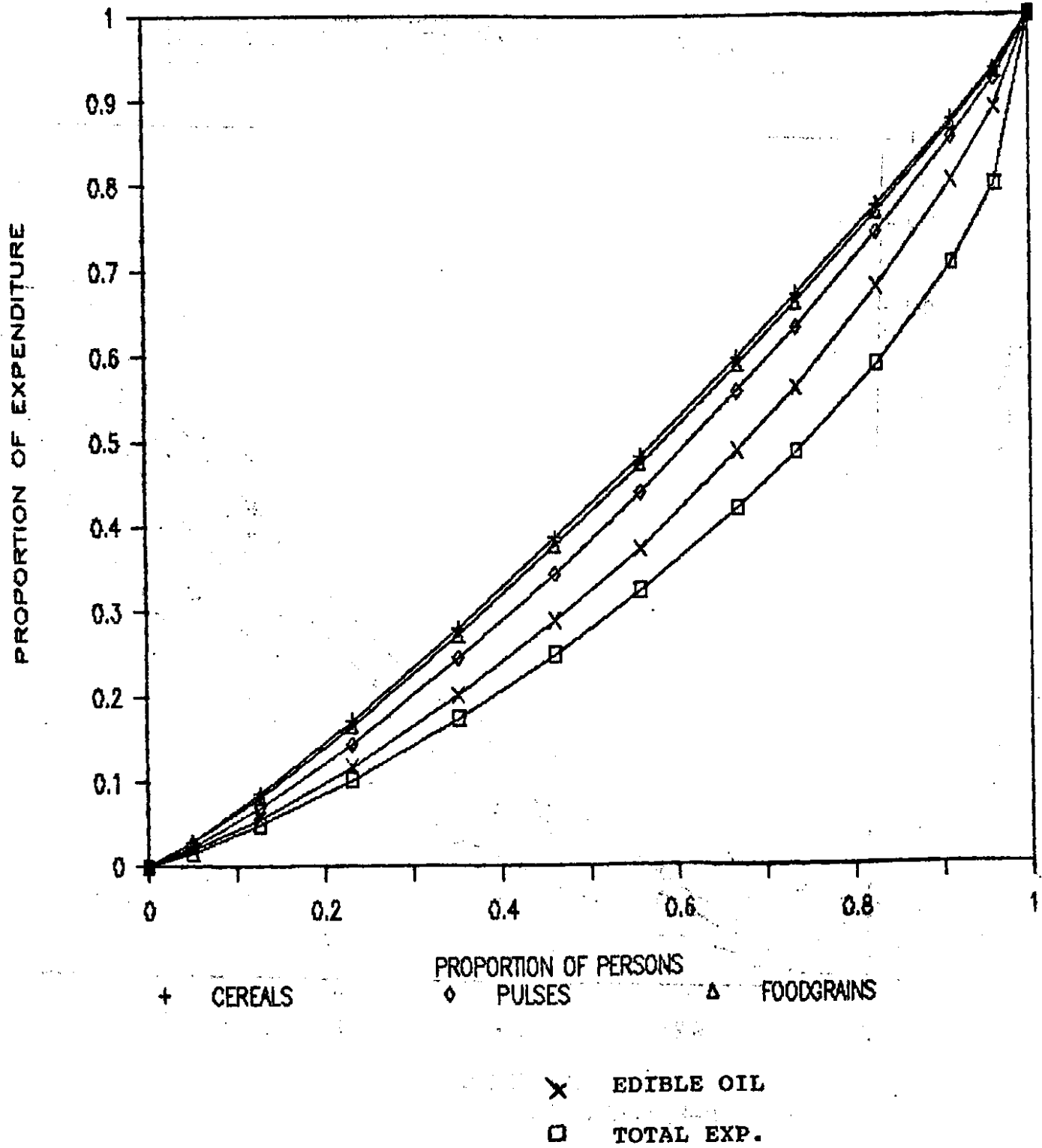
Δ OTHER EXP.

□ TOTAL EXP.

CHART 3(A)

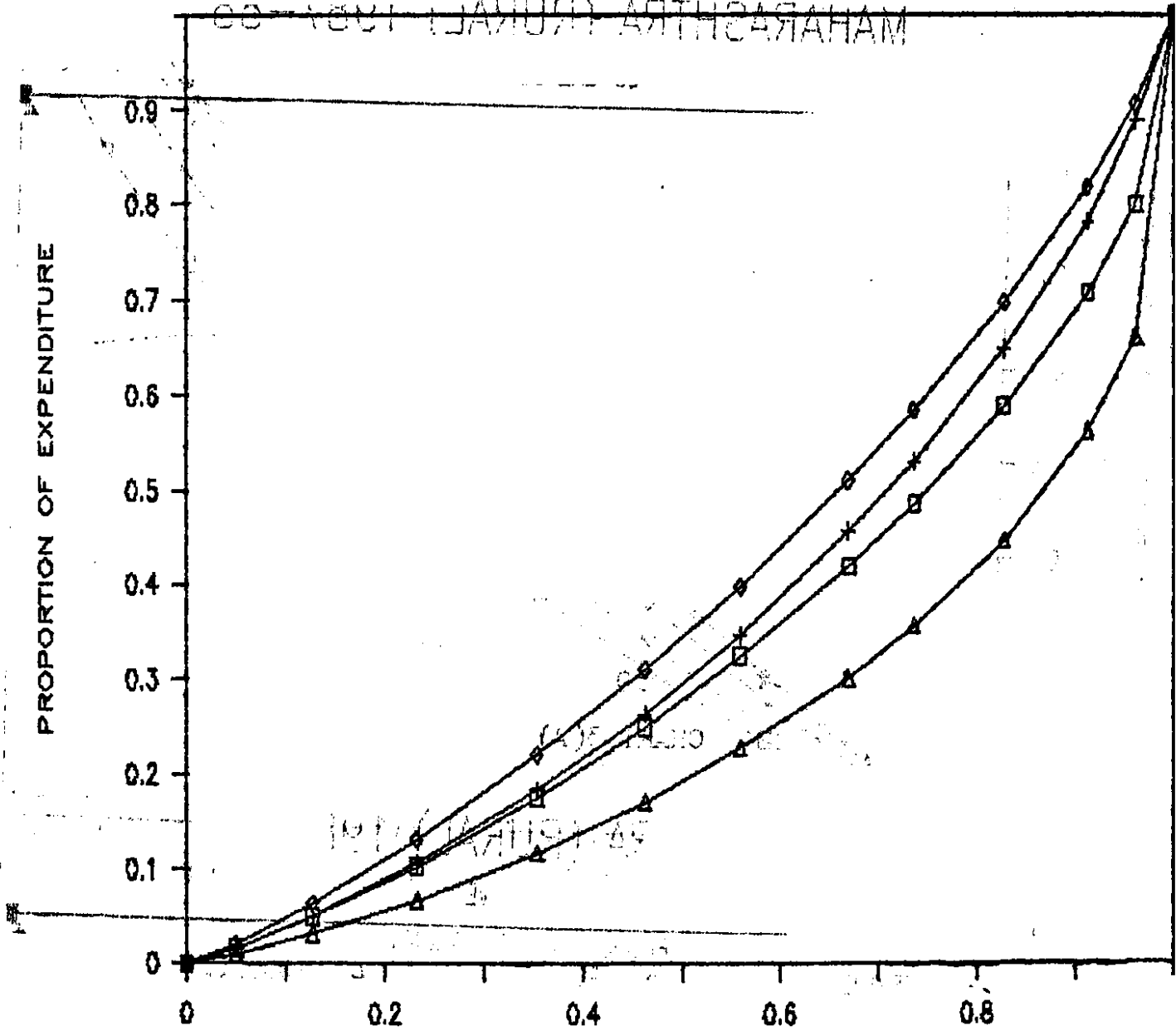
MAHARASHTRA (RURAL) 1987-88

LORENZ CURVE



MAHARASHTRA (RURAL) 1987-88

LORENZ CURVE

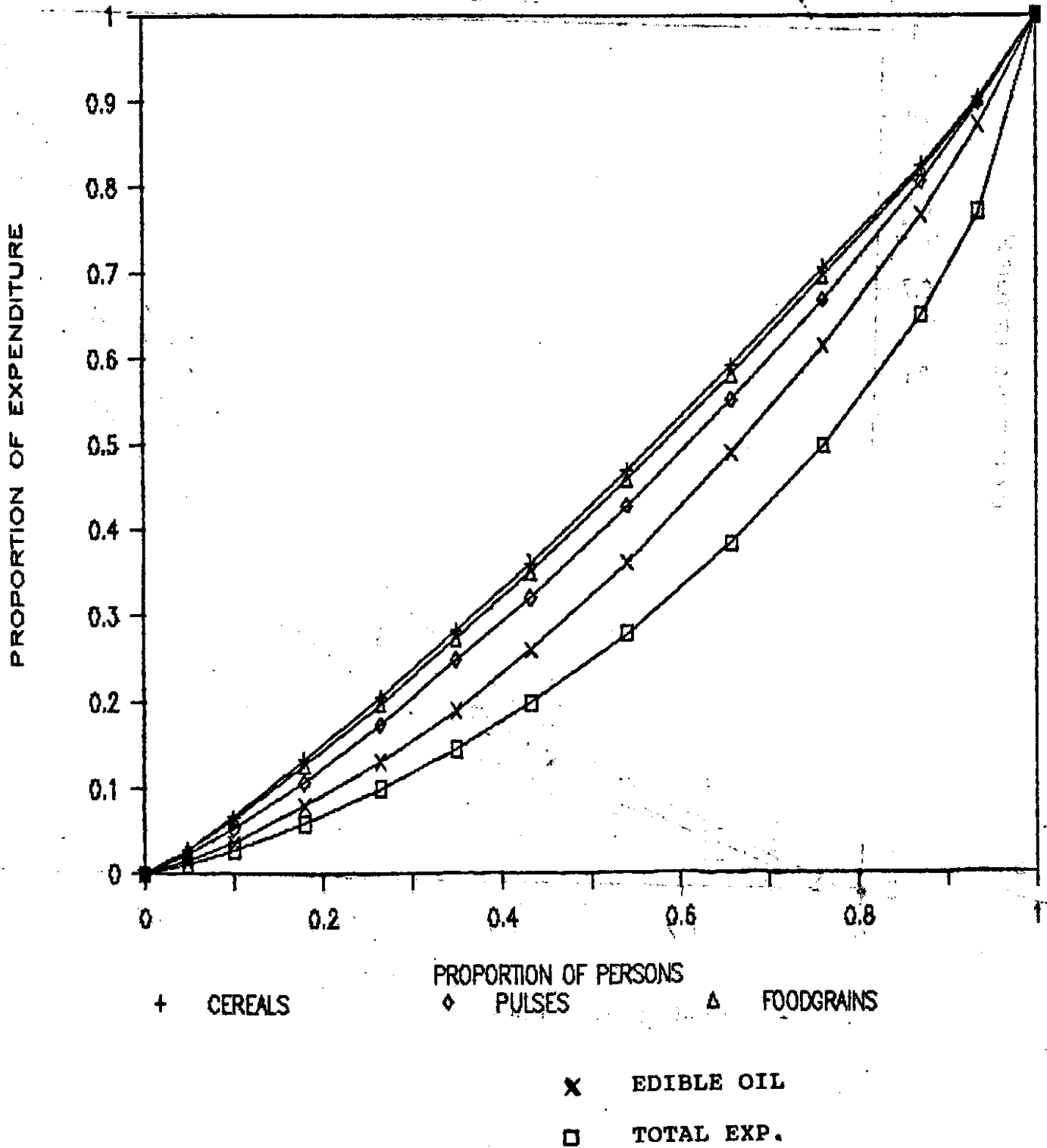


PROPORTION OF PERSONS
+ NON-FOODGRAINS FOOD ◇ TOTAL FOOD

△ OTHER EXP.
□ TOTAL EXP.

- MAHARASHTRA (URBAN) 1987-88

LORENZ CURVE



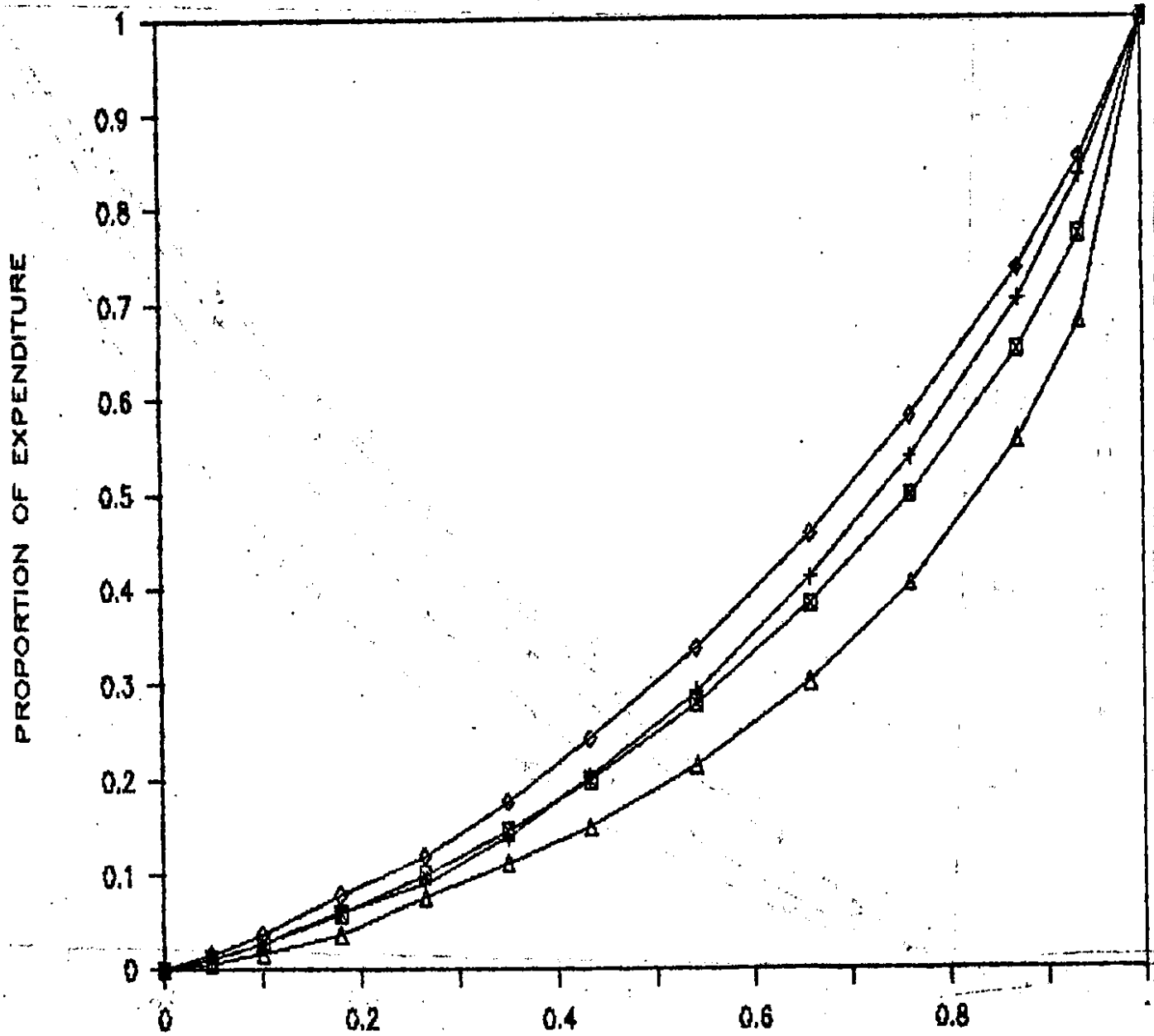
87-88 for India and Maharashtra as an illustration. Each chart is in two parts, For India-rural (1987-88), we have chart 1(A) covering cereals, pulses, foodgrains, edible oil and total expenditure categories while chart 1(B) covers non-foodgrains food, total food, other expenditure (non-food) and again total expenditure. These charts are computer-plotted and each can accommodate five series (categories) according to the computer programme and hence the A and B parts. (Further, more than five series in a chart would be confusing.) 'Total expenditure' appears in both the parts because it has a special place in the whole analysis. Any curve inside the total expenditure curve (that is, more towards the line of equality represented by the diagonal) has obviously less inequality than the total expenditure category (and curve outside has greater inequality) and also has elasticity less than one (and curve outside has elasticity greater than one).

Chart 1(A), for example for India-rural has Lorenz curves for cereals and foodgrains nearest to line of equality indicating low inequalities and low elasticities. Curves for pulses and edible oil are much closer to total expenditure curve (but still inside that curve) indicating higher than cereals and foodgrains elasticity but lower than unity elasticities. The curve for edible oil indicates greater than pulses inequality, as expected from the analysis in the previous section. In Chart 1(B), non-foodgrains food and other expenditure categories have Lorenz curves outside (i.e. below) the curve for total expenditure indicating greater inequalities and greater than unity elasticities. One can interpret

CHART 4(B)

MAHARASHTRA (URBAN) 1987-88

LORENZ CURVE



+ NON-FOODGRAINS FOOD ◇ TOTAL FOOD

△ OTHER EXP.

□ TOTAL EXP.

1987-88 for India and Maharashtra as an illustration. Each chart is in two parts. For India-rural (1987-88), we have Chart 1(A) covering cereals, pulses, foodgrains, edible oil and total expenditure categories while chart 1(B) covers non-foodgrains food, total food, other expenditure (non-food) and again total expenditure. These charts are computer-plotted and each can accommodate five series (categories) according to the computer programme and hence the A and B parts. (Further, more than five series in a chart would be confusing.) 'Total expenditure' appears in both the parts because it has a special place in the whole analysis. Any curve inside the total expenditure curve (that is, more towards the line of equality represented by the diagonal) has obviously less inequality than the total expenditure category (and curve outside has greater inequality) and also has elasticity less than one (and curve outside has elasticity greater than one).

.Chart 1(A), for example for India-rural has Lorenz curves for cereals and foodgrains nearest to line of equality indicating low inequalities and low elasticities. Curves for pulses and edible oil are much closer to total expenditure curve (but still inside that curve) indicating higher than cereals and foodgrains elasticity but lower than unity elasticities. The curve for edible oil indicates greater than pulses inequality, as expected from the analysis in the previous section. In Chart 1(B), non-foodgrains food and other expenditure categories have Lorenz curves outside (i.e. below) the curve for total expenditure indicating greater inequalities and greater than unity elasticities. One can interpret

similarly the remaining three charts. A welcome feature of these charts is that nearly all curves are non-overlapping.

This non-overlap of curves means that if one curve shows higher inequality than the other, then its constant elasticity estimate is also higher than the other. Thus we feel safe in estimating Gini's coefficients of concentration and the constant elasticities (i.e. one elasticity estimate for a given category applicable over the whole range of income-total expenditure.)

The Gini's coefficient of concentration based on Lorenz curves can be theoretically stated as follows. For total expenditure (proxy income) if the probability distribution is denoted by a continuous function $f(x)$, then the cumulative distribution or the distribution function showing proportion of persons below income x is

$$F(x) = \int_0^x f(y)dy$$

The proportion of income of these persons below income x in total income is

$$F_1(x) = \frac{1}{\mu_1} \int_0^x yf(y)dy$$

where μ_1 is the mean of x .

Let area below the Lorenz curve be called 'AREA'. Now Gini's coefficient relates area between the diagonal $(0,0)$ and $(1,1)$ and the curve to the the area of the lower triangle of the square in Lorenz chart. If Gini's coefficient is to have range 0 (all incomes equal, no inequality) to 1 (complete inequality),

it can be defined as :

$G = 1 - 2 (\text{AREA})$ where $G =$ Gini's Coefficient
 $\text{AREA} =$ Area below the Lorenz Curve
 (i.e. between the Lorenz curve and the
 X axis)

$$\begin{aligned} \text{i.e. AREA} &= \int_0^1 F_1(x) dF(x) \\ &= \int_0^{\infty} \left(\int_0^x \frac{1}{\mu_1} y f(y) dy \right) f(x) dx \end{aligned}$$

Empirically one can obtain G by calculating area below the actual curves as in Charts 1 to 4 by using the trapezoidal rule as indicated by Iyengar (3)

$$G = 1 - \sum_i (P_i - P_{i-1}) (Q_i + Q_{i-1})$$

where $P_i =$ cumulative proportion of persons upto the
 (upper limit of) i^{th} expenditure class.

$Q_i =$ Cumulative proportion of expenditure upto the
 (upper limit of) the i^{th} class.

