Chapter 2
Size and Spatial Distribution

2.1 Introduction: - The distribution of any phenomenon on the geo-plane evolves some pattern, the study of which is of prime concern for space scientists and geographers. Particularly in case of settlements such analysis becomes more relevant, for it helps not only in identifying the current distribution patterns but the future spatial trends as well, which may form basis for any economic planning of the region.\(^{115}\)

The spatial analysis is basically related with articulated and integrated system of settlements, which need to promote regional growth, social transformation and spatial integration. An articulated and integrated hierarchy of settlements provides potential access for the people, living throughout the country and to the markets of different sizes as well as to a wide variety of urban amenities.\(^{116}\) The towns, situated within the spatial network of a region, work as growth foci/service centres and by propelling the development impulses usher in an era of socio-economic transformation within the region.\(^{117}\) Small towns cover small areas, as their trickle down effect is minimum. This is due to the limited accessibility of the small towns to different services. Larger towns and cities on the other hand command large areas of hinterland development. With this background, this chapter is an attempt to analyze the size and the spatial distribution of towns in Haryana for a period of thirty years.

Considering the trends of urbanisation as measured through the progress in number and population-size of the urban settlements in the present century, Census data reveals that there has been a remarkable growth in the number and population of such places. For instance, the number of towns increased from 1,916 in 1901 to 4,615 in 1991, and urban population from 25.9 million to 215.7 million in India.


In Haryana, also the number of towns increased from 44 in 1901 to 90 in 1991, and urban population from 0.57 million to 16.46 million. It thus indicates that while the number of towns more than doubled, population of such places increased by more than twenty-eight times in the last 90 years. The decadal variations in number and population of the towns further reveals a rapid urban growth in the last decade when more than 19 new towns were added in 1981 and 15 new towns were added in 1991. Moreover data on size-class differential in urban growth reveals a growing tendency of concentration. This is well reflected by the most rapid growth in the number of cities having one lakh and more population. In Haryana, there was no class I town between 1901 and 1951, but the number rapidly rose from 1 town in 1961 to 12 towns in 1991 and the proportion of population also increased from 8.09 per cent in 1961 to 58.59 per cent in 1991. In medium towns, the number of towns has increased from 18 in 1961 to 26 in 1991 and proportion of population has decreased from 65.16 per cent in 1961 to 27.01 per cent in 1991. In case of small towns the number has increased from 41 in 1961 to 52 in 1991 and proportion of population decreased from 26.75 per cent in 1961 to 14.40 per cent in 1991 (Table 2.2). Therefore the fact is that the bigger cities are receiving more and more population with every passing decade. This tendency of increasing concentration of urban population into large cities and metropolitan centres, as succinctly pointed out in a report is due to the fact that “whilst the rate of growth of very large cities may have declined, the annual addition to their population in absolute numbers has been very substantial. Metropolitan cities such as Bombay, Delhi, and Bangalore grew each year by over 3,00,000 people”.

From the above description, the following research proposition has been deducted for the present analysis.

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118 These towns are Ambala Sadar (M.C.), Assandh (M.C.), Babiyal (C.T.), Barwala (M.C.), Bawani Khera (M.C.), Gurgaon (C.T.), Hassanpur (M.C.), Hathin (M.C.), Indri (M.C.), Jharsa (C.T.), Kalanaur (M.C.), Kalayat (M.C.), Panchkula Urban Estate (E.O.), Pinjore (M.C.), Rania (M.C.), Ratia (M.C.), Samalkha (C.T.), Taraori (M.C.). The towns, which were enumerated as new towns in 1991 are Bilaspur, Cheeka, Dharuhera, Dundahera, Ellenabad, Farakhpur, Kharkhoda, Kheri Sampla, Mustafabad, Narnaund, Pinjore (Rural), Punahana, Siwani, Tosham, Uncha Siwana. Two towns were declassified in 1991 Census were Jharsa (C.T.) and Rania (M.C.).


120 Ibid
Research proposition:

Small and medium towns of Haryana located near the metropolitan city of Delhi have faster growth-rate than the towns away from Delhi.

In this chapter an attempt has been made to analyse the reasons of the size-class growth their spatial distribution in terms of rank-size and an analysis of the nearest neighbour analysis of small and medium towns.

