

**A COMPARATIVE ANALYSIS OF SOME ASPECTS
OF URBANIZATION IN PUNJAB, HARYANA,
MAHARASHTRA AND GUJARAT-1991**

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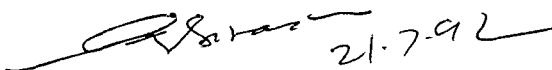
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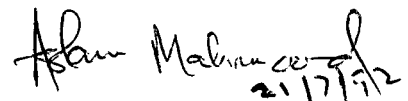
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C E R T I F I C A T E

This is to certify that the dissertation entitled "A COMPARATIVE ANALYSIS OF SOME ASPECTS OF URBANIZATION IN PUNJAB, HARYANA, MAHARASHTRA AND GUJARAT (1991)" submitted by Dinesh Kumar in partial fulfilment of requirements for the Degree of Master of Philosophy, has not been submitted earlier for any other degree of this or any other University and is his own work.

We recommend that this dissertation may be placed before the examiners for evaluation.


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DEDICATED TO

MY MATERNAL GRANDMOTHER

A C K N O W L E D G E M E N T S

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(DINESH KUMAR)

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CHAPTER I

(i) Introduction:

The relationship between urbanisation and economic development is a universal phenomenon. However, the pattern of urbanization will be determined by the nature of economic development in the surrounding region. Several scholars have shown that a close relationship exists between urbanization and economic development. The nature of economic development of a state is determined by the availability of physical resources, their endowments, population resources agriculture and other related factors. As these forces change, different pattern of urbanization are generated.

In this study, therefore, an attempt has been made to identify the differences in the patterns of urbanization between the states of Punjab and Haryana on the one hand - which have predominantly an agricultural economic base,—and the states of Maharashtra and Gujarat on the other hand—which have

predominantly industrial economic base. The present study is based on the latest data provided by the three papers of the Provisional Population Totals of 1991, Census of India.

Review of Literature::

There are not many studies dealing with the pattern of urbanization and its linkages with the surrounding rural economy. Alam and Reddy¹ have given a detailed account of the process of urbanization in terms of surrounding stimulants. Asok Mitra² has also

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1. S. Manzoor Alam and J. Geeta Ram Reddy (1987): "Process of Urbanization and urban system in India" in S. Manzoor Alam and Fatima Alikhan (eds.), Perspectives on Urbanization and Migration, India and USSR' Allied Publishers, New Delhi, pp.19-36.
 2. Asok Mitra (1967): "Internal Migration and Urbanization" Ecafe Working Group on Problems of Internal Migration and Urbanization, Bangkok, Thailand, pp. 35-81

tried to describe the process of urbanization in terms of internal migration and urbanization. Moonis and Habeeb³ have analysed these relationships in the historical perspective.

Moonis and Ramachandran⁴ have tried to establish the relationship between the pattern of urbanization and its linkages with surrounding rural economy. While analysing the pattern of urbanisation in relation to structure of the economy, Kingsley Davis

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3. Moonis Raza and Atiya Habeeb (1976):
"Characteristics of Colonial Urbanization - a case study of Satellite Primacy of Calcutta (1850-1921)", in Alam and Pokshishevasky (eds) - "Urbanization in developing countries p.187.
 4. Mooniz Raza et al (1979) : "Spatial Organization and Urbanization in India" in R.P. Mishra and K.V. Sundram (eds.) : Rural Area Development: Perspective and Approaches', Sterling, New Delhi, pp 33-77.
R.Ramachandran (1991): "Urbanization and Urban System in India", Oxford University Press, New Delhi, pp.82--94.

and Golden⁵ proposed the theory of over-urbanization in India as well as in several other developing countries. This became the major thesis for discussion at a joint UN/UNESCO Seminar held in Bangkok in 1956. These scholars argued that the proportion of urban population to total population in these countries was much higher than warranted by their level of economic or industrial development.

5. Kingsley Davis (1962): "Urbanization in India - Past and Future" in Roy Turner (ed.): "India's Urban Future", University of California Press, Berkeley.

- H.H. Golden (1954): "Urbanization and Development of Pre-Industrial Area", Economic Development and Cultural Change, 3 (1),

Scholars like Sinha, Desai and Sengupta⁶ have analysed the characteristics of land utilization in the fringe areas of the cities of Patna and Ahmedabad respectively and made recommendations pertaining to their future expansion and changes in their landuse patterns. In view of the instability and absence of long term dynamism at the lower level towns, and a higher and relatively stable growth of population in class I cities in all decades since Independence,

6. M.M.F. Sinha (1978): "Impact of Urbanization on Lands in Rural Urban Fringe of Patna". (Unpublished Ph.D. Thesis), Patna University, Patna, quoted in Amitabh Kundu (1992): "Urban Development and Urban Research in India", Khanna Publishers, New Delhi, pp.112.

- A.Desai and S. (1987): "Problem of changing Landuse Pattern in rban Fringe - The Case study of Ahmedabad" in C.S. Yadav (ed.): "Rural Urban Fringe, Perspective in Urban Geography 9, Concept, New Delhi , pp. 205 - 212.

some researchers have proposed dual settlement structure. According to Rothermund (1980) and Kundu (1983)⁷ such differences in the pace and pattern of growth at two levels of Urban hierarchy seem to be a reflection in space of the dual structure of Indian economy. Recently Kundu (1992)⁸ has tried to study the Rural-Urban Linkages and Pattern of Urban growth in

7. D. Rothermund (1980): "Urban Growth and Rural Stagnation," Manohar Pubs. , New Delhi, quoted in Amitabh Kundu (1992): "Urban Development and Urban Resource in India", Khama Publishers, New Delhi, p.110.

- Amitabh Kundu (1983): "Theories of City Size Distribution and Indian Urban Structure - a Reappraisal", Economic and Political Weekly, 18(3) pp. 1361-67.

8. Amitabh Kundu (1992) : "Urban Development and Urban Research in India", Khama Publishers, New Delhi, pp 23-47.

India. According to him, the similarity in pattern of growth of industries and tertiary activities in rural and urban areas indicates a strong rural-urban independence at the national level. It can be argued that the rural industries are to a certain extent, a spill-over or an extension of urban industries. But the process of industrial dispersal is restricted to the peripheries of only a few metropolitan and large cities. With the improvement in transportation, communication and other facilities, it is possible to initiate a process of industrial dispersal based on healthy rural-urban linkages.

A look at the workforce composition in different states will provide the basis for establishing the relationship between economic development and Urbanization. Percentage share of total workforce in different sectors of economy is given in Table 1.1. along with the percentage of urban population for major States in India.

Table 1.1
Percentage Distribution of Main Workers and Percentage
of Urban Population Major States of India,, 1991

State/ Country	Cultiva- tors	Agricul- tural Labou- rers	Agricul- tural Wor- kers	HHI wor- kers	Other wor- kers	% of Urban Popu- lation
India	38.75	26.15	64.9	3.63	31.47	25.72
Punjab	32.83	23.31	56.14	2.93	40.93	29.72
Haryana	39.38	19.53	58.91	2.99	38.10	24.79
Mahara- shtra	32.81	26.91	59.72	3.09	37.21	38.73
Gujarat	33.46	22.98	56.44	2.18	41.38	34.04
Andhra Pradesh	27.76	40.76	68.52	5.04	26.44	26.84
Bihar	43.41	37.21	80.62	2.69	16.69	13.17
Karna- taka	34.36	28.75	63.14	2.81	34.08	30.91
Kerala	12.38	25.66	38.04	3.92	58.04	26.44
M.P.	51.87	23.50	75.37	3.08	21.55	23.21
Orissa	4.21	28.85	73.06	3.47	23.47	13.43
Raja- sthan	59.18	10.13	69.31	2.84	27.85	22.85
Tamil Nadu	24.94	34.16	59.10	4.66	34.33	34.02
U.P.	52.84	19.23	72.07	4.38	23.55	19.89
West engal	28.42	24.53	52.95	4.98	42.07	27.39

Source: Census of India 1991, Series 1 Paper 3 of 1991
Provisional Population Totals: Workers and their
Distribution, Table 8, pp 443-507.

A close examination of Table 1.1 shows a broad inverse relationship obtaining between level of urbanisation and agricultural work force. However, there are also some deviations from this rule. For example the first two highly urbanized states, Maharashtra and Gujarat, show proportion of agricultural workers to total population as 59.72 per cent and 56.44 percent respectively. In the states of Punjab and Haryana, it is 56.14 per cent and 58.91 percent respectively, but in these states the percentage of urban population to total population is only 29.72 percent and 24.79 percent respectively. Thus although Punjab and Haryana have almost the same proportion of agricultural workers as in Maharashtra and Gujarat, the two sets of States are not similar in terms of their levels of urbanization. We know that in the states of Punjab and Haryana agriculture is fairly developed in terms of land productivity, but this might have arrested rapid urbanization as in the case of Maharashtra and Gujarat.

Level of urbanization, as reflected by the percentage of urban population to total population, is

not sufficient to describe the urban situation. One of the important characteristics of urbanization is the inequality in the size-class distribution of urban centres. Census of India, 1981⁹ has used the Gini's Concentration Ratio (G) to describe the inequality in the size class distribution of urban centres from 1951 to 1981. This analysis has been done statewise. According to Sarita¹⁰ "Gini's Concentration Ratio is a method for measuring the concentration of settlements which expresses the area on the graph between the Lorenz curve and the diagonal as a proportion of the total area below the diagonal. This is the next step

9. Census of India 1981, Series 1, Monograph, India: "Urban Growth in India 1951-1981 :A Statistical Analysis," pp. 11-13.

10. Sarita (1970): "Settlement Pattern of Jaipur Region: A Geographical Analysis." (Unpublished M.Phil Dissertation, CSRD/SSS.JNU, New Delhi, pp.29-39)

in the Lorenz curve method." Smith¹¹ has also used Gini's concentration Ratio and Lorenz curve for describing the inequality in the size-class distribution of urban units.

Another way to look into the size-class inequality is through Rank size Rule. The same thing with minor variations could be studied by the Index of Primacy suggested by Arrigha.¹² Alam and Reddy¹³ have

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11. David M. Smith (1977): "Patterns in Human Geography", Penguin Books, Harmondsworth,, Middlesex, England pp 180-202.
 12. Arrigha, Eduardo (19745): "Selected Measures of Urbanization", in Goldstein, Sidney and F. Sly. David (ed.): 'The Measurement and Projection of Urban Population', IUSSPL, Working Paper No.2, Liege, Belgium, p 64.
 13. S. Manzoor Alam and J. Geeta Ram Reddy (1987): "Process of Urbanisation and Urban System in India" in S. Manzoor Alam and Fatima Alikhan (eds.), 'Perspective on Urbanization and Migration, India & USSR, Allied Publishers, New Delhi, p.49-62.

used the Rank size Rule to look into the size inequality of towns in India. Mandal¹⁴ has used the Rank-size Relationship in his study of rural settlements. According to him, under this rule, the member of settlement should continue to increase as their size decreases, so that we should expect not only villages with higher population size, but more smaller size settlements than villages and more isolated farms leads than smaller settlements. The existence of a straight line rank-size curve for settlements in most of the countries and regions of the world suggests that this is a "normal" condition even though the reasons for its existence are far from clear. Ashish Sarkar¹⁵ has used the rank-size distribution of urban

14. R.B. Mandal(1979): "Introduction to Rural Settlements" Concept Publishing Company, New Delhi, pp.172-175.

15. Ashish Sarkar (1987): "Rank-Size Distribution of Urban Settlements in West Bengal", Geographical Review, Vol.49, No.4, pp 1-12.

settlements in West Bengal for the period 1901-1981. The conclusion was that the Zipfian concept did not exactly fit into the system of urban settlements in West Bengal. Sriparna Bose¹⁶ used the urban size relationship from the view point of rank size rule and primacy. In this study, again, the town sizes in West Bengal do not conform to the rank-size rule and Calcutta is a primate city. Brush¹⁷ tried to use the Rank-size Rule as a tool for structural analysis of Wisconsin Rural Communities in which he sought to establish population - size break -points leading to a

16. Sriparna Bose (1987): "Urban Rank Size Relationship in West Bengal, " Geographical Review of India, Vol.49, No.4, p 47-55.

17. John, E. Brush (1953): "The Hierarchy of Central Place in S.W. Wisconsin," Geographical Review Vol.43, pp 380-402.

functional classification scheme. Mishra¹⁸ has established a hierarchy of towns in the Umland of Allahabad. Rosing¹⁹ rejected the Zipf model as he tried to use the degree of Primacy as an indicator of relative economic development and found that it did not conform to the Zipfian model. Vishwanath²⁰ studied the growth patterns and history of urban centres in Mysore.

The inequality in the spatial pattern of distribution of settlements is another characteristic

18. H.N. Mishra (1976): "Hierarchy of Town in the Umland of Allahabad", The Deccan Geographer, Vol.24, pp 34-37.

19. Keneth. E. Rosing (1966): "A Rejection of the Zipf Model (Rank Size Rule) in Relation to City Sizes" The Professional Geographer Vol.18, pp 75-80.

20. Vishwanath (1972): "Growth Pattern and Hierarchy of Urban centres in Mysore: Indian Geographical Journal, vol.437, no.1 & 2.

of urbanization. King²¹ has suggested three different patterns based on the concept of Nearest Neighbour Analysis, i.e., 'Clustered', 'Random' and 'Uniform'. Before King, Plant biologists Clark and Evans²² evolved the formula for the pattern of distributions of plants as a measure of spacing. Smith²³ has used the Nearest Neighbour Analysis for describing the patterns

21. L.J. King (1962): "A Quantitative Expression of Pattern of Urban Settlement in Selected Areas of US. Tijdschrift Voor Economische in Social Geographic, vol.53, pp 177.
22. P.J.Clank and F.C. Evans (1954): "Distance to Nearest Neighbour as a measure of spatial Relationships in Population," Ecology, Vol.35, pp 445-453.
23. David M. Smith (1977): "Pattern in Human Geography" Penguin Books, Harmondsworth, Middlesex, England pp 180-195.

in human geography. According to him, the distance of each point to its nearest-neighbour is found and used to place the pattern on a scale indicating departure from randomness in the direction of either regularity or clustering. He further said that the degree of regularity or clustering in a point pattern could be approximately judged by the naked eye. Like other geographers, he has also used three patterns; i.e. 'Clustered', 'Regular' or 'Random'. Sarita²⁴ has also used the Nearest neighbour Analysis while describing the settlement pattern of Jaipur region. While describing the distribution of settlements, in Periyar River Basin, Tara²⁵ used this method. Thomon²⁶ used

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24. Sarita, (1978): "Settlement Pattern of Jaipur Region" A Geographical Analysis: (Unpublished M.Phil Dissertation CSR/D/SSS, JNU, New Delhi, pp.
 25. Rachel Tara John (1991): "Distribution of Settlement in the Periyar Basin", (Unpublished M.Phil Dissertation CSR/D/SSS, JNU) p.94-101.
 26. H.R. Thomson (1956): "Distribution of Distance to the neighbour in a population of randomly distributed individual" Ecology, Vol.37, pp.391-394.

the Nearest Neighbour concept and found non-randomness in a settlement distribution. Dacey²⁷ used the method of derivation of the mean and variance of a class of nearest neighbour distance which resembles that of Clark and Evans but it is more general. Further Countenho and Ramamurthy²⁸ have used the Nearest Neighbour Technique to find out the pattern, spacing, size and regional variation in settlement pattern in Tapti-Purna basin. Roy²⁹ has used the nearest neighbour Technique to find out the random element in the distribution of urban settlements in West Bengal.

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27. Michael E.Dacey (1960):."A Note on the Derivation of Nearest Neighbour Distance, " Journal of Regional Science, Vol.2, pp.81-87.
28. O. Countenho and K.Ramamurthy (1972): "A Study of Rural Settlement Pattern in Maharashtra" - Indian Geographical Journal, Vol.47, No.1 and 2, pp. 26-40.
29. Phanibhusan Roy (1985): Random Element in the Distribution of Urban Settlement in West Bengal 1901 - 1971 Indian Journal of Regional Science Vol.17. No.2, pp 69-71.

(iii) Objectives of the Study:

In this study, therefore, an attempt has been made to compare and contrast the patterns of urbanization in the states of Punjab and Haryana with the States of Maharashtra and Gujarat, in terms of the inequality in the size distribution. Keeping this in view the following objectives have been set for the study -

- 1) To compare the inequality in the size distribution of towns in the states of Punjab and Haryana with the same in the states of Maharashtra and Gujarat.
- 2) To compare the spatial pattern of distribution of towns in the states of Punjab and Haryana with that in the states of Maharashtra and Gujarat.

3) To compare the inter-relationship between some of the characteristics of urbanization and other socio-economic variables in Punjab and Haryana with the same in Maharashtra and Gujarat.

iv) Hypothesis: The following hypotheses have been developed for the present study -

1. Agro-based urbanization has less inequality in the size-distribution of towns than urbanisation based on industrialization.
2. Spatial pattern of distribution of town in agro-based areas is more uniform than the highly industrialized areas where it is more 'clustered' or 'random'.
3. Higher the level of urbanization, lower is the rate of growth of urban population.

V) Chapter Scheme:

The present study has been divided into six chapters. In the first chapter a short introduction has been given, showing the relationship obtaining between urbanization and economic development. This chapter also includes a review of relevant literature, objectives, hypotheses, chapter scheme and points out limitations in the study.

The second chapter describes the sources and types of data used for this study, methodology and gives an account of the study areas, i.e. Punjab, Haryana, Maharashtra and Gujarat.

In the third chapter urban concentration and inequality in the size-distribution of towns have been studied with the help of Lorenz Curve, Gini's concentration Ratio, Rank-size Rule and Index of Primacy.

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The fourth chapter deals with the pattern of spatial distribution of towns. Spatial pattern of distribution of towns has been analysed and compared as obtaining in the states of Punjab, Haryana, Maharashtra and Gujarat.

The fifth chapter shows the intercorrelation between some of the characteristics of urbanization and characteristics of other socio-economic variables. Comparisons have also been made for the above mentioned states.

The sixth chapter deals with summary and conclusion.

(vi) Limitations of the Study:

The present study is based on the data of 1991 Census of India given in three papers of Provisional Population Totals. There are limited data in these provisional volumes. While analysing the socio-economic correlates of urbanization, we have to contend with these limited variables only. Some of the

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important variables such as migration, educational level etc. could not be analysed because of the same reason.

For Nearest Neighbour Analysis to know the spatial distribution pattern of urban settlements , we have used only the towns from Class I to Class IV. Many new towns have been added in Class V to Class VI for which a location map is not available and so they have been left out.

CHAPTER 2
DATA, METHODOLOGY AND STUDY AREA

(i) DATA:

The data for this study has been collected from secondary sources. The present study is based on the latest data of 1991 census of India as given in the three volumes of Provisional Population Reports i.e. Total Population, Rural-Urban Distribution and workers and their Distribution.¹

-
1. (a) Census of India, 1991, Series -1, India Paper - I of 1991, Provisional Population Totals
 - (b) Census of India, 1991, Series-1, India Paper -2 of 1991, Provisional Population totals: Rural-Urban Distributions.
 - (c) Census of India, 1991, Series 1, India Report Paper-3 of 1991, Provisional Population Totals: Workers and Their Distribution.

