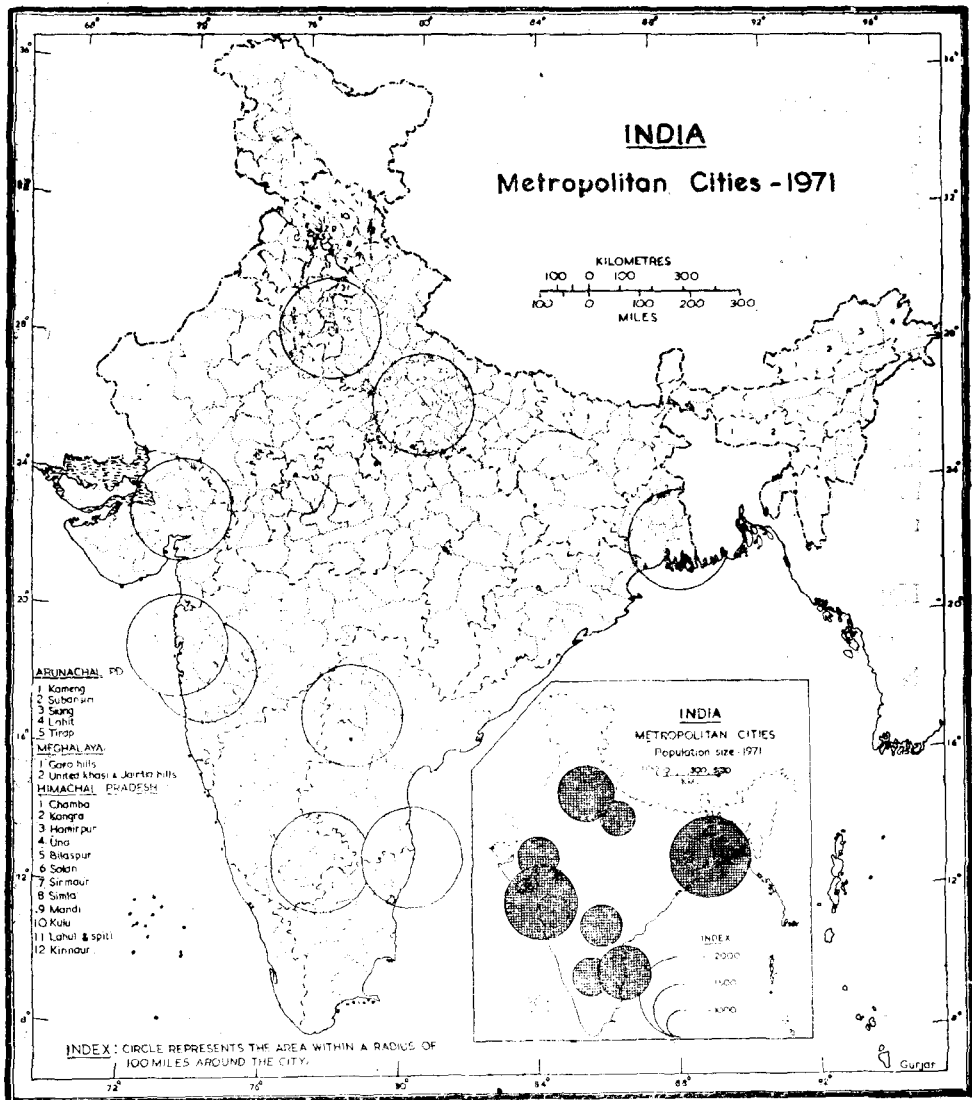


A Demographic Profile of Metro-Hinterlands in India

"METROPOLITIZATION is a vast expanding phenomenon both in the developed and the developing economies. In its spatial form, metropolitanization reflects itself in the physical sprawl of the cities, both vertical as well as horizontal. While vertical spread is dependent upon the high level of technology, the physical spread is possible even at the low level of technology and is clearly reflected in the changes in land-use in the adjoining area. The change is also reflected in the socio-economic characteristics of the population living in such areas.

In the Indian Situation, it is commonly believed that Indian cities have not been able to command a large influence zone; that they have a steep gradient profile; that one can immediately observe the disparity between the regions influenced and the regions not influenced by the metropolis as one journeys from the centre to the periphery; that such influence is more marked along Highways and railways than along the interstitial areas and so on. This paper is an attempt towards the identification of such influence zone with the help of some formal indicators. These indicators pertain to social, demographic and economic characteristics of population living in the region within a radius of 100 miles from the metropolitan cities of India.¹ Among the socio-demographic indicators, density and growth of population, Sex-composition and literacy-rate have been considered. The economic indicators relate to the participation rate of workers in primary, secondary and tertiary activities.