For specific commodity expenditure, Gini's Coefficient denoted by G_s ('s' for specific commodity) can be expressed similarly as

$$G_s = 1 - \sum_i (P_i - P_{i-1}) (q_i + q_{i+1})$$

where $P_i =$ Cumulative proportion of persons upto the
 (upper limit of) i^{th} class

$q_i =$ proportion of expenditure by these persons
 out of total expenditure on that commodity

We have calculated the Gini's coefficients for India, Maharashtra, Karnatak, Punjab and U.P. for 1967-68 and 1987-88 for rural and urban components separately and these are presented in Tables 2.13. to 2.16. We see that within a range of 0 to 1, Gini's coefficient of concentration (i.e. inequality) is highest for 'other expenditure' category between 0.4 to 0.5 whereas for total expenditure G's are between .3 and .4, indicating that elasticities would exceed unity for 'other expenditure' category. For edible oil, Gini's coefficients are marginally higher than coefficients for total expenditure in the 1968-69 but marginally lower in 1987-88. Coefficients for pulses and edible oil are always higher than those for cereals.

2.9 Expenditure elasticities from Lorenz curves can be estimated in two ways. The first is a graphical method which makes use of the plot of curves as in Charts 1 to 4 while the second is a numerical method. Both require the assumption of log-normality, that is, the requirement that the probability distribution $f(x)$ mentioned in the last section should be log-normally distributed. Iyengar (1) suggests the graphical method by first computing estimates of parameters of the log-normal distribution from actual data and then drawing the theoretical Lorenz curves. Iyengar (3) also points out the numerical method of obtaining Gini's coefficient from actual data as suggested in the previous section and then obtaining an estimate of elasticity of specific item, on the assumption of log-normality. The log-normality assumption ensures that the Lorenz curves are non-overlapping and the constant

Table 2.13 : Gini's Coefficients of Concentration for Various Categories of Consumer Expenditure

1968-69 : Rural

S.No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.1643	0.1743	0.2075	0.1248	0.1578
2 <u>Pulses</u>	0.2547	0.2395	0.2303	0.1913	0.1880
3 Foodgrains	0.1733	0.1816	0.2092	0.1324	0.1630
4 <u>Edible Oil</u>	0.3077	0.2917	0.3275	0.2409	0.3423
5 Non-foodgrains Food	0.3002	0.3038	0.3641	0.2928	0.3871
6 Total Food	0.2507	0.2307	0.2624	0.2330	0.2446
7 Other Expenditure (Non-food)	0.4613	0.4213	0.4794	0.4183	0.4684
8 Total Expenditure	0.3047	0.2841	0.3159	0.2935	0.3072

Table 2.14 : Gini's Coefficients of Concentration for Various Categories
of Consumer Expenditure

1968-69 : Urban

S.No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.0877	0.0427	0.1218	0.0666	0.1139
2 <u>Pulses</u>	0.1854	0.1507	0.2065	0.1982	0.1778
3 Foodgrains	0.0993	0.0592	0.1304	0.0823	0.1240
4 <u>Edible Oil</u>	0.2668	0.2671	0.2644	0.1600	0.3037
5 Non-foodgrains food	0.3865	0.3893	0.4055	0.3164	0.4174
6 Total Food	0.2627	0.2833	0.2689	0.2346	0.2760
7 Other Expenditure (Non-food)	0.4607	0.4324	0.4590	0.3954	0.4958
8 Total Expenditure	0.3292	0.3377	0.3292	0.2875	0.3493

Table 2.15 : Gini's Coefficients of Concentration for Various Categories of Consumer Expenditure

1987-88 ; Rural

S.No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.0936	0.1117	0.1606	0.0934	0.0844
2 Pulses	0.2193	0.1699	0.2356	0.1609	0.1797
3 Foodgrains	0.1117	0.1245	0.1732	0.1088	0.1017
4 Edible Oil	0.2607	0.2583	0.2892	0.1688	0.2352
5 Non-foodgrains food	0.3299	0.2963	0.2897	0.2375	0.3213
6 Total Food	0.2304	0.2259	0.2370	0.2064	0.2202
7 Other Expenditure (Non-food)	0.4433	0.5085	0.4328	0.4230	0.3919
8 Total Expenditure	0.3116	0.3490	0.3113	0.3010	0.2868

Table 2.16 : Gini's Coefficients of Concentration for Various Categories of Consumer Expenditure

1987-88 : Urban

S.No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.0668	0.1053	0.1028	0.0794	0.0637
2 <u>Pulses</u>	0.2003	0.1601	0.2359	0.1482	0.1971
3 Foodgrains	0.0931	0.1194	0.1304	0.0965	0.0959
4 <u>Edible Oil</u>	0.2593	0.2464	0.2629	0.1409	0.2466
5 Non-foodgrains food	0.3391	0.3434	0.3393	0.2465	0.3414
6 Total Food	0.2610	0.2822	0.2666	0.2124	0.2573
7 Other Expenditure (Non-food)	0.5009	0.4814	0.5288	0.3844	0.4384
8 Total Expenditure	0.3711	0.3758	0.3891	0.2924	0.3346

elasticity estimates represent the specific commodities and the estimates are directly comparable. We have adopted the numerical method which in general is superior to graphic approach and further, this method is 'intuitively better' (Iyengar (3) p.385) and appears to use more information contained in the data.

2.10 For the income-total expenditure variables which are highly skew, log-normal distribution fits rather well and further, for specific commodities a relation $E(x_s/x) = Ax^n$ is assumed which makes distributions of specific commodity expenditures also log-normal. The theoretical argument can be briefly stated as :

If x is log-normally distributed, its probability element is

$$f(x) dx = \frac{1}{\sqrt{2\pi} \lambda x} \text{Exp} \left[-\frac{1}{2} \left(\frac{\log x - \theta}{\lambda} \right)^2 \right] dx$$

where θ and λ are parameters of the log-normal distribution and .. 'Exp' means 'exponential of'. This statement is also expressed as

$$x \wedge (\theta, \lambda)$$

where ' \wedge ' indicates 'log-normally distributed'.

If we make a transformation to 'log x ' variable then probability element of log x is

$$f(\log x) d(\log x) = \frac{1}{\sqrt{2\pi} \lambda} \text{Exp} \left[-\frac{1}{2} \left(\frac{\log x - \theta}{\lambda} \right)^2 \right] d(\log x)$$

with log x having a range - ∞ to ∞ .

Thus $\log x$ is normally distributed with parameters θ (mean) and λ (standard deviation) of $\log x$. Thus one can write this as

$x \wedge (\theta, \lambda)$ and this means

$\log x \wedge N(\theta, \lambda)$, meaning $\log x$ is normally

distributed. Further, by the property of normal distributions,

$\eta \log x \wedge N(\eta\theta, \eta\lambda)$

$\log A + \eta \log x \wedge N(\log A + \eta\theta, \eta\lambda)$ which in turn means

$Ax^\eta \wedge (\log A + \eta\theta, \eta\lambda)$

Thus Ax^η is also log-normally distributed.

With the log-normality assumption G, the coefficient concentration mentioned in the last section in the integral form

$$L = 1 - 2 \text{ AREA}$$

where AREA = area below the Lorenz curve

$$\begin{aligned} &= \int_0^1 F_1(x) dF(x) \\ &= \int_0^1 \int_0^x \frac{yf(y)}{\mu_x} dy dF(x) \\ &= \int_0^\infty \left[\int_0^x \frac{yf(y)dy}{\mu_x} \right] f(x) dx \end{aligned}$$

This after suitable transformations amounts to

$$= \int_{-\infty}^{\infty} \left[\frac{1}{\mu_x} \int_{-\infty}^{\frac{\log x - \theta}{\lambda}} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}t^2} e^{\theta + \lambda t} dt \right] \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}u^2}$$

$$= \int_{-\infty}^{\infty} \left[\int_{-\infty}^{\frac{\log x - \theta}{\lambda}} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(t - \lambda)^2} dt \right] \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}u^2} du$$

with u_x getting cancelled out.

By using $z = t - \lambda$ transformation

$$= \int_{-\infty}^{\infty} \left[\int_{-\infty}^{\frac{\log x - \theta}{\lambda} - \lambda} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}z^2} dz \right] \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}u^2} du$$

where $u = \frac{\log x - \theta}{\lambda}$.

U (related with proportion of persons) and z (related with proportion of total expenditure) are two standard-normal variates. The integrals represent the probability that when we select an element from u and an element from z independently at random, value of u will exceed that of z by at least λ .

$$= P \left[u - z > \lambda \right] \quad \text{where } u \text{ and } z \text{ are } N(0,1)$$

standardizing $u - z$, which itself is $N(0,2)$

$$= P \left[\frac{u - z}{\sqrt{2}} > \frac{\lambda}{\sqrt{2}} \right]$$

Thus AREA = $P \left[N(0,1) > \frac{\lambda}{\sqrt{2}} \right]$, prob. that an element chosen from a standard Normal distribution exceeds $\frac{\lambda}{\sqrt{2}}$

$$G = 1 - 2P \left[N(0,1) > \frac{\lambda}{\sqrt{2}} \right]$$

If by ϕ we denote the distribution function of Normal variate,

$$G = 1 - 2 \left[1 - \phi \left(\frac{\lambda}{\sqrt{2}} \right) \right] \text{ by the property of standard normal distribution function}$$

$$\text{Hence } G = 1 - 2 + 2 \phi \left(\frac{\lambda}{\sqrt{2}} \right)$$

$$\text{and } \frac{1+G}{2} = \phi \left(\frac{\lambda}{\sqrt{2}} \right)$$

$$\text{Hence } \frac{t_{1+G}}{2} = \frac{\lambda}{\sqrt{2}} \text{ where } t \text{ is value of the standard normal deviate at } \phi \left(\frac{\lambda}{\sqrt{2}} \right) \dots (1)$$

Similarly for the specific commodity expenditure on commodity

X_s ,

Area below Lorenz = $P(u-z > \eta \lambda)$ where η = elasticity appearing in $E(X_s/X) = Ax^\eta$

where $u-z$ is $N(0, \sqrt{2})$

$$= P \left(\frac{u-z}{\sqrt{2}} > \frac{\eta \lambda}{\sqrt{2}} \right)$$

$$= P \left[N(0,1) > \frac{\eta \lambda}{\sqrt{2}} \right]$$

$$= 1 - \phi \left(\frac{\eta \lambda}{\sqrt{2}} \right)$$

Gini's coefficient of concentration for specific commodity

X_s (denoted by G_s) is then $G_s = 1 - 2$ (AREA)

$$= 1 - 2 \left[1 - \phi \left(\frac{\eta \lambda}{\sqrt{2}} \right) \right]$$

$$\text{Hence } \frac{1+G_s}{2} = \phi \left(\frac{\eta \lambda}{\sqrt{2}} \right) \text{ and } t \left(\frac{1+G_s}{2} \right) = \frac{\eta \lambda}{\sqrt{2}} \dots (2)$$

where t is the value of the standard normal variate for

$$\phi\left(\frac{t}{\sqrt{2}}\right)$$

If we take a ratio (2)/(1), we have

$$\frac{t\left(\frac{1+G_s}{2}\right)}{t\left(\frac{1+G}{2}\right)} = \eta$$

, the expenditure elasticity of X_s with respect to total expenditure.

Having calculated coefficients of concentration G and G_s as suggested in 2.8, all one has to do is to read off the 't' standardized values for $\frac{1+G_s}{2}$ and $\frac{1+G}{2}$ probabilities

respectively and divide the former by the latter, to arrive at commodity or category-specific elasticities. This is the methodology that we have adopted. The 't' values were also calculated by the computer with sufficient accuracy.

2.11 Constant elasticity estimates can also be obtained by fitting regression $X_s = Ax^\eta$ or in logarithmic terms

$$\log X_s = \log A + \eta \log X \dots (3)$$

as suggested in Iyengar(1) p.890.

These estimates of η are obtained by using number of persons in each expenditure group as weights. These elasticities do not assume any probability distribution for total expenditure but the estimates may come out of overlapping Lorenz curves, affecting the comparability of the constant elasticity estimates.

Alongwith Gini-coefficient based elasticities, we also calculated the regression-based elasticities by using

model (3). Both these results for all the categories and for the four entities of India, Maharashtra, Karnataka, Punjab and U.P. were obtained and these are incorporated in Tables 2.17 to 2.24. In Table 2.17 expenditure elasticities for Rural areas for 1968-69 which are based on Gini's coefficients are presented while in Table 2.18 regression-based (i.e. least square) estimates for rural 1968-69 are presented. In Table 2.23 and 2.24 estimates for 1987-88-Urban are presented, the former based on Gini's coefficient, the latter based on least squares. This is the final product of this whole discussion.

In 1968-69 Rural, results show pulses elasticity between 0.64 (Punjab) and 0.83 (India). Estimate for Maharashtra is 0.84 which is closer to India estimate. Pulses elasticity is much higher than elasticity for cereals (0.53 for India, 0.60 for Maharashtra). Elasticities for edible oil are over unity, barring Punjab. This means that as incomes increase by hundred percent, demand for edible oil is likely to go up slightly more than in proportion, that of pulses by 82-83 per cent while cereals demand would increase by 52 to 60 per cent. Edible oil is a 'luxury' good (or bordering on a luxury good) with its over-unity elasticity. Non-foodgrains food having items like edible oil, milk, sugar, fish, meat, etc. has a better than edible oil elasticity exceeding unity. The 'other expenditure' of non-food items like clothing, education, entertainment, consumer durables, repairs to houses, etc. has the highest elasticity exceeding 1.5, meaning for 100 per cent increase in total expenditure, increase in expenditure on these items (together) will be over 150 per cent. When

Table 2.17 : Estimates of Expenditure Elasticities of Various Categories of Consumer Expenditure Based on Gini's Coefficients
1968-69 ; Rural

S. No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.5290	0.6047	0.6463	0.4167	0.5036
2 Pulses	0.8291	0.8374	0.7191	0.6427	0.6017
3 Foodgrains	0.5503	0.6307	0.6516	0.4425	0.5204
4 Edible Oil	1.0106	1.0284	1.0388	0.8144	1.1219
5 Non-foodgrains					
Food	1.2672	1.0729	1.1637	0.9974	1.2812
6 Total Food	0.8156	0.8056	0.8231	0.7867	0.7884
7 Other Exp. (Non-food)	1.5708	1.5268	1.5798	1.4638	1.5844

(Category of 'total expenditure' does not feature in this and other tables of elasticities as it is always unity).

Table 2.18 : Estimates of Regression-Based Elasticities of Various Categories of Consumer Expenditure
1968-69 ; Rural

S. No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.5875	0.6429	0.7279	0.4444	0.6737
2 Pulses	0.9476	0.9100	0.7613	0.7162	0.7047
3 Foodgrains	0.6205	0.6704	0.7301	0.4720	0.5898
4 Edible Oil	1.0763	1.0557	1.2979	0.7717	1.1050
5 Non-Foodgrains					
Food	1.2618	1.0967	1.1734	1.0267	1.2378
6 Total Food	0.8576	0.8388	0.8792	0.7984	0.8272
7 Other Exp. (Non-Food)	1.4015	1.3998	1.3156	1.5064	1.4585

Table 2.19 : Estimates of Expenditure Elasticities of Various Categories of Consumer Expenditure Based on Gini's Coefficients

1968-69 : Urban					
S. No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.2587	0.1223	0.3601	0.2267	0.3159
2 Pulses	0.5512	0.4347	0.6154	0.6786	0.4959
3 Foodgrains	0.2931	0.1699	0.3858	0.2803	0.3442
4 Edible Oil	0.8017	0.7812	0.7942	0.5477	0.8618
5 Non-foodgrains					
Food	1.887	1.1656	1.2526	1.1063	1.2143
6 Total Food	0.7890	0.8306	0.8084	0.8100	0.7797
7 Other Exp. (Non-food)	1.4449	1.3089	1.4388	1.4053	1.4758

Table 2.20 : Estimates of Regression-Based Elasticities of Various Categories of Consumer Expenditure

1968-69 : Urban					
S. No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.2822	0.1282	0.3645	0.2334	0.3360
2 Pulses	0.6005	0.4756	0.6409	0.7485	0.5527
3 Food-grains	0.3208	0.1795	0.3932	0.2891	0.3698
4 Edible Oil	0.8377	0.8100	0.8672	0.6268	0.9622
5 Non-foodgrains					
Food	1.2167	1.1867	1.2373	1.1494	1.2560
6 Total Food	0.8159	0.8364	0.8309	0.8283	0.8070
7 Other Exp. (Non-food)	1.4021	1.3287	1.4063	1.3668	1.4313

Table 2.21 : Estimates of Expenditure Elasticities of Various Categories of Consumer Expenditure Based on Gini's Coefficient
1987-88 : Rural

S. No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.2929	0.3100	0.5054	0.3031	0.2878
2 Pulses	0.6940	0.4738	0.7478	0.5247	0.6179
3 Foodgrains	0.3499	0.3458	0.5457	0.3534	0.3474
4 Edible Oil	0.8294	0.7283	0.9255	0.5508	0.8139
5 Non-foodgrains					
Food	1.0625	0.8404	0.9270	0.7813	1.1271
6 Total Food	0.7302	0.6340	0.7524	0.6762	0.7605
7 Other Exp. (Non-food)	1.4662	1.5214	1.4289	1.4431	1.3958

Table 2.22 : Estimates of Regression-Based Elasticities of Various Categories of Consumer Expenditure
1987-88 : Rural

S. No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.3303	0.3542	0.5437	0.3240	0.3176
2 Pulses	0.7397	0.5337	0.7713	0.5467	0.5699
3 Foodgrains	0.3900	0.3927	0.5827	0.3742	0.3806
4 Edible Oil	0.8756	0.7880	0.9306	0.5740	0.8397
5 Non-foodgrains					
Food	1.1233	0.8992	0.9962	0.8321	1.1939
6 Total Food	0.7708	0.6890	0.8030	0.7107	0.7906
7 Other Exp. (Non-Food)	1.3768	1.3669	1.2921	1.3822	1.3361

Table 2.23 : Estimates of Expenditure Elasticities of Various Categories of Consumer Expenditure Based on Gini's Coefficients

1987-88 : Urban

S. No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.1732	0.2698	0.2536	0.2653	0.1991
2 Pulses	0.5247	0.4120	0.5894	0.4977	0.5767
3 Foodgrains	0.2415	0.3061	0.3221	0.3229	0.2783
4 Edible Oil	0.6845	0.6402	0.6593	0.4728	0.7264
5 Non-foodgrains					
Food	0.9075	0.9073	0.8625	0.8368	1.0220
6 Total Food	0.6891	0.7374	0.6690	0.7180	0.7590
7 Other Exp. (Non-food)	1.3990	1.3180	1.4166	1.3390	1.3429

Table 2.24 : Estimates of Regression-Based Elasticities of Various Categories of Consumer Expenditure

1987-88 : Urban

S. No.	India	Maharashtra	Karnatak	Punjab	Uttar Pradesh
1 Cereals	0.1983	0.2946	0.2609	0.2854	0.2006
2 Pulses	0.5754	0.4445	0.6398	0.5174	0.6155
3 Foodgrains	0.2700	0.3320	0.3371	0.3424	0.2869
4 Edible Oil	0.7516	0.7010	0.7064	0.5002	0.7749
5 Non-foodgrains					
food	0.9729	0.9766	0.9301	0.8547	1.0605
6 Total Food	0.7328	0.7750	0.7167	0.7329	0.7866
7 Other Exp. (Non-food)	1.3424	1.2825	1.3190	1.3451	1.3053

considers regression-based results of Table 2.18, which are all statistically very highly significant, one is struck by the closeness of these results with those in Table 2.17 although the regression based results show slightly higher elasticities. The order between the various categories, is however maintained.

For 1968-69 : Urban, the order of elasticities between categories is same but all the elasticities are of a lower order. Edible oil elasticities are high but below unity, around 0.80, while non-foodgrains food and non-food categories are luxury goods with clearly greater than unity elasticities. For 1987-88 data, elasticities are lower than those for 1968-69 but the order is retained. Urban elasticities are especially low. 'Non-food' elasticities are well over unity (but below 1.5) while non-foodgrains food elasticities are over unity for rural component and below unity for urban component.

In summary, one can say that as incomes increase, demand for pulses and oilseeds will increase with a higher proportion than the proportion of increase in cereals and foodgrains. Our exercise quantifies these proportions. Thus from the point of view of agriculture, over years apart from increase in demand for pulses and oilseeds due to increasing numbers there will be additional pressure due to increasing incomes, when compared with proportion of increases in cereals and foodgrains. This means production of pulses and oilseeds must keep on increasing and any easing of the demand pressure can only be temporary. Smaller elasticities in 1987-88 probably indicate that over time near-luxury items may also become

necessities, as has happened in the case of oilseeds (edible oil). But the overall reduced elasticities for 1987-88 may throw some doubt on such a line of argument. In any case, in the context of agricultural production one arrives at the conclusion that production of pulses and oilseeds (especially oilseeds) must keep on increasing faster than cereals-food-grains. Further, demand for livestock and poultry products alongwith sugar, etc. will keep on rising fast (faster than income perhaps) and these agriculture based activities also need sustained increases in outputs.