For different steps of analysis different variables have been selected. To show inequality in the size-class distribution of urban centres, the following variables have been used in each state.

1. Number of Towns of Size - 100000 and above. (x1)
2. Number of Towns of size - 50,000 - 99,999 (x2)
3. Number of Towns of size - 20,000 - 49,999 (x3)
4. Number of Towns of Size - 10,000 - 19,999 (x4)
5. Number of Towns of Size - 5000 - 9999 (x5)
6. Number of Towns of size below 5000 (x6)
7. Total Population living in Town size 100000 and above (y1)
8. Total Population living in Town size 50000-99999 (y2)
9. Total Population living in town size 20,000-49,989 (y3)
10. Total population living in town size 10,000-19999 (y4)
11. Total population living in town size 5000-9999 (y5)
12. Total population living in town size below 5000 (y6)

Apart from these data the population of all

the towns of our study area were also taken with their ranks. For measuring the pattern of spatial distribution the variable used is -

13. Distance of a town "i" from its nearest neighbours
Town j (d_{ij}).

For correlation analysis the following variables have been used at district level-

14. Percentage of urban population to total population (1991).
15. Growth Rate of urban population (1981-1991)
16. Sex Ratio (1991)
17. Density of Population (1991)
18. Proportion of Urban Male Workers (1991)
19. Proportion of Urban Female Workers (1991)
20. Proportion of other urban male workers (1991)
21. Proportion of other urban female workers (1991)

(ii) Methodology:

For measuring the inequality in the size

class distribution of urban centres Ginni's concentration Ratio was used. It is based on the concept according to which in a equal distribution percentage of number of Towns upto a given size to total number of towns will be equal to the percentage of population living in those towns to total urban population.

For this purpose, we convert the number of towns in each size class as proportion to total number of towns and the corresponding population living in each category of towns also in proportion to total urban population. These percentages are cumulated and we denote X_i as cumulative percentage of number of towns upto class i to total number of towns ($i = 1, 2, 3, 4, 5, 6$) and Y_i as total number of population living in urban centres upto class i to total urban population ($i = 1, 2, 3, \dots, 6$)

Different values of X_i and Y_i are plotted on a graph paper. In case of no equality in the size distribution, the graph will be a straight line, which is known as *line* of equal distribution. In a real

situation, however, the graph will deviate from the line of equal distribution.

The magnitude of this deviation will be directly proportional to the level of inequality in the size class distribution. Thus to show the inequality a graph is prepared with the hypothetical line of equal distribution and the actual line graph. Such a graph is known as a Lorenz curve. The Lorenz curve has been used in the present study to show the inequality in the size class distribution of urban centres in each state.

The Lorenz curve is only a graphical way of assessing the inequality. A more precise assessment of inequality is done through numerical counterpart i.e. Gini's concentration Ratio (G). The mathematical formulae for Gini's concentration Ratio "G" is as given below -

$$G = \frac{1}{100 \times 100} \left| \left(\sum_{i=1}^n x_i Y_{i+1} \right) - \left(\sum x_i + 1 Y_i \right) \right|$$

The maximum value of 'G' is one when it shows the highest inequality. The minimum value is zero where there is no inequality.

Yet another method for looking into the inequality of the size distribution of urban centres is through 'the Rank size Rule'. It was first suggested by Zipf in 1941. According to this rule the population of a town in a region is related with its rank in the following form of Pareto's distribution.

$$Pr = KR^{-b}$$

Pr is the population of a town whose rank is R.

K and b are constants.

This relationship gets transformed into the following linear form after taking the Logarithm of both the sides.

$$Y = a - bx$$

where $Y = \log Pr$

$$x = \log R$$

$$a = \log K$$

We plotted the population(Pr) of towns on Y axis and their rank (R) (was plotted on X axis on

double log paper. In this way, we got a scatter diagram which closely resembles a straight line with a negative slope.

"Statistically this regularity can be examined by fitting a regression line of $\log P_r$ and $\log R^2$. The regression-coefficient of this line reflect the degree of primacy in the entire urban system and the coefficient of determinants may be taken as a measurement of its goodness of fit to the system of Rank-size Regularity.

The inequality in the first few towns generated by Metropolization is called level of Primacy. Initially the first few towns are observed according to their ranks. The formulae for the first Primacy Index (IP1) is as below:-

-
2. Aslam Mahmood (1986): "Statistical Methods in Geographical Studies", Rajesh Publications, New Delhi, pp.77-81.

$$IP_1 = \frac{P_1}{P_2 + P_3 + P_4}$$

The formulae for the second Primacy Index (IP2) is as below-

$$IP_2 = \frac{2P_1}{(P_2 + P_3 + P_4 + \dots + P_{11})}$$

P1 = Population of the 1st rank Town

P2 = Population of the 2nd rank Town

P11 = Population of the 11th rank Town.

Further, for working out spatial patterns of distribution of urban centres, King³ has suggested three different patterns based on the concept of Nearest Neighbour Analysis i.e. 'Clustered', 'Random' and

-
3. L.J.King (1962): "A Quantitative expression of the pattern of urban settlement in selected areas of U.S., Tijdschrift voor Economische in Sociale Geographic, Vol 53, pg.1-7

'Uniform' or Even. This method was applied first by plant biologists Clark and Evans. ⁴.

According to Smith⁵, "Nearest Neighbour Analysis provides measure of the degree of concentration in geographical patterns."

The formulae for Nearest Neighbour Analysis is as give below:-

$$R = \bar{D}_o / \bar{D}_r$$

$$D_o = \sum d_i^2 / N$$

$$D_r = 1/2 \sum P$$

$$P = N/A$$

-
4. P.J. Clark ad F.C.Evans (1954):Distance to Nearest Neighbour as a measure of Spatial relationship in population Ecology 35:4 (1954), 445-453.
 5. David M.Smith (1977): Patterns in Human Geography", Penguin Books ,Harmondsoworth, Middlesex, England, pp 280-196.

R = Nearest Neighbour Index

d = distance

\bar{D}_0 = Actual mean distance between Nearest Neighbour points in a given area.

\bar{D}_r = Mean expected distance of random distribution of the same number of points in the same area.

P = density of settlement

N = Number of paired settlements.

A = Area of the region.

If the value of

R = 0, clustered

R = 1, Random

R = 2.15, uniform or even

"This ratio 'R' ranges from zero (0), when there is maximum aggregation of all the points at one location, through one which represents a random distribution, to 2.15 which represents even distribution (The limit of which at 5% and 1% level of significance is 2.58 and 1.96 respectively.

The standard Error of the expected mean distance is

$$\sigma \bar{D}_r = \frac{0.26136}{\sqrt{N^2/A}}$$

If the value of R falls between 0-1 or 1-2.15 they may be explained as approaching cluster and approaching Uniform respectively, provided that the value of \bar{D}_r is significantly different from \bar{D}_0 ; otherwise the pattern should be considered as Random and the difference between \bar{D}_0 and \bar{D}_r is attributed to the chance factor only.

The Statistics:

$$Z = \frac{\bar{D}_0 - \bar{D}_r}{\sigma \bar{D}_r}$$

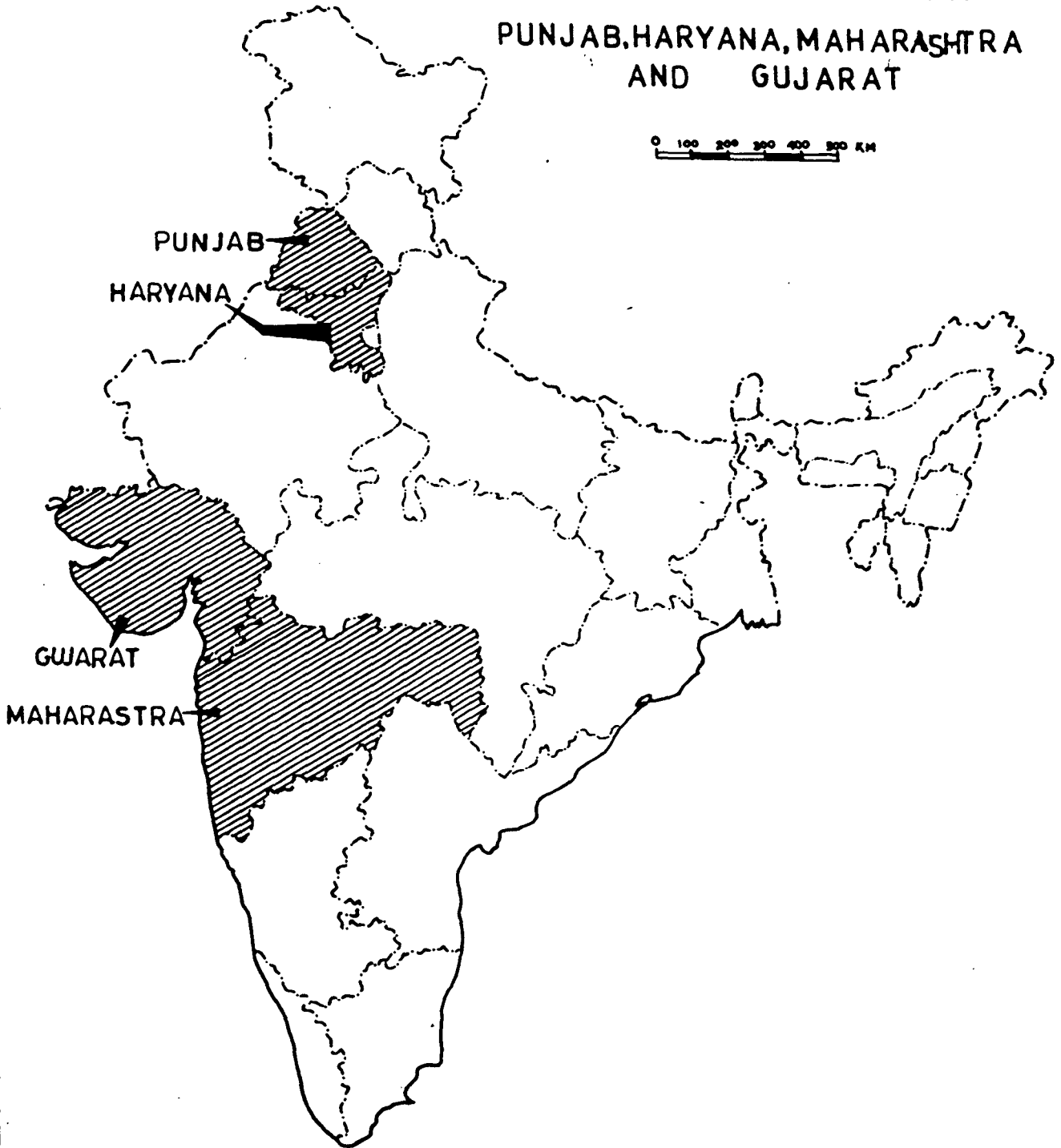
is a standard normal variate and is used to test the significance of difference between \bar{D}_0 and \bar{D}_r .⁶

6. Aslam Mamood (1986): "Statistical Methods in Geographical Studies", Rajesh Publications, New Delhi, p 73.

For Nearest Neighbour Analysis of urban settlements in Punjab , Haryana, Maharashtra and Gujarat, only size Class I to size class IV of Urban centres have been chosen. In 1991, the majority of the new towns have been added in size Classes V to size Classes VI of town. A location map of these towns is not available. As such these towns are not included. Towns grow and spread radially, a system of grid have been overlaid on the districtwise map of each state. District boundaries are created for the purpose of administrative convenience. They do not follow any particular direction and so they have not been used as a factor in Nearest Neighbour Analysis. Ideally , the grid should be hexagonal. However, in the present case a square grid has been used because it is simple and also because of its close proximity to hexagon. For convenience, different sizes of grids have been selected for different states. The area of the grids also differ. For example, in Punjab and Haryana it is $3\text{cm} \times 3\text{cm} = 9\text{Cm}^2$ in Gujarat it is $4\text{cm} \times 4\text{cm} = 16\text{cm}^2$ and in Maharashtra it is $6\text{Cm} \times 6\text{Cm} = 36\text{Cm}^2$ The areas of those grids which cover only a part of a state, have been adjusted approximately.

LOCATION MAP PUNJAB, HARYANA, MAHARASHTRA AND GUJARAT

0 100 200 300 400 500 KM



A comparison has also been made to find out the intercorrelation between some of the characteristics of urbanisation and characteristics of other socio-economic variables. The Pearson's product moment correlation between pairs of variables have been used and the results are given in a correlation matrix for each state separately.

(iii) STUDY AREA:

As it has been mentioned earlier, the present study is based on a comparative analysis of two sets of states. One set consists of the states of Punjab and Haryana and the other one consists of Maharashtra and Gujarat. Following is a brief account of the urban features and the economy of these states.

(a) PUNJAB

The present state of Punjab is a part of erstwhile Greater Punjab which was carved out in 1966 through the Punjab reorganization Act by the Parliament of India. The Punjabi speaking areas were constituted

into the unilingual state of Punjab and the predominantly Hindi-seeking areas were constituted into the State of Haryana. The hill areas were merged with adjoining Himachal Pradesh. According to 1991 census of India, the total population of Punjab was 20190795 which was 2.39 percent of India's total population. During the same period among the states 24.7 is its ranks 14th in term to population. The total area of Punjab is 50,362 square kilometers which is 1.53 percent of India's total area. In terms of area it ranks 16th among states and Union Territories. The growth rate of population during 1981-91 was 20.26 percent which was less than that of India's as a whole (23.50 percent). In 1991 the total number of districts in Punjab was twelve (12) (district names are given in Appendix) The number of districts in 1971 was eleven which became twelve in 1981. In 1991 the density of population was 401 persons per square kilometers Square. The total urban population of Punjab in 1991 was 6000882 which is 29.72 percent of the its total population. In 1951 the proportion of urban population was 21.72 percent followed by 23.06 percent. 1971 and 1981 respectively. In 1991 the sex ratio of

urban areas was 870 (females per thousand Male) Ludhiyana is the only million city in the state of Punjab.

The size class distribution of towns and their populations in 1991 is as given below.:

Table 2.1.
Distribution of Towns and Urban Population according by
Size Class, Punjab-1991

Size class	Number of Towns	Percentage of Towns	Urban Population	%age of urban Population
I	10	8.33	3262286	54.36
II	18	15	1187543	19.79
III	25	20.84	773389	12.89
IV	44	36.67	627422	10.46
V	16	13.33	122046	2.03
VI	7	5.83	28196	0.47
I-VI	120	100	6000882	100

From the above table we find that in Class I Category the proportion of population towns is only 8.33 percent whereas the proportion of population is 54.36 percent. On the other hand in the size Class IV, the proportion of towns is 36.67 percent where as the proportion of population is only 10.46 percent. In other words, out of 120 towns only 10 towns have more than 50 percent of Urban population as against less than 50 percent urban population is shared by 110 town (91.67 percent).

(b) HARYANA:

The state of Haryana was created in 1966. It is a predominantly Hindi speaking state. According to 1991 census its total population was 16317715 which was 1.93 percent of India's total population. The total area of this state is 44212 kilometers square which is 1.34 percent of India's total area. The growth rate of population during 1981-1991 was 26.28 percent which is higher than that of India as a whole (23.50 per cent). These were sixteen districts in 1991. The names of the

districts are given in the Appendix. In 1971 the number of districts in this state was only seven which became twelve in 1981. In 1991 the density of population was 369 persons per square Kilometer. At the same time the proportion of Urban population was 24.79%. The growth rate of urban population during 1981-91 was 26.27 percent as against that of India which was 36.17 percent. In 1991 the sex ratio of Haryana was 953. In Urban areas the sex ratio was 931 during the same period. Table 2.2 shows the size class distribution of towns and urban population in Haryana. It is as given below -

TABLE 2.2
Distribution of towns and urban population by size class
Haryana 1991

Size Class	Number of Towns	Percentage of Town	Urban Population	Percentage of urban Population
I	12	13.34	2367990	58.54
II	9	10.00	611146	15.11
III	17	18.89	483254	11.95
IV	30	33.33	421964	10.43
V	20	22.22	151500	3.74
VI	2	2.22	9316	0.23
I-VI	90	100	4045170	100

Table 2.2 shows that in size class I, there are only twelve towns (13.44 percent) having 58.54 percent of the State's urban population. At the same time in size Class IV there are thirty towns (33 percent) which have 10.43 per cent population. in other words we can say that 13.44 percent of towns

share 58.54 percent of urban population while 86.56 per cent of towns have only 41.46 percent of the State urban population.

(e) MAHARASHTRA

The state of Maharashtra was created in 1960 after bifurcating the erstwhile state of Bombay. It is pre-dominantly a Marathi speaking state located in Western part of India. In 1991 the total population of this state was 78748215 which was 9.33 per cent of the country's total population. Its total area is 307713 kilometer square which is 9.36 percent of India's total area. It ranks third according to population as well as according to area. The growth rate of population during 1981-91 was 25.36 per cent and the population density in 1991 was 256 person per kilometers square. During the same period the sex ratio was 936. The total number of districts in 1991 was thirty. The name of these district is given in the Appendix. The number of district was twenty six both in 1971 and 1981. According to 1991 census the Urban population of Maharashtra was 30,496352 which was 38.73 per cent of

the state's total population. After Mizoram and Goa, it is the most urbanized state in India. During 1981-91, the growth rate of urban population was 38.66 percent which was slightly more than the corresponding growth rate for India as a whole (36.09 percent). The urban sex ratio in 1991 was 876. The size class analysis of towns shows that Maharashtra has the highest concentration of population in big towns. Table 2.3 gives the size class distribution of towns and their population. It is as follows:

TABLE 2.3

Distribution of Towns and urban population by Size class Maharashtra-1991.

Size class	Number of Towns	Percentage of towns	Urban Population	Percentage of urban Population
I	27	9.31	23741541	77.85
II	28	9.66	1977802	6.49
III	101	35.52	3169555	10.39
IV	83	28.62	1260542	4.13
V	40	13.79	313553	1.03
VI	9	3.10	33359	0.11
I-VI	290	100	30496352	100

From Table 2.3, we find that twenty seven towns, accounting for 9.31 percent of total town in Maharashtra have 7.85 percent of the total urban population of the State. The size Class III has one hundred and three towns (35.52 percent) but the proportion of population is only 10.39 percent..... Thus we can say that 77.85 percent of population is concentrated only in 9.31 percent of towns and 22.15 percent of population is distributed in 90.89 percent of town.