1. During 1971 census enumeration, Nine cities were declared to be metropolitan cities with a population above one million. These are Calcutta, Bombay, Delhi, Madras, Hyderabad, Bangalore, Ahmedabad, Kanpur and Poona (Map).



Areal Unit of Analysis

The areal unit of observation is the subdivision of a district (which could be a tehsil, a police-station or a subdivision). Such subdivisions vary in number from 32 in case of Madras to 82 in case of Poona (Appendix Table). Besides, the city with its legal boundary has been considered as one areal unit of analysis.

Methodology

The entire-region around a metropolitan centre has been divided into five zone of 20 miles radius each, with legal boundary of the city forming one *zone*. However, all the radius are measured from the centre of the city and to that extent, there are likely to be variations in the actual zonal size. The zonal boundary has been adjusted with the administrative boundary. Wherever, zonal boundary has encompassed half or more than half a tehsil, the entire tehsil has been included within the zone.

Simple percentages and the break-off points in the arrays of the values arranged in descending order have been picked up to draw the isopleth lines. The isolines of highest value have helped in identifying the metro-influence zones for various indicators selected for analysis. A common break-off isoline has been marked by superimposition of lines of highest/lowest values of various indicators which in turn represents the mean metropolitan-zone which further has been translated into mileage to quantify the extent of zone of influence of metropolitan-cities.

Hypothesis

The study is based upon two sets of Hypothesis to measure the city-hinter-land relationship.

- (i) There is an inverse relationship between the distance from the metropolis and the following socio-demographic and economic indicators : density of population, population-growth, literacy, dependency-ratio, workers engaged in secondary and tertiary activities.
- (ii) There is a positive relationship between the distance from the city and the following variables : Sex-composition (females per thousand males), workers to total population, workers engaged in primary activities.

The two hypothesis have been tested upon fourteen variables.

Observations and Analysis

Socio-demographic variables. Among the socio-demographic variables, the density of population, population-growth, urbanization, literacy and sex-ratio have been taken into account.

DENSITY OF POPULATION. The metropolises have shown not only high density of population but also high variation in the density of population. The density varies from 6166 persons per km² in Poona to 58,423 persons per km² in Cal-

cutta. However, the density has not shown any relationship with the size of the metropolises. Delhi registers far lower density than Madras, Ahmedabad or Bangalore all of which have lower population size than Delhi. There is a sharp decrease in the density of population as one crosses the legal boundaries of the cities. One experiences a gradual decline in the respective distance zones except in case of Bombay and Poona, both of which show a sudden rise in density in the fifth zone (60-80 miles). This sudden rise however is attributed to the influence of Bombay while calculating density around Poona and of Poona while calculating density taking Bombay as the central point. Both the metropolises have impact on the zones in their vicinity. There is also a marginal increase in the density of population from 2nd zone to the 3rd (20-40 miles) in the metro-regions of Kanpur and Madras. The impact of Lucknow in case of Kanpur and of Vellore in case of Madras explains this phenomenon of rise. Barring the two anomalies, the density follows a general distance-decay rule, confirming thereby the first hypothesis. While Calcutta, Delhi, Madras, Ahmedabad and Kanpur show a breakpoint in the density values after the 3rd zone, the other cities show a breakpoint in the values after the second zone (Table 1).

TABLE 1—DENSITY OF POPULATION PER Km² (1971)

	<i>Zone I City</i>	<i>II upto 20 miles</i>	<i>III 20-40 miles</i>	<i>IV 40-60 miles</i>	<i>V 60-80 miles</i>	<i>VI 80-100 miles</i>
1. Calcutta	58,423	986	729	585	416	326
2. Bombay	13,641	573	215	133	560	178
3. Delhi	8,172	419	409	309	307	280
4. Madras	19,292	298	300	212	229	264
5. Hyderabad	9,494	136	141	140	96	140
6. Bangalore	11,462	360	200	110	155	206
7. Ahmedabad	17,053	282	279	197	143	131
8. Kanpur	4,412	690	717	288	278	253
9. Poona	6,166	207	129	169	454	157