The analysis has been done both in general as well as in regional terms. Before proceeding with the analysis it is necessary to look at the Census definition of towns.

2.2 Census Definitions of ‘Towns’ - The Census has laid down the following criteria for areas to be accepted as urban since 1961, which also was adopted in 1971, 1981 and 1991 Censuses:

1. All places with a municipality, corporations, cantonment board or notified town area committee, etc.
2. All other places, which satisfied this following criteria:
   a) A minimum population of 5,000;
   b) At least 75 per cent of male working population engaged in non-agricultural activities; and
   c) A density population of at least 400 persons per square kilometre (1,000 per square mile).

Besides the above definitions, other terms like Town Groups, Standard Urban Area and Urban Agglomeration were introduced from time to time by the

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122 Town Groups: - An innovation was made in the 1961 Census to present statistics severally and collectively of such towns as lie so close to one another, that in daily life they behave as one unit though served by more than one local administration. Grouping of towns in this way should prove useful for planning their development, by taking their requirements in totality.
123 Standard Urban Area: - The concept of ‘Standard Urban Area’ was to replace the town groups of 1961 Census. The concept of Standard Urban Area takes into account the contiguous areas made up of other Urban as well as rural administrative Units should have close mutual socio-economic links with the core town having a minimum population size of 50,000 and the probability are that the contiguous area in question got fully urbanized in a period of 2 to 3 decades.
124 Urban Agglomeration: - This concept was also started in the 1971 Census. It is a matter of common observation that around most of the core or statutory towns, fairly large and well-recognized Railway colonies, University Campuses, Military Camps etc. have come up. Although
Census authorities. In the case of Haryana, the following eleven standard urban areas were delineated in 1981.

**Standard Urban Areas of 1981:**

1. Ambala
2. Bahadurgarh
3. Bhiwani
4. Faridabad Complex Administration
5. Gurgaon
6. Hisar
7. Karnal
8. Panipat
9. Rohtak
10. Sonipat

In 1971 Census, no place was recognized to be a continuous urban spread extending beyond the Municipal limits of an urban unit deserving to be treated as an Urban Agglomeration, in Haryana. But at the time of 1981 Census, following four urban agglomerations were delineated.

**Urban Agglomerations and their Constituent towns or Urban Outgrowths, 1981:**

- **Yamunanagar (U.A.)** 
  (i) Jagadhri Workshop Railway Colony (MC), 
  (ii) Yamunanagar (M.C) and 
  (iii) Jagadhri (M.C)

- **Hisar (U.A.)** 
  (i) Hisar (M.C.), 
  (ii) Haryana Agricultural University Campus and Mini Secretariat,

- **Ambala (U.A.)** 
  (i) Ambala Cantt (C.B.), 
  (ii) Ambala Sadar (M.C.)

- **Gurgaon (U.A.)** 
  (i) Gurgaon (M.C.), 
  (ii) Gurgaon (Rural) Census Town

In 1991 Census, three more were added to the existing four. These were:

**Urban Agglomerations and their Constituent Towns or Urban Outgrowth in 1991:**

- **Karnal (U.A.)** 
  (i) Karnal (M.C.) 
  (ii) Part of Sector 6, Urban Estate (O.G.)

- **Pundri (U.A.)** 
  (i) Pundri (M.C.) 
  (ii) Part of village Fatehpur

- **Bahadurgarh (U.A.)** 
  (i) Bahadurgarh (M.C.) 
  (ii) Sector 6, H.U.D.A. (O.G.)

2.3 Introduction of the Concepts of Small and Medium Towns (Task Force Concept): While the question of definition and classification of urban areas have often been a subject of debate at various levels it is more or less a convention to go by standards evolved by the Census. Census follows a unidimensional system of urban classification in so far as all urban areas are grouped into six classes according to population size ranging from less than 5,000 to 1,00,000 and above. Based on this it is usual to designate a place with population exceeding 1,00,000 as a city. Apart from this, national categorisation of settlement as a city, the Census does not provide