(d) GUJARAT

The State of Gujarat was created in 1960, as was Maharashtra. The division of Bombay gave birth to Gujarat and Maharashtra as separate states. Gujarat is mainly a Gujarati speaking state. According to 1991 census the total population of this state was 411174343 which was 4.88 percent of the total population of India. The growth rate of population during 1981-91 was 20.80 per cent as against that of India's which was 23.50 per cent. Density of population was 210 persons per kilometer square in

1991. During the same period sex ratio of this state was 936. There were nineteen districts in the state in 1991 just as in 1971 and 1981. The names of the districts is given in Appendix. According to the 1991 census the total urban population was 14164301 which was 34.40 percent of the state's total population. The growth rate of urban population during 1981-91 was 33.6 per cent. The sex ratio of urban areas was 909 according to the 1991 census. Like other states it has high concentration of population in its big towns and cities. Table 2.4 shows the size class distribution of towns and urban population in Gujarat. It is as follows:

TABLE 2.4
Distribution of Towns and Urban Population by Size Class
Gujarat 1991

Size Class	Number of Town	Percentage of town	Urban Population	Percentage of Urban Population
I	21	9.33	9408790	66.43
II	27	12.00	1803584	12.73
III	50	22.22	1489602	10.52
IV	74	38.89	1089624	7.69
V	44	19.56	343380	2.42
VI	9	4.00	29321	0.21
I-VI	225	100	14164301	100

Table 2.4 shows how the urban population is concentrated. 66.4 per cent of urban population is concentrated in only 9.33 per cent of town. In the size Class IV there are 32-89 per cent of towns where as the population is only 7.69 per cent. On the other hand 90.67 per cent of towns have only 33.57 per cent of population.

History of Urban Section: - The process of urban development in India was largely influenced by such factors as political stability, agricultural prosperity and trade and religion during the ancient period. But with the advent of British rule in India the trends in urbanization changed. The Indian economy was transformed into a colonial economy. The British placed greater emphasis upon increasing the area for cultivation of cash crops like cotton and jute for export purposes. They developed mainly the port town, Mining regions, the imperial capital, provincial capitals etc. As Maharashtra and Gujarat are coastal states and have been established as cotton growing regions, the British paid more attention to these regions. The first railway line was built in 1853

between Bombay and Thana. The East India company was established in Surat in 1600 AD in present day Gujarat. Thus several big towns came into existence. Modern industrialization also started in India during this period. All these urban centres went on growing over time particularly in Maharashtra and Gujarat. Today Maharashtra and Gujarat show deep impact of modern industrialization on their urban patterns. On the other hand, the states of Punjab and Haryana are land-locked. They are also lacking in minerals. Agriculture has been the mainstay of these two states. In these two states the size distribution of towns does not show much variations. They are also dispersed over space. In 1991 Punjab had only one million city, Ludhiyana; and Haryana does not have any. On the other hand Maharashtra and Gujarat have three million cities each at the same time. We can say that in Maharashtra and Gujarat, Urbanization has taken place under the impact of colonial model and forces of modern industrialization. On the other hand Punjab and Haryana have agro-based economy which has deep impact on their Urbanization Patterns. One can analyse the base of

economy of these states through Table 2.5. It is as follows:

Table 2.5
Statewise, Level of Male Worker Productivity and Growth⁷
Rate of Values of output, Male Workers and male worker
productivity
(Statewise analysis)

States	Levels of Male Workers Productivity (1980-83)	Annual Compound Growth Rate Value of Output	Male wor- kers	Male wor- kers Pro- ductivity
Punjab	4838.67	6.61	2.11	4.40
Haryana	333.17	4.94	1.92	2.97
Maharashtra	1479.44	2.15	1.29	0.84
Gujarat	1793.61	2.82	1.90	0.90

The above table further establishes the superiority of Punjab and Haryana over Maharashtra and Gujarat in terms of levels of male worker productivity and growth rate of value of output, male workers and male worker productivity.

7. G.S. Bhalla and D.S.Tygi (1981), "Patterns in Indian Agricultural Development, A District Level Study" Institute for Studies in Industrial Development, New Delhi 1989, pp 40-41.

CHAPTER III

URBAN CONCENTRATION

i) Introduction:

One of the objectives in our study is to compare the inequality in the size distribution of towns in the states of Punjab and Haryana with the same in the states of Maharashtra and Gujarat. In the present chapter, the inequality in size distribution of towns has been studied with the help of Lorenz curve, Gini's concentration Ratio, Rank-size Regularity and the Index of primacy.

First of all, to show the inequality in the size distribution of urban centres, the size class distribution of towns and their population have been used for the above mentioned states according to the data provided by 1991 census. Graphically, the inequality is shown by the corresponding Lorenz curves

for each State and numerically by the corresponding Gini's Concentration Ratio's.

Another way of looking at the inequality is through Rank-size Regularity and the corresponding indices of primacy.

The Rank-size relationship of towns have been shown graphically and mathematical forms of relationship are also discussed for each state.

The strength of concentration has further been investigated through two indices of primacy as mentioned above. The result of this exercise is summarized below.

ii) Concentration of Urban Population Reflected by Size Class Distribution of Towns:

When we observe the percentage distribution of towns and their population according to size class,

we find that a small percentage of towns have higher concentration of population. It is obvious from table 3.1 as given below -

TABLE 3.1.
Percentage of Town and Population by size-class
Statewise-1991

	Punjab	Haryana		Maharashtra			Gujarat	
Size class	%age of Town	%age of urban popu-lation	%age of town	%age of urban popu-lation	%age of town	%age of urban popu-lation	%age of town	%age of urban popu-lation
I	8.33	54.36	13.34	58.54	9.31	77.85	9.33	66.43
II	15.00	19.79	10.00	15.11	9.66	6.48	12.00	12.73
III	20.84	12.89	18.89	11.95	345.52	10.39	22.22	10.52
IV	36.67	10.46	33.33	10.43	28.62	4.13	32.89	7.69
V	13.33	2.03	22.22	3.74	13.79	1.03	19.51	2.42
VI	5.83	0.47	2.22	0.23	3.10	0.11	4.00	0.21
1-VI	100	100	100	100	100	100	100	100

Table 3.1. shows how the percentage of towns and urban population are distributed in size classes in the States of Punjab, Haryana, Maharashtra and Gujarat. In Punjab, the percentage distribution of towns and urban population in size class I is 8.33 per cent and 54.36 per cent respectively. In Class II the proportion of towns increases to 15 percent and proportion of population goes down sharply to 19.79 percent. From Class I to Class IV, the proportion of town goes up but from Class IV to Class VI it goes down. On the other hand proportion of population declines from Class I to Class VI. Class IV has the maximum concentration of towns (36.67 per cent). It is found that 54.36 per cent of towns whereas another 45.64 per cent of population shares 91.67 per cent of towns.

In Haryana the concentration of population in Class I towns is 58.54 percent and concentration of

towns is 13.334 per cent. In comparison to Punjab, the concentration of both population and towns in Class I is higher. Secondly from class I to Class II the proportion of towns has gone down in Haryana compared to Punjab where it has gone up. The same decline is found in the concentration of population from Class I to Class II. As in Punjab, the maximum concentration of towns is found in Class-IV. Inequality in size class distribution of population and towns can easily be observed 13.34 percent of towns has 58.54 per cent of population and another 86.66 percent of towns has only 41.46 per cent of population.

Among the four states, Maharashtra has the maximum concentration of population in Class I towns, i.e., 77.85 per cent of population is only 9.31 percent of towns. As regards inequality in the size class distribution of town and population, Maharashtra is at the top followed by Gujarat, Haryana and Punjab. There is drastic change in the proportion of population from Class I to Class II, i.e., from 77.85

percent to 6.49 percent. In Maharashtra the maximum concentration of towns is found in Class III as against Class IV in case of other states.

In Gujarat the proportion of Class I towns is 9.33 percent and concentration of population in this class is 6.43 percent. As mentioned earlier, Gujarat ranks second after Maharashtra in terms of concentration in class I towns. In Class IV the concentration of town is maximum as in Punjab and Haryana. From Class I to IV there is increase in the concentration of towns and beyond that upto Class VI it declines. It is that 9.33 per cent of town has 64.43 per cent of population and the rest 90.67 of towns has 33.57 per cent of population.

The above analyses gives an idea that inequality in the size class distribution is found in all the states. Industrially stronger states Maharashtra and Gujarat have higher concentration in comparison to Punjab and Haryana where agricultural economic base is strong.

(iii) Concentration of Urban Population as Established
by Lorenz Curve and Gini's Concentration Ratio .

Four sets of Lorenz Curves, i.e. Fig.1 to 4 show the size class distribution of urban population. A comparative analysis of Lorenz curves drawn separately for each state give an idea of inequality. Fig.1 shows that Maharashtra has the maximum deviation from the line of equal distribution followed by Gujarat. Fig.3 and 4 show that the states of Punjab and Haryana have less deviation from the line of equal distribution. Thus the size of class distribution of urban units has the maximum inequality in Maharashtra followed by Gujrat, Haryana, and Punjab. The same conclusion was deduced in the previous section. The Lorenz Curve is the graphical way for analysing the inequality in the size class distribution of urban units. This inequality can also be assessed by Gini's concentration Ratio (G). The value of Gini's concentration Ratio for each is as given under.—