POPULATION-GROWTH. A few metropolises like Bombay, Madras and Poona have shown less population-growth during 1961-71 decade than their immediate zones. The rest of the cities have shown higher population-growth. The rate of growth varies from 28.28 per cent in case of Calcutta to 52.93 per cent in case of Delhi. The growth has a tendency to decline with distance from the

city upto 60 miles in case of most of the cities beyond which it shows a tendency to rise specially in Bombay, Madras, Bangalore and Poona. However, the breakpoint in population-growth occurs soon after the first zone of 20 miles. Hyderabad's picture is slightly different from the rest. Here the population-growth is more or less similar from the second to the fourth zone. Ahmedabad has registered low growth in the 2nd zone and shows an increase in the 3rd and 4th zone. On the basis of this variable, the zone of influence of the metropolitan cities extends approximately upto 20 miles except in case of Hyderabad, where the variable appears to be too weak to be used for the identification of an influence-zone for the region. The variable by and large follows the distance-decay rule (Table 2).

TABLE 2—PERCENTAGE OF POPULATION GROWTH DURING 1961-71

City	Zone I city	II upto 20 miles	III 20-40 miles	IV 40-60 miles	V 60-80 miles	VI 80-100 miles
1. Calcutta	28.28	19.06	14.11	10.12	9.86	6.39
2. Bombay	41.30	54.00	37.25	18.97	61.21	24.29
3. Delhi	52.93	38.38	25.42	23.45	22.29	24.65
4. Madras	42.20	63.78	21.35	14.26	15.82	19.59
5. Hyderabad	42.23	18.30	18.04	19.15	18.52	28.29
6. Bangalore	41.00	28.30	20.53	18.00	29.94	35.00
7. Ahmedabad	44.40	17.80	26.12	27.40	26.88	39.40
8. Kanpur	31.30	24.00	22.71	16.31	15.8	45.58
9. Poona	38.60	38.90	17.80	24.60	35.00	21.90

URBANIZATION. Here, urban population to total population has been taken to be the approximate measure of urbanization. As the table (Table 3) indicates, the cities of Bombay, Madras, Bangalore, Ahmedabad, Kanpur and Poona show cent-per cent of their population as urban. Calcutta, Delhi and Hyderabad have around 90 per cent of their population as urban. While Calcutta shows high concentration of urban population upto third distance-zone i.e., 40 miles from the city, the other metropolises show a break in urban population beyond second zone i.e., 20 miles. Delhi, Hyderabad, Kanpur and Poona show a very poor concentration of urban population even in the 2nd zone. For instance, Kanpur and Hyderabad have 5.83 percent and 8.9 percent of the population categorized as urban in the second zone, showing a very poor

TABLE 3—PERCENTAGE OF URBAN POPULATION TO TOTAL POPULATION (1971)

City	Zone I city	II	III	IV	V	VI
1. Calcutta	92.16	86.66	75.41	49.32	31.46	19.31
2. Bombay	100.0	47.0	17.78	7.44	40.40	14.05
3. Delhi	89.70	24.0	16.14	10.44	11.91	15.79
4. Madras	100.0	68.78	27.04	17.64	17.70	25.14
5. Hyderabad	89.79	5.83	7.78	7.52	14.16	12.32
6. Bangalore	100.0	51.93	17.49	34.87	29.44	19.77
7. Ahmedabad	100.0	42.60	19.61	26.70	19.10	11.66
8. Kanpur	100.0	8.90	0.93	6.07	6.74	15.95
9. Poona	100.0	29.60	10.90	18.30	71.10	15.50

impact of the metropolis on the neighbouring region as far as this variable is concerned. The variable itself shows a distance-decay relationship. The fifth zone (60-80 miles) shows high rate of urban growth around Bombay, Bangalore, Poona and to a very small extent around Madras, Hyderabad and Kanpur. Except for Calcutta and Ahmedabad, every metropolis shows a high growth-rate in the fifth-zone (60-80 miles) than the fourth zone. Ahmedabad, however, records higher growth-rate in the fourth-zone and then shows a decline.

LITERACY. The variable of literacy has been studied in its three aspects, percentage of literates to total population, male *literate*s to male population and female literates to female population. The literacy-rate varies from 49.77 per cent in case of Hyderabad to 84.45 per cent in case of Calcutta metropolis. Outside the metropolis, the literacy-rate tends to decline at a higher rate in other metropolitan-regions than in Calcutta. Bombay shows a sudden increase in literacy in the third zone upto 82.98 which is even higher than the metropolitan city of Bombay itself. Literacy rates are rather low close to Hyderabad.