REFERENCES:

1. N. Sreenivasa Iyengar ; "On A Method of Computing Engel Elasticities from Concentration Curves", Econometrica Vol.28, 4 (October 1960), pp. 882-891.
2. N. Sreenivasa Iyengar.; "On the Standard Error of the Lorenz Concentration Ratio", Sankhya Vol.22 Parts 3 and 4 (1960), pp. 371-378.
3. N. Sreenivasa Iyengar ; "On a Problem of Estimating Increase in Consumer Demand", Sankhya Vol.22 Parts 3 and 4 (1960), pp. 379-390.
4. N. Sreenivasa Iyengar ; A Consistent Method of Estimating the Engel Curve from Grouped Survey Data, Econometrica, Vol. 32, No.4 (October 1964), pp. 591-617.
5. Kakwani N.C. ; Income Inequality and Poverty ; Methods of Estimating and Policy Applications, IBRD Publication.
6. A. L. Nagar and Das : Basic Statistics
7. Suddhendu Biswas : Topics in Statistical Methodology.

Table 11.1 : PER PERSON CONSUMPTION
 - NSS 23rd round, (July 1968 - June 1969)

All India: Rural

Sr. No.	Expenditure Group (1)	Cereals (2)	Pulses (3)	Edible Oil (4)	Total Food (5)	Total Expenditure (6)	% Distribution of Persons (7)	Est. No. of Persons (8)
1	0- 8	3.36	0.18	0.10	4.76	5.98	0.79	378
2	8-11	5.67	0.31	0.25	8.03	9.67	2.06	986
3	11-13	7.01	0.46	0.30	9.91	12.07	2.52	1206
4	13-15	8.25	0.58	0.41	11.62	13.90	4.09	1957
5	15-18	9.35	0.87	0.53	13.73	16.57	8.95	4283
6	18-21	10.85	1.05	0.64	16.16	19.51	10.21	4886
7	21-24	12.10	1.17	0.74	18.57	22.54	9.65	4618
8	24-28	13.12	1.39	0.89	20.92	25.87	12.87	6160
9	28-34	15.09	1.53	1.06	24.62	30.88	14.56	6968
10	34-43	16.20	1.93	1.27	29.20	37.95	14.91	7135
11	43-55	18.17	2.36	1.51	35.32	47.97	9.74	4662
12	55-75	19.41	2.72	1.98	43.00	62.65	5.85	2800
13	75-	24.68	3.63	4.07	66.30	121.93	3.80	1819

No. of Sample Villages : 8400

No. of Sample Households : 9116

Average Size of Household : 5.25

Estimated No. of Persons : 47,859

(Information collected from different tables)

necessities, as has happened in the case of oilseeds (edible oil). But the overall reduced elasticities for 1987-88 may throw some doubt on such a line of argument. In any case, in the context of agricultural production one arrives at the conclusion that production of pulses and oilseeds (especially oilseeds) must keep on increasing faster than cereals-food-grains. Further, demand for livestock and poultry products alongwith sugar, etc. will keep on rising fast (faster than income perhaps) and these agriculture based activities also need sustained increases in outputs.

REFERENCES:

1. N. Sreenivasa Iyengar ; "On A Method of Computing Engel Elasticities from Concentration Curves", Econometrica Vol.28, 4 (October 1960), pp. 882-891.
2. N. Sreenivasa Iyengar.; "On the Standard Error of the Lorenz Concentration Ratio", Sankhya Vol.22 Parts 3 and 4 (1960), pp. 371-378.
3. N. Sreenivasa Iyengar ; "On a Problem of Estimating Increase in Consumer Demand", Sankhya Vol.22 Parts 3 and 4 (1960), pp. 379-390.
4. N. Sreenivasa Iyengar ; A Consistent Method of Estimating the Engel Curve from Grouped Survey Data, Econometrica, Vol. 32, No.4 (October 1964), pp. 591-617.
5. Kakwani N.C. ; Income Inequality and Poverty ; Methods of Estimating and Policy Applications, IBRD Publication.
6. A. L. Nagar and Das : Basic Statistics
7. Suddhendu Biswas : Topics in Statistical Methodology.

Table II.1 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes
- NSS 23rd round, (July 1968 - June 1969)

All India: Rural

Sr. No.	Expenditure Group (1)	Cereals (2)	Pulses (3)	Edible Oil (4)	Total Food (5)	Total Expenditure (6)	% Distribution of Persons (7)	Est. No. of Persons (8)
1	0- 8	3.36	0.18	0.10	4.76	5.98	0.79	378
2	8-11	5.67	0.31	0.25	8.03	9.67	2.06	986
3	11-13	7.01	0.46	0.30	9.91	12.07	2.52	1206
4	13-15	8.25	0.58	0.41	11.62	13.90	4.09	1957
5	15-18	9.35	0.87	0.53	13.73	16.57	8.95	4283
6	18-21	10.85	1.05	0.64	16.16	19.51	10.21	4886
7	21-24	12.10	1.17	0.74	18.57	22.54	9.65	4618
8	24-28	13.12	1.39	0.89	20.92	25.87	12.87	6160
9	28-34	15.09	1.53	1.06	24.62	30.88	14.56	6968
10	34-43	16.20	1.93	1.27	29.20	37.95	14.91	7136
11	43-55	18.17	2.36	1.51	35.32	47.97	9.74	4662
12	55-75	19.41	2.72	1.98	43.00	62.65	5.85	2800
13	75-	24.68	3.63	4.07	66.30	121.93	3.80	1819

No. of Sample Villages : 8400

No. of Sample Households : 9116

Average Size of Household : 5.25

Estimated No. of Persons : 47,859

(Information collected from different tables)

Table II.2 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 23rd round, (July 1968 - June 1969)

All India : Urban

Sr. No. (0)	Expenditure Group (1)	Cereals (2)	Pulses (3)	Edible Oil (4)	Total Food (5)	Total Expenditure (6)	% Distribution of Persons (7)	Est. No. of Persons (8)
1	0-8	2.21	0.09	0.11	3.39	5.45	0.07	32
2	8-11	4.14	0.36	0.27	7.06	9.59	0.83	373
3	11-13	6.00	0.63	0.45	9.65	12.17	0.85	382
4	13-15	6.90	0.83	0.58	11.38	14.08	1.82	818
5	15-18	7.77	0.73	0.72	13.16	16.62	4.32	1941
6	18-21	8.78	0.91	0.98	15.49	19.59	6.11	2745
7	21-24	9.90	1.13	1.10	17.80	22.62	7.07	3176
8	24-28	10.32	1.17	1.28	19.78	25.91	10.76	4834
9	28-34	11.76	1.36	1.57	23.57	31.07	13.70	6155
10	34-43	12.40	1.58	2.00	27.92	38.34	17.00	7637
11	43-55	13.46	1.83	2.57	33.98	48.70	12.99	5836
12	55-75	13.71	2.04	2.96	41.45	63.84	11.76	5283
13	75-	12.91	2.47	3.86	63.42	115.48	12.72	5715

No. of Sample Blocks : 4698

No. of Sample Households : 9458

Average Size of Household : 4.75

Estimated No. of Persons : 44926

(Information collected from different tables.)

Table II.3 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes
 - NSS 23rd round, (July 1968 - June 1969)

Maharashtra : Rural

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0- 8	4.11	0.57	0.11	6.18	7.54	0.25	7
2	8-11	5.86	0.47	0.36	8.18	10.27	0.49	14
3	11-13	4.82	0.34	0.23	8.91	12.37	1.41	40
4	13-15	7.11	0.52	0.57	10.83	13.33	3.98	113
5	15-18	7.91	0.90	0.69	13.10	16.44	11.87	337
6	18-21	9.07	0.98	0.86	15.21	19.35	10.88	309
7	21-24	10.66	1.07	0.87	17.91	22.44	10.57	300
8	24-28	11.32	1.42	1.24	20.52	25.85	14.87	422
9	28-34	13.04	1.82	1.20	23.85	30.66	13.63	387
10	34-43	14.58	1.92	1.59	27.33	38.01	14.76	419
11	43-55	16.17	2.49	2.02	34.35	48.67	9.40	267
12	55-75	17.83	2.64	2.33	38.68	65.55	4.05	115
13	75-	25.48	3.26	5.32	59.25	105.60	3.84	109

No. of Sample Villages : 624

No. of Sample Households : 519

Average Size of Household : 5.47

Estimated No. of Persons : 2839

(Information collected from different tables)

Table II.4 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 23rd round, (July 1968 - June 1969)

Maharashtra : Urban

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0-8	0	0	0	0	0	0	0
2	8-11	5.02	0.52	0.62	8.58	10.00	0.32	16
3	11-13	4.82	0.98	0.92	10.11	12.54	0.36	18
4	13-15	5.60	0.70	0.83	10.98	14.06	1.41	71
5	15-18	6.07	0.82	1.00	12.83	16.96	4.02	202
6	18-21	7.11	0.83	1.30	14.64	19.96	5.75	289
7	21-24	8.26	0.93	1.40	16.98	22.52	6.86	345
8	24-28	8.55	1.27	1.48	19.09	26.24	10.16	511
9	28-34	9.95	1.71	1.97	23.63	31.36	11.25	566
10	34-43	9.24	1.58	2.19	25.53	38.40	15.75	792
11	43-55	10.02	1.95	3.05	33.63	50.60	12.57	632
12	55-75	9.77	1.98	3.85	41.80	64.15	13.31	670
13	75-	9.03	2.14	4.82	65.24	116.60	18.24	918

No. of Sample Blocks : 591 No. of Sample Households : 1033
 Average Size of Household : 4.87 Estimated No. of Persons : 5031
 (Information collected from different tables)

Table II.5 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes
- NSS 23rd round, (July 1968 - June 1969)

Karnatak : Rural

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0-8	1.42	0.13	0.04	2.55	3.03	1.01	19
2	8-11	4.99	0.67	0.02	7.38	9.27	2.29	43
3	11-13	8.25	0.51	0.11	10.01	12.11	2.23	42
4	13-15	6.88	0.63	0.24	10.06	12.69	3.83	72
5	15-18	9.92	0.63	0.37	13.76	16.56	12.65	238
6	18-21	10.71	0.89	0.46	16.29	19.53	13.67	257
7	21-24	11.82	1.03	0.58	18.58	22.58	10.26	193
8	24-28	13.44	0.97	0.86	20.98	25.86	12.76	240
9	28-34	15.74	1.11	0.85	25.48	31.02	13.56	255
10	34-43	17.52	1.49	0.89	29.73	37.80	12.65	238
11	43-55	23.59	1.73	0.89	35.52	47.38	7.07	133
12	55-75	24.03	1.69	1.39	45.88	63.14	3.93	74
13	75-	27.19	3.11	3.39	64.08	122.33	4.09	77

No. of Sample Villages : 360

No. of Sample Households : 337

Average Size of Household : 5.58

Estimated No. of Persons : 1881

(Information collected from different tables).

Table II.6 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 23rd round, (July 1968 - June 1969)

Karnatak : Urban

Sr. No. (0)	Expenditure Group (1)	Cereals (2)	Pulses (3)	Edible Oil (4)	Total Food (5)	Total Expenditure (6)	% Distribution of Persons (7)	Est. No. of Persons (8)
1	0- 8	0	0	0	0	0	0	0
2	8-11	5.28	0.59	0.31	8.25	10.07	1.47	40
3	11-13	7.13	0.67	0.21	10.35	12.22	1.69	46
4	13-15	7.20	0.44	0.44	11.01	13.96	1.76	48
5	15-18	8.11	0.76	0.59	13.09	16.56	4.70	128
6	18-21	10.01	0.76	0.68	15.94	19.31	4.23	115
7	21-24	10.10	1.06	0.73	18.10	22.60	11.79	321
8	24-28	10.52	1.07	0.87	19.16	25.94	11.28	307
9	28-34	13.14	1.31	1.03	23.43	31.41	14.84	404
10	34-43	15.44	1.50	1.38	28.93	38.90	15.87	432
11	43-55	15.62	1.88	1.57	34.14	48.36	11.76	320
12	55-75	18.03	2.44	1.68	41.76	62.54	10.29	280
13	75-	14.20	2.22	2.74	66.26	117.80	10.32	281

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No. of Sample Blocks : 214 No. of Sample Households : 545
 Average Size of Household : 4.75 Estimated No. of Persons : 2720
 (Information collected from different tables)

Table II.7 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes
 - NSS 23rd round, (July 1968 - June 1969)

Punjab : Rural

Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0- 8	0	0	0	0	0	0	0
8-11	0	0	0	0	0	0	0
11-13	3.00	0.33	0.75	9.62	11.64	0.45	6
13-15	6.31	0.31	0.60	11.69	13.87	1.57	21
15-18	6.13	0.53	0.57	13.67	16.78	1.35	18
18-21	7.96	0.86	0.45	16.73	20.32	0.82	11
21-24	9.81	0.77	0.72	18.02	22.68	3.30	44
24-28	10.00	0.93	0.84	20.17	24.30	4.50	60
28-34	10.27	1.39	1.33	25.16	30.94	11.99	160
34-43	11.89	1.43	1.02	29.64	39.19	20.77	277
43-55	11.49	1.43	1.23	34.47	48.10	19.19	256
55-75	13.20	1.62	1.42	44.10	67.57	17.77	237
75-	18.59	2.91	3.18	69.89	117.54	18.29	244

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No. of Sample Villages : 192
 Average Size of Household : 5.85

No. of Sample Households : 228
 Estimated No. of Persons : 1334

(Information collected from different tables).

Table II.8 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 23rd round, (July 1968 - June 1969)

Punjab : Urban

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0-8	0	0	0	0	0	0	0
2	8-11	0	0	0	0	0	0	0
3	11-13	0	0	0	0	0	0	0
4	13-15	0	0	0	0	0	0	0
5	15-18	7.54	0.35	0.34	10.62	15.88	0.98	10
6	18-21	7.40	0.49	0.85	15.07	19.82	4.42	45
7	21-24	8.39	0.64	1.64	17.14	22.56	6.28	64
8	24-28	8.21	0.89	2.26	20.06	25.78	7.46	76
9	28-34	9.99	1.05	1.72	23.24	31.33	15.80	161
10	34-43	10.42	1.33	2.30	28.16	37.96	24.44	249
11	43-55	9.71	1.60	2.57	33.79	48.43	10.50	107
12	55-75	12.06	1.92	2.88	42.41	63.04	12.46	127
13	75-	11.75	2.06	3.54	60.33	103.06	17.66	180

No. of Sample Blocks : 94 No. of Sample Households : 224
 Average Size of Household : 4.55 Estimated No. of Persons : 1019
 (Information collected from different tables)

Table II.9 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes
- NSS 23rd round, (July 1968-June 1969)

Uttar Pradesh ; Rural

Sr. No. (0)	Expenditure Group (1)	Cereals (2)	Pulses (3)	Edible Oil (4)	Total Food (5)	Total Expenditure (6)	% Distribution of Persons (7)	Est. No. of Persons (8)
1	0- 8	1.70	1.74	0	2.73	3.28	0.29	15
2	8-11	5.20	0.44	0.42	8.22	9.92	2.63	136
3	11-13	6.81	0.82	0.37	9.87	12.14	2.25	116
4	13-15	8.17	1.03	0.54	12.05	14.18	3.76	194
5	15-18	8.77	1.84	0.69	13.92	16.65	10.36	535
6	18-21	10.13	1.88	0.76	15.99	20.13	12.39	639
7	21-24	10.87	2.34	0.85	18.35	22.53	8.56	442
8	24-28	11.96	2.70	0.92	20.51	26.38	13.24	683
9	28-34	14.03	2.59	1.22	24.10	30.91	14.77	762
10	34-43	14.05	3.47	1.34	28.56	37.83	12.45	643
11	43-55	16.38	3.64	1.72	34.43	48.48	9.80	506
12	55-75	16.49	3.99	2.61	40.22	65.37	5.67	293
13	75-	24.10	3.80	6.59	64.28	121.27	3.83	198

No. of Sample Villages : 1056
Average Size of Household : 5.05

No. of Sample Households : 1022
Estimated No. of Persons : 5161

(Information collected from different tables)

Table II.10 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Expenditure Classes - NSS 23rd round, (July 1968 - June 1969)

Uttar Pradesh : Urban

Sr. No. (0)	Expenditure Group (1)	Cereals (2)	Pulses (3)	Edible Oil (4)	Total Food (5)	Total Expenditure (6)	% Distribution of Persons (7)	Est. No. of Persons (8)
1	0-8	0	0	0	0	0	0	0
2	8-11	4.95	0.42	0.31	7.71	10.14	1.21	68
3	11-13	6.69	0.82	0.39	9.80	12.07	1.60	90
4	13-15	6.66	1.30	0.47	11.30	13.97	4.95	279
5	15-18	7.99	1.25	0.73	13.23	16.59	5.89	331
6	18-21	9.13	1.29	0.93	15.55	19.34	9.05	509
7	21-24	9.37	1.88	1.19	17.54	22.47	9.34	526
8	24-28	10.23	1.79	1.25	19.67	25.81	10.26	577
9	28-34	11.60	2.01	1.61	23.40	31.02	13.95	785
10	34-43	12.49	2.25	1.93	27.86	37.99	12.90	726
11	43-55	12.87	2.45	2.58	33.68	48.36	10.73	604
12	55-75	13.79	2.64	3.28	39.36	64.03	10.18	573
13	75-	13.83	3.56	3.75	62.87	117.26	9.94	559

No. of Sample Blocks : 565 No. of Sample Households : 1197
 Average Size of Household : 4.70 Estimated No. of Persons : 5626
 (Information collected from different tables)

Table II.11 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 43rd round, (July 1987 - June 1988)

All India : Rural

Sr. No. (0)	Expenditure Group (1)	Cereals (2)	Pulses (3)	Edible Oil (4)	Total Food (5)	Total Expenditure (6)	% Distribution of Persons (7)	Est. No. of Persons (8)
1	0-85	23.49	2.61	2.67	39.51	53.71	3.80	8514
2	65-80	31.20	3.60	3.80	54.44	73.25	5.68	12731
3	80-95	34.88	4.43	4.69	64.87	87.14	8.39	18799
4	95-110	38.42	5.03	5.60	74.44	102.56	10.54	23606
5	110-125	40.69	5.78	6.45	84.33	117.45	10.35	23180
6	125-140	42.12	6.21	7.16	93.17	132.58	9.24	20710
7	140-160	43.92	6.73	8.06	102.50	149.30	10.73	24035
8	160-180	45.24	7.33	8.89	113.69	169.67	8.41	18849
9	180-215	46.07	8.37	9.94	126.74	196.36	10.83	24253
10	215-280	47.92	9.63	11.67	147.88	242.77	10.72	24025
11	280-385	51.08	11.22	13.86	177.64	321.32	6.73	15069
12	385-	62.30	16.80	25.01	262.28	628.52	4.58	10261

No. of Sample Villages : 4184
Average Size of Household : 5.39

No. of Sample Households : 41597
Estimated No. of Persons : 224032

(Information collected from different tables)

Table II.12 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 43rd round, (July 1987 - June 1988)

All India : Urban

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0-90	25.66	3.72	4.49	54.34	74.97	5.06	5530
2	90-110	31.00	5.20	6.25	71.91	100.80	6.49	7097
3	110-135	34.01	5.76	7.61	85.27	122.35	10.67	11668
4	135-160	35.57	6.93	9.26	99.26	147.16	12.10	13229
5	160-185	36.88	7.81	10.90	111.88	172.55	10.13	11128
6	185-215	37.06	8.55	12.54	126.69	199.68	9.94	10867
7	215-255	38.31	9.96	14.52	145.12	234.08	10.97	11995
8	255-310	39.73	10.94	16.79	166.72	279.91	10.06	11003
9	310-385	40.92	11.94	18.87	191.07	343.88	8.35	9331
10	385-520	41.31	12.74	21.11	226.19	439.34	7.76	8487
11	520-700	42.57	14.95	25.19	280.06	593.56	4.09	4471
12	700-	50.59	17.06	32.48	383.92	1194.25	4.35	4759

No. of Sample Blocks : 2298

Average Size of Household: 4.82

No. of Sample Households : 22703

Estimated No. of Persons: 109365

(Information collected from different tables.)