FIG-1

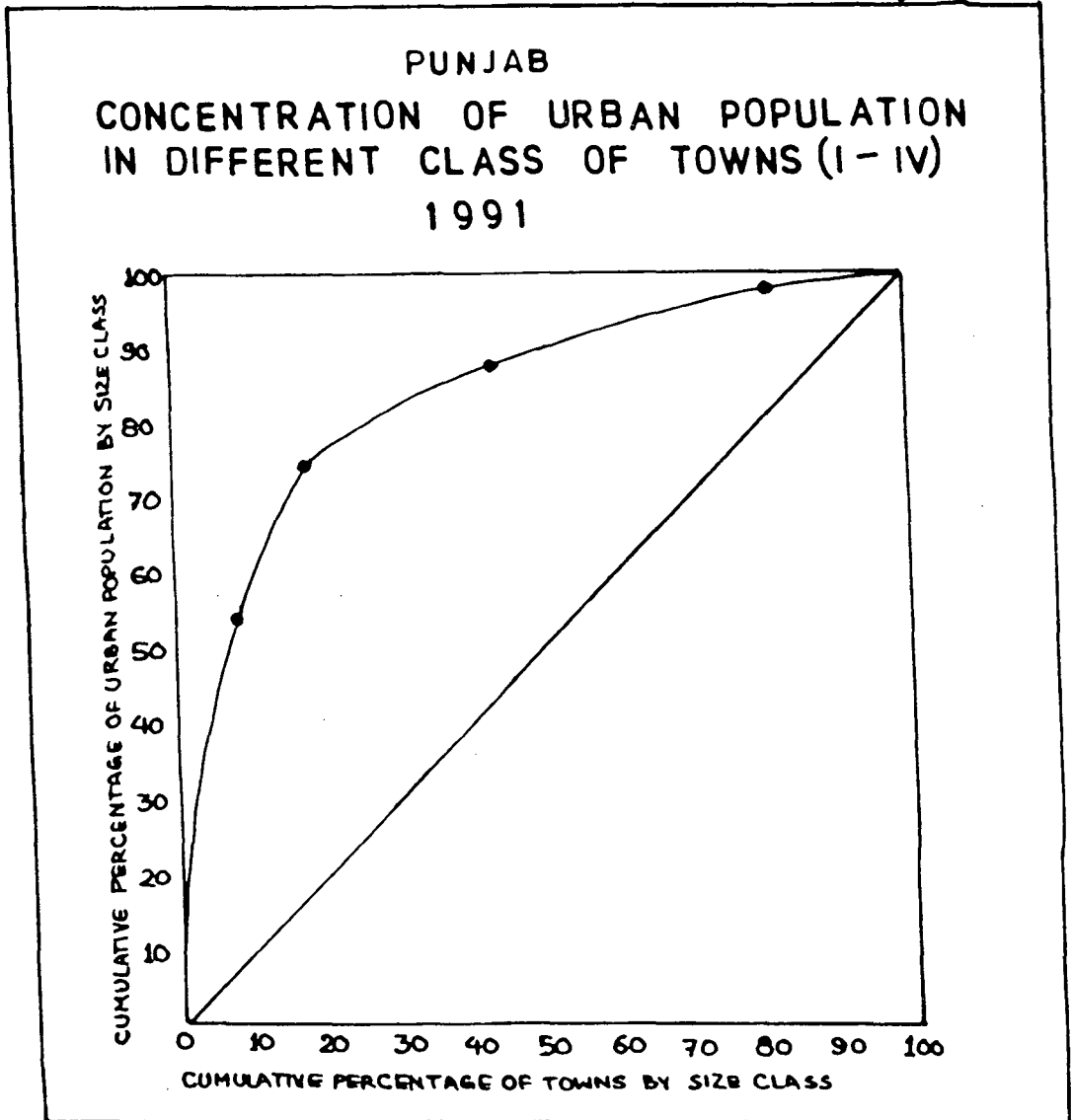


FIG. 2

HARYANA
CONCENTRATION OF URBAN POPULATION
IN DIFFERENT CLASS OF TOWNS (I-IV)
1991

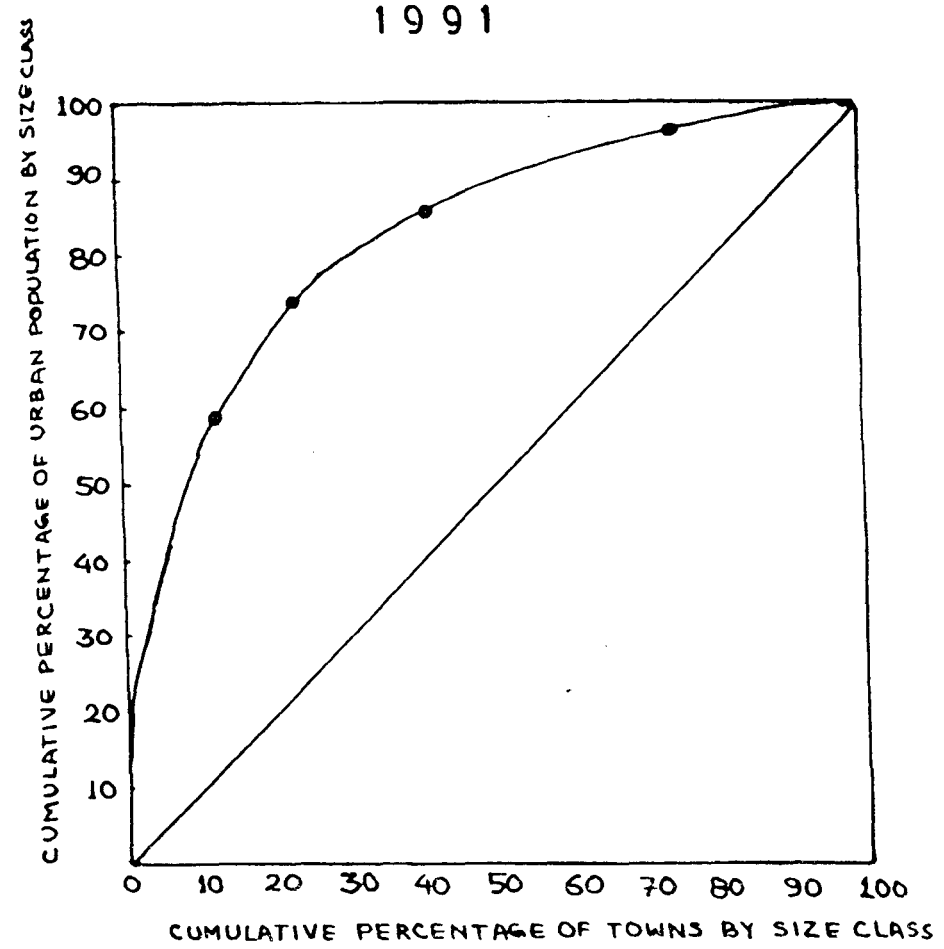


FIG. 3

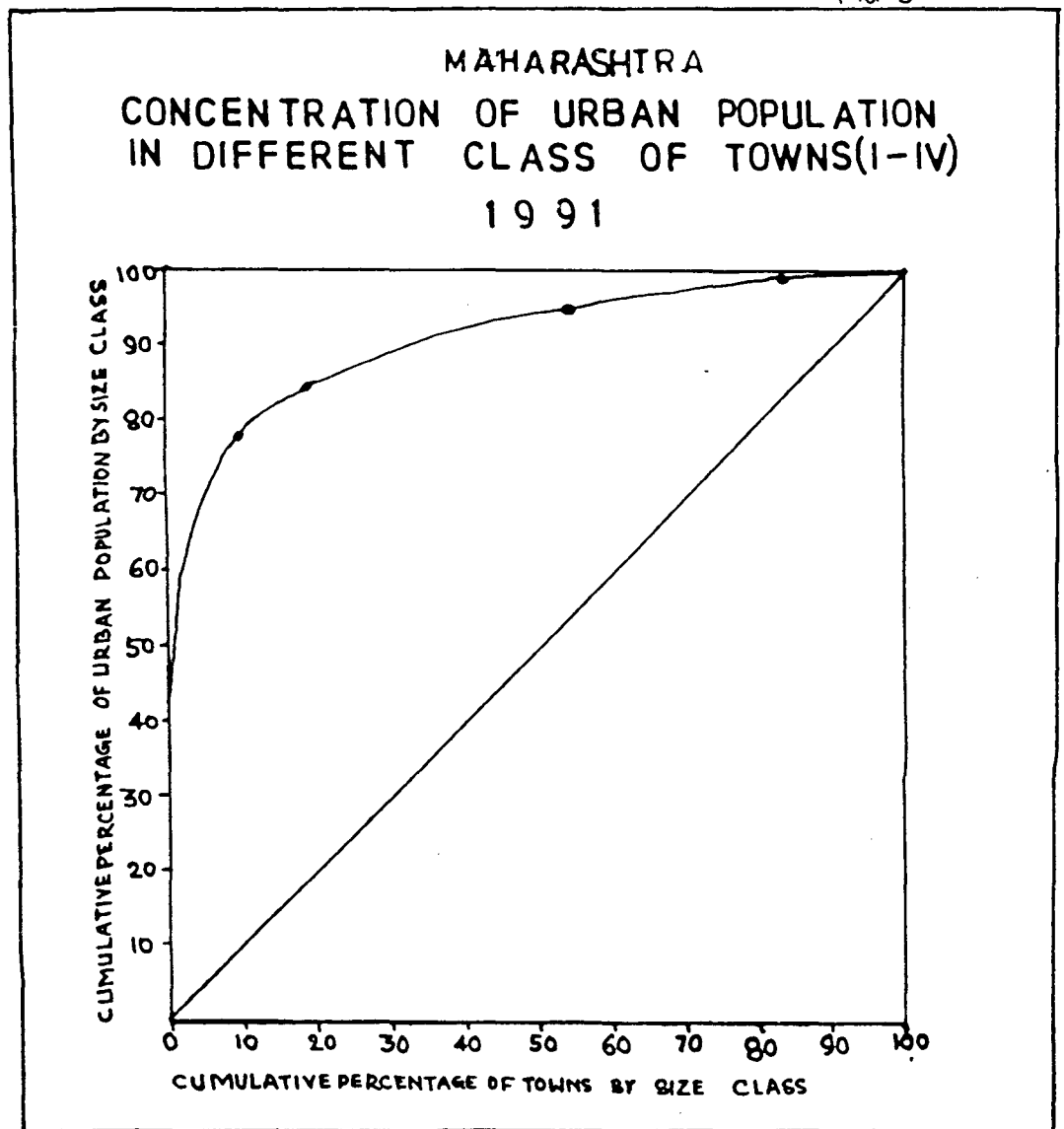


FIG.4

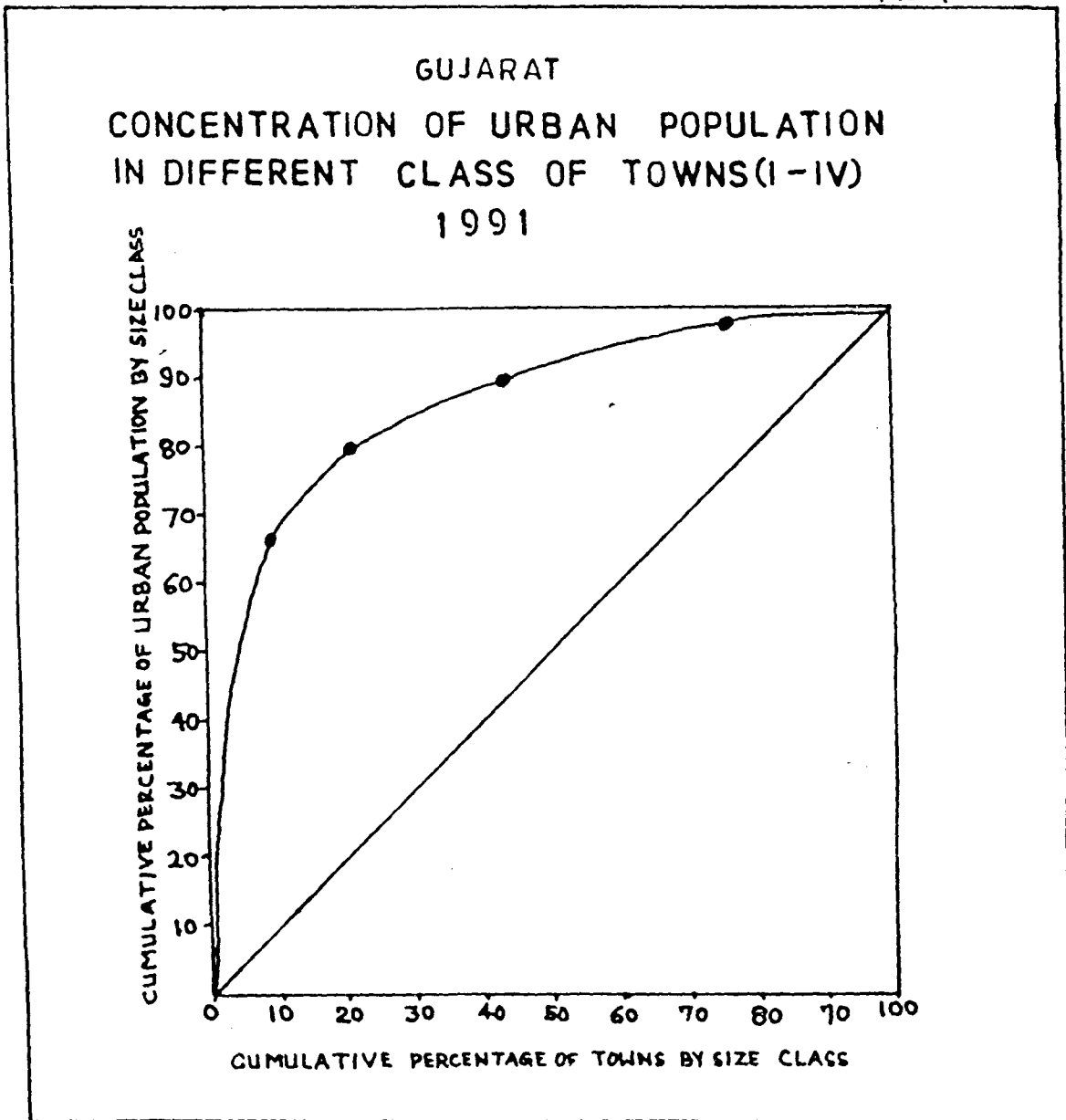


TABLE 3..2

Value of Gini's Concentration Ratio (G) State-wise 1991

Year	Punjab	Haryana	Maharashtra	Gujarat
1991	0.6296	0.5950	0.7553	0.6926

Table 3.2 shows that the value of Gini's Concentration Ratio (G) is highest in Maharashtra (0.75) followed by Gujarat (0.69), Punjab (0.62) and Haryana (0.59).

Hence we conclude that there is highest inequality in Maharashtra followed by Gujrat, Punjab and Haryana. Here a change is found in the order of inequality. Through size class distribution of urban units Haryana shows higher inequality than Punjab.

iv) Concentration of urban population as established by Rank-Size Rule and Index of Primacy

Rank-size Rule is the size distribution of urban units in any region. According to this rule the population of a town is related to its rank. It helps us to study the size hierarchy of population that exists with the settlement system of an area. In the present study we have plotted population on y-axis and rank (R) on X-axis using double log paper as shown in fig. 5 to 8. The four sets of figures showing the rank size distribution of towns in Maharashtra, Gujarat, Punjab and Haryana do not depict significant inequality. Rank-size Relationship is a graphical representation showing inequality in the size distribution of urban units in a region. Mathematically this relationship is measured by regression coefficient (b) of the line and intercept. The coefficient of determinants (R^2) may be taken as a measurement of its goodness of fit to the

Fig 5

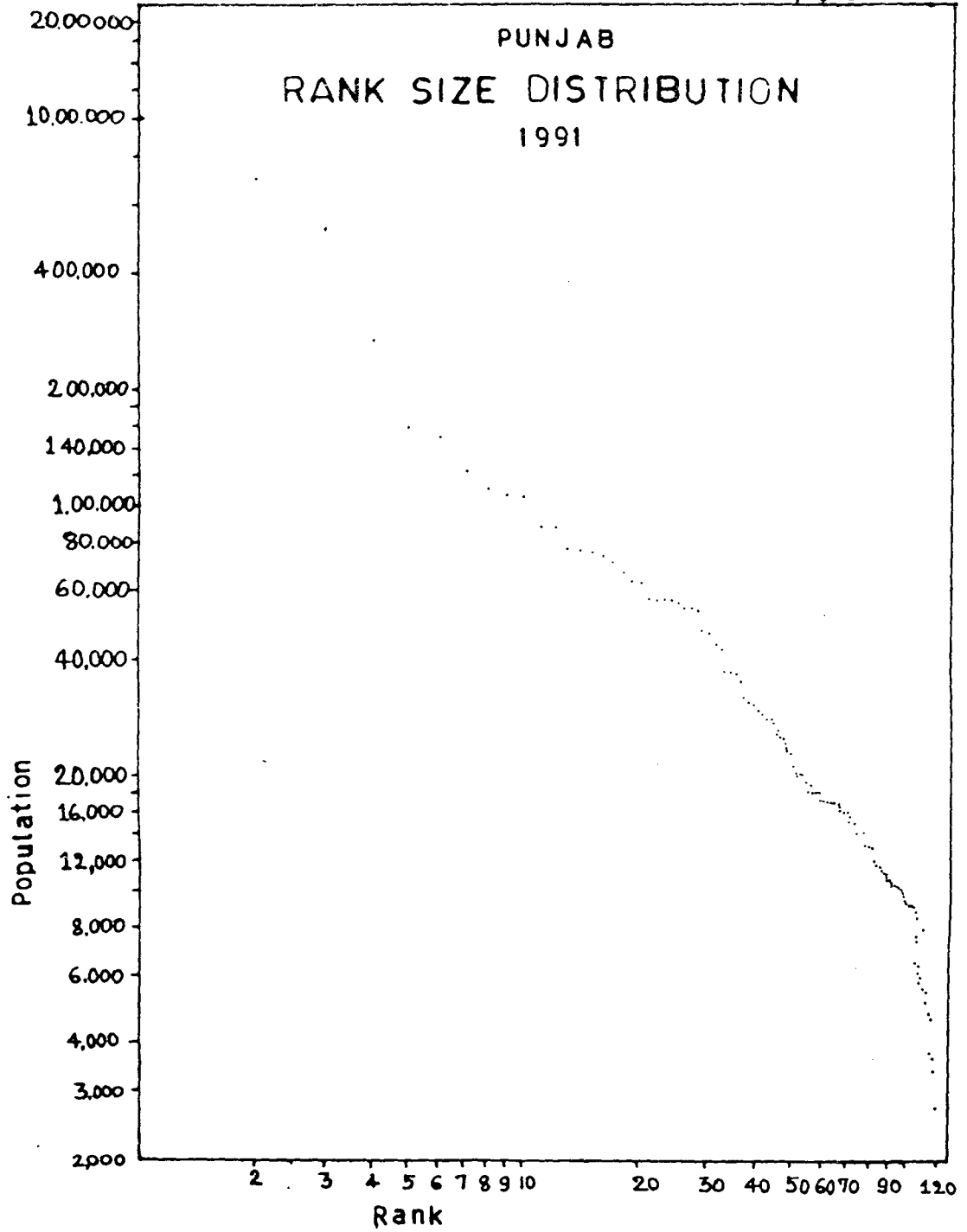
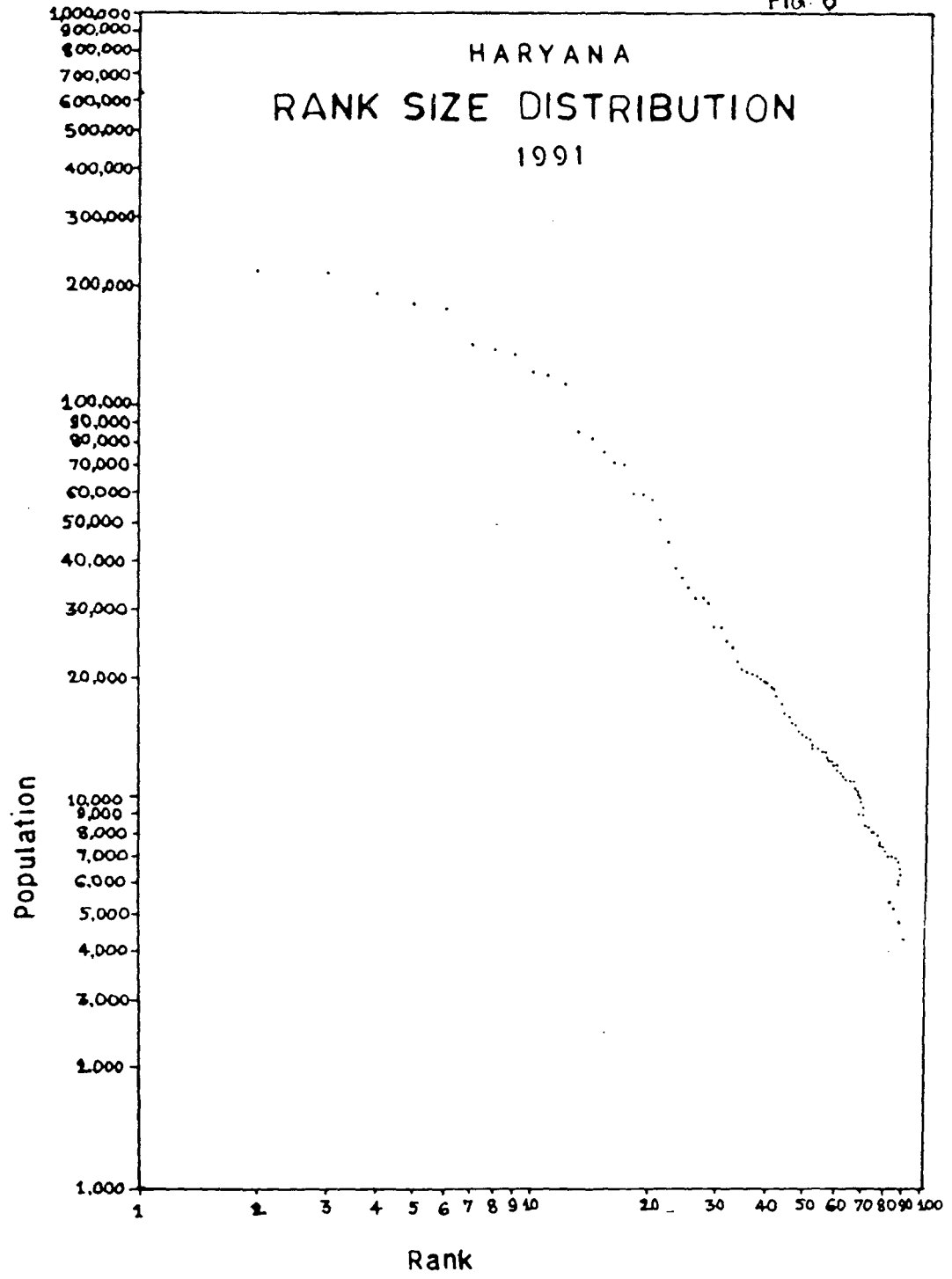
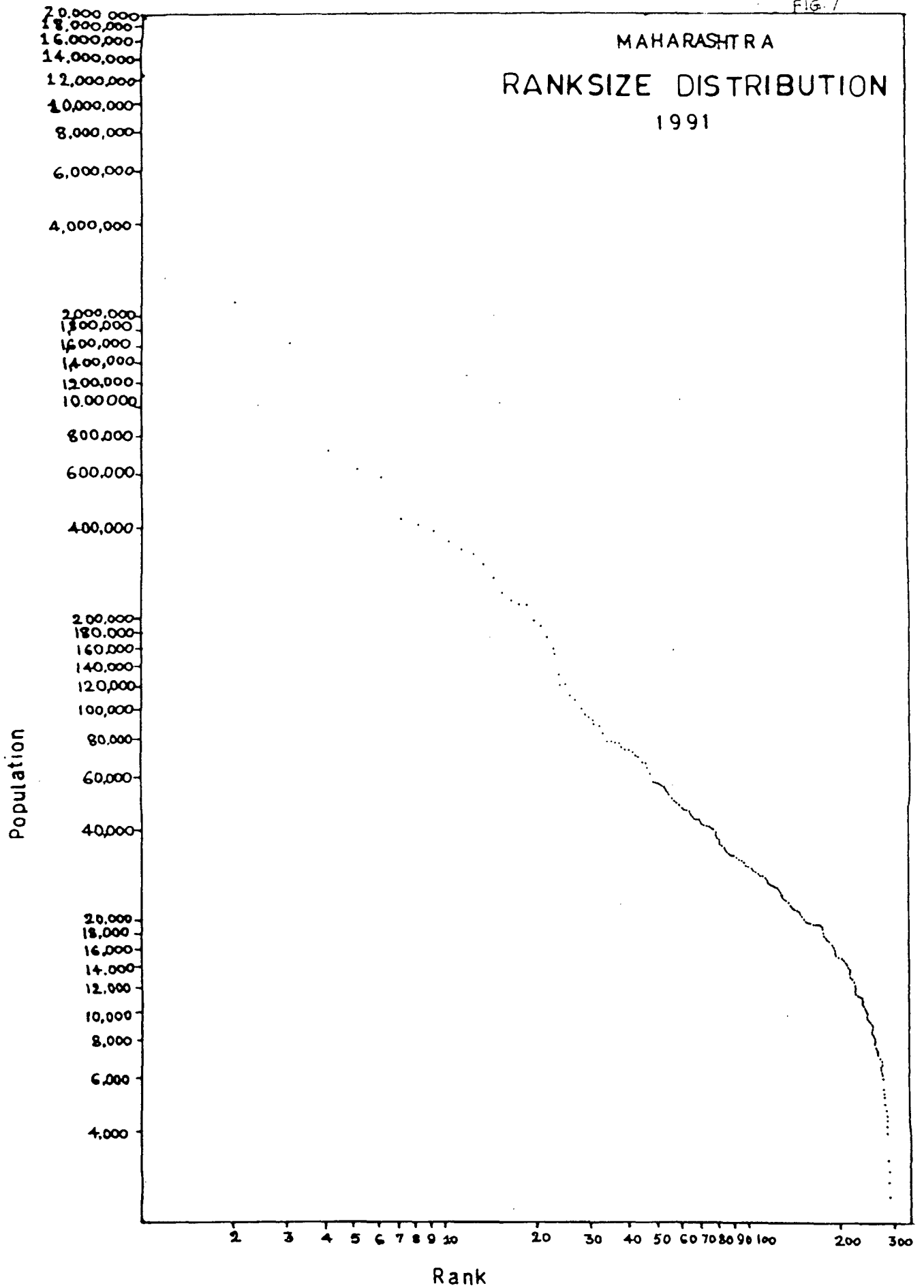
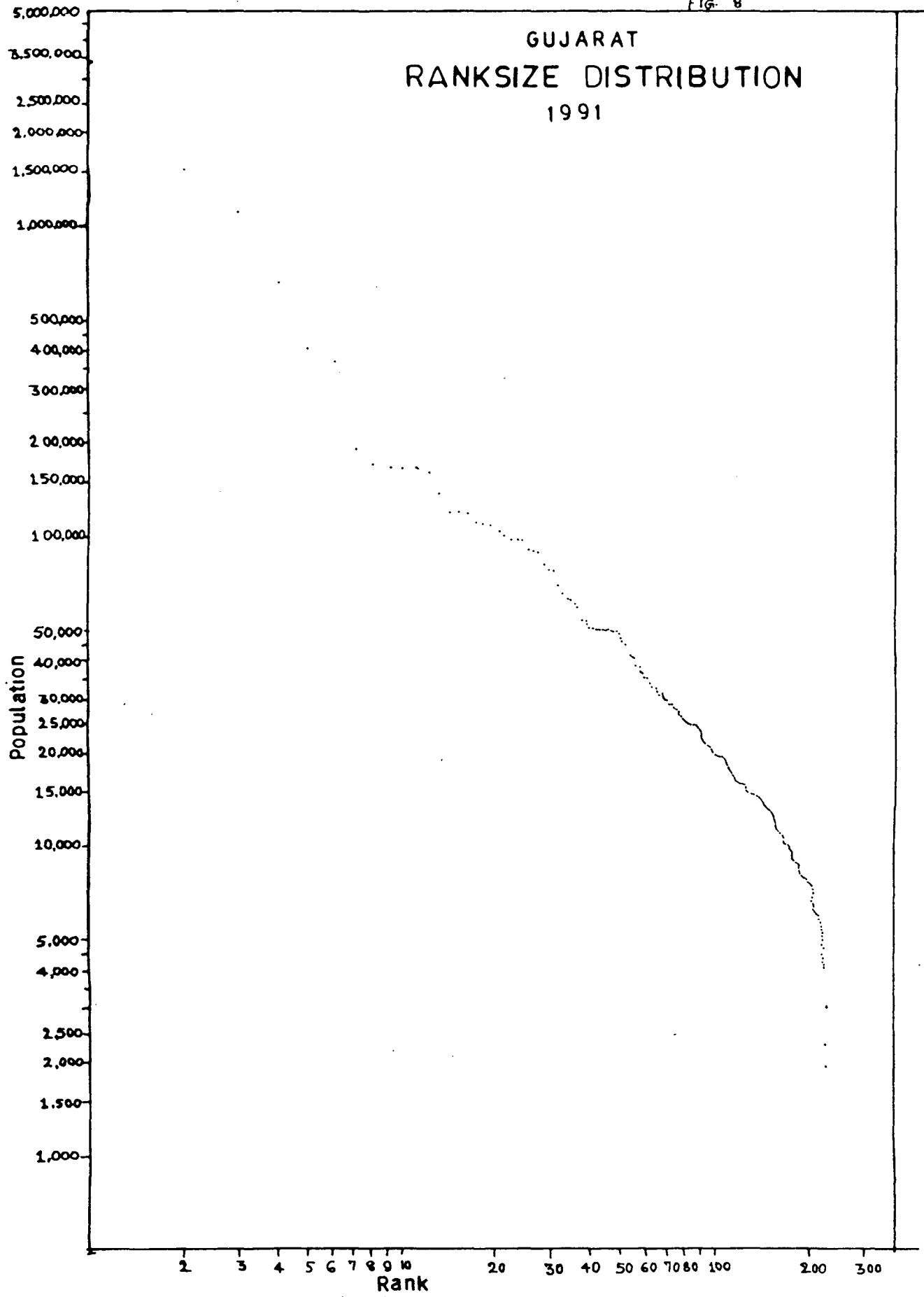


FIG. 6







system of Rank size Relationship. Table 3.3. gives the value of constants of Rank-Size relationships.