The cities of Calcutta, Ahmedabad and Kanpur show lower literacy in the fifth zone compared to the fourth while in other cities, the literacy increases from 4th to 5th zone. Ahmedabad, Kanpur, Poona, and Jaipur show higher literacy in the 4th zone compared to 3rd zone. The distance-decay rule is

TABLE 4-PERCENTAGE OF LITERATE POPULATION TO TOTAL POPULATION (1971)

<i>City</i>	<i>Zone I city</i>	<i>//</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>
1. Calcutta	84.45	74.43	42.04	36.31	29.84	20.12
2. Bombay	63.84	47.20	82.98	28.90	46.88	35.47
3. Delhi	58.95	31.84	27.17	22.97	23.91	23.99
4. Madras	62.01	50.33	36.10	28.29	31.48	34.68
5. Hyderabad	49.77	17.05	17.33	15.29	18.22	16.88
6. Bangalore	58.95	47.28	26.12	24.95	25.66	36.82
7. Ahmedabad	58.38	38.31	33.38	39.65	30.93	19.45
8. Kanpur	50.80	40.38	22.59	25.71	19.46	18.46
9. Poona	63.07	42.33	34.71	38.06	56.29	35.04
10. Jaipur	48.32	22.25	14.99	15.52	17.56	19.62
a. Percentage of Male Literates to Male Population						
1. Calcutta	89.31	76.66	65.61	61.32	30.39	21.26
2. Bombay	69.00	59.00	69.44	19.74	58.43	47.47
3. Delhi	63.71	43.56	37.47	32.54	35.89	27.98
4. Madras	70.57	61.59	48.45	40.44	43.91	46.46
5. Hyderabad	59.20	26.14	26.11	23.86	26.99	25.16
6. Bangalore	65.68	55.55	40.17	34.62	29.44	19.77
7. Ahmedabad	66.00	49.90	54.20	51.10	41.94	27.87
8. Kanpur	43.20	35.20	31.95	20.56	29.97	29.45
9. Poona	71.40	55.30	47.50	50.50	63.40	47.40
b. Percentage of Female Literates to Female Population						
1. Calcutta	75.32	71.32	62.92	53.30	29.21	13.93
2. Bombay	55.00	34.00	46.07	8.51	34.37	23.37
3. Delhi	47.75	18.21	12.33	10.00	8.40	8.79
4. Madras	52.54	38.06	23.25	15.83	18.68	22.40
5. Hyderabad	39.51	7.70	8.37	6.57	9.29	8.40
6. Bangalore	51.27	38.05	20.52	24.72	13.48	19.08
7. Ahmedabad	49.20	25.50	10.66	27.30	19.14	10.70
8. Kanpur	41.30	13.54	13.37	9.08	9.45	8.43
9. Poona	53.50	28.20	22.10	25.70	43.80	22.40

maintained only upto 2nd zone in all the cities. Subsequent zones present high variations except Calcutta which shows a continuously declining trend to the last zone.

Male Literacy. There is a general declining trend in male literacy with distance from the city. In the cities, the male literacy varies from as high as 89.31 per cent in case of Calcutta to as a low as 43.20 per cent in case of Kanpur. While Calcutta and Bangalore regions show a declining trend in male literacy from 1st to the last zone, the other metropolises show variations in male literacy with different distance-zones. Breakpoint in the values of male literacy occurs after the 3rd zone in case of Bombay, Kanpur and Poona. Delhi shows a sudden fall beyond the legal boundary of the city; the fall is gradual upto the 4th zone, a rise is experienced in the fifth zone followed by a decline in the sixth zone.

Female literacy. Compared to the male literacy, the female literacy is low. The cities show higher literacy rates than the peripheral regions. The percentage of female literates to total female population varies from 75.32 per cent in case of Calcutta to 39.51 per cent in case of Hyderabad. Except in Calcutta region, the decline of female literacy is very fast as one moves away from the centre of the city. There is a definite breakpoint in the literacy rate soon after the city except in case of Calcutta where the figures continue to be high even upto the fourth zone. On the basis of female literacy rate then, it is difficult to identify a zone of influence except that one could say that cities have no influence on the female literacy of their peripheral regions.