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such out-growths are outside the statutory limit of a corporation or a Municipal or a Cantonment Board, they usually fall within the revenue boundary of the place by which the town itself is known.
any explicit definition of small and medium towns. However, in most of the existing studies on the subject, a small town is taken to be an urban area below 20,000 population.\footnote{Report of the Committee on Development of Small Towns in Hills and Border Areas appointed by the Govt. of India, Ministry of Health, in September 1963 (Page 5 report); Asok Mitra’s paper titled, ’A Selection of Statistics on Small Towns presented in UNESCO Seminar on Urban Rural Differences in Southern Asia, held in Delhi in 1962; Ashish Bose, “Studies in India’s Urbanisation 1901-1971” Institute of Economic Growth, 1974 in Report of the Task Force on Planning and Development of Small and Medium Towns & Cities (1977), Ministry of Works and Housing, Govt. of India, Volume II, p. 1} Once the cut off point is accepted as less than 20,000 and for the city as 1,00,000 plus, the medium town would, as if fall within the range of 20,000 and 1,00,000 population.\footnote{Ibid.}

In view of these limitations, categorisation of urban areas with reference to specific population range can at best be a first step in evolving a rational system of classification. Perceived in this light, for the purpose of Task Force study, small towns are taken to be those with population ranging from 5,000-20,000, medium towns as those with population above 20,000 but not exceeding 1,00,000 and small cities as those with population ranging between 1,00,000 to 3,00,000.\footnote{Task Force Classification of Towns by Population Range}

For the purpose of present study, on the basis of above classification, we have classified class I towns as cities, class II & class III as medium towns and class IV and V as small towns and class VI towns as smaller towns. As there were only two towns in the class VI category, they have been included in the small town category in the present study (Table 2.1).

**Table 2.1**

<table>
<thead>
<tr>
<th>Size-Class</th>
<th>Population</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1 Lakh and above</td>
<td>Cities</td>
</tr>
<tr>
<td>II</td>
<td>50,000 to 99,999</td>
<td>Medium Towns</td>
</tr>
<tr>
<td>III</td>
<td>20,000 to 49,999</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>10,000 to 19,999</td>
<td>Small Towns</td>
</tr>
<tr>
<td>V</td>
<td>5,000 to 9,999</td>
<td></td>
</tr>
<tr>
<td>VI</td>
<td>Below 5,000</td>
<td></td>
</tr>
</tbody>
</table>

And each such individual area by itself may not satisfy the minimum population limit to qualify for being created as an urban area.

\footnote{For the purpose of Task Force study, small towns are taken to be those with population ranging from 5,000-20,000, medium towns as those with population above 20,000 but not exceeding 1,00,000 and small cities as those with population ranging between 1,00,000 to 3,00,000.}
2.4 Size-Class Distribution of Towns and Population in Haryana (1961-1991) - The pattern of variation in the size relationship of urban settlements of a region reflects the characteristics of urbanization of the region. The urban structure of Haryana according to 1991 Census comprised of 90 towns and a population of 4 million accounting for 25.51 per cent of the total population. In 1961, this proportion was 15.78 per cent. Thus the pace of urbanization in Haryana has accelerated over the years. Table-2.2 represents the proportion of towns and population in different size classes for the period 1961-1991. The Table reveals the uneven distribution of population among different size-class towns. In 1961, 8 per cent of the urban population was concentrated in 1.67 per cent of the cities. In contrast to this 68.33 per cent of the small towns accommodated 26.75 per cent of the urban population. The medium towns, which accounted for 30 per cent of the towns, contained 65.16 per cent of the population. This lop-sided distribution pattern continued in 1971, 1981 and also in 1991 (Figs. 2.1).

Table- 2.2
Proportion of Towns and Population according to Size-Class (1961-1991)