Table 3.3
Value of constants of Rank Size
Relationships

State	Regression Coefficient (b)	Intercept	R ²	F
Punjab	-1.12261	14.29106	0.94955	220.093
Haryana	-1.14203	14.03662	0.95934	2076.036
Maharashtra	-1.14881	15.53766	0.96077	7053.48
Gujarat	-1.4018	15.03598	0.34005	3496.80

Table 3.3 shows that urban systems in all the four states are following the rank-size regularity with almost equal intensity as depicted by the values of the coefficient of determinant (R²). The value of Regression

coefficient (b) also does not show any significant departure from each other. As the calculation is carried out by taking into account all the urban centres in each state, the differences in the concentration of urban population as found earlier might have been marginalised.

Index of Primacy shows the inequality in the size distribution of towns in higher order generated by metropolitisation. When first four towns are analysed, it is denoted as first Index of Primacy. (I PI). when the first eleven towns are analysed it is denoted as second Index of Primacy (IP2). Table 3.4 gives the values of Index of Primacy in each state.

Table 3.4

Value of Index of Primacy
State-wise - 1991

State	IP1	IP2
Punjab	0.6752	0.8655
Haryana	0.9797	0.7478
Maharashtra	2.5822	3.13119
Gujarat	1.0043	1.34208

An examination of Table 3.4 shows that the state of Maharashtra has the highest value of both IP1 (2.58) and IP2 (3.13) followed by Gujarat, Haryana and Punjab in that order, with an exception in the case of IP2 value. This value is found to be higher in Punjab than in Haryana. Thus it is found that in

Maharashtra the level of Primacy is high at both the levels. Primacy at second level is slightly higher. The state of Gujarat has primacy at both the level with almost equal intensity. In case of Punjab and Haryana the values of I P1 and I P2 are less than unity. These two states do not have primacy at both the level.

Summary of the Chapter

The concentration of Urban population is found to be fairly high in the states of Maharashtra and Gujarat as compared to Punjab and Haryana. Inequality in the distribution of urban population is significant in top ranking towns. The urban system of Maharashtra and Gujarat has been influenced by colonial model and modern industrialization. On the other hand the states of Punjab and Haryana have the influence of agricultural economic base on their urban system where the urban units are fairly dispersed over space. Hypothesis number one: - "Agro-based urbanization has

less inequality in the size distribution of towns than urbanization based on industrialization" stands validated.

CHAPTER IV

PATTERN OF SPATIAL DISTRIBUTION OF TOWNS

(i) Introduction: - Geographers, at times, are interested in knowing the patterns of spatial distributions of things over space. With reference to settlement these patterns are identified as clustered, 'Uniform' or 'Random'. King¹ has devised an index to identify the nature of spatial patterns of distribution. This index is known as the Nearest Neighbour Index.

In this chapter, therefore, we have analysed and compared the spatial patterns of distribution of

1. L.J.King (1962), "A Quantitative expression of the pattern of urban settlement in selected areas of U.S" Tijdschrift Voor Economische en Sociale Geographic, Vol. 53, pp 1-7.

towns in the states of Punjab, Haryana, Maharashtra and Gujarat. Since the pattern of spatial distribution of towns may not be the same throughout a state, a system of grids has been overlaid on the districtwise map of each state. It has been mentioned in the methodology section that patterns of distribution of towns are branded as 'clustered', 'Random' or 'Uniform' on the basis of different values of the Nearest Neighbour Index.² Nearest Neighbour Index as well as corresponding 'Z' values have been worked out for each grid and also for the whole state separately. These values are given in Table 4.1 to 4.4

(1) Spatial Patterns of Distribution of Towns in Punjab

It is clear from map No.4a and 4b that urban settlements in Punjab are fairly dispersed. Here towns

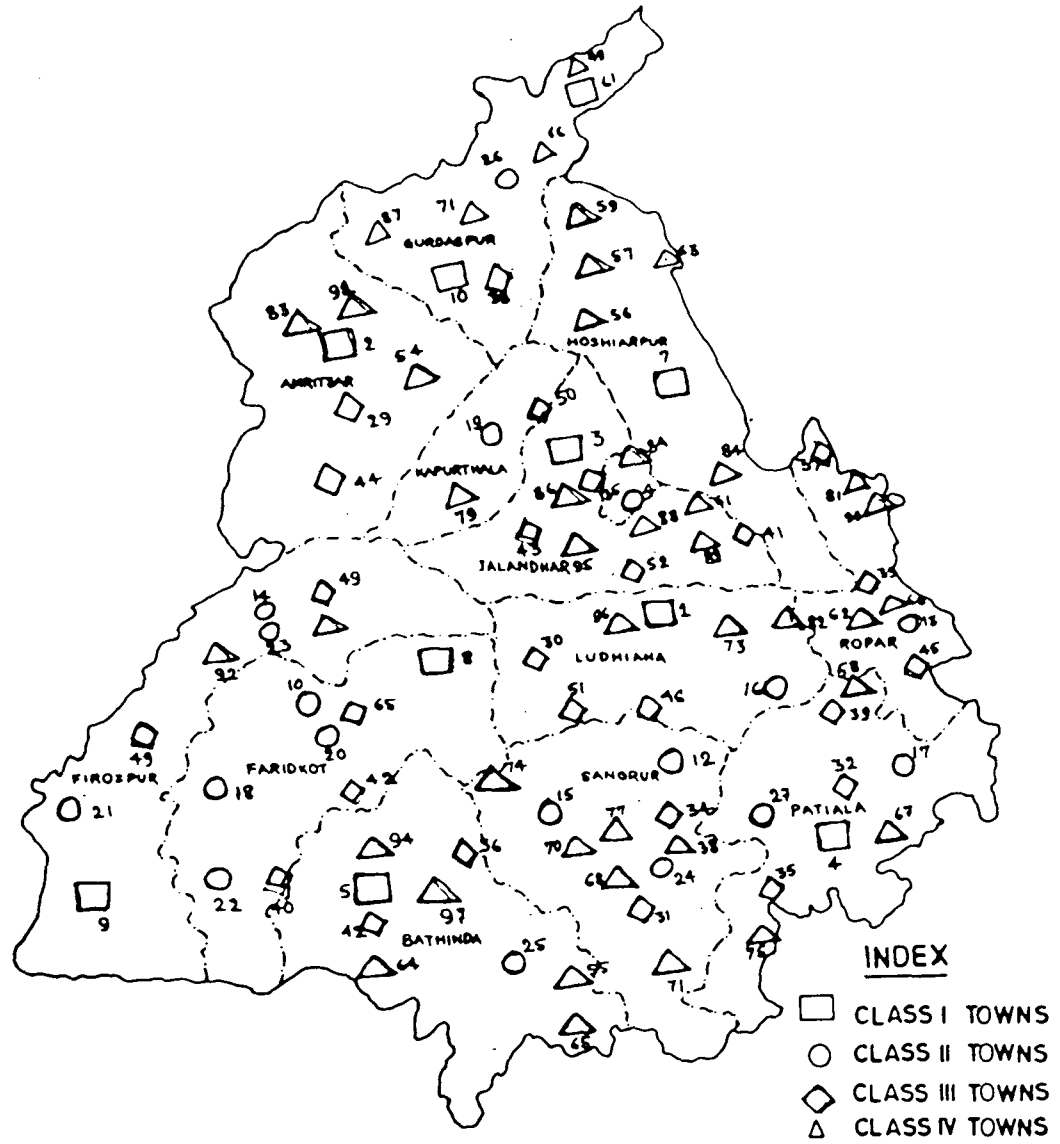
2. Aslam Mahmood (1986). "Statistical Methods in Geographical Studies" Rajesh Publication, New Delhi pp 72-76.

PUNJAB

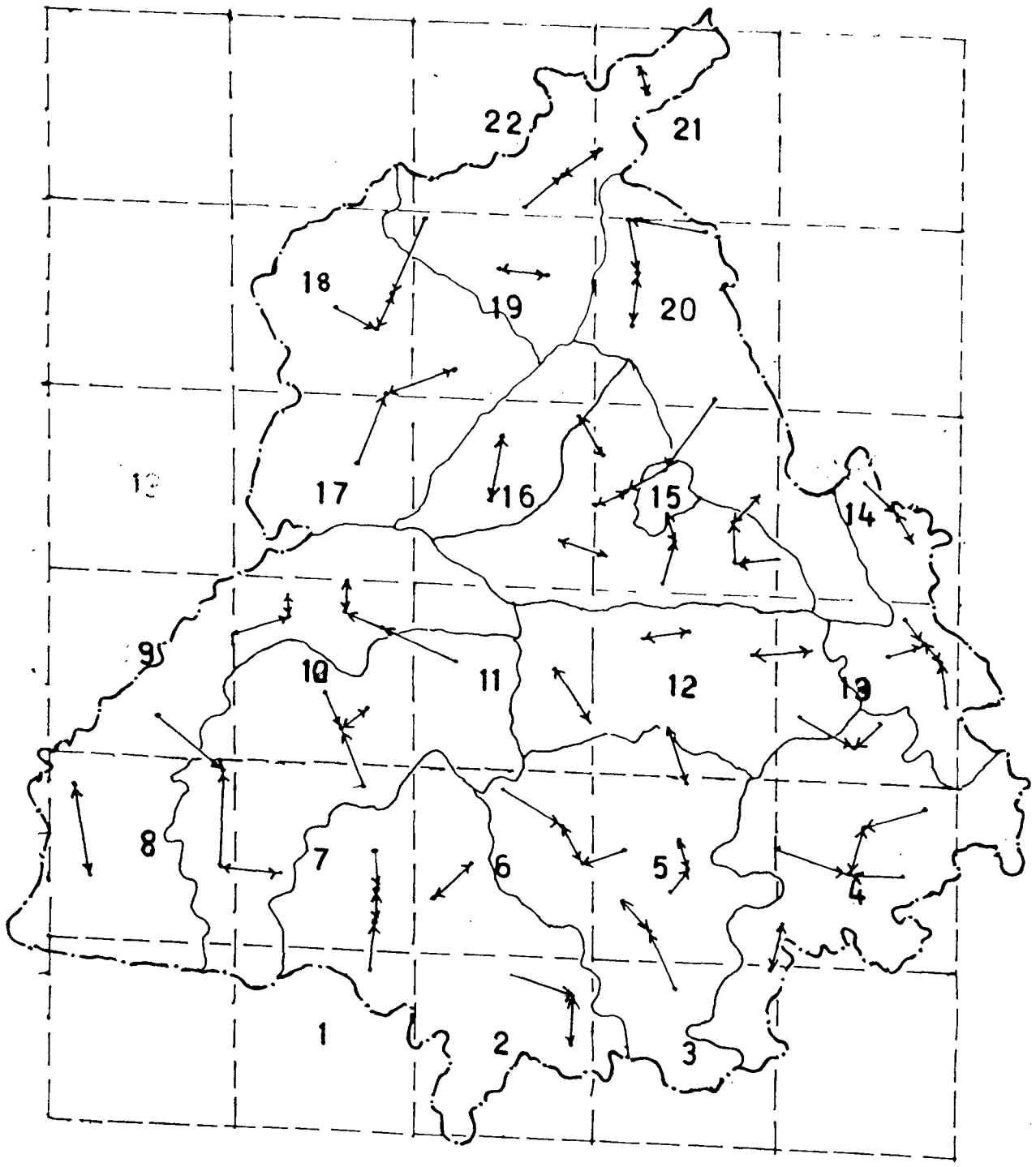
DISTRIBUTION OF TOWNS

CLASS I IV

1991



PUNJAB
NEAREST NEIGHBOURS
URBAN Class I-IV
1991



10 0 10 30 50 kms.

from size Class I to Size IV have been taken into account for Nearest Neighbour Analysis; they are ninety seven in number. These urban centres are distributed among twelve districts averaging 8.08 towns per district. There are three towns located in Kapurthala district which is minimum and the maximum number of towns are found in the district of Sangrur ; twelve. The Nearest Neighbours Index and related values are given in Table 4.1

A close examination of Table 4.1 shows that a large number of grids have random pattern of distribution of urban settlements. From out of twenty two grids only six are either 'uniform' or 'approaching uniform'. The rest show a random pattern of distribution of towns. None of the grids has any 'clustering'. When we take the values of 'R' and 'Z' for Punjab as a whole, we find these are 1.55 and 11.08 respectively, i.e., 'approaching uniform'. The gridwise analysis, however, gives a different pattern. As mentioned above a majority of grids show random pattern,. Only the grid nos.4,8,10,15,18 and 20 depict a 'uniform' or 'approaching uniform' pattern. From

TABLE 4.1
Nearest Neighbour Index and Related Values
Punjab-1991

Grid	\bar{D}_o	\bar{D}_r	R	SE	Z	Remark
1	0.8	0.6364	0.5091	0.3326	0.4918	-Random
2	0.8666	0.7745	1.1189	0.2337	0.39409	-Random
3	0.9	0.8746	1.0290	0.3232	0.0785	-Random
4	0.9333	0.5809	1.6066	0.1239	2.8442	Approaching** uniform
5	0.5	0.5669	0.8819	0.1120	0.5972	Random
6	0.7666	0.6123	1.2518	0.1306	1.1802	Random
7	0.7333	0.6123	1.1974	0.1306	0.92539	Random
8	1.4	0.6123	2.2861	0.1306	6.627	Uniform**
9	1.25	0.7866	1.5890	0.2907	1.5938	Random
10	0.630	0.4522	1.4672	0.0712	2.9648	Approaching** uniform
11	1.33	0.660	1.3066	0.26136	1.0226	Random
12	0.8	0.6708	1.1926	0.1568	0.8239	Random
13	0.6444	0.4949	1.3019	0.0862	1.7331	Random
14	0.65	0.6046	1.0749	0.1580	0.2869	Random
15	0.7076	0.5435	1.3021	0.0603	2.7224	Approaching** uniform
16	0.95	0.75	1.2666	0.19602	1.0203	Random
17	1.2	1.3829	0.8677	0.7228	0.2530	Random
18	0.9	0.6	1.5000	0.1402	2.1388	Approaching unit *
19	1.05	0.75	1.4000	0.1960	1.5304	Random
20	1.06	0.6074	1.7449	0.1420	3.1869	Approaching** uniform
21	0.6	0.4743	1.2650	0.12397	1.0139	Random
22	0.8	0.6244	1.2812	0.1884	0.9317	Random
Punjab	16.6	10.69	1.5500	0.5332	11.08	App.Uniform**

* - Significant at 5% level.
** - Significant at 1% level.

these six grids, only grid No.4 shows a 'uniform' pattern of town and rest five grids depict 'approaching uniform' pattern. Grid No.4 covers a major part of Patiala district, the city of Patiala is located in the centre of this grid. Grid No.8 is overlaid on the districts of Firozpur and Faridkot; the city of Abohar is located within this grid. Grid No.15 covers the districts of Jalandher, Hoshiarpur and Kapurthala: Jalandher city is located in this grid. Grid No.18 covers a large part of Amritsar district and Amritsar city is within it. We also find that the number of towns vary from one grid to another. For example, grid no.15, has twelve towns whereas grid No.22 has only two. It is evident that pattern of spatial distribution of town in Punjab is predominantly 'Random'.