SEX-RATIO. The females per thousand males show a general tendency to increase with distance from the metropolitan cities as has been clearly brought out in Table 5. Within the metropolises, the sex-ratio varies from as low as 529 females per thousand males in case of Calcutta to as high as 919 females per thousand males in case of Hyderabad. The three big metropolises, namely Calcutta, Bombay and Delhi have lowest sex-ratio i.e., 800 or less. There is a constant increase in the females per thousand males from Calcutta city to the periphery. In case of Bombay, Delhi, Madras and Hyderabad, the ratio increases upto 4th zone i.e., upto 60 miles and declines thereafter. Bangalore and Poona show an increase upto third zone and a varying figure after that. While Ahmedabad shows a consistent increase, Kanpur shows high variations from one zone to the other in sex-ratio.

PARTICIPATION RATE IN ECONOMIC ACTIVITIES. This sector is based upon the analysis of Tables six to ten. It is concerned with the percentage of workers to total population; male workers to male population; female workers to female population and percentage of workers engaged in primary, secondary and ter-

TABLE 5—SEX-RATIO (FEMALES PER THOUSAND MALES, 1971)

City	Zone I city	II	III	IV	V	VI
1. Calcutta	529	686	742	861	901	989
2. Bombay	716	855	933	1019	956	1011
3. Delhi	800	831	857	862	861	855
4. Madras	904	925	961	975	970	963
5. Hyderabad	919	975	980	987	975	978
6. Bangalore	874	890	996	910	949	942
7. Ahmedabad	829	911	918	926	933	963
8. Kanpur	762	859	726	850	849	862
9. Poona	869	900	1014	1007	801	980

tiary activities to total workers. The basic hypothesis being that the percentage of total/male/female workers to total/male/female population and workers in primary activity tends to increase with distance from the city-centre. On the other hand, the workers in secondary and tertiary activities tend to decline with distance from the city.

The percentage of workers to total population is high in Calcutta, Bombay, Delhi, Madras and Kanpur cities within their legal boundaries and declines in the second zone. In the case of other metropolitan centres, the workers ratio increases in the subsequent zone soon after the city boundary terminates. Calcutta shows a declining trend in participation rate upto the fourth zone; Bombay and Kanpur show upto second zone and Delhi shows a declining trend upto 3rd zone. There are variations in the participation rate from one zone to another, exhibiting thus neither a regular declining nor an increasing trend in the participation rate of workers in the total population.

MALE PARTICIPATION RATE. The male participation rate shows a more regular trend than the total participation-rate. For instance, Calcutta and Bombay show a continuously declining trend from the first zone to the last with a slight increase of .11 per cent in the 5th zone in Calcutta and .16 per cent in the 6th zone in case of Bombay. All other metropolitan centres register an increase in male workers from first zone to the second zone. Beyond second zone, the pattern tends to vary for individual centres.

TABLE 6—PERCENTAGE OF WORKERS TO TOTAL POPULATION (1971)

<i>City</i>	<i>Zone I city</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>
1. Calcutta	37.02	35.67	25.19	25.09	25.30	24.46
2. Bombay	36.82	34.02	35.41	38.23	33.97	35.87
3. Delhi	30.21	27.07	26.11	27.15	27.77	28.34
4. Madras	28.20	15.49	34.08	39.14	37.92	35.28
5. Hyderabad	25.54	44.84	52.09	44.95	44.53	42.11
6. Bangalore	29.50	33.52	34.02	33.89	37.29	34.97
7. Ahmedabad	28.53	33.46	29.50	25.26	32.87	36.21
8. Kanpur	29.58	21.03	31.12	30.54	35.92	30.34
9. Poona	29.43	32.97	34.58	34.70	36.05	35.42

a. Percentage of Male Workers to Male Population

1. Calcutta	81.30	63.80	46.10	45.77	45.88	40.18
2. Bombay	53.10	52.80	52.66	50.92	49.60	49.76
3. Delhi	50.66	47.80	41.85	48.23	49.02	50.10
4. Madras	49.09	51.34	55.20	53.20	57.00	74.09
5. Hyderabad	48.33	60.40	61.54	68.55	59.89	57.60
6. Bangalore	49.35	56.37	56.74	56.28	60.39	55.62
7. Ahmedabad	48.48	61.84	52.73	50.50	63.81	58.96
8. Kanpur	50.30	51.80	47.22	52.50	59.90	50.80
9. Poona	48.00	51.00	55.00	53.00	56.00	50.00

b. Percentage of Female Workers to Female Population

1. Calcutta	2.40	2.50	2.11	3.20	3.80	6.20
2. Bombay	7.70	12.00	16.19	26.09	17.42	22.13
3. Delhi	1.98	2.13	1.85	2.11	1.95	2.16
4. Madras	5.08	2.66	41.3	19.4	18.2	14.12
5. Hyderabad	8.45	29.07	32.29	31.45	28.93	32.58
6. Bangalore	6.81	9.19	10.20	10.69	14.32	13.26
7. Ahmedabad	4.59	7.30	6.42	5.12	11.82	11.70
8. Kanpur	2.40	2.50	3.90	5.20	9.70	6.90
9. Poona	8.00	12.00	20.00	28.00	13.00	19.00