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1</td>
<td>105543</td>
<td>2</td>
<td>227248</td>
</tr>
<tr>
<td>%</td>
<td>1.67</td>
<td>8.09</td>
<td>3.13</td>
<td>12.91</td>
</tr>
<tr>
<td>Medium Towns</td>
<td>18</td>
<td>849967</td>
<td>23</td>
<td>1171698</td>
</tr>
<tr>
<td>%</td>
<td>30.00</td>
<td>65.16</td>
<td>35.94</td>
<td>66.56</td>
</tr>
<tr>
<td>II</td>
<td>7</td>
<td>478731</td>
<td>9</td>
<td>709624</td>
</tr>
<tr>
<td>%</td>
<td>11.67</td>
<td>36.70</td>
<td>14.60</td>
<td>40.31</td>
</tr>
<tr>
<td>III</td>
<td>11</td>
<td>371236</td>
<td>14</td>
<td>462074</td>
</tr>
<tr>
<td>Small Towns</td>
<td>41</td>
<td>348923</td>
<td>39</td>
<td>361405</td>
</tr>
<tr>
<td>%</td>
<td>68.33</td>
<td>26.75</td>
<td>60.94</td>
<td>20.53</td>
</tr>
<tr>
<td>IV</td>
<td>15</td>
<td>205066</td>
<td>14</td>
<td>204933</td>
</tr>
<tr>
<td>%</td>
<td>25.00</td>
<td>15.72</td>
<td>21.88</td>
<td>11.64</td>
</tr>
<tr>
<td>V</td>
<td>14</td>
<td>99418</td>
<td>20</td>
<td>138989</td>
</tr>
<tr>
<td>%</td>
<td>23.33</td>
<td>7.62</td>
<td>31.25</td>
<td>7.90</td>
</tr>
<tr>
<td>VI</td>
<td>12</td>
<td>44439</td>
<td>5</td>
<td>17483</td>
</tr>
<tr>
<td>%</td>
<td>20.00</td>
<td>3.41</td>
<td>7.81</td>
<td>0.99</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>130443</td>
<td>64</td>
<td>1760351</td>
</tr>
<tr>
<td>%</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>


In 1991, the distribution was much more uneven with only 13 per cent of the class I cities accounting for 58.59 per cent of the population while 58 per cent...
of the small towns accounting for only 14 per cent of the population. The balance was much closer for the medium towns as in 29 per cent of the towns stayed 27 per cent of the urban population. The figures indicate that the distribution of urban population in Haryana is top heavy i.e., higher the size class of an urban centre higher is the proportion of population and vice versa.

Not only is the maximum proportion of population concentrated in cities, the proportionate share of population living in Class IV, V and VI towns has decreased between 1961 and 1991 (Fig. 2.1). On the other hand, among the medium towns, the proportion of population shows a continuous upward trend. The decline in the proportion of Class II towns (Fig. 2.1) and its corresponding share of population is due to the promotion of nine class II towns of 1971 to class I towns of 1981. They are: Karnal, Panipat, Hisar, Faridabad Township, Ambala, Bhiwani, Yamunanagar, Sonepat and Gurgaon. In 1991 the proportion of class IV towns was not only highest among the small towns but among all the other towns. But the proportion of population accommodated was less than 10 per cent in Class IV towns. Thus the overall picture that emerges is that within the medium town group i.e. class II and III, class II towns are important and within the small town group, class IV towns are important. This supports the fact stated that the urban population is mainly concentrated in large urban centres and the concentration has increased over the years.

2.5 Growth of Small and Medium Towns (1961-1991) - The overall growth rate of the medium towns in 1961-71 was 27.78 per cent (Table-2.3) and the growth rate of both the class II and class III towns was almost equal. But the growth rate of population in Class II towns was almost double (48.23 per cent) than class III towns (24.47 per cent). Between 1971-81 the growth rate of medium towns shows a negative share which is due to the sudden increase in the number of class I towns from 2 to 11 between 1971 and 1981. All the 9 class II towns of 1971 were upgraded to class I town as their population increased. In terms of absolute share though five class IV towns namely Charkhi Dadri, Gohana, Jhajjar, Kalka and Tohana were added to the medium town category (Class III) the increase was much less than the one between medium towns and cities.
Proportion of Towns and Population according to Different Size Class (1961-1991)

Year and Size Class

<table>
<thead>
<tr>
<th>Year</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Fig. 2.1
As there was an addition of only one class I town (Sirsa) in 1991 to the existing 11 in 1981, the growth rate of class I town shows a relatively low increase while the growth rate of population between 1981 and 1991 was as high as 48 per cent (Fig. 2.1I).