Table II.13 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 43rd round, (July 1987 - June 1988)

Maharashtra : Rural

Sr. No. (0)	Expenditure Group (1)	Cereals (2)	Pulses (3)	Edible Oil (4)	Total Food (5)	Total Expenditure (6)	% Distribution of Persons (7)	Est. No. of Persons (8)
1	0-65	18.81	4.20	4.04	41.45	57.19	4.92	732
2	65-90	22.21	5.20	4.64	52.38	73.13	7.78	1157
3	90-95	25.47	6.13	5.90	62.56	87.35	10.54	1568
4	95-110	27.93	7.39	6.94	71.64	102.46	12.11	1801
5	110-125	30.27	7.90	8.07	80.56	117.85	10.89	1619
6	125-140	30.68	8.59	8.59	88.05	132.83	9.68	1440
7	140-160	32.11	9.34	10.28	99.47	148.96	10.97	1631
8	160-180	34.54	9.73	11.14	106.96	169.32	6.70	996
9	180-215	35.88	10.82	13.07	121.68	195.90	9.10	1354
10	215-280	36.77	11.49	14.61	137.39	239.56	8.52	1267
11	280-385	37.23	12.11	17.42	174.90	324.22	4.92	732
12	385-	52.25	17.36	28.59	234.24	893.63	3.87	575

No. of Sample Villages : 285
 Average Size of Household : 5.22
 No. of Sample Households : 2849
 Estimated No. of Persons : 14872
 (Information collected from different tables)

Table II.14 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 43rd round, (July 1987 - June 1988)

Maharashtra : Urban

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0-90	19.63	5.42	5.64	52.87	73.20	4.86	633
2	90-110	24.69	6.82	7.43	70.13	99.66	5.17	674
3	110-135	28.18	7.90	10.06	86.05	122.49	7.96	1038
4	135-160	28.68	9.14	10.84	97.92	148.14	8.58	1118
5	160-185	31.11	10.35	12.72	110.98	172.30	8.46	1103
6	185-215	31.14	9.97	15.41	132.45	200.31	8.38	1092
7	215-255	34.08	11.55	17.24	146.11	234.72	10.75	1401
8	255-310	34.99	12.27	19.77	170.32	279.98	11.68	1522
9	310-385	37.56	13.22	22.13	193.07	344.65	10.31	1344
10	385-520	37.01	14.62	25.46	235.75	438.06	11.00	1434
11	520-700	40.82	16.52	29.70	302.14	588.42	6.44	840
12	700-	50.82	18.56	36.22	381.54	1116.25	6.42	837

No. of Sample Blocks : 276 No. of Sample Households : 2741
 Average Size of Household : 4.76 Estimated No. of Persons : 13036

(Information collected from different tables).

Table II-15 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 43rd round, (July 1987 - June 1988)

Karnataka : Rural

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0- 65	18.86	3.28	2.36	37.84	53.64	7.33	640
2	65- 80	24.81	4.04	3.10	52.43	72.67	6.76	590
3	80- 95	27.19	4.89	3.59	62.23	87.71	9.30	812
4	95-110	30.27	5.35	3.97	72.19	102.77	10.98	959
5	110-125	34.65	5.98	4.52	81.85	117.63	11.22	980
6	125-140	37.73	6.53	5.63	92.69	132.02	9.66	843
7	140-160	39.10	7.63	5.85	102.38	148.58	10.25	895
8	160-180	45.39	8.94	7.00	118.21	170.95	8.04	702
9	180-215	44.49	10.19	7.75	124.40	194.67	9.53	832
10	215-280	47.59	10.93	10.05	145.59	239.56	7.97	696
11	280-385	56.46	13.55	12.09	171.73	322.44	5.75	502
12	385-	65.40	17.90	21.49	251.44	656.64	3.21	280

No. of Sample Villages : 163 No. of Sample Households : 1625
 Average Size of Household : 5.37 Estimated No. of Persons : 8731
 (Information collected from different tables)

Table II. 16 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 43rd round, (July 1987 - June 1988)

Karnatak : Urban

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0- 90	21.37	3.64	3.77	49.93	73.42	7.32	426
2	90-110	29.83	5.43	4.49	69.80	101.73	6.38	371
3	110-135	33.55	5.66	5.95	84.84	121.04	12.74	741
4	135-160	35.87	7.86	7.08	98.57	146.65	12.29	831
5	160-185	38.63	9.11	7.98	112.02	172.52	9.70	564
6	185-215	38.44	9.69	9.39	126.11	200.12	10.45	608
7	215-255	43.54	11.73	11.56	151.90	236.33	10.49	610
8	255-310	37.59	12.00	12.17	156.98	279.97	8.17	475
9	310-385	38.29	12.92	13.66	183.09	344.90	8.17	475
10	385-520	42.32	14.57	14.63	223.47	437.95	5.64	328
11	520-700	45.11	18.11	19.35	253.53	584.81	3.58	208
12	700-	55.37	13.25	21.97	346.91	1399.07	3.03	179

No. of Sample Blocks : 24

No. of Sample Households : 1143

Average Size of Household : 5.01

Estimated No. of Persons : 5316

(Information collected from different tables.)

Table II.17 : For Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS. 43rd round, (July 1987 - June 1988)

Punjab : Rural

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0- 65	11.86	2.23	4.45	30.32	57.27	0.37	28
2	65- 80	14.16	3.88	5.67	54.23	76.49	0.37	28
3	80- 95	18.85	4.18	5.78	62.43	90.25	1.69	129
4	95-110	20.17	5.31	7.19	72.46	103.97	4.31	329
5	110-125	23.31	5.43	7.96	83.08	117.87	6.35	485
6	125-140	23.23	5.68	8.78	91.25	133.14	6.30	481
7	140-160	23.54	6.25	10.38	103.23	148.39	8.50	649
8	160-180	24.99	6.96	10.44	113.09	169.73	9.52	727
9	180-215	26.20	7.31	10.76	131.07	199.26	14.58	1114
10	215-280	27.69	8.08	11.83	154.08	245.06	19.23	1469
11	280-385	29.74	9.56	12.19	183.03	321.64	14.92	1140
12	385-	37.11	13.08	22.13	254.16	609.89	13.88	1060

No. of Sample Villages : 134
 Average Size of Household : 5.7
 No. of Sample Households : 1339
 Estimated No. of Persons : 7639
 (Information collected from different tables)

(CONTINUED FROM PREVIOUS PAGE)

Table II.18 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 43rd round, (July 1937 - June 1938)

Punjab : Urban

Sr. No. (0)	Expenditure Group (1)	Cereals (2)	Pulses (3)	Edible Oil (4)	Total Food (5)	Total Expenditure (6)	% Distribution of Persons (7)	Est. No. of Persons (8)
1	0- 90	14.60	3.53	7.55	56.70	76.63	1.29	53
2	90-110	13.03	5.24	6.79	70.50	99.92	2.12	95
3	110-135	21.92	5.33	9.91	32.19	123.73	5.49	246
4	135-160	22.04	6.10	10.97	96.06	147.17	11.29	506
5	160-185	25.56	7.37	13.29	111.52	171.26	9.64	432
6	185-215	24.66	7.40	14.11	124.73	193.25	12.34	533
7	215-255	25.96	8.49	15.50	133.52	252.46	13.32	597
8	255-310	26.97	9.13	16.76	161.37	213.57	13.56	603
9	310-335	23.35	10.71	19.83	134.96	341.40	10.19	547
10	335-520	30.18	10.82	19.07	215.01	441.25	11.67	523
11	520-700	33.69	13.49	23.59	263.76	537.76	5.22	234
12	700-	36.07	14.17	21.83	344.03	871.63	3.33	174

No. of Sample Blocks : 96

No. of Sample Households : 949

Average Size of Household: 4.72

Estimated No. of Persons : 4433

(Information collected from different tables.)

Table II.19 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 43rd round, (July 1987-June 1988)

Uttar Pradesh : Rural

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0- 65	23.36	3.96	3.37	39.93	55.73	4.42	1308
2	65- 80	28.85	5.15	4.37	52.07	73.13	6.87	2036
3	80- 95	32.24	6.10	5.24	63.42	87.80	10.44	3094
4	95-110	33.71	7.01	6.25	70.78	102.45	12.08	3579
5	110-125	35.14	7.40	6.74	79.79	117.54	11.34	3358
6	125-140	37.27	8.14	7.38	89.05	132.31	9.19	2722
7	140-160	37.38	8.62	8.55	96.43	149.60	10.52	3117
8	160-180	37.84	1.40	9.13	107.20	170.01	8.22	2436
9	180-215	40.07	10.20	10.43	120.23	196.72	9.60	2844
10	215-280	42.98	12.61	12.41	140.41	243.21	9.22	2731
11	280-385	43.56	14.21	15.56	173.98	320.30	5.33	1580
12	385-	58.01	22.55	24.14	247.58	590.50	2.76	819

No. of Sample Villages : 528 No. of Sample Households : 5274
 Average Size of Household : 5.62 Estimated No. of Persons : 29624
 (Information collected from different tables.)

(INVESTIGATION OF CONSUMER EXPENDITURE)
Table II.20 : Per Person Consumer Expenditure (in Rs.) for 30 Days by Per Person Expenditure Classes - NSS 43rd round, (July 1937 - June 1938)

Uttar Pradesh : Urban

Sr. No.	Expenditure Group	Cereals	Pulses	Edible Oil	Total Food	Total Expenditure	% Distribution of Persons	Est. No. of Persons
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	0- 90	25.70	4.03	4.36	54.43	75.92	9.00	1048
2	90-110	23.03	5.99	6.78	68.90	100.77	12.03	1406
3	110-135	29.70	6.29	7.77	81.27	121.99	15.73	1337
4	135-160	32.17	7.76	9.31	95.33	147.45	12.93	1505
5	160-185	33.23	8.20	11.13	105.77	172.43	9.25	1077
6	185-215	32.62	9.61	12.93	120.51	200.28	8.13	947
7	215-255	33.27	11.26	15.10	143.90	234.30	9.39	1152
8	255-310	39.22	11.30	16.57	160.35	273.53	8.13	947
9	310-385	38.32	13.63	18.51	186.53	344.55	5.69	663
10	385-520	39.45	12.93	20.33	217.23	441.10	5.11	595
11	520-700	39.05	17.35	25.95	296.47	606.58	2.10	244
12	700-	34.52	14.07	24.75	363.01	1003.30	1.91	222

No. of Sample Blocks : 227

No. of Sample Households : 2245

Average Size of Household: 5.19

Estimated No. of Persons : 11643

(Information collected from different tables)

3. PULSES AND OILSEEDS IN THE STATE AND ITS AGRO-CLIMATIC REGIONS

3.1 In Maharashtra the performance of pulses and oilseeds is significantly different from the one at the all-India level, examined in the first chapter. But Maharashtra is also one of the few states where drought and scarcity conditions occur with some regularity as the rainfall in most parts is not only low but unreliable. This vulnerability, coupled with a meagre irrigation of around 12 per cent of cropped area contrasted with the 30 per cent for all India, makes the assessment of growth and trends also a difficult proposition. While at the all-India level about two-three years over the three decades appear rather bad, Maharashtra has a greater number of them spread over the period. To get at the underlying trends which we would like to identify as the result of the development of agriculture, one has to eliminate these 'unusual' years. If we do so, then growth in pulses and oilseeds appears rather satisfactory compared with the stagnation observed in the first chapter at the all-India level.

In Table 3.1 index numbers of major crop-groups are presented. The base of these index numbers is same as for all-India production index, viz., average of the triennium ending 1969-70. This makes the comparison with Table 1.1 for India easier and brings out the relative instability in the state. For all cereals, there is a clear upward trend for all-India barring 1965-66 and 1966-67 and any

Table 3.1 : Index Numbers of Production of Major Crop-groups in Maharashtra

(Base : Triennium ending 1969-70)

Year	All Cereals (45.05)	All Pulses (10.44)	All foodgrains (55.49)	All Oilseeds (10.54)	All Agri. Commodities (100)
1960-61	113.7	123.8	115.6	126.9	109.8
1961-62	97.0	105.1	98.5	123.5	95.5
1962-63	101.2	100.5	101.1	126.7	97.4
1963-64	99.0	104.9	100.1	122.1	99.0
1964-65	101.2	105.4	102.0	130.1	99.8
1965-66	69.1	79.7	71.1	77.4	75.0
1966-67	88.5	93.9	89.5	75.5	84.9
1967-68	99.8	97.7	99.4	102.1	95.9
1968-69	102.0	102.0	102.0	103.9	103.2
1969-70	98.2	100.3	98.6	94.0	100.9
1970-71	87.1	82.8	86.3	91.0	88.3
1971-72	76.8	73.2	76.1	80.8	83.6
1972-73	47.3	51.7	48.1	39.2	62.1
1973-74	110.0	105.4	109.1	92.3	104.0
1974-75	119.7	133.1	122.2	103.0	123.8
1975-76	144.6	141.0	143.9	113.3	134.1
1976-77	150.8	122.8	145.6	98.0	136.9
1977-78	165.7	127.4	158.5	101.5	149.2
1978-79	157.8	126.3	151.9	89.0	142.8
1979-80	162.4	127.4	155.9	95.2	142.5
1980-81	158.1	103.5	147.8	78.1	141.1
1981-82	168.7	128.3	161.1	104.5	160.8
1982-83	143.7	118.7	138.8	95.9	151.2
1983-84	173.7	154.0	170.0	137.5	160.4
1984-85	150.4	138.8	148.2	120.1	150.0
1985-86	132.8	142.2	134.6	85.2	138.1
1986-87	108.1	118.6	110.1	78.0	113.0
1987-88	163.5	172.5	165.2	120.6	158.4
1988-89	168.0	211.2	176.1	166.4	169.7
1989-90	198.7	214.8	201.7	159.1	201.2

(Figures in bracket are weights in the index number).

Source : Statistical Abstract of Maharashtra State and Epitome of Agriculture.

dip in the upward movement is not sizeable. For Maharashtra, the sixties appear stagnant (barring 1960-61 which has an exceptionally high production level not surpassed over the next 13 years) with 1965-66 and 1966-67 bad as at the all-India level. Then follow three consecutive scarcity years with index number for cereals getting progressively worse, reaching just 47.3 in 1972-73. This is also true across the board for pulses, oilseeds and all agricultural commodities. Only then follows a period of growth from mid-seventies to early eighties. But in eighties years 1982-83, 1985-86, 1986-87 are again rather bad.

Barring these 'unusual' years, pulses show a good growth compared with stagnation witnessed at the all-India level. But in oilseeds, after the decline in the sixties and the seventies the growth in eighties is marred by very low indices of 85 and 73 in 1985-86 and 1986-87, lowest for these two years among all the categories shown in the table.

3.2 To assess growth the procedure of selecting time-points based on averages of trienniums adopted for all-India is also adopted here with minor changes. The first two averages are centered on 1962-63, 1963-69 same as earlier but the third time point is centered on 1973-79 while the last is based on average of only two years, viz. 1987-88 and 1988-89 (in absence of three consecutive normal years) to avoid unusual years. The averages for the time-points and the annual compound growth rates are presented in

Table 3.2 along with population data and growth rates. First of all, we notice that for the entire period among the compound growth rates in the last column entitled 'overall' and based on initial and end time-points, growth rate in population at 2.32 per cent per annum exceeds but not largely so, the growth in cereals with a growth rate of 2.04 per cent while growth rate for pulses is a comfortable 2.45 per cent per annum. For oilseeds though, the rate is 0.57 per cent per annum only, well below the population growth rate. Looking at the decade-wise details, we see that stagnation-decline in the sixties is a feature of all categories and is particularly severe in oilseeds. Seventies show excellent growth rates for cereals (4.51 per cent per annum), pulses (2.42 per cent per annum) along with comfortable growth rates for 'foodgrains' and 'all commodities' categories but oilseeds decline marginally with growth rate -0.49 per cent per annum. In the eighties pulses show even better growth rate of 4.44 per cent and now oilseeds too, register growth rate of 4.41 per cent per annum while cereals slow down considerably with growth rate of 0.24 per cent per annum only.

It is remarkable that pulses show good growth in seventies as well as eighties but oilseeds only in the eighties after heavy decline in sixties and marginal declines in seventies. At all-India level, cereals growth rate was steady over 3 per cent but reduced to 2.19 per cent in eighties while oilseeds had growth rates near 1½ per cent per annum over the decades while pulses had half a per cent growth rate. But comparison with Maharashtra (especially

Table 3.2 : Growth Rates of Important Categories of Agricultural Production based on Production Index Numbers (Base triennium ending 1969-70) and Population Growth Rates in Maharashtra

S. No.	Averages of the trienniums centered at			Average 87-88 & 88-89	Growth Rates (% p.a.)				
	62-63	68-69	78-79		Sixties	Seventies	Eighties	Over all	
1	All Cereals	99.07	100.00	161.97	165.75	0.16	4.94	0.24	2.04
2	All Pulses	102.50	100.00	127.03	191.85	-0.57	2.42	4.44	2.45
3	All Foodgrains	99.90	100.00	155.43	170.65	0.02	4.51	0.99	2.12
4	All Oilseeds	124.10	100.00	95.23	143.50	-3.53	-0.49	4.41	0.57
5	All Agril. Commodities	97.30	100.00	144.43	164.05	0.46	3.74	1.35	2.07
6	Population (million) by Decennial Census of 1961-71, 81 and 1991	39.55	50.41	62.78	78.75	2.46	2.22	2.29	2.32

for pulses) is difficult. . because in Maharashtra there is no steadiness and with scarcity years interspersed over the period there is certainly greater uncertainty. And yet it must be admitted that gains in pulses are unmistakable and recovery in oilseeds worth studying in detail for the eighties.

3.3 The behaviour of farm harvest prices is examined in this section to consider whether these reflect the various shortages that must have been felt on account of state's production of crops in general and of pulses and oilseeds in particular. In Table 3.3 time-series data of farm harvest prices of various crops for the thirty year period are presented. Prices of tur and gram and groundnut (pods) are somewhat higher, around $1\frac{1}{2}$ times those for rice, wheat jowar and bajra at the beginning of the sixties but by late eighties these proportions go up to 2 to 3 times the prices for individual cereals. But this comparison is approximate and for more accurate assessment one may go into growth rates. This is done by presenting the relevant data and price growth rates in Table 3.4. The 'entire period' growth rates confirm that growth in prices of tur and gram is nearly 9 per cent per annum and $8\frac{1}{2}$ per cent for oilseeds compared with $5\frac{1}{2}$ to $6\frac{1}{2}$ per cent growth rates for cereals. In the sixties and seventies growth in prices of tur, gram and oilseeds remains high while eighties mark subdued growth rates for tur on par with coarse cereals like jowar and bajra around $4\frac{1}{2}$ per cent, but gram and oilseeds have growth rates of near 7 per cent on par with growth rate for rice and to some extent wheat (6.74 and 5.78 per cent per annum respectively).

Table 3.3 : Farm Harvest Prices of Principal Crops in Maharashtra (1960-61 to 1989-90)

(Price Rs. per Quintal)

Year	Rice (Paddy)	Wheat	Jowar	Bajri	Turdal	Gram	Cotton (Unginned)	Sugar Raw (Gur)	Groundnut
1960-61	38.69	51.17	35.18	49.92	59.24	45.25	97.76	38.18	61.22
1961-62	37.40	52.97	37.78	44.39	58.30	44.72	94.12	40.38	62.32
1962-63	38.21	51.25	40.30	45.17	60.60	43.30	113.54	57.74	62.16
1963-64	51.68	70.17	44.45	48.23	81.37	53.56	121.29	91.47	65.61
1964-65	65.94	102.02	48.63	73.97	95.59	101.57	131.01	88.71	87.56
1965-66	82.33	112.19	59.17	100.38	100.32	131.24	113.59	71.37	122.21
1966-67	76.39	116.55	59.79	81.06	153.59	153.08	141.66	140.29	123.96
1967-68	82.89	123.85	60.14	89.20	157.86	138.81	97.61	201.56	119.93
1968-69	76.97	113.71	62.91	81.84	122.20	103.15	129.06	135.40	131.41
1969-70	73.83	109.04	63.20	82.03	132.85	113.18	132.96	85.09	156.65
1970-71	78.28	100.14	77.94	76.14	130.99	100.23	164.35	102.44	158.43
1971-72	82.87	101.34	84.85	84.45	155.55	103.97	169.93	144.44	145.97
1972-73	107.73	135.34	107.26	134.33	209.70	156.59	191.65	197.43	219.60
1973-74	115.99	203.37	155.54	134.91	208.63	212.95	346.05	221.15	274.25
1974-75	129.31	203.37	169.94	146.02	234.83	211.02	283.82	212.70	257.93

Contd...

Table 3.3 : (Contd..)