FEMALE PARTICIPATION RATE. In comparison to male participation, the female participation rate is very low. When observed for the metropolitan cities, the maximum female participation is recorded in Hyderabad followed by Poona and Bombay. Delhi registers minimum participation of female in economic activities. There are variations in the participation rate from one zone to the other. For instance, Calcutta shows a slight increase in female participation rate in the second-zone followed by a decrease and then an increase. Bombay and Poona register an increase upto the 4th zone, Ahmedabad and Delhi upto second zone before the variations begin.

Workers non-workers Ratio. The ratio of non-workers to workers (Table 7) is high in case of Madras, Ahmedabad, Hyderabad, Poona, Bangalore, Delhi and Kanpur. It is low only in case of Calcutta and Bombay (1.7). While Calcutta shows an increase upto 4th zone, Bombay, Bangalore and Kanpur show upto the 2nd zone, Delhi upto 3rd zone, Madras, Ahmedabad and Hyderabad show variations in each zone. Poona shows a continuous decline upto the 6th zone except a slight rise of .05 per cent from 5th to 6th zone.

TABLE V^DEPENDENCY RATIO (NON-WORKERS TO WORKERS 1971)

<i>Cities</i>	<i>Zone I city</i>	<i>//</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>
I. Calcutta	1.70	2.90	2.96	2.98	2.95	2.87
2. Bombay	1.70	1.90	1.73	1.61	1.94	1.7;
3. Delhi	2.30	2.69	2.82	2.64	2.65	2.52
4. Madras	2.55	2.26	4.89	1.56	1.53	1.83
5. Hyderabad	2.42	1.30	1.12	1.22	1.25	1.37
6. Bangalore	2.39	1.98	1.94	1.95	1.74	1.86
7. Ahmedabad	2.50	1.98	2.45	2.46	2.04	1.84
8. Kanpur	2.30	2.40	2.00	2.15	2.02	1.96
9. Poona	2.40	2.03	1.89	1.88	1.77	1.82

Participation of Workers in Different Economic Activities. The analysis of Table 8 indicates a low percentage of workers in primary activities in the metropolises. The figures range from 8.33 per cent in case of Hyderabad to 0.4 per cent in case of Calcutta. The figures go up as soon as one crosses the legal boundary of the city. They are as high as 76.29 per cent around Bangalore to

TABLE 8—PERCENTAGE WORKERS TO TOTAL WORKERS (1971)

Cities	Zone I city	II	III	IV	V	VI
1. Calcutta	0.40	40.30	52.72	72.94	81.71	79.60
2. Bombay	1.10	36.40	56.12	84.10	53.31	78.45
3. Delhi	4.70	50.45	61.90	72.69	72.49	72.01
4. Madras	1.53	31.09	66.50	80.70	71.50	68.68
5. Hyderabad	8.33	72.74	80.98	80.28	84.08	74.40
6. Bangalore	1.97	76.29	80.55	81.90	82.57	72.35
7. Ahmedabad	1.22	55.95	71.91	66.26	79.09	83.91
8. Kanpur	3.80	60.30	88.50	73.70	73.70	86.60
9. Poona	3.00	41.00	79.00	75.90	21.50	76.60

as low as 36.4 per cent around Bombay in their 2nd zones. They show a further increase in the third zone in case of all the cities. In the fourth zone, the increase is observed in case of Calcutta, Bombay, Delhi, Madras and Bangalore. Analysing percentage of workers in secondary activities to total workers (Table 9), it is observed that within the metropolitan centres, the percentage varies from 49.95 per cent in case of Ahmedabad to 26.28 in case of Hyderabad. The percentage declines in the second zone and varies from 36.8 around Bombay to 7.3 around Kanpur. In the third zone again, Bombay (22.6 per cent) and Kanpur (4.49 per cent) show the *maximum and the minimum* figures. The figures reveal varying trends beyond the third zone. For instance, Calcutta and Delhi show a declining trend upto the fifth zone; Bombay and Madras upto the fourth zone and Bangalore upto fifth zone while the rest of the cities show a declining trend upto the third zone.