### Table-2.3

**Growth Rate of Towns and Population (1961-1991)**

<table>
<thead>
<tr>
<th>Size-Class</th>
<th>1961-71</th>
<th>1971-81</th>
<th>1981-91</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Town</td>
<td>Popn.</td>
<td>Town</td>
</tr>
<tr>
<td>I</td>
<td>100.00</td>
<td>115.31</td>
<td>450.00</td>
</tr>
<tr>
<td>Medium Towns</td>
<td>27.78</td>
<td>37.85</td>
<td>-21.74</td>
</tr>
<tr>
<td>II</td>
<td>28.57</td>
<td>48.23</td>
<td>-44.44</td>
</tr>
<tr>
<td>III</td>
<td>27.27</td>
<td>24.47</td>
<td>-7.14</td>
</tr>
<tr>
<td>Small Towns</td>
<td>-4.88</td>
<td>3.58</td>
<td>20.51</td>
</tr>
<tr>
<td>IV</td>
<td>-6.67</td>
<td>-0.06</td>
<td>5.71</td>
</tr>
<tr>
<td>V</td>
<td>42.86</td>
<td>39.80</td>
<td>15.00</td>
</tr>
<tr>
<td>VI</td>
<td>-58.33</td>
<td>-60.66</td>
<td>-60.00</td>
</tr>
</tbody>
</table>

The important fact is that the overall growth rate of medium towns in 1991 both for the number of towns and population was higher than the cities. The growth rate of medium towns was 44 per cent while that of the population was 53 per cent. The growth rate as is expected was higher for the class II category. The number of class II towns’ growth rate was 80 per cent while the population grew by 100 per cent. But this was not the case with class III towns. Though the class III towns increased, the growth rate of population was much less.

The growth rate of small towns particularly for class IV and class VI category was negative in 1961-71 decade. This is due to the upgradation of class IV towns to Class III and Class VI to Class V towns during the same period. During 1971-81 the growth of Class IV towns and their population was impressive. The growth of towns was, however, more than the population growth rate. This trend was reversed in 1981-91 decade with higher population growth (41 per cent) rate compared to towns’ growth (37 per cent).

The growth of Class V towns was higher than population growth in 1961-71 as seven class VI towns were upgraded to Class V in 1971. Between 1971-81 the growth rate of towns was slow but in 1981-91 decade the growth rate of class V towns and population was negative. This is again due to the up-gradation of Class V to Class IV towns.
Growth Rate of Towns and Population
(1961-71 to 1981-91)

Fig. 2.11
The Class VI towns of Haryana are merely expanded villages which due to its natural population growth is upgraded to the higher class. Jakhalmandi of 1981 was upgraded to Class V in 1991 and only one new town Uncha Siwana was added to the Class VI category in 1991 with the existing town of Ateli (1981 and 1991).

The huge concentration of population since 1961 in class II towns and their rapid growth both in number and population is attributed to the following factors. The lop-sided regional development can also be partly explained by these factors.

Firstly, in 1947, due to the partition of the country, large number of people were displaced and they got settled in Haryana. These displaced persons were basically non-agricultural and educated persons. So they took all non-agricultural activities like trading, manufacturing, weaving, transport and government and private services. Settlement of displaced persons was the most important factor, which led to the growth of area and population of the towns.

Second major factor was the formation of Haryana State on 1st November 1966, as a separate state. The planners of newly formed state felt the need to develop the urban areas and thus there was a rapid expansion of basic infrastructure like roads, medical and educational institutions in these towns.

Third factor is the well-connected transport network. The northern railway branch and the national highway (No.1) connect Ambala in the north to Delhi in the south. Other than this N.H.8 connects Gurgaon, Dharuhera and Bawal. A railway line parallel to the national highway connects Gurgaon, Haileymandi, Rewari, Ateli and Narnaul. N.H.10 connects Bahadurgarh (near Delhi) to Kheri Sampla, Rohtak, Maham, Hansi, Hisar, Fatehabad, Sirsa and Mandi Dabwali (north west). Another branch of northern railway running between Rewari and Bhatinda connects Charkhi Dadri, Bhiwani, Bhawani Khera, Hansi, Hisar, Fatehabad and Sirsa. One more branch of northern railway connects Delhi to Jakhalmandi via Bahadurgarh, Kheri Sampla, Rohtak, Jind, Narwana and Tohana. Therefore the criss-crossing of the road and railway network has facilitated the growth of most of the towns.