(Price Rs. per Quintal)

Year	Rice (Paddy)	Wheat	Jowar	Bajri	Turdal	Gram	Cotton (Unginned)	Sugar Raw (Gur)	Groundnut
1975-76	136.99	155.38	140.85	127.28	188.74	162.31	202.12	178.17	201.40
1976-77	119.74	142.09	119.18	112.41	288.80	151.41	210.32	175.99	269.04
1977-78	112.13	145.91	108.99	119.06	397.82	211.32	411.62	152.66	255.42
1978-79	104.41	141.30	110.65	107.74	390.68	207.88	346.53	132.54	241.45
1979-80	117.82	161.62	113.83	113.99	400.25	223.52	351.62	297.98	309.33
1980-81	134.58	199.92	151.41	141.72	423.01	313.85	481.30	380.86	387.26
1981-82	145.45	204.14	143.50	138.44	444.84	290.39	485.83	227.55	390.14
1982-83	164.90	229.95	155.52	145.82	463.46	285.97	484.23	230.06	421.69
1983-84	163.75	207.69	155.65	140.17	446.95	303.28	493.62	262.20	406.80
1984-85	171.06	213.74	156.15	148.27	456.48	351.53	506.35	273.26	402.86
1985-86	180.73	232.02	154.80	165.32	450.13	369.43	486.90	294.16	423.93
1986-87	199.14	241.54	164.10	165.95	507.49	359.76	462.35	323.85	468.32
1987-88	206.97	251.52	162.89	168.08	558.54	392.04	473.45	336.13	517.94
1988-89	207.20	260.35	175.75	175.10	601.30	435.35	525.40	362.60	499.60
1989-90	224.50	293.45	184.85	199.40	713.65	520.10	589.30	347.50	656.30

Source : Season and Crop Reports and Directorate of Agriculture, Department of Agriculture.

Table 3.4 : Changes in Harvest Prices of Different Crops Over the Decades in Maharashtra

(Price Rs./Qtl.)

S. No.	Crops	Average Harvest Prices for Trienniums Centred on			Average 87-88 & 88-89	Compound Growth Rates (% p.a.)			
		62-63	68-69	78-79		Sixties	Seventies	Eighties	Overall
1	Rice (Paddy)	42.43	77.90	111.45	207.09	10.66	3.65	6.74	6.41
2	Wheat	58.13	115.53	150.11	255.94	11.21	2.65	5.78	5.99
3	Jowar	40.84	62.08	112.84	169.32	7.23	6.16	4.36	5.74
4	Bajri	45.93	84.36	113.60	171.59	10.66	3.02	4.44	5.30
5	<u>Turdal</u>	66.76	137.64	396.25	579.92	<u>12.82</u>	<u>11.15</u>	<u>4.09</u>	<u>8.85</u>
6	<u>Gram</u>	47.04	118.38	214.24	413.70	<u>16.63</u>	<u>6.11</u>	<u>7.17</u>	<u>8.90</u>
7	Cotton (unginned)	109.65	119.88	369.92	501.93	1.50	11.93	3.26	6.15
8	Sugar Raw (Gur)	63.20	140.68	194.39	349.37	14.27	3.29	6.37	6.94
9	<u>Groundnut (Pads)</u>	63.36	136.00	268.73	508.77	<u>13.58</u>	<u>7.05</u>	<u>6.95</u>	<u>8.51</u>

In this one discerns a relatively comfortable position for tur but not so far gram (and oil-seeds) in the eighties.

Although better price increases in pulses and oil-seeds are established in the above analysis, the different price increases within cereals and between two pulses (tur and gram) cause some disturbance. Another way to summarize and perhaps clinch the issue is to use the 1967-70 weights which form the basis of the agricultural production index. For each crop one can calculate price indices for the triennium averages relative to price in the triennium average of 1967-70. These indices for say different cereals can be averaged by weighting them with index number weights which reflect proportion of value of each crop to total crops. The weights of various crops in the index numbers of production are as follows.

Rice 11.52, wheat 4.81, jowar 21.12, bajra 5.80 which add upto 43.25 out of 45.05 for 'all cereals' ('other cereals' thus being negligible). Now price indices for individual cereals relative to price in average 1967-70 triennium can be calculated and averaged by using these weights (and then dividing by 43.25) to arrive at combined index for given cereals. For pulses the weights are tur 4.46, gram 1.32 adding to weight of 5.78 in 'all pulses' weight of 10.44, thus the two given pulses covering half the pulse production. In case of oilseeds, groundnut weight is 9.25 out of 'all oilseeds' weight of 10.54 and hence groundnut really represents the oilseeds group. Incidentally we may mention that cotton and sugarcane have weights of 8.43 and 21.64

respectively, to complete the picture. The point is, we can combine price indices of cereals and contrast them against the two combined pulses. By this procedure (Harest) price indices at the four time points are as follows (averages of triennium centered on the years mentioned for first 3 points, the last is average 1987-88 and 1988-89).

	1962-63	1968-69 (Base Year)	1978-79	1987-88 and 1988-89
Four cereals	59.53	100	159.38	255.91
Two pulses	46.50	100	263.47	405.37
One oilseed (groundnut)	46.59	100	197.60	374.09
Cotton	91.47	100	308.57	418.69
Sugarcane	44.92	100	138.18	248.34

Vis-a-vis cereals, greater price increases in pulses and oilseeds are obvious. Compared to 1968-69 (average), cereals prices are 2½ times by the end of the eighties but pulses and oilseeds are even higher at about four times. We do not again calculate various price growth rates as already the discussion is a bit detailed.

3.4 The discussion began with production index numbers and appropriately so as overall assessment can be done only with index numbers. But index numbers have a limited purpose and further, productions of cereals and pulses are traditionally treated as additive, to form 'foodgrains' so as we go to individual pulses, pulses as a whole and cereals as a whole can be compared along with groundnut which is nearly the entire oilseeds group as weighting pattern of

index numbers reveals. But one can look at traditionally grown safflower and emerging oilseeds of sunflower and soyabean separately, data on which may not be as complete as in the case of groundnut. In Table 3.5 time-series data for production of cereals, pulses and for groundnut are presented along with the productivities. Earlier comments about high frequency of 'unusual' years (mainly scarcity years) in Maharashtra apply here and we do not go into that aspect. But we see that cereals productivity and production really pick up in the mid-seventies and thus the green revolution came to Maharashtra somewhat late - by 6 to 8 years. Pulse production started crossing 1 million tonnes mark after mid-seventies and the productivity appears higher but only slightly so in these years till 1987-88 to 1989-90 where it is appreciably higher around 5 quintals/ha. The provisional estimates for 1990-91 and 1991-92 have lower productions and productivities of 4.43 and 3.10 quintals/ha. respectively, somewhat cautioning against undue optimism.

For groundnut, the decline of the sixties and seventies is clear here as observed earlier and productivity may be put around 6 to 6½ quintals but that too, is fluctuating. The rise in production and productivity is higher and consistent from 1983-84 till 1989-90 and barring 1985-86 and 1986-87, productivity is above 9 quintals/ha. reaching over 11 quintals/ha. by 1989-90. Thus the spurt in productivity in late eighties is obvious here and in fact the growth in production is more on account of productivity. The

Table 3.5 : Production and Productivity of Cereals, Pulses and Groundnut for Maharashtra

(Production in '00 tonnes,
Productivity in Qtls/ha)

Year	Cereals		Pulses		Groundnut (Pods)	
	Production	Productivity	Production	Productivity	Production	Productivity
1960-61	67549	6.37	9889	4.21	7999	7.39
1961-62	56034	5.32	8547	3.52	7821	7.00
1962-63	58739	5.60	8279	3.52	8069	7.05
1963-64	57887	5.48	8506	3.57	7805	6.87
1964-65	58870	5.59	8581	3.57	8405	7.49
1965-66	40373	3.84	6574	2.82	4731	4.23
1966-67	51846	4.82	7672	3.13	4534	4.65
1967-68	58291	5.48	8060	3.22	6425	6.99
1968-69	59132	5.61	8441	3.21	6575	7.09
1969-70	56523	5.50	8357	3.00	5839	6.50
1970-71	47367	4.59	6770	2.64	5863	6.49
1971-72	42632	4.22	5932	2.60	5045	6.04
1972-73	26840	2.88	4202	1.98	2076	2.54
1973-74	61769	5.57	8682	3.14	5657	7.46
1974-75	67901	6.38	11098	3.89	5895	7.37
1975-76	78687	7.20	11673	4.01	6925	8.11
1976-77	85717	7.72	10433	3.59	5828	6.44
1977-78	93539	8.42	10044	3.56	5809	6.72
1978-79	88935	8.02	10492	3.75	4867	6.07
1979-80	92113	8.22	10683	3.83	5428	7.37
1980-81	86465	7.88	8252	3.04	6860	6.99
1981-82	93364	8.28	9997	3.67	5030	7.47
1982-83	82527	7.48	9629	3.74	4770	7.29
1983-84	96941	8.36	12577	4.25	6060	9.04
1984-85	86215	7.62	11143	3.93	7300	9.90
1985-86	76149	6.78	11641	4.07	4687	7.06
1986-87	61691	5.70	9750	3.70	4352	6.66
1987-88	96504	8.70	14140	4.66	6983	9.84
1988-89	93475	8.43	17297	5.19	10056	10.97
1989-90	115070	10.32	17350	5.28	9790	11.46

provisional figure for 1990-91 is as good but for 1991-92 rather bad with production returning to mid-eighties level and productivity again lower at 7.36 quintals/ha, dampening the optimism, as we shall see later.

3.5 We now go into details of the production of pulses. In Table 3.6 time-series data on major pulses of tur and gram (in that order, the former 2 to 3 times important as a component than the latter, a situation opposite to that at the all-India level) and all remaining pulses like mung, udid, horsegram (kulthi) etc. clubbed together under 'other pulses' are presented. First of all, we note that tur productivity is traditionally nearly $1\frac{1}{2}$ times the productivity of gram. This is somewhat strange because gram is nearly the only pulse which receives any irrigation. Proportion of irrigated area for all pulses does not cross 4 per cent mark over the thirty years and nearly all that irrigation is taken up by gram which has its irrigation component increasing from 9 to 23 per cent. Tur is thus entirely rainfed and yet its productivity is higher. This may be due to the fact that tur is a kharif crop mainly taken in cotton-growing area and is relatively a longer duration crop straddling kharif and nearly half the rabi season like cotton whereas gram is rabi, shorter duration. Thus longer duration of tur must be contributing to this higher productivity. Further, irrigation to gram is likely to be of protective nature as Maharashtra receives its rainfall mainly in kharif seasons.

Barring the early sixties productivity of tur hovers

Table 3.6 : Production and Productivity of Tur, Gram and Other Pulses in Maharashtra

(Production in '00 tonnes,
Productivity in Qtls/ha)

Year	Tur		Gram		Other Pulses	
	Produ- ction	Produc- tivity	Produ- ction	Produ- ctivity	Produ- ction	Produ- ctivity
1960-61	4683	8.84	1341	3.33	3865	2.72
1961-62	3440	6.12	1364	3.38	3743	2.56
1962-63	3076	5.65	1440	3.27	3763	2.63
1963-64	3604	6.37	1149	3.06	3753	2.61
1964-65	3516	6.02	1213	3.38	3852	2.64
1965-66	2479	4.39	789	2.53	3306	2.27
1966-67	3075	5.11	1052	3.12	3545	2.34
1967-68	3040	5.03	950	2.76	4070	2.61
1968-69	3015	4.91	1183	3.33	4243	2.55
1969-70	2923	4.65	951	2.74	4483	2.47
1970-71	2711	3.95	866	2.79	3193	1.96
1971-72	2277	4.52	1320	3.04	2385	1.74
1972-73	1802	3.60	486	1.88	1914	1.40
1973-74	3223	5.17	1287	3.67	4172	2.33
1974-75	3772	6.14	1436	3.52	5890	3.21
1975-76	4078	6.04	1805	4.04	5792	3.23
1976-77	2940	4.61	1317	3.13	6176	3.34
1977-78	3320	5.15	1311	3.09	5413	3.09
1978-79	3894	5.87	1482	3.46	5116	2.99
1979-80	4067	6.03	1662	3.84	4954	2.95
1980-81	3184	4.95	1372	3.35	3696	2.22
1981-82	3927	5.99	1571	3.73	4499	2.73
1982-83	3989	5.86	1479	3.39	4161	2.88
1983-84	4870	6.66	2118	4.28	5589	3.22
1984-85	4852	6.40	2017	3.96	4274	2.73
1985-86	4513	5.97	1756	2.95	5372	3.42
1986-87	3724	4.90	1294	2.68	4732	2.97
1987-88	5346	6.86	2285	4.08	6509	3.84
1988-89	5974	6.66	4070	6.11	7246	4.30
1989-90	7120	7.48	3350	5.34	6880	4.02

between 4 and 5 quintals till end of seventies and in eighties, it is somewhat consistently closer to and at times higher than 6 quintals/ha. For gram, productivity is between 2 and 4 quintals throughout the series and only in 1988-89 it is as high as 6.11 quintals/ha and production is also high, in fact highest at 4.07 lakh tonnes, twice the level prevailing in earlier years, suggesting area increases too. In our analysis with end point of average 1987-88 and 1988-89, growth of production of gram may be somewhat exaggerated.

3.6 In Table 3.7 details of growth of various pulses are presented along with growth rates for the three decades and the entire period. The decline in sixties is strong for tur and gram but recovery in seventies and eighties is impressive for both. The decline in sixties for tur and gram with growth rates of -2 and -4 per cent per annum are to some extent compensated by growth in mung and urid (growth rates close to 2 per cent each) and remaining pulses so that pulses as a whole show growth rate of -0.31 per cent only. Recovery of tur and gram in seventies is expressed in good growth rates of 2.31 and 3.75 per cent per annum respectively so that all pulses show a satisfactory growth rate of 2.30 per cent per annum. The eighties growth rates of 4.40 per cent and 8.35 per cent per annum are again good but the latter rate for gram is somewhat exaggerated, as observed above. For the overall (or entire) period, tur and gram show growth rates of 2.05 and 3.52 per cent per annum, other pulses also reinforcing growth by registering a growth of 2.40 per cent per annum so overall pulses show a satisfactory growth

Table 3.7 : Production and Growth Rates of Pulses in Maharashtra

(Production in '00 tonnes)

	Average Production Centered on			Average 1987-88 and 1988-89	Per Year Rates (in '00 tonnes) and Growth Rates (% p.a.)			
	1962-63	1968-69	1978-79		Sixties	Seventies	Eighties	Overall
1 All Cereals	57553	57982	91529	94990	71.40 0.12	3354.70 4.67	364.30 0.39	1468.10 1.98
2 Tur	3373 (39.94)	2993 (36.12)	3760 (36.13)	5660 (36.01)	-63.40 - 1.98	76.80 2.31	200.00 4.40	89.70 2.05
3 Gram	1318 (15.61)	1028 (12.41)	1485 (14.27)	3181 (20.24)	-48.30 - 4.05	45.70 3.75	178.50 8.35	73.20 3.52
4 Mung	1092 (12.93)	1283 (15.48)	1563 (15.02)	N.A.	31.90 2.73	27.90 1.99	-	-
5 Udid	1181 (13.99)	1387 (16.74)	1606 (15.43)	N.A.	34.30 2.72	21.90 1.48	-	-
6 Other Pulses (including 4,5)	3753 (44.45)	4265 (51.47)	5161 (49.60)	6878 (43.76)	85.40 2.16	89.60 1.92	180.70 3.07	122.50 2.40
7 All Pulses	8444 (100)	8286 (100)	10406 (100)	15719 (100)	-26.30 - 0.31	212.00 2.30	559.20 4.44	285.30 2.47

rate of 2.47 per cent per annum. These rates are also consistent with the rates based on production indices, in Table 3.2.

The role of area changes in pulse production along with changes in productivity is brought out in Table 3.8 where growth rates for area-production-productivity are presented for the three decades along with the entire period. One sees that area gains have played an important part in growth of tur along with productivity and same is the case for gram. Thus for all pulses together, area growth rates are as important as productivity rates. For the category of 'all cereals' also incorporated in this table, growth is on account of productivity only and this is considerable as green revolution has occurred in cereals. For pulses and oilseeds area contribution will remain significant till high-yielding, fertilizer responsive (and hence adequately irrigated) varieties as in case of wheat and rice are developed.

3.7 Decline-revival of the main oilseed of groundnut is already commented upon. The spurt in productivity in the eighties especially attracts attention. Average outputs at the four time-points and the growth rates are as on the next page. (All time-points are triennium averages centered at the respective years except the last, which is average of two years only, viz. 1987-88 and 1988-89.)

The rates appearing are for the sixties, seventies and entire period respectively. Thus after heavy declines in sixties and the seventies, considerable recovery in the eighties results in a mild but positive growth rate for the

Table 3.8 : Area, Production and Productivity Growth Rates for Various Pulses for the Three Decades and the Entire Period

(Compound Growth Rates % p.a.)

Crop		Area	Production	Productivity
1 Tur	Sixties	1.68	-1.98	-3.60
	Seventies	0.71	2.31	1.59
	Eighties	2.53	4.40	1.82
	Overall	1.61	2.05	0.43
2 Gram	Sixties	-1.59	-4.05	-2.50
	Seventies	2.80	3.75	1.64
	Eighties	3.85	8.35	4.33
	Overall	1.86	3.52	1.63
3 Other Pulses	Sixties	2.52	2.16	-0.35
	Seventies	0.22	1.92	1.70
	Eighties	0.09	3.07	2.98
	Overall	1.14	2.47	1.31
4 All Pulses	Sixties	1.72	-0.31	-2.00
	Seventies	0.60	2.30	1.69
	Eighties	1.34	4.44	3.06
	Overall	1.14	2.47	1.31
5 All Cereals	Sixties	-0.06	0.12	0.18
	Seventies	0.06	4.67	4.61
	Eighties	-0.05	0.39	0.44
	Overall	0.21	1.98	1.77

Time-points	Production (Pods in '00 tonnes)	Per year absolute rates ('00 tonnes)	Compound growth rates (% per annum)
1962-63	7898	-	-
1968-69	6280	-269.8	-3.75
1978-79	5368	-91.2	-1.56
1987-88 and 1988-89 (average)	8520	331.7	4.98
Entire period		24.4	0.30

entire period, of 0.30 per cent per annum. This is due to the state's encouragement in cultivation of this crop by making canal water available in summer, apart from other encouragements. This is reflected in the sudden increase of irrigated component of area of this crop, which is traditionally unirrigated kharif crop. At the time of analysis irrigation data upto 1984-85 were available and it is relevant to point out that after less than two per cent irrigated area in early sixties and seventies, the component is as high as 23 per cent by 1984-85. This trend is partly reinforced by generally declining total (and hence rainfed) area under groundnut. But there are fluctuations too, probably due to lack of availability of water for summer irrigation in those years. Groundnut area and productions data since late seventies are presented in Table 3.9.

This table clearly reveals the decline of kharif groundnut area and rise of hundred per cent irrigated summer groundnut. Although summer groundnut does dip significantly for two-three years (probably on account of

Table 3.9 : Area and Production of Kharif and Summer Groundnut

(Area '00 ha, production '00 tonnes
of pods)

	Kharif		Summer		Total	
	Area	Production	Area	Production	Area	Production
1978-79	7780	4880	230	270	8010	5150
1979-80	7230	5380	240	340	7470	5720
1980-81	6653	4410	300	450	6953	4860
1981-82	6303	4350	430	680	6733	5030
1982-83	6170	4190	410	580	6580	4770
1983-84	6130	5260	570	800	6700	6060
1984-85	6270	5730	1100	1570	7370	7300
1985-86	6260	4220	370	470	6630	4690
1986-87	6120	3770	410	580	6530	4350
1987-88	5940	5280	1080	1520	7020	6800
1988-89	6610	6000	2560	4060	9170	10060
1989-90	6390	6190	2150	3600	8540	9790
1990-91	-	-	-	-	8810	9920
1991-92	-	-	-	-	7420	5460

Source : Epitome of Agriculture (1990-91) by Department of Agriculture, Govt. of Maharashtra upto 1989-90. Handbook of Basic Statistics 1991 and 1992, Directorate of Economics and Statistics, Govt. of Maharashtra for the last two years. Summer groundnut data for 1980-81 to 1983-84 in earlier Epitomes show very high figures. But the present lower figures are accented because they are from a later Epitome and further, area for summer groundnut in Season and Crop Reports of 1980-81 and 1981-82 tally with 1990-91 Epitomes figures.

reduced availability for summer irrigation after rabi cultivation), increasing importance of summer groundnut is quite obvious from this table. Productivity of summer groundnut is around 15 quintals/ha in pods, which is way above the productivities for overall groundnut observed in Table 3.5. On the whole, an upsurge of summer groundnut is unmistakable. The year 1991-92 with provisional production level of 5.46 lakh tonnes much below the level of previous three years of 10 lakh tonnes is again a reminder of the vulnerability of the crop.