Percentage of workers in tertiary activities (Table 10) varies from 69.93 per cent in Calcutta to 48.82 per cent in Ahmedabad metropolis. The percentage declines considerably in the second zone. It varies from 11.96 per cent around Bangalore to 35.61 per cent around Madras generally, Calcutta shows a declining trend upto the fifth zone. Ahmedabad upto second zone and the others upto third zone.

Conclusion

An analysis of the fourteen indicators selected to understand the demographic profile of metropolitan cities and their hinterlands highlights the following characteristics.

TABLE 9—PERCENTAGE OF SECONDARY WORKERS TO TOTAL WORKERS (1971)

<i>Cities</i>	<i>Zone I city</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>
1. Calcutta	30.24	32.90	22.23	10.26	5.18	11.41
2. Bombay	45.10	36.80	22.60	5.43	17.42	9.20
3. Delhi	29.23	22.84	13.70	9.89	9.76	9.96
4. Madras	32.62	33.31	14.40	8.20	15.74	11.66
5. Hyderabad	26.28	12.33	8.67	9.31	7.87	12.58
6. Bangalore	40.69	11.74	7.60	7.53	6.24	10.27
7. Ahmedabad	49.95	13.97	9.88	14.19	7.69	4.93
8. Kanpur	35.60	7.30	4.49	6.80	5.30	4.80
9. Poona	36.70	28.70	8.10	10.10	36.80	9.50

TABLE 10—PERCENTAGE OF TERTIARY WORKERS TO TOTAL WORKERS (1971)

<i>Cities</i>	<i>Zone I city</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>
1. Calcutta	69.93	26.50	24.84	16.78	13.11	14.69
2. Bombay	53.40	26.80	22.32	8.80	28.74	11.47
3. Delhi	66.00	26.71	24.32	16.98	17.98	17.86
4. Madras	66.25	35.61	19.09	11.14	13.46	19.16
5. Hyderabad	65.38	14.93	9.84	10.42	8.04	12.83
6. Bangalore	57.34	11.96	11.48	10.57	11.21	17.02
7. Ahmedabad	48.82	14.35	18.51	19.58	13.40	8.34
8. Kanpur	60.50	32.00	7.20	17.10	8.86	8.10
9. Poona	60.60	30.10	11.30	14.00	41.60	1.40

The variables selected, exhibit different behavioural pattern from each other with distance from the metropolitan centres. Generalization can be made with respect to overall pattern of decline or increase in values of certain variables with increase in distance from the city as in case of density of population or workers engaged in primary activities. In certain variables, even such an overall pattern is not forthcoming around certain cities as in case of population growth around Bombay and Ahmedabad. Hence, with different metropolitan centres sometimes, the trend of the same variable has been different. However, the two null hypothesis promulgated in the beginning of the exercise have been upheld.

An attempt has been made to identify the influence zones of each metropolitan centre based on the combined behaviour of all the fourteen variables, by following a simple technique of identifying a zone which accounted for maximum frequency of occurrence of breakpoints in the values of selected indicators (Table 11). Such an exercise reveals that on the basis of the formal indicators

TABLE 11—INFLUENCE-ZONES ON THE BASIS OF BREAK-POINTS IN VALUES OF THE SELECTED INDICATORS

<i>Name of the Metropolis</i>	<i>Density of Population</i>	<i>Population Growth</i>	<i>Percentage of urban population to total population</i>	<i>Percentage literates to total population</i>	<i>Male literates to male population</i>	<i>Female literates to female population</i>	<i>Sex-ratio</i>	<i>Workers to total population</i>	<i>Male workers to male population</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
1. Calcutta	3	3	3	—	4	4	3	—	6
2. Bombay	3	3	2	2	3	3	2	1	3
3. Delhi	3	2	2	—	4	4	3	3	5
4. Madras	3	2	2	—	3	2	2	2	3
5. Hyderabad	4	3	2	1	3	2	2	1	6
6. Bangalore	2	2	2	2	2	2	2	1	1
7. Ahmedabad	3	2	2	1	2	2	2	2	1
8. Kanpur	3	2	2	2	2	2	1	2	2
9. Poona	2	2	2		2	2	2	—	1

Table 11 (contd. on page 160)