SPATIAL PATTERNS OF DISTRIBUTION OF TOWNS IN HARYANA-

Like Punjab, the urban centres are widely dispersed in Haryana. The total number of towns upto size class Class IV is sixty eight and these are distributed among sixteen districts. The average number of towns per district is 4.25. Map No.4c and 4d show that the maximum number of towns are located in Rohtak

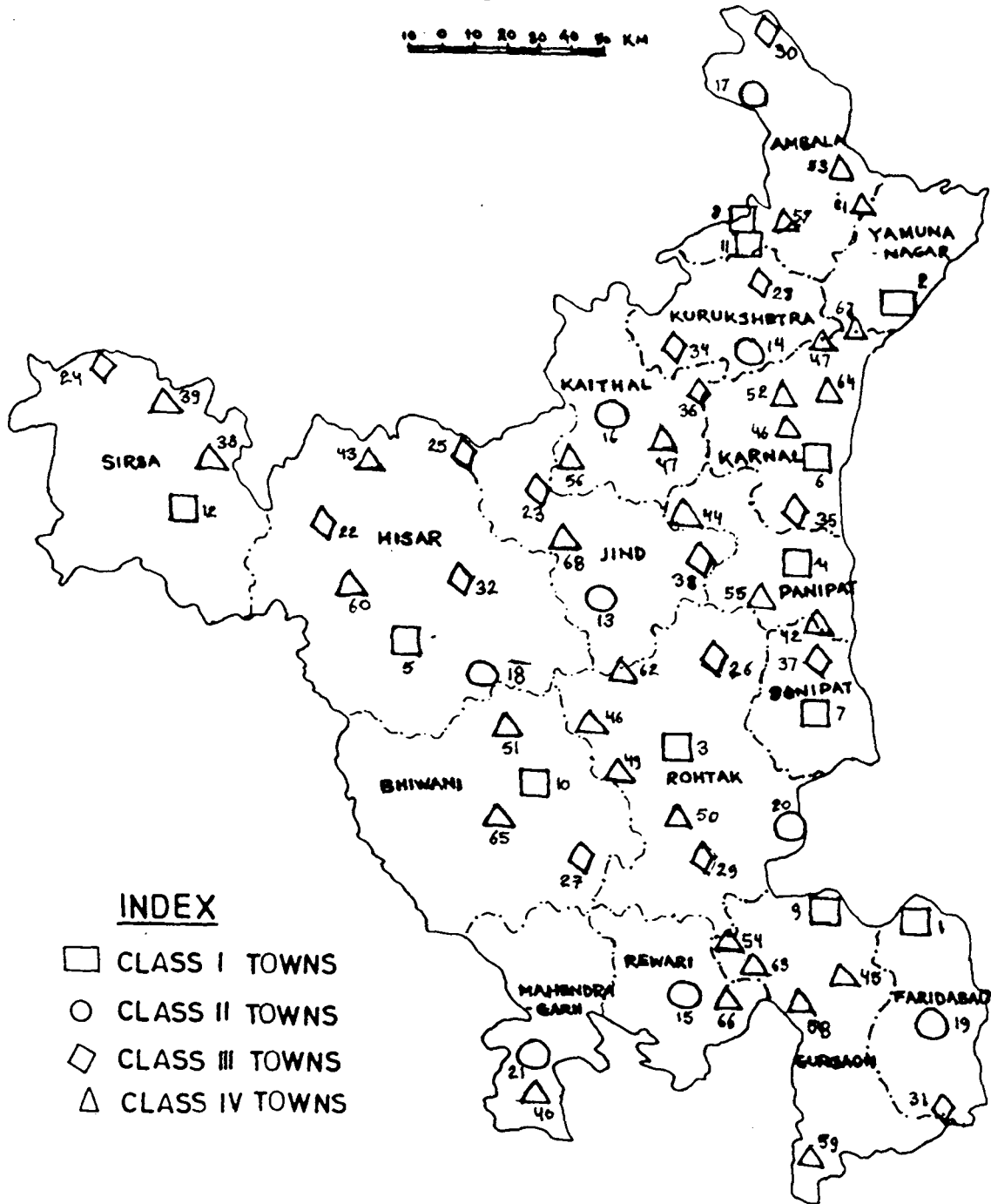
HARYANA

DISTRIBUTION OF TOWNS

CLASS I IV

1991

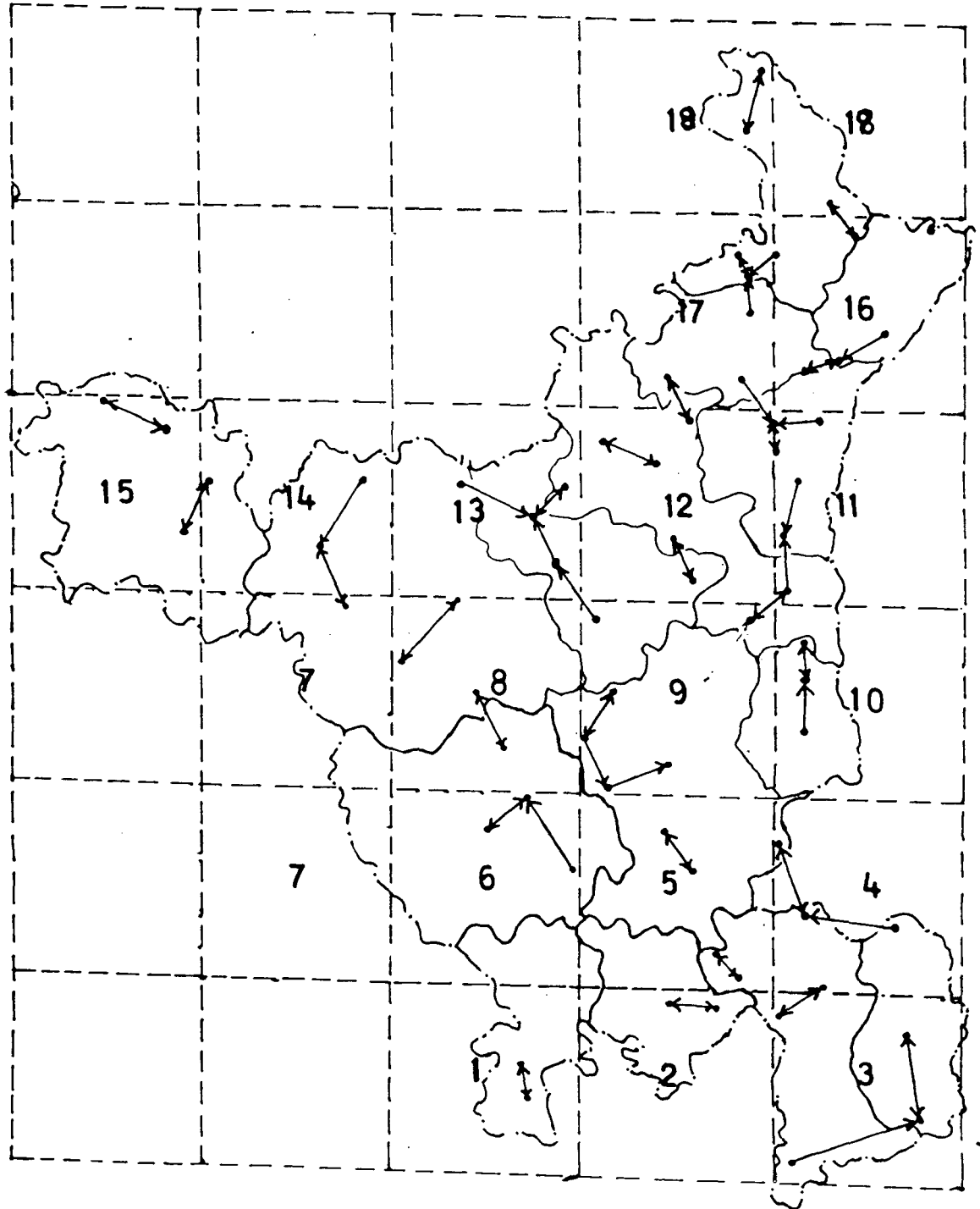
0 10 20 30 40 50 KM



HARYANA NEAREST NEIGHBOURS

URBAN Class I-IV

1991



10 0 10 30 50 Kms.

Gurgaon and Faridabad. The largest city of Haryana is Faridabad which is located within this grid. The grid Nos.3 and 4 are located in the south-eastern part of the state. Grid No.9 which is located in the east central part of the state covers a major part of Rohtak district and some parts of the districts of Panipat, Sonipat, and Jind. Grid No.11 is located in the north-eastern part of the state and is overlaid on the districts of Karnal and Panipat. And the rest are randomly patterned grids distributed all over the states. Thus we find that like Punjab the pattern of spatial distribution of towns in Haryana is predominantly 'random'.

Table 4.2
Nearest Neighbour index and Related Values Haryana 1991

Grid	\bar{D}_o	\bar{D}_r	R	SE	Z	Remark
1	0.5	0.7115	0.7027	0.2629	0.8044	Random
2	0.7	0.627	1.1164	0.2319	0.3148	Random
3	1.4	0.6914	2.0247	0.1807	3.9206	Uniform**
4	1.15	0.4860	2.3660	0.1270	5.2265	Uniform**
5	0.6	0.75	0.8000	0.1960	0.7652	Random
6	0.9666	0.8215	1.1766	0.2479	0.5852	Random
7	1	1.2093	0.888269	0.6320	0.311	Random
8	1.05	0.75	1.4000	0.1602	1.5304	Random
9	0.95	.5303	1.7913	0.0980	4.2819	App.Uniform**
10	0.6	0.48	1.2500	0.1478	0.8119	Random
11	0.7	0.3105	2.2544	0.06135	6.3488	Uniform**
12	0.78	0.6708	1.1627	0.1298	0.8419	Random
13	0.7	0.6184	1.1319	0.1445	0.5647	Random
14	1.1	0.75	1.4666	0.2263	1.5647	Random
15	1.0333	0.77937	1.3018	0.2395	1.0004	Random
16	0.65	0.6363	1.0215	0.1663	0.0723	Random
17	0.55	0.4937	1.1140	0.10535	0.5344	Random
18	0.6	0.82	0.7300	0.4294	0.5123	Random
19	0.9	0.6708	1.3416	0.3506	0.65436	Random
Haryana	16.74	12.56	1.3300	0.77850	5.3248	Approaching Uniform**

* - Significant at 5% level.

** - Significant at 1% level.

district : seven, and Mahentragarh district has only two towns. The Nearest Neighbour Index and other related values are given in Table 4.2.

The above table shows that the Nearest Neighbour Index and 'Z' value for Haryana as a whole are 1.33 and 5.32 respectively i.e. pattern of distribution of towns is 'approaching uniform'. However, the regional analysis or in the present case gridwise analysis of spatial distribution of towns gives a different pattern for Haryana. Majority of the grids exhibit 'random pattern' and a few show 'approaching uniform' or 'uniform pattern'. Only grid n0.3 depicts uniform pattern whereas grid No.4,9 and 11 depict 'approaching uniform' pattern. Except above mentioned four grids, rest fifteen depict random pattern of spatial distribution of towns. Grid No.3 is overlaid on the districts of Gurgaon and Faridabad. Grid No.4 also covers a part of the districts

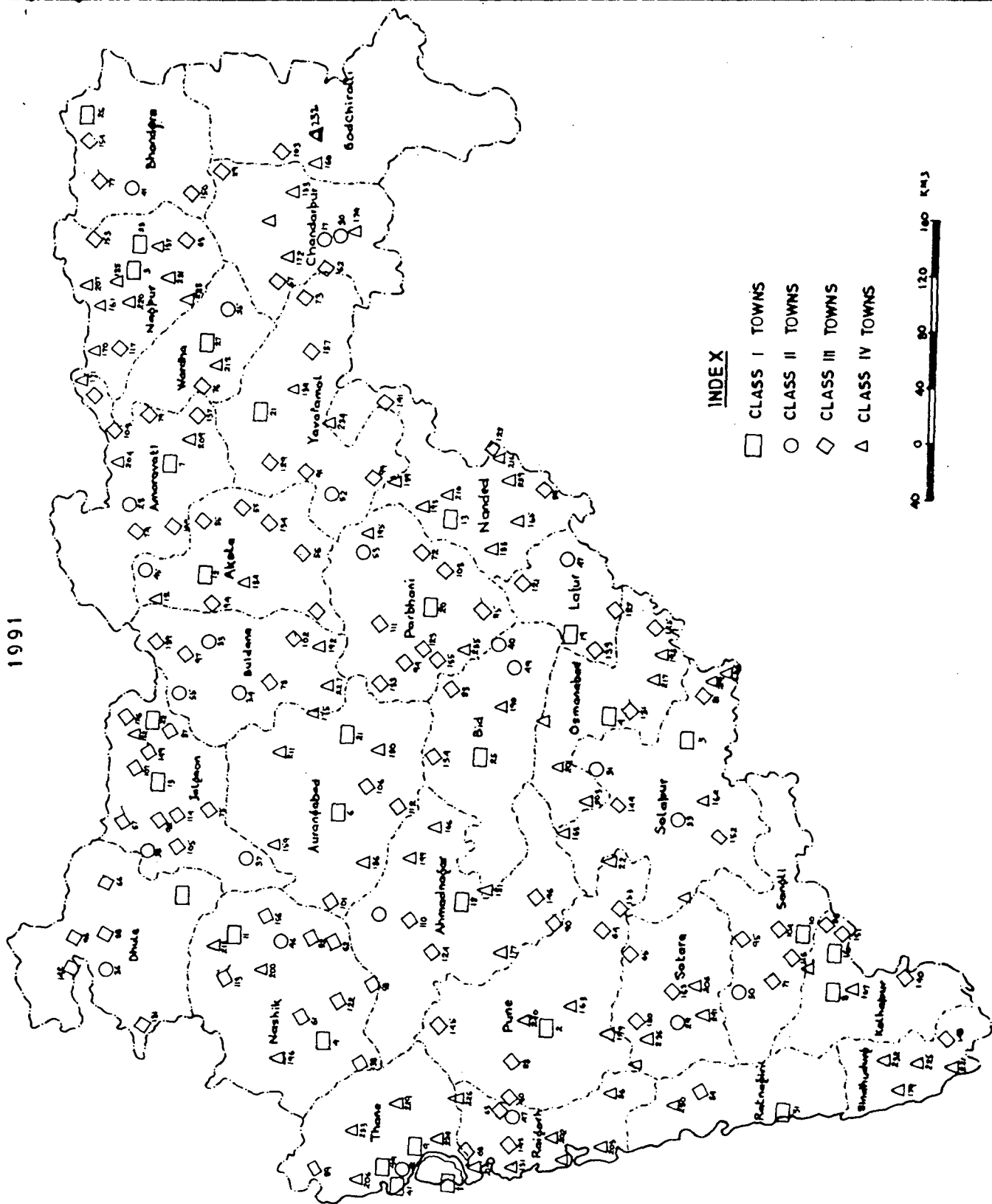
IV: SPATIAL PATTERN OF DISTRIBUTION OF TOWNS IN MAHARASHTRA

Map No.4e & 4f shows that distribution of towns in Maharashtra. There are Two hundred and forty one towns upto size class IV which are distributed among thirty districts averaging 8.03 towns per district. Jalgaon district has fourteen towns while Ratnagiri district has only three. The number of town is maximum in grid No.15, i.e., twenty six. The Nearest Neighbour Index and the related values are given in Table 3.3

Table 4.3 shows that out of a total eighteen grids, nine depict 'approaching uniform' pattern of spatial distribution of towns; the rest are randomly patterned. The Nearest Neighbour Index and 'Z' value for Maharashtra as a whole depict 'approaching uniform' pattern of urban settlements. But regional analysis gives a different pattern of spatial distribution of towns. It is evident from the above analysis that from the total fifty percent of the grids depict 'approaching uniform' and the rest fifty percent depict random pattern of the spatial distribution of towns. Grid Nos.5,8,9,10,11,12,13,14. ', and 15 exhibit 'approaching uniform' pattern. These grids are located in northeastern, central and central western part of

MAHARASHTRA
DISTRIBUTION OF TOWNS
CLASS I-IV
1991

MAP 4 a



INDEX

- CLASS I TOWNS
- CLASS II TOWNS
- ◇ CLASS III TOWNS
- △ CLASS IV TOWNS



MAP 4f

MAHARASHTRA
NEAREST NEIGHBOUR
URBAN CLASS I-IV
1991

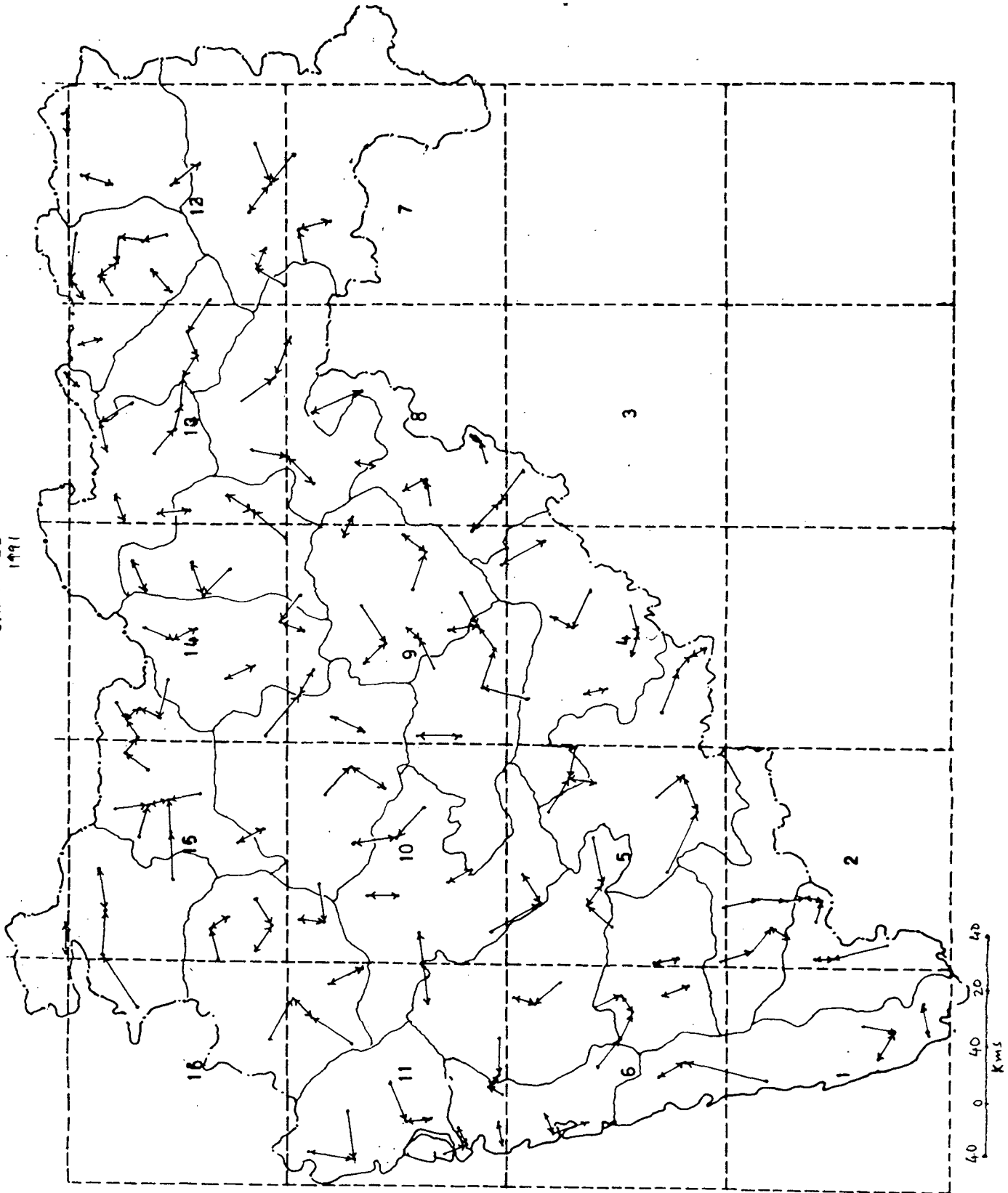


Table 4.4
Nearest Neighbour Index and Related Values Gujarat-1991

Gyid	\bar{D}_0	\bar{D}_r	R	SE	z	Remark
1	1.2	.5477	2.1909	0.2024	3.2228	Uniform **
2	0.7	.447	1.56	0.2337	1.0825	Random
3	0.45	.3717	1.2016	0.0585	1.3366	Random
4	1.2	1.1313	1.0607	0.5913	0.1161	Random
5	0.8428	0.6094	1.3829	0.1204	1.9385	Random
6	0.55	0.68	0.8088	0.1457	0.8918	Random
7.	0.825	0.4795	1.7205	0.0626	5.5113	App. uniform**
8.	0.6722	0.4666	1.4406	0.0574	3.762	App. uniform**
9.	0.333	0.4830	1.1041	0.1030	0.4879	Random
10.	0.8214	0.106	1.6086	0.0713	4.3672	App. uniform**
11.	0.947	0.4472	1.3298	0.036	2.718	App. uniform**
12.	0.8416	0.5773	1.4578	0.0871	3.0337	App. uniform**
13.	0.8625	0.7071	1.2197	0.1306	1.1891	Random
14.	0.55	0.5099	1.0786	0.0842	0.4757	Random
15.	1.125	0.8062	1.3954	0.2109	1.5130	Random
16.	0.6909	0.4264	1.6203	0.0475	5.5660	App. unifrom**
17.	0.75	0.6324	1.1858	0.1045	1.1248	Random
18.	0.86	0.8944	0.9615	0.2091	0.1645	Random
19.	1.225	0.9949	1.2312	0.2600	0.8848	Random
20.	0.86	0.7483	1.1492	0.1749	0.6386	Random
21.	2	1.7888	1.1180	0.9350	0.2258	Random
GUJARAT	19.79	16.409	1.2060	0.6358	5.3177	App. unifrom**