Decadewise area-production-productivity growth rates for groundnut over the time-points mentioned, are as follows :

(Growth rates % per annum)

	<u>Area</u>	<u>Production</u>	<u>Productivity</u>
Sixties	-3.49	-3.75	-0.27
Seventies	-1.32	-1.56	-0.24
Eighties	0.16	4.98	4.81
Entire period	-1.29	0.30	1.61

Thus the entire period rates result after many changes in this crop whose summer and hence irrigation component has suddenly changed in the eighties. Its loss in kharif area is probably attributable to the successful crop of kharif jowar which is nearly entirely rainfed. Hybridization of kharif jowar and considerable gains in production-productivity and also of area of this widely grown crop is a feature of the period under consideration and crops like kharif groundnut have lost area to this crop.

3.8 Data on some of the emerging oilseeds are presented in Table 3.10. These are safflower, sunflower and soyabean. Safflower is a traditional crop and unlike groundnut it is a rabi crop and is often taken mixed with rabi jowar. Table reveals that its area and production are increasing over the years and production is as large as 3.6 lakh tonnes compared to near 10 lakh tonnes for groundnut pods.

Sunflower and soyabean are relatively recent, and yet by 1990 their production levels are 2 and 1 lakh tonnes respectively. These three oilseeds may come to form a substantial part of total oilseeds in future. Other oilseeds are sesamum and linseed whose production together barely crosses 1 lakh tonnes and whose productivity is very low at 2 to 2½ quintals/ha compared to 4-6 quintals per hectare for safflower, sunflower and soyabean.

We have examined the growth of pulses and oilseeds in the state and one wonders why pulses have a better performance in the state vis-a-vis stagnation at the all-India level. During the sixties though tur and especially gram suffered, other pulses forming nearly half the pulse production, have done well so that for all pulses a mild decline of -0.31 per cent per annum results. The seventies and eighties register good growth rates although part of it must be 'recovery' from the decline in the sixties. But for the entire period a growth rate of 2.47 per cent per annum is indeed satisfactory. This is partly exaggerated as the year 1988-39 included in the last time-point is exceptionally good especially for gram as mentioned earlier but 1989-90

Table 3.10 : Area and Production of Some Emerging Oilseeds in Maharashtra

(Area in '00 ha, Production in '00 tonnes)

	Safflower		Sunflower		Soyabean	
	Area	Production	Area	Production	Area	Production
1968-69	3850	770	-	-	-	-
1969-70	3740	280	-	-	-	-
1970-71	4050	1020	-	-	-	-
1971-72	5310	1340	-	-	-	-
1972-73	3670	840	-	-	-	-
1973-74	4370	1560	-	-	-	-
1974-75	5030	1940	-	-	-	-
1975-76	4730	1840	-	-	-	-
1976-77	4880	1810	-	-	-	-
1977-78	4940	1360	-	-	-	-
1978-79	4860	1680	-	-	-	-
1979-80	4890	1660	-	-	-	-
1980-81	4800	1740	300	200	-	-
1981-82	4940	2360	510	210	-	-
1982-83	4510	2260	700	380	-	-
1983-84	4490	2850	1230	500	-	-
1984-85	6100	3640	3250	1700	350	120
1985-86	6190	2490	3250	750	560	180
1986-87	5840	1970	3140	840	550	200
1987-88	7080	3280	4050	1960	770	240
1988-89	5900	3300	4560	1540	870	560
1989-90	6150	3600	3460	2050	1270	1000

Source : Epitome of Agriculture, Dept. of Agriculture,
Government of Maharashtra

and 1990-91 have productions of same order (but not for 1991-92). So the trend is upwards, but as for all cereals and indeed all other crops, sudden dips are a feature of Maharashtra's agriculture and this uncertainty must be kept in mind. Another explanation of good growth in pulses is the fact that Maharashtra has tur as the main pulse which is entirely rainfed and with the paucity of irrigation in the state, in many areas (especially the cotton tracts) rainfed cultivation has no option. Tur is a somewhat longer duration crop than other kharif crops and goes well with longer duration rainfed cotton. It was observed that harvest prices of pulses have also increased more than cereals crops, so that factor also keeps the attraction for this crop and area increase is as responsible as productivity increases. Late eighties rise can also be attributed to various schemes like National Pulses Development Programme (NPDP). This is also true of oilseeds where National Oilseeds Development programme is also implemented in this period only. But oilseeds growth is mainly due to summer groundnut which is entirely irrigated. It is to be seen whether sunflower and soyabean, the emerging oilseeds keep up the initial upsurge.

3.9 It is pertinent to examine growth in the agro-climatic zones of the state. For this a brief outline of the characteristics of these regions is necessary. This is done with the help of Table 3.11 while the details of cropping pattern in the initial and end time-points are presented in Table III.1 and III.2 at the end of the present chapter, for information. At the time of analysis, districtwise details of area, production etc., were available only upto 1937-88 (though state-level data were available upto 1933-89 and the year is

Table 3.11: Some Important Characteristics of Agro-Climatic Regions

Sr. No.	Item	Region	Konkan	Nasik	Pune	Kolha- pur	Auran- gabad	Amra- oti	Nagpur	State
			I	II	III	IV	V	VI	VII	
1.	Geographical Area (%)		9.42	13.54	15.49	8.90	20.90	14.97	16.66	100.00
2.	Net Sown Area (%)	AV.1967-70	4.79	12.99	19.06	9.45	26.32	16.35	11.01	100.00
		AV.1980-82	4.35	13.38	18.52	8.98	27.03	16.73	11.00	100.00
3.	Gross Cropped Area (%)	AV.1967-70	4.72	13.20	19.13	9.37	26.38	15.76	11.41	100.00
		AV.1980-82	4.38	13.49	18.63	8.93	27.20	16.30	11.14	100.00
4.	Net Irrigated Area (%)	AV.1967-70	1.74	14.09	27.04	13.57	19.23	3.54	20.78	100.00
		AV.1980-82	1.37	14.30	27.16	13.09	21.78	5.44	16.86	100.00
5.	Gross Irrigated Area (%)	AV.1967-70	1.71	16.17	27.69	14.09	18.72	3.21	18.39	100.00
		AV.1980-82	1.34	15.61	26.81	12.59	22.60	5.72	15.35	100.00
6.	Net Irrigated/ Net Sown (%)	AV.1967-70	2.69	8.03	10.50	10.62	5.41	1.60	13.96	7.40
		AV.1980-82	3.33	11.30	15.50	15.41	8.51	3.44	16.18	10.57
7.	Gross Irrigated/ Gross Cropped (%)	AV.1967-70	2.90	9.82	11.61	12.06	5.69	1.63	12.93	8.02
		AV.1980-82	3.82	14.32	17.81	17.46	10.28	4.34	17.06	12.38
8.	Cropping Intensity (%)	AV.1967-70	3.66	7.04	5.66	4.34	5.12	1.49	9.03	5.27
		AV.1980-82	9.11	10.61	10.39	9.03	10.39	6.85	11.02	9.72
9.	Irr. Cropping Intensity (%)	AV.1967-70	11.81	30.88	16.86	18.54	11.13	3.32	10.03	7.40
		AV.1980-82	25.19	40.22	26.90	23.57	33.34	35.07	17.00	28.53

incorporated in the last time-point) and as no three successive 'normal' existed, we have taken the last time point as average of two years only and that too, of years rather distant from each other, viz. 1984-85 and 1987-88. This would change somewhat the picture but the essential conclusions, in our opinion, would not be greatly affected. Such lags in say provisional and final estimates, between state-level and district level estimates and between Total cropping pattern and irrigated cropping pattern are normal in agricultural statistics and the problems arising therefrom can be avoided by evaluating data keeping these aspects in mind.

The regional characteristics can be identified as follows :

- Region I : Konkan : Comprises of districts Thane, Raigad, Ratnagiri and Sindhudurg. This is a high rainfall zone with half the cropped area under rice. It has also nachani and horticultural crops. Pulses and oilseeds have negligible area in relation to state as the region covers just 5 per cent of state cropped area and is the smallest in the state. Has little irrigation.
- Region II; Nasik Region : Comprises of districts Nasik, Dhulia and Jalgaon covering 14 per cent of state cropped area and similar percentage of state irrigated area. Apart from widely grown bajra it has kharif and rabi jowar and wheat among cereals. Pulses cover 14 per cent of its cropped area and produces similar

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Sr. No.	Item	Region	Konkan	Nasik	Pune	Kolha- pur	Auran- gabad	Amra- oti	Nagpur	State
			I	II	III	IV	V	VI	VII	
1.	Geographical Area (%)		9.42	13.54	15.49	8.90	20.90	14.97	16.66	100.00
2.	Net Sown Area (%)	AV.1967-70	4.79	12.99	19.06	9.45	26.32	16.35	11.01	100.00
		AV.1980-82	4.35	13.38	18.52	8.98	27.03	16.73	11.00	100.00
3.	Gross Cropped Area (%)	AV.1967-70	4.72	13.20	19.13	9.37	26.38	15.76	11.41	100.00
		AV.1980-82	4.38	13.49	18.63	8.93	27.20	16.30	11.14	100.00
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		AV.1980-82	1.37	14.30	27.16	13.09	21.78	5.44	16.86	100.00
5.	Gross Irrigated Area (%)	AV.1967-70	1.71	16.17	27.69	14.09	18.72	3.21	18.39	100.00
		AV.1980-82	1.34	15.61	26.81	12.59	22.60	5.72	15.35	100.00
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		AV.1980-82	3.82	14.32	17.81	17.46	10.28	4.34	17.06	12.38
8.	Cropping Intensity (%)	AV.1967-70	3.66	7.04	5.66	4.34	5.12	1.49	9.03	5.27
		AV.1980-82	9.11	10.61	10.39	9.03	10.39	6.85	11.02	9.72
9.	Irr. Cropping Intensity (%)	AV.1967-70	11.81	30.88	16.86	18.54	11.13	3.32	10.03	7.40
		AV.1980-82	25.19	40.22	26.90	23.57	33.34	35.07	17.00	28.53

incorporated in the last time-point) and as no three successive 'normal' existed, we have taken the last time point as average of two years only and that too, of years rather distant from each other, viz. 1984-85 and 1987-88. This would change somewhat the picture but the essential conclusions, in our opinion, would not be greatly affected. Such lags in say provisional and final estimates, between state-level and district level estimates and between Total cropping pattern and irrigated cropping pattern are normal in agricultural statistics and the problems arising therefrom can be avoided by evaluating data keeping these aspects in mind.

The regional characteristics can be identified as follows :

- Region I : Konkan : Comprises of districts Thane, Raigad, Ratnagiri and Sindhudurg. This is a high rainfall zone with half the cropped area under rice. It has also nachani and horticultural crops. Pulses and oilseeds have negligible area in relation to state as the region covers just 5 per cent of state cropped area and is the smallest in the state. Has little irrigation.
- Region II; Nasik Region : Comprises of districts Nasik, Dhulia and Jalgaon covering 14 per cent of state cropped area and similar percentage of state irrigated area. Apart from widely grown bajra it has kharif and rabi jowar and wheat among cereals. Pulses cover 14 per cent of its cropped area and produces similar

percentage of state pulses production. Groundnut covers 14 per cent of its cropped area but it has reduced to nearly eight per cent over the years although irrigated groundnut area is on the increase which is mainly summer groundnut.

Region III ; Pune Region : drought-prone but traditionally canal-well irrigated region comprising of Ahmednagar, Pune and Solapur districts. Covers 19 per cent of state cropped area and 27 per cent of state irrigated area and this is an important sugar-belt. Pulses cover 7 per cent of its cropped area while groundnut covers less than 4 the percent which has decreased over/years. Irrigated summer groundnut has increased in this region also.

Region IV : Kolhapur Region : fertile western Maharashtra comprising of Sangli, Satara and Kolhapur districts. Covers 9 per cent of state cropped area but nearly 15 per cent of state irrigated area and is a sugar-belt like the third region. Pulses and groundnut cover 8 to 10 per cent each, of its cropped area but there is no upsurge of summer groundnut.

Region V : Aurangabad Region (Marathwada) covers 27 per cent of state gross cropped area and falls in the assured rainfall zone and has districts of Aurangabad, Jalna, Parbhani, Bhir, Nanded, Osmanabad and Latur. Major pulse area, covering 17 to 19 per cent of its cropped area. Emerging

irrigated area, covering 20 per cent of state irrigated area. Upsurge of irrigated groundnut significant.

Region VI : Amraoti Region : Cotton-kharif jowar tract with districts Buldhana, Akola, Amraoti and Yeotmal. Covers 15 per cent of state-cropped area but just 3 to 5 per cent of state irrigated area. Hybridization of kharif jowar has caused a minor revolution in this area. Important pulse area, covering 11 per cent of its cropped area initially, rising to 19 per cent over the years. This is also a minor revolution. Groundnut 4 per cent of its cropped area, has reduced to 2 per cent over the years.

Region VII : Nagpur region containing high rainfall areas and rice-kharif and rabi jowar crops. Covers 11 per cent of state cropped area and 17-18 per cent of state irrigated area. Rice area is nearly one-fourth of its cropped area and another one-fourth is jowar area divided nearly equally between kharif and rabi components. Pulses cover 15 per cent of its area but groundnut is less than 2 per cent.

3.10 After this introduction we examine first growth of pulses in various regions. In Table 3.12, regionwise details of growth in pulses are presented. This table gives area and production details for initial and end-points and gives grown rates, productivities, irrigated components etc., in this single table. Below productivity data, irrigated area

Table 3.12 : Growth of 'All Pulses' for Important Regions over the Entire Period

(Initial Point: Av. 1961-62 to 1963-64, End Point: Av. 1984-85 and 1987-88)

Region	Area ('00 ha.)		Production ('00 tonnes)		Productivity (Qt./ha.)		Absolute change (p.a.) and Growth Rates (% p.a.)			
	Initial Pt.	End Pt.	Initial Pt.	End Pt.	Initial Pt.	End Pt.	Area	Production	Productivity	Irr.Area
II	3719 (15.59)	4239 (14.62)	1372 (16.30)	1795 (14.20)	3.69 (1.15)*	4.18 (5.00)*	24 0.61	18 1.15	- 0.54	9 8.71
III	2387 (12.10)	2565 (8.74)	826 (9.80)	955 (7.60)	2.86 (5.75)	3.72 (6.74)	-14 -0.50	6 0.62	- 1.13	4 1.85
V	8616 (36.12)	10507 (35.82)	2468 (29.20)	4447 (35.20)	2.86 (1.32)	4.23 (3.41)	80 0.85	84 2.54	- 1.68	13 6.29
VI	3292 (13.80)	6431 (21.93)	1696 (20.10)	3157 (25.00)	5.15 (0.14)	4.91 (1.35)	134 2.39	62 2.68	- -0.20	3 15.05
VII	3338 (13.99)	3090 (10.54)	1322 (15.70)	1386 (11.00)	3.96 (0.24)	4.49 (1.15)	-11 -0.33	3 0.20	- 0.53	1 7.60
State	23855 (100)	29330 (100)	8444 (100)	12641 (100)	3.54 (1.73)	4.31 (3.60)	233 0.88	179 1.73	- 0.84	30 4.61

* These figures in brackets are percentage of crop area irrigated. End point for irri. data are av. 1980-81 and 1981-82. Other details of irrigation given in the last column. Absolute changes per annum are in '00 ha. for area and '00 tonnes for production.

component of crop is given while absolute per year irrigated area increases (in hundred ha.) as well as growth rates of irrigated area are available in the last column. Three other columns in the last section, give area and production per year absolute rates so that relative magnitudes are also kept track of, and growth rates and contributions to state are properly assessed. It may also be mentioned that any region which is not a major producer is excluded from this table so that the table is less cluttered. From this table we see that Marathwada and Amraoti regions have made tremendous contribution to growth of pulses, with their growth rates of production of 2.54 and 2.68 per cent per annum respectively. Area growth rate however, is about 1 per cent for the former but 2.89 per cent in case of the latter. It is not immediately clear why productivity gains explain the growth in Marathwada but area gains in Amraoti region. But farmers preference for tur is clear. In absolute terms most of the state increase is due to these two regions. In fact these two regions have come to cover 60 per cent of pulse production and half the area. Importance of Nasik region as a pulse producer has declined. We note that with the changed end-point, state level growth rate of all pulses reduces to 1.73 per cent, equally accounted by area and productivity. But the essential conclusions, in our opinion, hold. The decadewise-regionwise growth rates for all pulses are presented in Table 3.13. We note that good growth rate in seventies continues in eighties for major pulse area of Marathwada (Region V) and Amraoti (Region VI) as well as minor pulse area of Region VII. But in Western regions of Nasik and Pune (Region II and III) there is a decline in the eighties.

Table 3.13 : Area Production and Productivity Compound Growth Rates for the Three Decades for Important Regions in Maharashtra (1960-61 to 1987-88) Crop : All Pulses

(Growth Rate per cent p.a.)

Region	Decade	Area	Production	Productivity
II	Sixties	2.62	1.08	-1.50
	Seventies	0.27	2.40	2.12
	Eighties	-0.53	-0.44	0.09
III	Sixties	1.81	1.47	-0.33
	Seventies	0.81	1.20	0.39
	Eighties	-4.01	-0.83	3.31
V	Sixties	2.64	2.23	-0.40
	Seventies	0.44	2.65	2.20
	Eighties	-0.03	2.63	2.66
VI	Sixties	1.36	-3.55	-5.31
	Seventies	2.16	3.73	1.54
	Eighties	4.71	6.50	1.71
VII	Sixties	-0.80	-4.55	-3.78
	Seventies	-0.86	0.42	1.29
	Eighties	0.77	3.87	3.08
State	Sixties	1.72	-0.31	-2.00
	Seventies	0.60	2.30	1.70
	Eighties	0.60	2.63	2.02

Similar analysis for Tur is presented in Table 3.14. We see that Marathwada and Amraoti regions (Regions V and VI) have made contributions that explain the good state-level growth in absolute terms. Changes in other regions simply cancel each other, Pune region, which produced 10 per cent of tur, now has a share of just 3 per cent. In Marathwada, best growth rate of 3.91 per cent is nearly equally accounted by area and productivity growth rates of 1.66 and 2.25 per cent per annum respectively whereas in Amraoti area rate is 2.60 per cent but production rate is 1.75 per cent, productivity declining by about 1 per cent per annum. The tremendous attraction for tur in this cotton tract (in spite of loss in productivity) is obvious and it seems the better-than-cereals price for tur has acted as a sufficient incentive in this area in absence of perhaps, other options. In Table 3.15 decadewise regionwise growth rates of tur are presented. Consistency of growth in tur in Marathwada (Region V) stands out and although area played greater role initially, recently productivity gains appear to dominate the production growth rates which are around 4 per cent for every decade throughout the period. But in Amraoti and Nagpur regions of Vidarbha, considerable growth occurs only after very bad sixties. Decline of Pune-Region III as tur producer is also brought out here.

3.11 Gram presents an interesting aspect of growth in pulses, details of which are set out in Table 3.16. We see that area has increased everywhere and so also production and this is accompanied by increase in irrigated area everywhere so that at the state level irrigated component of area increases

Table 3.14 : Growth of Tur for Important Regions over the Entire Period

(Initial Point: Av. 1961-62 to 1963-64, End Point: Av. 1984-85 and 1987-88)

Region	Area ('00 ha.)		Production ('00 tonnes)		Productivity (Qtl./ha.)		Absolute Change (p.a.) Growth Rate (% p.a.)			
	Initial Pt.	End Pt.	Initial Pt.	End Pt.	Initial Pt.	End Pt.	Area	Production	Productivity	Irrigation Area
III	649 (11.64)	412 (5.37)	344 (10.20)	170 (3.30)	5.30 (N.A.)*	4.12 (4.33)*	-10 <u>-1.91</u>	-7 <u>-2.96</u>	- <u>-1.07</u>	- <u>-</u>
V	2070 (37.15)	3046 (39.63)	714 (21.20)	1757 (34.40)	3.45 (N.A.)	5.80 (1.29)	42 <u>1.66</u>	44 <u>3.91</u>	- <u>2.21</u>	- <u>-</u>
VI	1364 (24.48)	2493 (32.45)	1293 (38.30)	1946 (38.20)	9.48 (N.A.)	7.80 (0.00)	48 <u>2.50</u>	28 <u>1.75</u>	- <u>-0.83</u>	- <u>-</u>
VII	861 (15.46)	1081 (14.06)	616 (18.30)	822 (16.20)	7.16 (N.A.)	7.61 (0.00)	9 <u>0.97</u>	9 <u>1.23</u>	- <u>0.26</u>	- <u>-</u>
State	5572 (100)	7685 (100)	3373 (100)	5099 (100)	6.05 (0.63)	6.63 (1.28)	90 <u>1.38</u>	73 <u>1.77</u>	- <u>0.39</u>	- <u>4.74</u>

* These figures in brackets are percentage of crop area irrigated. End point for Irr. data are av. 1980-81 and 1981-82. Other details of irrigation given in the last column. Absolute changes per annum are in '00 ha. for area and '00 tonnes for production.