Table 11 (contd. from page 159)

<i>Name of the Metropolis</i>	<i>Female Workers to female Population</i>	<i>Dependency ratio</i>	<i>% Workers engaged in primary activities to total workers</i>	<i>% Workers engaged in secondary activities to total workers</i>	<i>% Workers engaged in tertiary activities to total workers</i>	<i>Average influence zone derived on the basis of frequency of break points</i>	<i>Average distance col. 15</i>
	10	11	12	13	14	15	16
1. Calcutta	—	—	—	—	—	3	40 miles
2. Bombay	3	4	2	3	3	3	40 miles
3. Delhi	6	2	2	2	3	2	20 miles
4. Madras	2	2	2	2	2	2	20 miles
5. Hyderabad	2	2	2	2	3	2	20 miles
6. Bangalore	2	4	2	2	3	2	20 miles
7. Ahmedabad	1	—	—	—	—	2	20 miles
8. Kanpur	3	2	2	2	2	2	20 miles
9. Poona	1	—	2	—	—	2	20 miles

Dash (—) means there is no particular zone with a breakpoint, figures are either fluctuating or showing a gradual declining or an increasing trend.

and, the influence zones of Calcutta and Bombay extend upto a distance of 200 miles while those of other metropolitan centres extend upto a distance of 20 miles. Apparently, the influence of the fast developing metro-cities of India on their neighbouring areas is still in its infancy.

References

1. Deshpande, C. D., Poverty and the Urban process : A spatial analysis of the urban scene. Reprinted from *Socio-economic Development Problems in South and South East Asia*. Edited by S. Manzoor Alam and G. Ram Reddy, Published by Popular Prakashan Pvt. Limited, pp. 115-121.
2. Joyce, Frank (ed.), 1977, *Metropolitan Development and Change the West Midlands : A Policy Review*, Published Teakfield Limited, 445.
3. Mitra, Asok, 1979, Where do we go from here? The problems of Calcutta Metropolitan Region, *Nagar Lok*, **XI** (2), 13-33.
4. Mookherjee, Debnath, 1978, Urbanization trends in India, *Geographia Palonica*, **39**, 79-90.
5. Nangia, Sudesh, 1978, Delhi Metropolitan Region : A profile of population growth, *Indian Journal of Regional Science*, **X**(1), 68-77.
6. _____, 1976, *Delhi Metropolitan Region. A Study in Settlement Geography*, K. B. Publications, New Delhi, p. 209.
7. _____, 1971, Gradient analysis in Delhi Metropolitan Region, *Analytical Geograpy*, **1**(1), 48-56.
8. _____, 1974, Interrelationship amongst the patterns of selected indicators in Delhi Metropolitan Region, *Indian Journal of Regional Science*, **VI**(1), 24-29.
9. Spreiregen, Paul D. (ed.), 1979, *Metropolis and Beyond* Selected Essays by Hans Blumenfeld, Published John Wiley and Sons, Inc., p. 420.
10. Prakasa Rao, V. L. S. and Tewari, V. K., 1978, *Urbanization in India : Spatial Dimensions*, Published by Institute for Social and Economic Change, Bangalore, p. 35,

APPENDIX

TABLE 1—SOME CHARACTERISTICS OF METROPOLITAN CITIES AND THEIR HINTERLANDS, 1971

<i>City</i>	<i>No. of Taluks in 100 miles radius</i>	<i>Population of urban agglomeration</i>	<i>Area of the urban agglomeration (Km²)</i>	<i>Density of population of UA (km²)</i>	<i>Population of the city</i>	<i>Area of the city (km²)</i>	<i>Density of population in city per (km²)</i>
Calcutta	55	7,031,382	568.79	12,362	6,076,035	104.00	58,423
Bombay	64	5,970,575	437.71	13,640	5,970,575	437.71	13,640
Delhi	65	6,647,023	446.26	8,172	3,647,023	446.26	8,172
Madras	32	3,169,930	530.77	5,972	2,469,449	128.00	19,292
Hyderabad	51	1,796,339	298.51	6,019	1,607,396	169.31	9,494
Bangalore	72	1,653,779	174.71	9,466	1,504,741	134.42	11,462
Ahmedabad	63	1,741,522	123.88	14,058	1,585,544	92.98	17,053
Kanpur	68	1,275,242	298.98	4,265	1,158,321	262.52	4,412
Poona	82	1,135,034	324.52	3,498	856,105	138.85	6,165