* - Significant at 5%

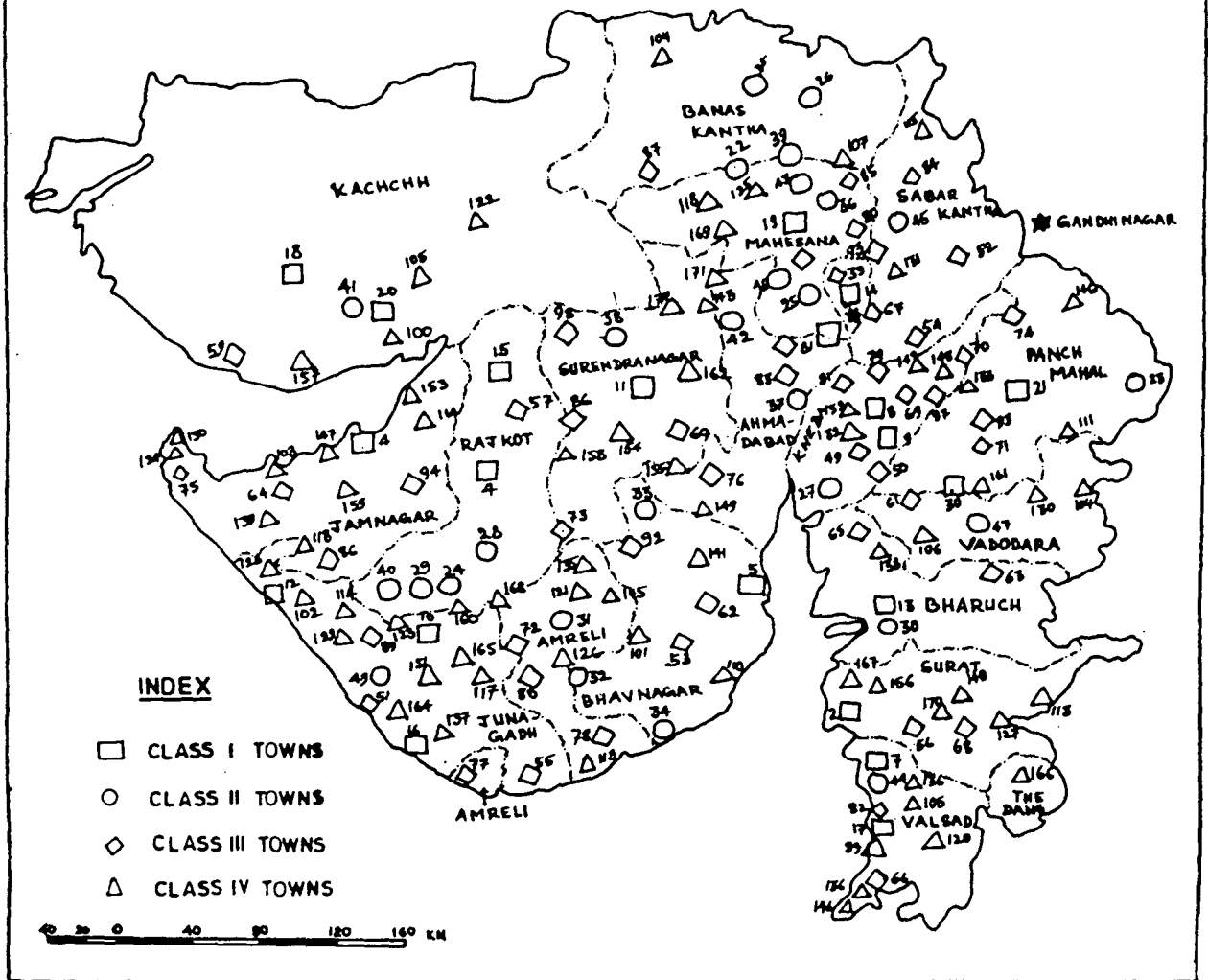
** - Significant at 1%

the states. Grid No.5 is overlaid on the districts of Solapur, Satara, Pune, Ahmadnagar and Sangli. Grid No.11 covers the districts of Greater Bombay, Thane, North Raigarh and a part of Nasik, Pune and Ahmednagar districts. Greater Bombay, the sixth largest city in the world is located in this grid. Grid No.12 is overlaid on the districts of Nagpur, Bhandara, North Chadrapur and North Gadchiroli. Nagpur, one of the million cities in India is located in this grid. Grid no.15 is overlaid on the districts of Jalgaon, Dhule, Aurangabad and Nasik. From the above discussions we find that compared to Punjab and Haryana, the pattern of spatial distribution of town in Maharashtra is predominantly 'uniform'.

(V) SPATIAL PATTERNS OF DISTRIBUTION OF TOWNS IN GUJARAT

Map no.4g and 4h shows the distribution of towns in Gujarat. There are one hundred and seventy two towns distributed among nineteen districts averaging 9.05 towns per district. The number of towns sharply varies from one district to another. In Junagadh

GUJARAT
 DISTRIBUTION OF TOWNS
 CLASS I IV
 1991



INDEX

- CLASS I TOWNS
- CLASS II TOWNS
- ◇ CLASS III TOWNS
- △ CLASS IV TOWNS

0 40 80 120 160 KM

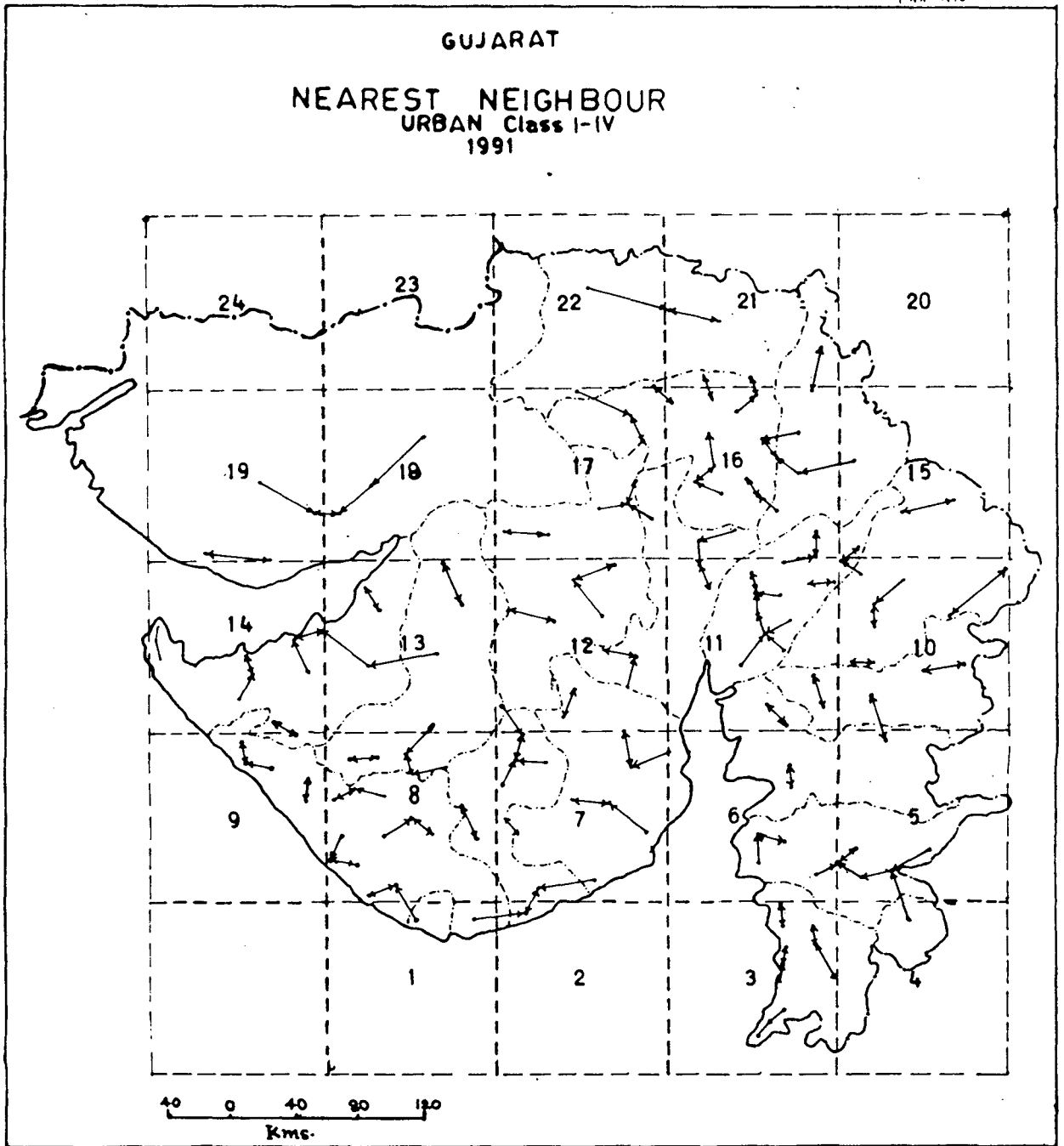


Table 4.3
Nearest Neighbour Index and Related values Maharashtra-1991.

Grid	\bar{D}_o	\bar{D}_r	R	SE	Z	Remark
1	6.300	0.9082	1.1009	0.1938	0.77312	Random
2	0.868	0.5581	1.2183	0.0809	1.5061	Random
3	1.00	0.7348	1.3609	0.3841	0.6904	Random
4	0.8	0.6495	1.2317	0.0848	1.7733	Approaching Uniform**
5.	0.9526	0.6882	1.33841	0.0876	3.2048	Random
6	0.8125	0.6708	1.2112	0.0876	1.6164	Random
7.	0.525	1.0062	0.5217	0.2629	1.8297	Random
8.	0.8066	0.60	1.3443	0.0809	2.5515	App.uniform**
9.	0.9148	0.5773	1.5846	0.0580	5.8109	App.Uniform**
10.	1.0333	0.7745	1.3339	0.1045	2.4717	App.Unif*
11.	0.8346	0.5734	1.4555	0.0587	4.4436	App.uniform**
12	0.8347	0.6255	1.3344	0.0681	3.0683	" "
13.	0.8607	0.5669	1.5182	0.0560	5.2459	" "
14.	0.8	0.6210	1.2881	0.0708	2.5261	App uniform*
15.	0.8869	0.6160	1.4396	0.0671	4.0338	App.uniform**
16.	1.55	1.3747	1.1275	0.5081	0.3449	Random
17.	0.7	0.6708	1.2918	0.2024	0.9671	Random
18.	0.8666	0.6708	1.2918	0.2024	0.9671	Random
Mahara- shtra	22.95	17.20	1.3334	0.5576	10.3100	App.uniform**

* - Significant at 5% level

** - Significant at 1% level.

App - Approching uniform.

district there are seventeen towns which are the highest count for any district in Gujarat. Gandhinagar district has only two towns which is minimum number for any district. There is also gridwise variation in the number of district. It is highest in grid No.16 and the lowest in grid No.2 which is twenty and two respectively. The Nearest Neighbour Index and the related values are given in table 4.4.

An analysis of Table 4.4 shows that one third of the total grids depict either 'uniform' or 'approaching uniform' pattern of distribution of urban settlements. The other grids depict a random pattern of distribution. In comparison with Punjab and Haryana uniformity in settlement pattern is greater in Gujarat just as Maharashtra. When we analyse values of 'R' and 'Z' in Gujarat as a whole they depict 'approaching uniform' pattern of distribution of towns. Like other states the pattern varies from one region to another. As mentioned, out of a total twenty one grids overlaid on the districtwise map of the state, seven show either 'uniform' or 'approaching uniform' pattern. These grids Nos. are 1,7,8,10,11,12 and 16. Grid No.10 covers the

districts of Vadodara and Panchmahal; the million city Vadodara is located inside this grid. Grid No.16 is overlaid on a part of districts Gandhinagar, Ahmedabads, Mahesana and Sabarkantha. Another million city Ahmedabad and the Capital of Gujarat: Gandhinagar are located in this grid. The grids depicting 'uniform' or 'approaching uniform' pattern of spatial distribution of towns are located in the south-central Kathiawad Peninsula and central Gujarat. The whole of Kachchh district, Jamnagar district, northern part of Rajkot district, Banaskantha, Valsad, the Dangs and north Panchmahal districts etc. show random distribution pattern. It is found that compared to Punjab and Haryana, uniformity in the pattern of spatial distribution of town is greater in Gujarat just as Maharashtra.

(vi) Summary of the Chapter:

The above analysis shows that in the states of Punjab and Haryana which have predominantly agricultural economic base, the pattern of spatial distribution of towns is largely random. In Maharashtra

and Gujarat where industrial economic base is stronger, the pattern of spatial distribution of towns is mainly 'uniform'. Hypothesis number two, "Spatial pattern of distribution of towns in agro-based areas is more 'uniform' than in the highly industrialized areas where it is more 'clustered' or 'random'" is, therefore, not validated and the modified hypothesis should be as under, "spatial pattern of distribution of towns in agro-based areas is more random than in the highly industrialized areas where it is more uniform". The above point is supported by the fact that in Punjab from out of a total of twenty two grids only six depict 'uniform' pattern and in Haryana from out of a total of nineteen grids only four depict 'uniform' pattern and the rest are randomly patterned. However in Maharashtra from out of a total of eighteen grids, nine depict uniform pattern and in Gujarat from out of a total of twenty one grids seven depict 'uniform' pattern while rest are randomly patterned.

CHAPTER V

SOCIO-ECONOMIC CORRELATES OF URBANIZATION

i) Introduction :

In the preceding two chapters, urban concentration and pattern of spatial distribution of towns were analyzed for the two sets of states. In this chapter an attempt has been made to find out the inter correlation between some of the characteristics of urbanization and characteristics of socio-economic variables. Since the analysis is based on the data provided by Census of India, 1991, the choice of the variables used for this purpose is greatly effected by the availability of the districtwise data in the census report of 1991. Only those variables have been chosen here for which districtwise data was available. These variables are as listed below-

1. Percentage of urban population to total population
2. Growth rate of urban population (1981-1991).
3. Sex Ratio
4. Density of population
5. Percentage of male urban workers
6. Percentage of female urban workers
7. Percentage of male other urban workers
8. Percentage of female other urban workers.

On the basis of above mentioned variables inter correlation matrices have been prepared for each state separately and the value of these correlation matrices are given below for each state from Table 5.1 to Table 5.4.

Socio Economic Correlates of Urbanization in Punjab:

After a thorough examination of Table 5.1 we find that there is a weak correlation between level of

Table 5.1

Correlation Matrix for Socio-Economic correlates of urbanization

Panjab 1991

	Level of Urbanization	Ur-Growth Rate of Urban population	Urban sex Ratio	Density of population	Percentage of Urban workers (M)	Percentage of Urban workers (F)	Percentage of other Urban workers (M)	Percentage other Urban workers (F)
	X1	X2	X3	X4	X5	X6	X7	X8
X1	1.00000							
X2	0.46040	1.00000						
X3	-0.69327**	-0.49736	1.00000					
X4	0.76828**	0.33648	-0.37381	1.00000				
X5	0.57035*	0.08865	-0.79545**	0.14695	1.00000			
X6	0.18231	0.14356	-0.13002	0.32136	-0.07193	1.00000		
X7	0.39795	0.20747	0.29124	0.54104*	-0.0405	0.65575**	1.00000	
X8	-0.48782	0.08425	0.17274	-0.29284	-0.42559	0.51727	0.37064	1.00000

* Significant at 5% level

** Significant at 1% level.

urbanization (X1) and growth rate of urban population (X2) in the state of PUnjab. They are directly related but statistically not significant. The correlation between level of urbanization (X1) and urban sex ratio (X3) is inversely high and significant. It indicates male selectivity in migration to urban areas. There is a direct and high correlation between level of urbanization (X1) and density of population (P4) It is obvious that with the increase in level of urbanization, the density of population also increases. In the same way the level of urbanization (X1) and male urban workers are directly correlated and also significant. We find an inverse correlation between the level of urbanization (X1) and female urban other workers which is not significant. There is no significant correlation between level of urbanization (X1) and female urban workers (X6) on the one hand and urban male urban other workers (X7) on the other hand though these two variables are directly related.

We find a weak correlation between growth rate of urban population (X2) and urban sex ratio (X3) but it is not significant, ``. Growth rate of urban population (X2) does not show significant correlation with any other variable. There is a high and inverse correlation between urban sex ratio (X3) and urban male workers (X5). It is significant and easily understandable. Between density of population (X4) and other male workers (X7) we find a direct and significant correlation. Thus density of population increases with increase in proportion of the male urban workers. Female urban other workers (X6) show direct and significant correlation with male other urban workers (X7) The above analysis shows that urbanization level in punjab has deep impact of other variables like sex ratio, density of population, male urban workers etc. It is also affected by growth rate of urban population, male other urban workers and female other urban workers.

ii. Socio-Economic Correlates of Urbanization in Haryana.

From Table 5.2 we know that Haryana follows almost the same pattern of relation among the socio-economic correlates of urbanization, as Punjab. But we also find a few noticeable variations between these two states and these variations will be discussed in this chapter. There is direct correlation between level of urbanization (X1) and growth rate of urban population (X2) which is significant but of moderate intensity. We find inverse correlation between level of urbanization (X1) and urban sex ratio (X3) which is not significant. There is direct and significant correlation is found between level of urbanization (X1) on the one hand separately, and density of population (X4), male urban workers (X5), and female urban workers (X6) on the other. A weak and inverse correlation is found between level of urbanization (X1) and male other urban workers (X7). It is not significant. Further, we find inverse

Table 5.2

Correlation Matrix for Socio-Economic correlates of urbanization

HARYANA 1991

	Level of Urbanization X1	Growth Rate of Urban population X2	Urban sex Ratio X3	Density of population X4	Percentage of Urban workers (M) X5	Percentage of Urban workers (F) X6	Percentage of other Urban workers (M) X7	Percentage other Urban workers (F) X8
X1	1.00000							
X2	0.53601*	1.00000						
X3	-0.32344	-0.68579**	1.00000					
X4	0.72836**	0.58096**	-0.35256	1.00000				
X5	0.51476*	0.37493	-0.33202	0.22567	1.00000			
X6	0.46155*	-0.07660	0.12409	0.44435	0.64071	1.00000		
X7	-0.31569	-0.72525**	0.49395*	-0.32559	-0.23309	0.38098	1.00000	
X8	-0.51503*	-0.64436**	0.77505**	-0.44463	-0.22274	-0.05433	0.32281	1.00000

* Significant at 5% level

** Significant at 1% level.

and significant correlation between level of urbanization (X1) and female other urban workers (X3).

Urban growth rate of population (X2) and urban sex ratio (X3) have inverse and significant correlation which is easily understood, growth rate of urban population (X2) and density of population (X4) are directly correlated. It is significant at 1 per cent level. In the same way, there is an inverse significant correlation between growth rate of urban population (X2) and male other urban workers (X7). The same relationship is found between urban growth rate of population (X2) and female other urban workers (X8). There is a positive and significant correlation between sex ratio (X3) and male other urban workers (X8) but they have high correlation. Thus we can say that in Haryana urbanization has close relationship with variables like growth rate of urban population, density of population, male urban workers, female other urban workers etc. Other two variables i.e. sex ratio and

male other urban workers do not show any significant relationship with urbanization.