Table 3.15 : Area Production and Productivity Compound
Growth Rates for the Three Decades for Important
Regions in Maharashtra (1960-61 to 1987.88)
Crop : Tur

(Growth Rates per cent p.a.)

Region	Decade	Area	Production	Productivity
III	Sixties	4.08	0.38	-3.07
	Seventies	0.25	-1.49	-1.74
	Eighties	-9.12	-7.79	-7.79
V.	Sixties	2.92	4.04	1.09
	Seventies	1.11	3.37	2.24
	Eighties	1.39	4.51	3.08
VI	Sixties	1.27	-5.31	-6.49
	Seventies	0.97	2.43	1.45
	Eighties	5.91	6.84	0.69
VII	Sixties	-0.71	-5.67	-5.00
	Seventies	-0.26	2.35	2.62
	Eighties	4.02	5.56	1.48
State	Sixties	1.68	-1.98	-3.60
	Seventies	0.71	2.31	1.59
	Eighties	2.03	4.14	2.07

Table 3.16 : Growth of Gram for Important Regions over the Entire Period

(Initial Point : Av. 1961-62 to 1963-64, End Point : Av. 1984-85 and 1987-88)

Region	Area ('00 ha.)		Production ('00 tonnes)		Productivity (qtl./ha.)		Absolute change and Growth Rate (% p.a.)			
	Initial Pt.	End Pt.	Initial Pt.	End Pt.	Initial Pt.	End Pt.	Area	Production	Productivity	Irri. Area
II	349 (9.10)	742 (13.89)	118 (9.00)	349 (16.20)	3.38 (12.22)*	4.69 (42.23)*	17 3.26	10 4.72	- 1.41	6 7.37
III	659 (17.18)	1025 (19.17)	203 (15.80)	494 (23.00)	3.15 (17.85)	4.82 (21.79)	16 1.89	12 3.76	- 1.84	3 2.01
IV	314 (8.17)	550 (10.30)	123 (9.40)	250 (11.60)	3.93 (25.18)	4.54 (21.31)	10 2.42	5 3.05	- 0.62	Neg. 0.27
V	1775 (46.26)	1884 (35.25)	604 (45.30)	661 (30.70)	3.40 (5.43)	3.51 (16.96)	5 0.25	2 0.38	- 0.13	11 6.42
VI	392 (10.21)	607 (11.36)	129 (9.80)	227 (10.50)	3.29 (1.19)	3.73 (12.97)	9 1.88	4 2.41	- 0.52	3 14.09
VII	331 (8.62)	497 (9.29)	175 (13.30)	154 (7.10)	5.30 (2.22)	3.09 (7.16)	7 1.74	-1 -0.50	- -2.26	1 7.41
State	3838 (100)	5345 (100)	1318 (100)	2151 (100)	3.43 (9.04)	4.02 (19.27)	64 1.42	35 2.11	- 0.68	25 4.63

* These figures in brackets show percentage crop area irrigated. End point for Irri. data are av. 1980-81 and 1981-82. Other details of irrigation given in the last column. Absolute changes per annum are in '00 ha. for area and '00 tonnes for production.

from 9 to 19 per cent. Major gram producer of Region V of Marathwada has a poor growth rate of 0.38 per cent per annum and its production share in the state gram production has reduced from 46 to 30 per cent over the years. Region IV of Kolhapur which did not figure in total pulses, gets included here as its share in production crosses 10 per cent of the state production (a criterion we applied in including a region in these tables). Western regions of Nasik (Region II), Pune (Region III) and Kolhapur (Region IV) have excellent growth rates of 5, 4 and 3 per cent p.a. respectively and account for 2,700 tonnes out of 3,500 tonnes per year rate for the state, over the thirty year period. Thus although Marathwada continues to produce largest share of 30 per cent of state output, the three regions mentioned have increased their contribution from 30 to 50 per cent. Highest contributor to additions in Region III of Pune, the drought-prone area, where rabi jowar has also gained. Rabi jowar has a low productivity (but better irrigation) and rabi jowar-gram mixed crop with moderate irrigation is attractive there. In Table 3.17 decadewise growth rates are presented. Great declines everywhere in the sixties followed by gains in the next two decades is a feature everywhere but gains in the three Western regions are higher and consistent.

We have not presented contributions due to 'pulses other than gram and tur'. But the absolute per year rates of production leave half the growth unexplained. It is seen that Regions V and VI of Marathwada and Amraoti have made most of the additional pulse contributions but we also saw

Table 3.17 : Area Production and Productivity Compound Growth Rates for the Three Decades for Important Regions in Maharashtra (1960-61 to 1987-88) Crop : Gram

(Growth Rates per cent p.a.)

Region	Decade	Area	Production	Productivity
II	Sixties	-0.65	-0.60	0.04
	Seventies	1.49	3.22	1.71
	Eighties	8.98	10.22	1.14
III	Sixties	-1.03	-4.35	-3.35
	Seventies	2.27	5.54	3.20
	Eighties	3.78	8.25	4.31
IV	Sixties	-4.74	-5.95	-1.27
	Seventies	4.44	5.42	1.03
	Eighties	5.76	7.57	1.71
V	Sixties	-0.96	-4.98	-4.06
	Seventies	0.97	3.63	2.63
	Eighties	0.28	0.52	0.24
VI	Sixties	-7.51	-10.53	-3.27
	Seventies	6.45	7.42	0.91
	Eighties	3.32	7.07	3.13
VII	Sixties	1.27	-6.43	-7.60
	Seventies	2.04	0.44	-1.57
	Eighties	1.74	3.00	1.24
State	Sixties	-1.59	-4.05	-2.51
	Seventies	2.08	3.75	1.63
	Eighties	2.99	5.06	2.01

that this was true of tur but not of gram, additions for which came from Region II, III and IV in Western Maharashtra. So contributions by Tur cannot explain dominance of Marathwada - Amraoti in additions to pulses. In fact for Marathwada of the 8,400 tonnes of (total) pulses added per year, 4400 come from tur and only 200 from gram so that 3,800 tonnes per year came from 'other pulses' in Marathwada. Similarly of the 6,200 tonnes of pulses added per year in Amraoti, 2,800 tonnes came from tur and only 400 tonnes from gram, so 3,000 tonnes per year came from other pulses of udid, mung, horsegram (kulthi) and miscellaneous pulses, contribution to the category of 'other pulses' has thus come from these two regions only (6,700 tonnes per year out of state rate of 7,800 tonnes per year). Thus other regions between themselves contribute only about 4,000 tonnes to all pulses per year. There was some puzzle regarding remarkable growth in pulses in Marathwada being on account of productivity but that in Amraoti being on account of area. From the discussion of tur, gram and other pulses we see that the result for 'all pulses' is really the effect of various tendencies. For tur, Marathwada has near equal contribution by area and productivity (though latter is higher) but for Amraoti growth in tur is wholly on account of area with some loss on account of productivity. Let us note area-production-productivity rates for 'other pulses' in Marathwada and Amraoti.

Growth rates of 'other pulses' (% p.a.)

	<u>Area</u>	<u>Production</u>	<u>Productivity</u>
Region V (Marathwada)	0.67	2.44	1.77
Region VI (Amraoti)	3.35	5.60	2.18

Thus growth mainly on account of productivity for Marathwada is more due to tur and 'other pulses' while Amraoti has good area and productivity growth rates in 'other pulses' but because major tur has negative productivity rate (-0.83 per cent p.a. to be exact), for all pulses it appears as if area is the only important factor in growth in pulses. Thus when we look at these figures, contrasts appear less severe.

3.12 In oilseeds, we have regionwise data on groundnut provided in Table 3.18. It is already observed that groundnut area and production has been declining in the state but since the early eighties there is considerable increase in summer groundnut which is 100 per cent irrigated and hence there is an upsurge of irrigated groundnut. The present table reveals that Nasik (Region II), Kolhapur (Region IV) and Marathwada (Region V) are the major groundnut producing regions and among these only in Kolhapur Region production has increased. More notable is the fact that the minor region of Pune (Region III) is making a significant contribution to the positive side. Thus the sugarcane tract of Region III and IV shows gains in production (Regions I and VII not in the table also show gains of 2 and 9 hundred tonnes per year) but overwhelming declines in Marathwada and Nasik regions result in loss of 32 hundred tonnes per year at the state level with a growth rate of -0.43 per cent per annum. Loss in area under groundnut is unrelieved, over all regions contained in the table (but there is a marginal gain in area in Region VII Nagpur not in the table). Productivity in Region III has soared from 6.89 quintals/ha to

Table 3.18 : Growth of Groundnut for Important Regions Over the Entire Period

(Initial Point : Av. 1961-62 to 1963-64, End Point: Av. 1984-85 and 1987-88)

Region	Area ('00 ha.)		Production ('00 tonnes of pod)		Productivity (qtl. of pods/ha.)		Absolute change (pa) and Growth Rates (% p. a.)			
	Initial Pt.	End Pt.	Initial Pt.	End Pt.	Initial Pt.	End Pt.	Area	Production	Production	Irri. area
II	3117 (27.52)	2098 (29.00)	2038 (25.80)	1398 (19.60)	6.54 (0.34)*	6.66 (8.19)*	-43 -1.67	-27 -1.59	- 0.08	8 16.29
III	1479 (13.06)	989 (13.68)	1020 (12.90)	1366 (19.10)	6.89 (6.76)	13.80 (32.20)	-21 -1.70	15 1.25	- 3.00	8 4.88
IV	2051 (18.11)	1868 (25.83)	2140 (27.10)	2616 (35.60)	10.43 (0.54)	14.00 (0.89)	-8 -0.40	20 0.86	- 1.27	Neg. 1.11
V	3417 (30.16)	1214 (16.78)	2116 (26.80)	930 (13.00)	6.19 (0.06)	7.66 (0.13)	-94 -4.31	-51 -3.44	- 0.91	8 26.53 ^e
VI	1168 (10.31)	654 (9.04)	535 (6.80)	358 (5.00)	4.58 (0.00)	5.47 (5.75)	-22 -2.44	-8 -1.69	- 0.77	3 -
State	11327 (100)	7233 (100)	7898 (100)	7145 (100)	6.97 (1.11)	10.48 (9.58)	-174 -1.89	-32 -0.43	- 1.49	28 9.35

* These figures in brackets show percentage of crop area irrigated. End point for irr. data are av. 1930-31 and 1981-32. Other details of irrigation given in the last column. Absolute changes per annum are in '00 ha. for area and '00 tonnes (pods) for production.

@ This rate appears too high as the increment in irri. area is from just 2 to 155.5 (in '00 ha.)

13.80 quintals/ha. (in pods) and one would like to attribute the same to irrigation proportion increase from 6 to 32 per cent. In Kolhapur Region IV which is a fertile tract, productivity is already high at 10.43 quintals/ha and has gone up to 14 quintals/ha. but in other areas though irrigation proportion has increased, productivity is only marginally higher. In Table 3.19 decadewise growth rates are presented and here we see that in Region III and IV, eighties show production growth rates of 9.44 and 8.20 per cent per annum respectively while area has increased by less than 2 per cent in the decade. The productivity rates registered are 7.39 and 6.37 per cent per annum are very high, and appear to be due to upsurge of summer groundnut. Productivity gain is also high in Region V of Marathwada for the eighties with a modest 1.34 production rate in that region. Otherwise decline is apparent nearly everywhere..

Upward increase in summer groundnut both in area and production is already noted in the discussion of Table 3.19. Which regions account for this increase? Districtwise break-ups available in some Epitomes of Agricultural can throw some light on this. Epitomes of 1988-89 and 1990-91 give this for years 1986-87 and 1989-90 respectively. Regionwise these may be grouped and presented as follows :

Table 3.19 : Area Production and Productivity Compound Growth Rates for the Three Decades for Important Regions in Maharashtra (1960-61 to 1987-88) Crop : Groundnut

(Growth Rates per cent p.a.)

Region	Decade	Area	Production	Productivity
II	Sixties	-7.17	-7.81	-0.69
	Seventies	1.98	1.79	-0.19
	Eighties	-1.93	-0.83	1.08
III	Sixties	-2.95	-4.94	-2.05
	Seventies	-3.58	-0.80	2.88
	Eighties	-1.91	9.44	7.39
IV	Sixties	0.86	-2.02	-2.86
	Seventies	-2.69	-2.64	0.05
	Eighties	1.72	8.20	6.37
V	Sixties	-4.55	-3.99	0.59
	Seventies	-5.05	-6.56	-1.59
	Eighties	-3.12	1.34	4.60
VI	Sixties	-3.48	1.61	5.27
	Seventies	3.03	1.85	-1.15
	Eighties	-8.49	-8.68	-0.21
State	Sixties	-3.49	-3.75	-0.27
	Seventies	-1.32	-1.56	-0.24
	Eighties	-1.35	3.89	5.31

Summer Groundnut Area ('00 ha.)

<u>Region</u>	<u>1986-87</u>	<u>1989-90</u>
I (Konkan)	32	40
II (Nasik)	81	366
III (Pune)	88	614
IV (Kolhapur)	27	45
V (Marathwada)	50	935
VI (Amraoti)	118	143
VII (Nagpur)	20	11
State	416	2154

Considerable increase in Region III is expected as there are also production additions but even higher increases in Marathwada have resulted only productivity increase in the eighties and mild production increase. Region IV has relatively very little addition to summer groundnut although this has added highest amount, according to Table 3.19. Very high additions in Nasik also go unreflected but then total area under groundnut decreasing everywhere, such a phenomenon may not be ruled out. But we again underline the fact that increasing summer groundnut, is contributing substantially to the upward trend observed in recent years.

Table III.1 : Cropping Pattern in Various Agro-Climatic Regions of Maharashtra
(Average 1961-62 to 1963-64)

Sr. No.	Crop	Reg I % area	Reg II % area	Reg III % area	Reg IV % area	Reg V % area	Reg VI % area	Reg VII % area	Maha- rash- tra % area
1.	Rice	45.82	2.83	2.00	7.77	1.79	1.02	23.61	7.01
2.	Wheat	-	5.83	2.23	1.64	5.47	5.47	9.21	4.68
3.	K.Jowar	0.04	8.28	0.91	14.19	15.45	31.07	14.61	13.11
4.	R.Jowar	0.003	8.53	50.00	14.19	21.38	0.08	12.01	19.10
5.	Bajra	-	21.53	14.98	15.17	5.45	0.88	0.11	8.86
6.	O.Cereals	18.16	4.16	1.23	4.29	0.93	0.22	0.52	12.42
7.	T.Cereals	66.02	51.17	71.34	57.26	50.46	38.74	60.07	55.18
8.	Gram	0.19	1.35	1.79	1.67	3.60	1.34	1.54	2.01
9.	Tur	0.61	1.04	1.76	1.61	4.20	4.65	4.01	2.92
10.	Mung	0.18	2.71	0.95	0.27	4.53	1.89	1.26	2.19
11.	Udid	1.23	5.24	0.19	0.85	2.83	2.51	2.07	2.24
12.	O.Pulses (incl.10,11)	3.72	11.97	4.28	5.20	9.67	5.23	9.98	7.57
13.	All Pulses	4.52	14.35	7.83	8.49	17.48	11.22	15.53	12.50
14.	Foodgrains	68.54	65.52	79.17	65.75	67.94	49.97	75.60	67.68
15.	S'cane	0.01	0.48	1.51	2.65	0.44	0.07	0.04	0.75
16.	Cotton	0.00	14.27	1.91	0.58	15.17	42.63	12.49	14.25
17.	G'nut	0.04	12.03	4.01	10.95	6.93	3.98	0.42	5.94
18.	Safflr	0.00	0.68	3.50	0.69	3.32	0.50	--	1.69
19.	O.Crops	31.41	7.62	9.90	19.38	0.06	2.86	11.45	Neg.
20.	G.C.A.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table III.2: Cropping Pattern in Various Agro-Climatic Regions of Maharashtra
(Average 1984-85 and 1985-86)

Sr. No.	Crops	Reg.I % area	Reg.II % area	Reg.III % area	Reg.IV % area	Reg.V % area	Reg.VI % area	Reg.VII % area	Maha- rash- tra % area
1.	Rice	48.51	2.54	1.76	7.86	1.91	0.95	26.26	7.12
2.	Wheat	0.00	5.88	3.97	3.64	3.91	2.98	7.36	4.24
3.	K.Jowar	0.00	12.73	1.30	13.96	18.18	27.58	14.10	14.39
4.	R.Jowar	0.00	6.66	49.24	14.51	20.16	0.04	11.06	18.18
5.	Bajra	0.00	22.53	14.02	10.65	6.92	0.85	0.06	8.81
6.	O.Cereals	14.21	4.57	1.88	4.54	0.88	0.37	0.48	2.44
7.	All Cereals	62.27	54.91	72.17	55.16	51.96	32.77	59.31	55.17
8.	Gram	0.42	2.64	2.73	2.83	3.34	1.82	2.36	2.63
9.	Tur	0.67	1.20	1.10	1.29	5.40	7.47	5.14	3.79
10.	Mung	-	-	-	-	-	-	-	-
11.	Udid	-	-	-	-	-	-	-	-
12.	O.Pulses (Incl.10,11)	4.38	11.39	3.00	5.80	9.89	9.97	7.19	8.03
13.	T.Pulses	5.47	15.23	6.83	9.91	18.63	19.26	14.69	14.45
14.	Foodgrains	68.18	70.49	79.00	65.07	70.59	52.02	74.01	69.62
15.	S'cane	0.00	1.91	3.26	5.70	1.02	0.14	0.02	1.72
16.	Cotton	0.00	8.38	0.15	0.15	11.91	42.00	13.41	12.81
17.	G'nut	0.33	7.45	2.63	9.61	2.15	1.96	1.78	3.56
18.	Safflr	0.00	0.51	5.05	0.91	6.37	2.34	0.00	3.25
19.	O'crops	31.49	11.26	9.91	18.56	7.96	1.54	10.77	Neg.
20.	G.C.A.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

4. SUMMARY AND CONCLUSION

4.1 Since 1961, the country's population has nearly doubled to 844 million and the foodgrains production has kept up with the ushering in of the green revolution in mid-sixties in the cereals like wheat, rice, maize, jowar, bajra, etc. The component of pulses has however, lagged due to near-stagnancy in its production while the cooking medium of oilseeds has a moderate growth with a growth rate of $1\frac{1}{2}$ per cent per annum well below the compound growth rate of population of 2.20 per cent per annum. Major pulse of gram shows fluctuations within a narrow band and indicates lack of trend and hence stagnancy whereas tur, a rainfed crop shows an upward trend within its fluctuations. Pulses other than tur have generally lower productivity and the lack of upward trend in production is as apparent. These tendencies can be quantified to gram growth rate of -0.43 per cent and tur growth rate of 1.99 per cent per annum and thus the two pulses covering 35 and 15 per cent of pulse production have contrasting behaviour while remaining pulses covering remaining half of pulse production has a mild positive growth rate of 0.54 per cent per annum. All this leads to 'all pulses' showing a production growth rate of 0.33 per cent per annum and the lack of parity with the population growth rate outlines the dimensions of the problem of pulses. One may attribute this lack of growth to absence of high-yielding, fertilizer-responsive and short duration varieties as in case of cereals. Barring gram, pulses are also poorly irrigated and tur does not even feature in irrigation statistics. Being nitrogen-fixing, even the modest doses of fertilizers are not given and the fact that for their own growth

they need fertilizers is often overlooked. (Sections 1.1 to 1.3.)

Among 'seven oilseeds', groundnut, rapeseed and mustard (together) and sesamum have importance of 61 per cent, 22 per cent and 8 per cent respectively (on the basis of their weights in the production index numbers). Major oilseed of groundnut has stagnated while rapeseed and mustard category has a good growth of 4 per cent over the thirty year period with area growth rate of 1 per cent and productivity growth rate of nearly 2 per cent and has registered somewhat consistent performance over the decades. Safflower, sunflower and soyabean are the emerging oilseeds (the last two are truly emerging as safflower is a traditional crop) and data on seventies and eighties indicate, very high growth rates of 7 to 30 per cent per annum on account of area. These two crops of sunflower and soyabean have all the advantages of a new crop going through small to reasonably big magnitudes and high growth rates need to be interpreted in that light. But these emerging oilseeds appear to have a role to play in future. Growth in rapeseed and mustard may be due to the fact that more than half this area is irrigated and with oilseeds shortages and favourable prices and official encouragement in various forms, the situation could be better exploited under irrigated conditions and this may not be equally true for remaining oilseeds as only 19 per cent of all oilseeds area finds irrigation.