The fourth factor that led to the growth and expansion of the existing towns was the Green Revolution of the 1960s. The improvement in agricultural produce and mechanised farming pushed the surplus labour to work and settle in the urban areas.
2.6 Regional Analysis of Towns: -The twentieth century has been an important period of change in urban population of Haryana. Not only the people living in urban places recorded a continuous increase, a marked redistribution also occurred. The incidence and repercussion of two political readjustment i.e. the partition of the country in 1947 and formation of Haryana as a separate political state in November 1966 had significant effects on population growth and distribution. The geographical location of Metropolitan Delhi in the south-east and Chandigarh in the north are no less important, and had greatly been responsible for the differential growth pattern of urban population and ‘lopsided urban development’ in the state. The stability and achievement of the great Green Revolution in the late sixties permitted the intensification of economic and social infrastructure programmes, the modernization of agriculture and the progressive industrialization of economy further pushed the rural population to the urban areas.

2.6.1 Regional Distribution and Growth of Small and Medium Towns -
As mentioned earlier the plain of Haryana has been divided into 3 physiographic units depending on the local topography and soil types. The regional analysis follows the 3 division of the plain into Eastern, Western and Southern for the present analysis.

2.6.1.1 Distribution of Towns and Population in Eastern Plain - The eastern plain of Haryana covers an area of 20410 sq. km., which is spread over nine districts according to 1991 Census. Therefore it is natural that the number of towns are more in number compared to other plains. The location of the towns (Fig. 2.III) show a linear pattern as they are mostly along, the national highway i.e. the G.T. Road and the railway line. The total number of towns in 1961 was 31 i.e. 51.67 per cent of the total towns of the state were found in this region. In 1971, 53.12 per cent of the towns, in 1981, 55.26 per cent and in 1991, 55.43 per cent were located in this region.

In the year 1961 among the 31 towns, small towns accounted for 67.74 per cent and the proportion of population was 25.78 per cent (Table 2.4) in these towns. The medium towns accounted for 29 per cent of the towns with 61.23 per cent of the population. Ambala Cantonment was the only class 1 town of the state and was located in the eastern plain. 13 per cent of the urban population was found in this
HARYANA
SIZE-CLASS DISTRIBUTION OF URBAN AREAS
1991

Legend

Class I
Class II
Class III
Class IV
Class V
Class VI

Medium Towns
Small Towns

Kilometers

Fig. 2.111
It is revealed from Fig. 2.IV. that in 1961 Class II towns were the most important category, in terms of population concentration.

Table 2.4

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>I</td>
<td>3.23</td>
<td>12.98</td>
<td>5.88</td>
<td>21.62</td>
</tr>
<tr>
<td>Medium Towns</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>29.03</td>
<td>61.23</td>
<td>35.30</td>
<td>59.06</td>
</tr>
<tr>
<td>III</td>
<td>16.13</td>
<td>44.31</td>
<td>14.71</td>
<td>38.45</td>
</tr>
<tr>
<td>IV</td>
<td>67.74</td>
<td>25.78</td>
<td>58.82</td>
<td>19.33</td>
</tr>
<tr>
<td>V</td>
<td>29.03</td>
<td>15.93</td>
<td>26.47</td>
<td>11.74</td>
</tr>
<tr>
<td>VI</td>
<td>32.26</td>
<td>8.82</td>
<td>29.41</td>
<td>7.15</td>
</tr>
<tr>
<td></td>
<td>6.45</td>
<td>1.03</td>
<td>2.94</td>
<td>0.44</td>
</tr>
</tbody>
</table>


No new town was added in the small town group, in 1971. The total number of towns was 21 (67.74 per cent) in 1961 which declined to 20 in 1971 with the upgradation of Shahbad town (Class IV in 1961) to Class III category in 1971. The proportion of population was thus 19.33 per cent in 1971 as against 25.78 per cent in 1961.

In 1971, the total number of Class II towns were the same in absolute number (i.e. 5) but the proportion declined as the total number of towns increased to 34. Rohtak, the Class II town of 1961 was upgraded to Class I in 1971. Therefore in 1971, the two towns Rohtak and Ambala constituted 5.88 per cent of the towns of the eastern plain and 21.62 per cent of the population. The importance of medium class towns continued in 1971 also, with 59.06 per cent population concentrated in such towns. The number of towns increased from nine in 1961 to twelve in 1971. Four towns namely Thanesar, Bahadurgarh, Shahbad and Narwana (all Class III towns in 1971) entered the medium town group for the first time in 1971.