There is a remarkable difference when we compare the relationship between some socio-economic correlates of urbanization in Punjab and Haryana. In Punjab the relationship between urban growth (X2) and male other urban workers (X7) shows no significance correlation. They are directly correlated here. The same relationships is found between growth rate of urban population (X3) and female other urban workers (X8) , On the other hand there these two variables are inversely and significantly correlated with the growth rate of urban population in Haryana. It shows that agricultural base of Haryana is stronger than Punjab and secondly that Punjab has higher proportion of migrant workers than is Haryana.

Socio-Economic Correlates of Urbanization in Maharashtra:

Table 5.3 shows that there is no significant correlation between level of urbanization (X1) and growth rate of urban population (X2). Level of urbanization (X1) and sex ratio (X3) show high inverse correlation and it is significant. There is direct and high correlation between level of urbanization (X1) and density of population (X4) and it is significant. It can be easily understood. In the same way we find positive and significant correlation between level of urbanization (X1) and male urban workers (X3). But unlike Punjab and Haryana, Maharashtra has direct and positive correlation between level of urbanization (X1) and male other urban workers (X7). In the same way, there is direct and significant correlation between level of urbanization (X1) and female urban other workers (X8).

Table 5.3

Correlation Matrix for Socio-Economic correlates of urbanization

MAHARASHTRA 1991

	Level of Urbanization X1	Growth Rate of Urban population X2	Urban sex Ratio X3	Density of population X4	Percentage of Urban workers (M) X5	Percentage of Urban workers (F) X6	Percentage of other Urban workers (M) X7	Percentage of other Urban workers (F) X8
X1	1.00000							
X2	-0.08548	1.00000						
X3	-0.73234**	-0.26030	1.00000					
X4	0.72107**	-0.10719	-0.57450**	1.00000				
X5	0.57701**	0.11014	-0.47203**	0.49135**	1.00000			
X6	-0.27262	0.26469	0.45753**	-0.03116	0.03957	1.00000		
X7	0.57085**	-0.21060	0.28746*	0.34187	0.46914**	-0.09113	1.00000	
X8	0.63319**	-0.16939	0.40410	0.39465*	0.54818**	0.05701	0.83023	1.00000

* Significant at 5% level

** Significant at 1% level.

Growth rate of urban population (X2) does not show any significant correlation with any of the variables included in our study. Except male urban workers and female urban workers, all other variables are inversely related to growth rate of urban population. Urban sex ratio (X3) shows inverse correlation with density of population (X4). It is significant. There is a significant and inverse correlation between urban sex ratio (X3) and male urban worker (X5). Female urban worker (X6) and female other urban worker (X8) are directly and significantly correlated with sex ratio (X3). There is significant and positive correlation between density of population (X4) and urban male worker (X5). X4 is similarly related to X8. Male other urban worker (X7) and female other workers (X8) are directly correlated with male urban workers (X5). Unlike Punjab and Haryana, in Maharashtra main other urban workers (X7) show high, direct and significant correlation with female other urban workers. Thus, we find that urbanization level in Maharashtra has close relationship with variables like

urban sex ratio, density of population, male urban workers, male other urban workers, and female other urban workers.

Socio-Economic correlates of Urbanization in Gujarat:

A through analysis of table 5.4 shows that except for a few differences, the socio-economic correlates of urbanization in Gujarat follow the same pattern of relationship as in Maharashtra. The level of urbanization (X1) in Gujarat does not show significant correlation with urban sex ratio (X3) though they are inversely related. In Maharashtra, between these two variables, there is high, significant and inverse correlation. Level of urbanization (X1) and density of population (X4) are directly and significantly correlated. As in Maharashtra, there is direct and significant correlation between level of urbanization (X1) and male urban workers (X7) and female other urban workers (X8) are correlated directly with level of urbanization (X1) and both values are significant.

Table 5.4

Correlation Matrix for Socio-Economic correlates of urbanization

GUJARAT 1991

	Level of Urbanization X1	Growth Rate of Urban population X2	Urban sex Ratio X3	Density of population X4	Percentage of Urban workers (M) X5	Percentage of Urban workers (F) X6	Percentage of other Urban workers (M) X7	Percentage other Urban workers (F) X8
X1	1.00000							
X2	0.24697	1.00000						
X3	-0.42558	-0.39635	1.00000					
X4	0.45057*	0.57343**	-0.56626**	1.00000				
X5	0.67036**	0.54652**	-0.54476**	0.38662	1.00000			
X6	0.03662	0.57451*	.0.31974	0.41604	0.08994	1.00000		
X7	0.67024**	0.44656*	-0.48112*	0.42574	0.66244**	0.01607	1.00000	
X8	0.54035**	0.61120**	-0.46118*	0.55445**	0.48820	0.27445	0.87642**	1.00000

* Significant at 5% level

** Significant at 1% level.

Except sex ratio (X3) and level of Urbanization(X1), growth rate of urban population shows positive and significant correlation with all the other selected variables. These variables do not show significant correlation with growth of urban population (X2) in Maharashtra. Density of population (x4), male urban worker (X5), male other urban worker (X7) and female other urban worker (X8) show inverse and significant correlation with sex ratio (X3). Density of population (X4) is showing positive and significant correlation with female other urban worker (x8). Male urban worker (X5) shows high direct correlation with male other urban worker (x7). It is significant. There is a significant, direct correlation between male urban workers (X5) and female other urban workers (X8). As in Maharashtra, there is high and direct correlation between male other urban workers (X7) and female other urban worker (X8) in the state of Gujarat. This too is

though, positive. On the other hand, the correlation between the same variables is negative and not significant in Maharashtra. while it is weak and positive but not significant "Gujarat. There is no overwhelming empirical evidence to support hypothesis no.3 - "Higher the level of Urbanization lower is the rate of growth of urban population". The relationship between level of Urbanization and growth rate of Urban population can best be described as very general.

CHAPTER VI

SUMMARY AND CONCLUSION

(i) SUMMARY :

The basic purpose of this study of certain aspects of urbanization in the states of Punjab, Haryana, Maharashtra and Gujarat is to look into the variations in their urban characteristics in a comparative manner. The urban system of Punjab and Haryana shows the impact of agro-based economy while the states of Maharashtra and Gujarat show the impact of colonial model and modern industrialization upon their urban systems. The variation in urban characteristics between these two sets of states have been analysed using the Lorenz Curve, the Gini's Concentration Ratio, the Rank Size Rule and two Indices of Primacy mainly to highlight the concentration problems of urbanization in these states.

The size class distribution of towns and urban population show that Maharashtra has the maximum

inequality followed by Gujarat, Haryana and Punjab in that order. Maharashtra has 77.85 per cent of urban population concentrated in Class I towns followed by Gujarat (66.43 percent), Haryana (58.54 per cent) and Punjab (54.36 percent). The study of inequality in size class distribution by Lorenz Curve showed similar results. The states of Maharashtra and Gujarat have high deviation from the line of equal distribution but the states of Punjab and Haryana show lesser deviation. The same fact was quantitatively revealed using the Gini's Concentration Ratio (G). It again proves that the states of Maharashtra and Gujarat have higher concentration of urban population as their value of Gini's Concentration Ratio is higher than that of the states of Punjab and Haryana. Another dimension of inequality has been measured through Rank-size Regularity and it is related to the Index of Primacy. The analysis, however, did not reveal many differences in terms of the exponent constant (b). The first Index of Primacy (IP1) and the second Index of Primacy (IP2) show similar pattern. They are found to be higher than unity in Maharashtra and Gujarat. In case of Punjab and Haryana its value is less than unity showing lesser

inequality. Thus the hypothesis number one "Agro-based urbanization has less inequality in the size distribution of towns than urbanization based on industrialisation" was found to be validated.

Nearest Neighbour Analysis has been used to identify the pattern of spatial distribution of towns in two sets of states. The Nearest Neighbour Analysis worked out on the basis of a state as a whole shows that the distribution pattern of towns is 'approximately uniform' in all the states. But the regional analysis of spatial distribution pattern of towns which is based on the system of grids depicts different patterns. By the latter method the states of Maharashtra and Gujarat had predominantly 'uniform' pattern as compared to Punjab and Haryana where the pattern is predominantly random. Thus the hypothesis number two, 'spatial pattern of distribution of towns in agro-based areas is more uniform than the highly industrialized areas where it is more clustered or "random" is not validated. Therefore, the hypothesis is modified as "spatial distribution of towns in agro-based areas is more random than in the highly

industrialized areas where it is more uniform".

The socio-economic correlates of urbanization have been analysed to understand the variation of the relations among these states. The study is based on secondary sources of data provided mainly by the three papers of Provisional Population Totals as brought out by Census of India-1991. The findings of this study are summarised below. The most important finding of the above analysis appears to be the fact that in industrially dominant states of Maharashtra and Gujarat the level of urbanization has shown a positive and statistically significant correlation with the level of 'other urban workers', male and female. The 'other workers' category consists or mainly of the 'non-agricultural workers'. Its weak correlation with level of urbanisation and level of 'other urban workers' in the agriculturally dominant states of Punjab and Haryana conforms with the general perception. Correlation between level of urbanisation and growth rate of urban population is positive and significant only in Haryana. In Maharashtra it shows a weak and inverse relationship. In Gujarat a positive weak and

not significant correlation is found between level of urbanization and growth rate of urban population, In Punjab the correlation between these two variable is positive and not significant. However, it is stronger than in Gujarat. The relationship between level of urbanization and growth rate of urban population appears to be quite general. Hypothesis number three, "Higher the level of urbanization, lower is the rate of growth of urban population" appears to be quite general. Thus Hypothesis number three, is not supported by empirical evidence.

CONCLUSION

The main conclusions of the present study are as given below :-

The process of urbanization in any area is governed by the underlying economic base of that area. In case of the predominantly agricultural areas the size class distribution of towns is more balanced. The inequality is found to be less than what is expected when we use 'Rank -Size Regularity. In case of the

predominantly industrial areas, the size class distribution of towns is more unequal. The pattern of spatial distribution of urban settlement in the areas predominantly agricultural is found to be random compared to the areas which are predominantly industrial; here the pattern of spatial distribution of urban settlement is found to be 'uniform'. There is a very general kind of relationship between level of urbanization and both male and female workers in predominantly industrial areas.

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APPENDIX

Socio-Economic correlates of urbanization
Panjab, Haryana, Maharashtra, Gujarat
Districtwise - 1991

Panjab

STATE dist	PANJAB X1	X2	X3	X4	X5	X6	X7	X8
1. LUDHIANA	49.95	58.59	815	629	54.1	6.37	87.6	84.58
2. JALANDHAR	36.31	20.55	886	598	51.43	5.62	85.06	85.23
3. AMRITSAR	34.14	18.35	876	492	52.69	4.12	85.21	82.34
4. PATIALA	30.48	25.03	897	415	49.73	8.64	85.04	88.82
5. KAPURTHAL	25.79	1.29	862	392	52.93	7.46	86.83	89.28
6. RUPNADAR	25.57	49.78	870	434	50.12	7.28	90.78	93.28
7. FARIDKOT	25.35	27.31	883	301	51.73	4.59	79.4	85.1
8. SANBRUR	24.56	29.91	881	333	91.9	3.44	72.17	83.01
9. FIROJPUR	23.94	28.47	887	272	50.27	4.13	82.81	90.52
10. GUDASPUR	23.1	24.24	911	496	46.17	5.2	85.51	86.93
11. BHATINDA	22.58	18.68	874	280	51.28	4.34	82.12	86.83
12. HOSHIARPUR	15.5	23.46	890	369	49.76	6.12	80.18	91.49

APPENDIX

Socio-Economic correlates of urbanization
Panjab, Haryana, Maharashtra, Gujarat
Districtwise - 1991

Haryana

STATE	dist.	Level of urbanization	Growth Rate of Urban Population	Urban Sex Ratio	Density of Population	Percent- age of Urban Workers	Percent- age of Urban Workers	Percent- age of Other Urban Workers	Percentage Other Urban Workers
						(M)	(F)	(M)	(F)
HARYANA									
		X1	X2	X3	X4	X5	X6	X7	X8
	1. Faridabad	48.66	74.64	813	697	50.35	5.03	27.31	7.55
	2. Ambala	35.85	41.88	921	464	47.75	6.13	91.51	96.4
	3. Yamunanag	33.82	44.88	879	466	48.61	3.69	9.21	91.92
	4. Karnal	27.6	33.77	887	447	48.34	5.01	83.43	88.27
	5. Panipat	27.16	37.18	870	474	51.28	5.14	82.36	88.81
	6. Kurukshet	24.25	43.04	866	522	46.8	4.64	81.91	88.47
	7. Sonipat	23.78	40.68	872	538	46.69	5.26	82.55	87.65
	8. Rohtak	21.63	31.72	880	404	46.36	5.63	81.39	82.49
	9. Hisar	21.18	34.66	864	292	48.76	4.88	81.81	73.12
	10. Sitka	21.16	32.08	876	211	50.15	3.47	85.25	89.37
	11. Gurgaon	20.51	36.85	884	409	46.98	6.22	85.01	81.39
	12. Bhiwani	17.49	33.25	874	218	45.08	3.91	77.26	76.02
	13. Jind	17.29	39.64	859	350	45.99	4.06	78.1	74.06
	14. Rewari	15.26	60.4	859	400	47.77	3.23	6.88	86.88
	15. Kaithal	14.74	48.59	879	292	48.72	3.24	75.72	83.15
	16. Mehehdrag	12.7	27.99	901	395	45.58	3.18	83.48	79.1

APPENDIX

Socio-Economic correlates of urbanization
Panjab, Haryana, Maharashtra, Gujarat
Districtwise - 1991

Maharashtra

STATE	MAHARASHTRA	Level of urbaniza- tion	Growth Rate of Urban Population	Urban Sex Ratio	Density of Popula- tion	Percent-	Percentage	Percentage	Percentage
						age of Urban Workers (M)	of Urban Workers (F)	of Other Urban Workers (M)	of Other Urban Workers (F)
dist.	X1	X2	X3	X4	X5	X6	X7	X8	
1.	G. BOMBAY	100	20.21	819	16434	54.22	10.78	95.36	92.61
2.	THANE	64.74	127.67	841	547	54.28	9.74	94.31	85.31
3.	NAGPUR	61.84	38.04	916	332	45.81	9.66	90.72	73.99
4.	PUNE	50.76	31.92	906	352	48.91	11.56	94.26	86.04
5.	NASIK	35.52	47.13	915	248	46.75	10.02	88.36	62.52
6.	AMRAVATI	33.01	33.88	924	181	46.83	10.48	74.52	40.22
7.	AURANGABA	32.01	83.67	884	219	44.52	9.79	89.77	67.77
8.	SOLAPUR	28.81	21.03	945	216	45.43	13.81	88.02	78.33
9.	AKOLA	28.68	39.48	926	209	46.04	9.72	76.02	37.18
10.	CHANDRAPUR	28.04	101.47	901	155	45.51	9.23	89.38	61.23
11.	HAI GADN	27.42	32.65	922	271	45.16	8.43	76.38	34.62
12.	WARDHA	26.61	22.46	930	169	45.02	9.58	79.49	44.35
13.	KOI AHAPUR	26.4	26.26	916	387	51	7.96	86.39	66.95
14.	SANGLI	22.84	27.39	932	256	48.82	10.73	77.07	48.8
15.	PARBHANI	22.5	45.8	924	192	43.93	9.48	77.85	42.85
16.	NAWDED	21.71	54.06	914	221	42.28	10.14	79.45	35.27
17.	BOI SANA	20.63	39.1	932	195	46.37	12.32	71.87	23.62
18.	DHULA	20.53	29.77	916	192	43.44	8.23	86.31	53.29
19.	LATUR	20.42	60.32	898	234	42.18	6.74	81.03	52.18
20.	YAVAT MAL	17.21	36.15	925	153	45.51	10.44	79.53	46.64
21.	RAIGARH	17.84	54.24	905	254	51.65	10.76	87.86	72.64
22.	RID	17.96	42.15	911	170	43.23	9.55	81.54	46.76
23.	JALIA	16.92	44.44	930	177	45.96	9.36	83.74	52.43
24.	AHAMADNAG	15.84	51.57	915	197	48.24	13.88	82.01	54.77
25.	OSOSMANAB	15.22	48.67	905	168	43.27	11.3	69.12	31.75
26.	BHANDRA	13.15	14.85	952	226	44.07	15.21	79.25	40.32
27.	SATARA	12.91	18.74	926	233	45.98	10.21	79.84	56.6
28.	RATNAGIRI	8.97	14.64	981	188	46.77	10.89	90.2	25.08
29.	GADCHIROL	9.71	341.31	910	55	47.33	18.18	70.23	25.08
30.	SINDHUDUR	7.6	24.86	999	160	45.94	25.54	87.62	79.37

APPENDIX

Socio-Economic correlates of urbanization
Panjab, Haryana, Maharashtra, Gujarat
Districtwise - 1991

Gujarat

STATE	GUJARAT	Level of urbaniza- tion	Growth Rate of Urban Population	Urban Sex Ratio	Density of Popu- lation	Percent-	Percent-	Percent-	Percentage
						age of Urban Workers (M)	age of Urban Workers (F)	age of Other Urban Workers (M)	Other Urban Workers (F)
dist	X1	X2	X3	X4	X5	X6	X7	X8	
1. Ahmedabad	74.77		28.41	892	549	51.88	10.43	95.37	85.71
2. Surat	50.61		60.98	849	443	57.01	7.09	94.28	73.34
3. Rajkot	47.03		36.53	934	224	51.59	6.3	90.01	71.81
4. Vadodara	42.82		38.45	902	394	52.07	10.89	93.04	87.63
5. Gandhinagar	40.81		165.09	897	625	54.22	18.99	93.64	91.65
6. Jamnagar	39.74		17.72	942	109	50.72	6.25	92.19	74.99
7. Bhavnagar	35.05		28.19	938	205	49.84	6.36	89.11	69.01
8. Junagarh	32.55		21.7	949	226	49.87	7.39	81.91	59.32
9. Kachch	30.28		37.52	938	27	53	8.24	91.4	74.21
10. Surendran	29.83		21	928	115	49.89	10.82	86.14	67.28
11. Valsad	24.43		36.5	911	414	51.07	10	90.2	72.43
12. Kseda	22.63		28.33	927	478	48.98	7.34	82.76	66.69
13. Mehesana	22.03		26.2	925	324	49.47	9.59	86.84	63.4
14. Emrell	21.53		22.3	953	185	50.82	9.52	75.5	49.19
15. Bharuch	21.26		35.8	916	171	52.49	7.43	89.32	73.07
16. Dangs	11.08			903	81	46.39	13.68	76.59	54.07
17. Panchmaha	10.58		21.16	931	333	47.81	9.25	85.6	73.21
18. Saharkant	10.5		24.17	936	238	47.93	9.11	87.47	68.69
19. Banaskant	10.18		52.34	922	170	47.47	6.3	85.08	73.44

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