The shortages of pulses and oilseeds cannot but find reflection in the prices and various components of the all-India

wholesale price index numbers indicate that beginning with 1971, pulse index is always above that for cereals and from 1930 onwards the margin really widens. For 1988 and 1989 cereals have indices of 325 and 339 while pulses have indices of 628 and 633, Oilseeds index is below that for cereals till 1972 but thereafter it is 10 to 20 points higher till 1979 and higher by over 50 points thereafter. Compound growth rates for entire period are 10 and 9 per cent for pulses and oilseeds whereas for cereals the rate is 7 per cent and even for 'all commodities' it is near 8 per cent. Thus prices of pulses and oilseeds are always higher and this is true for every decade. (Sections 1.4 and 1.5).

4.2 Population increase causes demand for pulses and oilseeds to increase but another important reason is the fact that incomes are also rising. Although cereals provide bulk of the food-intake, as incomes increase, proportion spent on items like pulses and oilseeds is higher than proportion spent on cereals. There are of course other items where expenditures increase more than in proportion like clothes, consumer durables, housing, entertainment and some food items like milk, fish, eggs, etc., and in fact edible oil is one of them. These expenditure responses in India and in Maharashtra are looked into by considering NSS data on consumer expenditure by taking five entities : India, Maharashtra and three other states of Karnataka (neighbouring state), Punjab and Uttar Pradesh (both leading in agricultural production) to put matters in perspective. To have a reflection of temporal change, two years data are taken up. One for 1968-69 (23rd

round of NSS) and the other for 1987-88 (43rd round of NSS). Eight categories of expenditures are considered by regrouping the available data and these are : (i) cereals, (ii) pulses, (iii) foodgrains, (iv) edible oil, (v) non-foodgrains food (including edible oil), (vi) total food, (vii) other expenditure (i.e. non-food expenditure) and (viii) total expenditure. (Sections 2.1 and 2.2.)

In 1968-69 per person expenditure of 30 days is Rs. 33 for rural India as well as Maharashtra. For urban India, it is Rs. 46 but for urban Maharashtra it is higher at Rs. 52. Cereals share is about 40 per cent with pulses share at 4.70 per cent and oilseeds (edible oil) at 3.28 per cent for rural India. Maharashtra has a similar picture. For urban India cereals share is lower at 25 per cent (for Maharashtra it is lowest at 20 per cent but the absolute amount is also lowest). Shares of pulses and edible oil for urban India are 3 and 4.5 per cent respectively, reverse of those for rural India. Nearly twenty years later in 1987-88 per person total expenditure for 30 days for rural India is Rs. 177 and Rs. 271 for urban India, both 5 to 6 times old level. Prices are also $3\frac{1}{2}$ to 4 times the old level and this margin indicates that incomes have also increased in real terms. But more importantly, shares of foodgrains are lower at 23 to 28 per cent (rural India and Maharashtra) and 15 to 17 per cent (for the same two entities but urban component). Share of pulses and edible oil are now higher at 4 to 6 per cent. The rise in prices of consumer goods of $3\frac{1}{2}$ to 4 times is supported by data on consumer price indices

for industrial workers, for agricultural labourers etc., available at the state and the country level.

More relevant is the behaviour of expenditure proportion over income groups for a given year, i.e. the cross-section data. Confining comments to India and Maharashtra for brevity, one can see that for 1968-69 for rural India, expenditure on cereals reduces steadily from 59 to 20 per cent but for pulses

it increases from 3 to 5 per cent over first 20 expenditure groups and then dips steadily to 3 per cent. For edible oil it rises from 2 to $3\frac{1}{2}$ per cent over first 9 groups and then falls. This means income elasticities for pulses and oilseeds should be higher than elasticity for cereals. Non-foodgrains food category (milk, fish etc., and edible oil) proportion rises steadily from 20 to 33 per cent but dips only for the last group, indicating over unity elasticity. For non-food items (clothing, consumer durables, housing repairs, entertainment, etc.) after somewhat fluctuating over 9 groups between 16 and 20 per cent, the share rises steadily to 46 per cent for the highest, indicating even higher income elasticities. For urban India movements are even sharper. Similar behaviour is observed for rural Maharashtra but for urban Maharashtra, shares of pulses and edible oil fluctuate and fall, indicating somewhat lower elasticities. For 1987-88 behaviour of proportions is similar but for cereals, pulses, edible oil and even non-foodgrains food, elasticities are likely to be of even lower order. For Maharashtra even lower elasticities appear likely as the initial rise is weak and thereafter the fall is consistent.

(Sections 2.3 to 2.6.)

4.3 Lorenz curves indicating departures from equality are plotted, for illustration for 1987-88 year only, for rural and urban categories for India and Maharashtra. These support the above observations. These curves are seen in relation to Lorenz curve for the total expenditure (proxy for income). While Lorenz curves for specific categories like cereals, pulses, foodgrains, edible oil are generally inside (i.e. above) the total expenditure curve, cereals and cereals dominated 'food-grains' are upper most, indicating least departure from equality. Pulses curve is outside (i.e. below) these two and edible oil curve is between pulses and total expenditure curves. This means inequality in pulses and edible oil expenditure is higher than that in cereals and foodgrains (but lesser than that for total expenditure). For 'non-foodgrains food' category, except for rural India, the Lorenz curve is inside the Lorenz curve for total expenditure. Non-food expenditure shows the greatest inequality, the curve being the outermost, everywhere. These curves are non-overlapping which allows us to express the related elasticity by a single number, so that each curve can be represented by a single (constant) elasticity. To estimate these elasticities we follow four pioneering articles by N. Sreenivasa Iyengar and one of the methods suggested is numerically estimating Gini's coefficients of concentration and then on the basis of assumption of log-normality of the distribution of expenditures, estimating the elasticities. The first step of calculating Gini's

coefficients numerically is undertaken. The coefficients have a range of 0 (complete equality) to 1 (complete inequality) and we get coefficients for total expenditure between 0.3 and 0.4. Cereals coefficients are the least, ranging between 0.06 to 0.16. But pulses and edible oil have consistently higher coefficients between around 0.20 and 0.28 respectively. 'Non-food-grains food' has coefficients higher than total expenditure in 1968-69 but in 1987-88 there are marginally lower, and this came out in the 1987-88 charts described above. 'Other expenditure' (non-food) category has highest coefficients everywhere, between 0.42 and 0.50 (Sections 2.7 and 2.8).

The theoretical side of elasticity estimation is then explored. As mentioned above, N. Sreenivasa Iyengar's suggestion of estimating elasticity through Gini's coefficient is adopted. This appears in Sankhya, Vol. 22, Parts 3 and 4 (1960), p. 385 and the method is 'intuitively better'. The theoretical exploration reveals that if G and G_s indicate Gini's coefficients for total expenditure and specific category, e.g. 'pulses', respectively, the ratio of standardized normal values $\frac{t(1+G_s)}{2}$ to $\frac{t(1+G)}{2}$ gives us elasticity of expenditure with respect to 'pulses'. Resolution of elasticity into such a ratio also means that higher the Gini's coefficient of concentration, higher is the elasticity and further, if the coefficient G_s is smaller than G for total expenditure, then elasticity is less than unity making commodity a 'necessity' while G_s greater than G means elasticity greater than unity, making the commodity a 'luxury'. This approach assumes log-

normality of total expenditure and specific category expenditures. Just as an additional check direct calculation by fitting equation $X_s = Ax^\eta$ to the data or in logarithmic terms, fitting the linear regression by least squares

$$\log X_s = \log A + \eta \log X$$

were also resorted to and ' η ' the elasticities are estimated. These are remarkably (indeed astonishingly) close to Gini coefficient-based elasticities and this reinforces faith in the approach adopted (Sections 2.9 and 2.10).

4.4 The elasticities for India and Maharashtra are as follows :

	India		Maharashtra	
	Rural	Urban	Rural	Urban
<u>1968-69</u>				
1. Cereals	0.53	0.26	0.60	0.12
2. Pulses	0.83	0.55	0.84	0.43
3. <u>Edible oil</u>	1.01	0.80	1.03	0.78
4. Non-foodgrains food	1.27	1.89	1.07	1.16
5. Other (Non-food) expenditure	1.57	1.44	1.53	1.30
<u>1987-88</u>				
1. Cereals	0.29	0.17	0.31	0.27
2. Pulses	0.69	0.52	0.47	0.41
3. <u>Edible oil</u>	0.83	0.68	0.73	0.64
4. Non-foodgrains food	1.06	0.91	0.84	0.91
5. Other (Non-food) expenditure	1.46	1.40	1.52	1.32

Higher income elasticity for pulses and edible oil than cereals is apparent everywhere. In 1968-69 for rural India edible oil has greater than unity elasticity but for urban areas it is less than unity and so also for both

rural and urban for 1987-88. Non-foodgrains food comprising sugar, meat, fish, edible oil, eggs, etc., has greater than unity elasticities in 1968-69 but in 1987-88 urban India and rural-urban Maharashtra have lower than unity but close to unity elasticities. As these products are also agro-based, we note that their productions must increase in proportion as income increases as the high elasticity indicates.

Regarding the commodities under consideration viz. pulses and edible oil, one can say that as incomes increase, increase in demand for pulses and oilseeds in proportionate terms will be higher than the increase in cereals. Thus apart from population increase, income increases would exert pressure on prices of these items of common consumption and their production-availability needs constant watching (Section 2.11).

4.5 In Maharashtra performance of pulses and oilseeds is different. For the former it is much better but for the latter it is much worse but there are indications of better prospects in the last few years. We have to note that Maharashtra has meagre irrigation of 12 per cent and low and uncertain rainfall with large areas being drought-prone and the assessment made above is after eliminating 'unusual' years. For the country as a whole barring two-three years there is consistency in its agricultural production and this difference must be kept in mind for any meaningful comparison. Production index number-based analysis reveals that cereals in Maharashtra have done well with growth rate falling short of the population growth rate by quarter of a per cent for the

entire period but the sixties show stagnancy, seventies excellent growth and eighties some tapering off. Pulses have done well after stagnant and mildly declining sixties with overall period growth rate being 2.45 per cent per annum, exceeding population growth rate of 2.32 per cent per annum. Oilseeds, on the other hand show a growth rate of just 0.57 per cent per annum after heavy decline in the sixties followed by a marginal decline in the seventies and over 4 per cent growth in the eighties. Gains in pulses are unmistakable and recent recovery in oilseeds is worth studying in detail (Sections 3.1 and 3.2).

Study of farm harvest prices for Maharashtra show that in the initial years prices of pulses and oilseeds are about $1\frac{3}{4}$ times the prices of cereals but by the end of the period, these are 2 to 3 times the cereal prices. In terms of compound growth rate, pulses and oilseeds have a price growth rate of about 9 per cent per annum whereas cereals prices have rates ranging between $5\frac{1}{2}$ and $6\frac{1}{2}$ per cent per annum. Within cereals and within pulses the rates of individual crops of course vary and these can be aggregated for the categories by making use of the production index numbers weights based on triennium ending 1969-70. With price level for these categories 100 in the base period, price indices at the end of eighties are : cereals 256, pulses (gram and tur) 405, oilseeds (groundnut) 374 and thus prices for pulses and oilseeds have grown faster than cereals (Section 3.3).

4.6 If we refer to production and productivity series

of total cereals, total pulses and groundnut (where prices are not used as weights), mid-seventies indicate a turning point with cereals attaining higher and higher levels with consistency and pulses crossing the 1 million tonnes-mark. Pulse productivity appears increasing moderately till 1986-87 but thereafter it is much higher, around 5 quintals per hectare. The provisional figures for 1990-91 and 1991-92 are lower, especially for the latter year and productivity falls to 3.10 quintals/ha, cautioning against undue optimism. For groundnut, after the production declines in the sixties and the seventies production-productivity picks up from 6 to 6½ quintals/ha to nearly 11 quintals/ha. by 1989-90. Provisional figure for 1990-91 is good but for 1991-92 it is again low, and productivity again lower at 6.36 quintals/ha, once again dampening optimism. Looking at individual pulses one sees that rainfed tur has a better productivity around six quintals/ha. which is 1½ times the productivity of much better irrigated (rabi) gram. The explanation may lie in the fact that the crop straddles over two seasons - kharif and half rabi,

whereas gram is of shorter duration, rabi crop. Longer occupation of land may be the cause of higher productivity and continuance and indeed preference for its cultivation, which goes well with long-term cotton varieties in the cotton tract. Tur productivity is between 4 and 5 quintals till the end of seventies but in eighties it is often higher than 6 quintals/ha. In terms of growth rates, while cereals show a 2 per cent rate, tur also has same rate while gram has a better 3½ per cent per annum growth rate which is somewhat exaggerated

as only the terminal years of eighties have done well. In growth of pulses 'other pulses' constituting half the pulses production make up the loss in tur and gram in the sixties and continue to show gains in seventies and eighties so 'other pulses' consisting of udid, mung, horsegram (kulthi) etc. are also important contributors. In the development of pulses, area is playing as important role as productivity and this should be contrasted with the role of productivity in good performance of cereals. But then green revolution has occurred for cereals and not pulses. Productivity of pulses has to increase from proper fertilizer doses, improved seeds, plant-protection measures etc., for rainfed tur and better irrigated gram (Sections 3.4 to 3.6).

For oilseeds, index numbers-based analysis has revealed that for the entire period oilseeds have a mild-positive growth rate of half a per cent in production. For groundnut crop which nearly dominates the oilseeds, this rate is 0.30 per cent but heavy decline followed by a mild ones in sixties and seventies respectively is followed by good growth in eighties. There is a sudden increase in its irrigated component in the eighties for this crop but this increase appears to be more due to emergence of hundred per cent irrigated summer groundnut. Productivity of summer groundnut is rather high, around 15 quintals/ha compared to overall groundnut productivity from 6 to 10 quintals/ha over the years. Importance of summer groundnut is obvious but the area varies probably on account of lack of availability of water

after rabi irrigation in some years. Provisional figure of groundnut production for 1991-92 of 5.46 lakh tonnes is much below average of previous three years of around 10 lakh tonnes and cautious optimism recommends itself. Regarding the role of area and productivity in production, for entire period productivity rate of 1.61 per cent is nearly cancelled by an area rate of -1.29 per cent per annum. But over the decades, sixties and seventies indicate heavy area declines while eighties show 5 per cent production growth mostly on account of productivity and the effect of hundred per cent irrigated summer groundnut is obvious as it was in the index-number based analysis. Loss of area under groundnut witnessed has probably gone to another kharif but highly successful crop of kharif jowar. Safflower, sunflower and soyabean are the emerging oilseeds. Of these, safflower is traditional, taken in rabi so suitable for rabi areas. Its area as well as production is constantly increasing, especially in the eighties and its production has reached nearly 3.6 lakh tonnes compared to the groundnut's about 10 lakh tonnes production. Sunflower and soyabean are truly emerging and by 1990 their production levels are 2 lakh and 1 lakh tonnes. Other oilseeds are sesamum and linseed whose productivity is rather low at 2 to $3\frac{1}{2}$ quintals compared to 4 to 6 quintals/ha of the three emerging oilseeds.

Rather good performance in pulses can be attributed to two or three possible factors. First of all, decline in the sixties is followed by good growth in the seventies and

eighties so part of it is 'recovery'. Further, Maharashtra does not have much irrigation and for large kharif rainfed tracts there are not many options. In cotton tracts longer-duration pulses of tur suits well with long-duration cotton varieties, while gram in rabi season goes well with rabi jowar which has a stable-increasing area and is a provider of fodder. Pulses are nitrogen-fixing and help to maintain productivity of land. Analysis of harvest prices also shows relatively higher increases in pulse prices. In the eighties implementations of National Pulse Development Programme must have had some impact. In case of groundnut, it has lost vast areas probably to kharif jowar and this has happened in spite of higher prices. It is only completely irrigated summer groundnut that has caused an upward trend in the eighties. But summer irrigation has its limitations and crops like sunflower, soyabean may come to play an important role (Sections 3.7 and 3.8).

4.7 The analysis of growth is also undertaken for seven agro-climatic regions of the state. These are Konkan (the smallest, covering 5 per cent of state crop area), Nasik region of Dhulia, Jalgaon and Nasik with about 12 per cent area and a slightly higher share in state irrigation. Then third region is the drought-prone but canal-well irrigated sugarcane tract of Ahmednagar, Pune and Solapur with vast rabi jowar areas. Somewhat smaller (8 per cent of state crop area) of Kolhapur is the fourth region of Kolhapur, Satara and Sangli - a fertile region with 13-14 per cent of state irrigated area and another sugar-belt. Marathwada forms the fifth region,

largest in size (26 per cent of state crop area) with somewhat lower (20 per cent) share in irrigation but where recent additions to irrigation have occurred. This has seven districts of Aurangabad, Jalna, Parbhani, Bhir, Nanded, Osmanabad and Latur. Kharif-rabi jowar with many pulses and cotton are its crops. Then sixth region is Amraoti from Vidarbha (16 per cent share of state crop area) with four districts of Buldhana, Akola, Amraoti and Yeotmal. Essentially cotton-kharif jowar tract with little irrigation. Last is the Nagpur region from Vidarbha (11 per cent share of state crop area) with better irrigation (20 per cent of state area) and rice-kharif-rabi jowar tract.

Regionwise analysis reveals that for pulses, Marathwada (Region V) and Amraoti (Region VI) have made tremendous contributions with overall growth rates of 2.54 and 2.68 per cent respectively. In absolute terms, most of the state-level increase is due to these two regions where tur and 'other pulses' have sustained the pulses production. But in other pulse areas of Region II (Nasik) and Pune (Region III) only mild growth has taken place with moderate production growth rates. When we come to specific pulses, state level growth in pulses is easily accounted by these two regions and in fact Region III has lost its importance as its share of tur production reduces from 10 to 3 per cent over the years. Area and to some extent productivity have played important role in growth of tur (Sections 3.9 and 3.10).

Gram has its area increasing everywhere as well as the

irrigated component, but the major area of Marathwada has contributed little. Western Regions of Nasik, Pune and Kolhapur (Regions II, III and IV) have in fact contributed to growth of gram. In Pune which is a major rabi jowar area, this rabi pulse has done well. In Region II of Nasik it has probably replaced the rabi component of jowar. But in all, these regions otherwise fail to contribute substantially to overall pulse production as region like Pune has lost in tur substantially.

The overall supremacy of Marathwada and Amraoti regions really comes from tur and 'other pulses' and not gram. Both these regions have excellent growth rates due to area and to some extent productivity increases in 'other pulses'. In absolute terms, of the 14.6 lakh tonnes of pulses per year added by these two regions, 13.9 lakh tonnes come, nearly equally, from tur and from 'other pulses' of udid, mung, horsegram (Kulthi) and miscellaneous pulses (Section 3.11).

4.8 Regionwise analysis of groundnut reveals that although Nasik (Region II), Marathwada (Region V) and Kolhapur (Region IV) are the major producers of groundnut, only in Kolhapur the production has increased. It is a somewhat minor region of Pune (Region III) that makes a substantial contribution. Thus it is the sugarcane tract that has made additions to groundnut production. It may be noted that productivity in Pune region has soared from 6 to 13 quintals/ha. An attempt at getting a regionwise break-up of summer groundnut area reveals that besides Pune, Marathwada and Nasik have added very large

areas of summer groundnut but we see that in the last two regions mentioned, there are no gains in production. With heavy declines in rainfed groundnut everywhere, such a result is possible when consequent losses and gains are accounted for. In any case, contribution of summer groundnut to the upward movement in the recent years is unmistakable (Section 3.12).

4.9 In conclusion it can be said that against the backdrop of stagancy in pulses and moderate growth in oilseeds at the national level, the state of Maharashtra has done better in the former but much worse in the latter. Maharashtra has in a sense a certain advantage in pulses as there are vast areas without irrigation and where options are limited. This is especially true of tur and the better prices over the years has been a sufficient attraction to raise the crop. This fact should be exploited by the actual implementation of various dry-land farming techniques. 'Other Pulses' category of urid, mung etc. is also important and needs to be watched and the cultivation encouraged. Gram is being taken progressively under irrigated conditions and all the growth possibilities attendant on irrigation must be thoroughly exploited. In oilseeds although there is stagnation-decline over the years during eighties summer groundnut has transformed the scenario. But summer irrigation has its limitations and emerging oilseeds like safflower, sunflower and soyabean need to be watched and encouraged. Pulses and oilseeds have income elasticities much higher than those for cereals and the upward trend in production must be maintained.