In 1981 all the class II towns of 1971 viz. Karnal, Panipat, Ambala, Yamunanagar and Sonepat were upgraded to class I town. and only two towns from the class III category of 1971, Kaithal and Jind were upgraded to class II town. Therefore in 1981 the proportionate share of class II town in the eastern plain was 4.76 per cent and the population share was also a little above 7 per cent.
Proportion of Towns and Population according to Different Size Class in Eastern Plain (1961-1991)

Fig. 2.IV
Four class IV towns were added to the class III category in 1981 keeping the number of towns (seven) same during 1971 and 1981. But there was a decline in the proportionate share of both town and population for the class III category in 1981 as there was a much greater increase in the number of class IV towns. From 9 (26.47 per cent) in 1971 it increased to 15 (35.71 per cent) in 1981. Three class V towns of 1971 were added to this group in 1981 and five new towns namely, Samalkha, Assandh, Taraori, Kalanaur and Kalayat also came into being. But the proportion of population of all these class IV towns in 1981 was only 13.14 per cent. This is mainly because of the major share (60.66 per cent) enjoyed by the seven class I cities of the plain. There were no class VI town in 1981 as the one (Buria) of 1971 was upgraded to class V in 1981. Therefore the proportionate share of town and population is nil for class VI category in 1981.

In 1991, again the number of class IV towns was highest (18) among all the other towns. There were 28 small towns in the region accounting for 54.90 per cent with 14.45 per cent population. One important fact that emerges from Table 2.4 is the declining share of population as well as town in this group.

The importance of the medium towns that continued till 1971 declined abruptly in 1981. In 1991 with the addition of four class III towns of 1981 to class II towns and four class IV towns and one new town (Cheeka) to class III town, the total number of medium sized towns has increased. Though the population tilt is towards the class II town, the proportion of medium sized town and population has increased between 1981 and 1991.

2.6.1.2 Growth Rate of Towns and Population in Eastern Plain - The total number of towns in eastern plain was 31 in 1961, which increased to 51 in 1991. The overall growth rate for the towns was 64.52 per cent during this period.

During the decade 1961-71, 100 per cent growth rate of class I town is due to the addition of Rohtak town in the Class I list. The population also increased as a result of it. During 1971-81, the growth rate of class I town and their accompanying population was highest; as is revealed from the Table-2.5. During 1981-91 the low growth rate for the cities is due to the fact that there was no addition of any new towns. The 29.39 per cent growth rate of population between 1981-91 is the natural growth rate, therefore, the rapid increase of the earlier decade is not observed.
During 1961-71 the number of medium towns increased from 9 to 12, therefore the growth was 33.30 per cent and the population growth rate 24.68 per cent. The number of class II towns remained the same between 1961-71 while their population grew. The class III towns' growth rate was 75 per cent while that of the population 57.41 per cent. Though there was up-gradation of town from the lower category to the upper category the number of the class IV, and V towns did not increase between 1961-71. On the whole, during 1961-71, the two class I towns and the 12 medium towns were prominent.

Table 2.5
Growth Rate of Towns and Population in Eastern Plain (1961-1991)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>100.00</td>
<td>250.00</td>
<td>0.00</td>
<td>115.31</td>
<td>310.28</td>
<td>29.39</td>
</tr>
<tr>
<td>Medium Towns</td>
<td>33.30</td>
<td>-25.00</td>
<td>77.78</td>
<td>24.68</td>
<td>-48.61</td>
<td>117.98</td>
</tr>
<tr>
<td>II</td>
<td>0.00</td>
<td>-60.00</td>
<td>200.00</td>
<td>12.18</td>
<td>-71.51</td>
<td>275.83</td>
</tr>
<tr>
<td>III</td>
<td>75.00</td>
<td>0.00</td>
<td>42.86</td>
<td>57.41</td>
<td>-5.89</td>
<td>28.834</td>
</tr>
<tr>
<td>Small Towns</td>
<td>-4.80</td>
<td>30.00</td>
<td>7.69</td>
<td>-3.08</td>
<td>40.57</td>
<td>12.36</td>
</tr>
<tr>
<td>IV</td>
<td>0.00</td>
<td>66.67</td>
<td>20.00</td>
<td>-4.76</td>
<td>63.64</td>
<td>24.59</td>
</tr>
<tr>
<td>V</td>
<td>0.00</td>
<td>10.00</td>
<td>-18.18</td>
<td>4.78</td>
<td>11.41</td>
<td>-22.91</td>
</tr>
<tr>
<td>VI</td>
<td>-50.00</td>
<td>-100.00</td>
<td>0.00</td>
<td>-44.54</td>
<td>-100.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

During 1981-91 decade the class IV towns increased by 66.67 per cent and the growth rate of the population was 63.64 per cent. Leaving this category all the other classes recorded a negative growth rate (Fig. 2.V).

In the 1981-91 decade the growth rate of medium towns particularly class II towns has been quite high. The class IV towns also grew steadily. The important fact is that any increase in the number of towns is accompanied by a much higher growth rate of population. The medium towns are much more important than the small towns due to the availability of basic civic amenities and other infrastructural facilities.

The proportionate distribution of towns and population and their growth rates brings out the fact that, the towns of the Eastern Haryana plain are benefited from the agriculturally rich hinterland bestowed with the natural resources of fertile alluvial soil and water for irrigation from the number of rivers that cross the area. A well connected transport network in the form of NH 1 (Ambala to Delhi) and branches of Northern Railway has been instrumental for the location of the majority of the towns.
Growth Rate of Towns and Population in Eastern Plain
(1961-71 to 1981-91)

Year and Size Class

Town  Population

Fig. 2.V
The location of Metropolitan Delhi in the south and capital city Chandigarh in the north has also influenced the growth of the small and medium towns in this plain.

2.6.1.3 Distribution of Towns and Population in Western Plain - The western plain of Haryana consisting of three districts namely, Sirsa, Hisar and Bhiwani covers an area of 15695 sq. km. The physical characteristics of this area limit the overall development and it is also reflected in the number of towns in this region. In 1961 only 12 (20 per cent) towns were located in this area which increased to 13 in 1971, 15 in 1981 and to 19 (21 per cent) in 1991.

During 1961 and 1971, there were no class I town in this region. Therefore the medium towns were very important. Hisar and Bhiwani the district headquarters were the two class II towns of 1961 and 1971 and they accounted for 46 per cent of the population in 1961 and 45 per cent in 1971 (Fig. 2. VI).

### Table 2.6
Proportion of Towns and Population in Western Plain (1961-1991)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Medium Towns</td>
<td>33.34</td>
<td>72.78</td>
<td>46.15</td>
<td>82.38</td>
</tr>
<tr>
<td>II</td>
<td>16.67</td>
<td>46.46</td>
<td>15.38</td>
<td>45.23</td>
</tr>
<tr>
<td>Small Towns</td>
<td>66.66</td>
<td>27.22</td>
<td>53.84</td>
<td>17.63</td>
</tr>
<tr>
<td>IV</td>
<td>33.33</td>
<td>21.23</td>
<td>15.38</td>
<td>10.10</td>
</tr>
<tr>
<td>V</td>
<td>0.00</td>
<td>0.00</td>
<td>30.77</td>
<td>6.44</td>
</tr>
<tr>
<td>VI</td>
<td>33.33</td>
<td>5.99</td>
<td>7.69</td>
<td>1.09</td>
</tr>
</tbody>
</table>

Hansi and Sirsa were the class III towns of 1961 accounting for 26 per cent of the population. In 1971, two more towns were added to the class III category and both the proportion of towns (30.77 per cent) and population (37.55 per cent) was increased. In 1981, there was no addition of any new town in lower classes. Therefore the number of small towns decreased which is revealed by the declining proportion (Table-2.6). In 1991 there were no class VI town in the western plain. The upgradation of the existing Jakhalmandi town (in 1961, 1971 and 1981) to class V in 1991 reduced the proportionate share to zero, while the increase in class IV towns increased the proportionate share of population from 7.49 per cent in 1981 to 9.64 per cent in 1991, for the class IV towns (Fig. 2. VI).
Proportion of Towns and Population according to Different Size Class in Western Plain (1961-1991)

Fig. 2.VI
2.6.1.4 Growth Rate of Towns and Population in Western Plain - In western plain, the number of towns have shown 58.34 per cent of growth rate from 1961 to 1991. The number of towns increased from 12 to 19 during this period.

Table 2.7
Growth Rate of Towns and Population in Western Plain (1961-1991)

<table>
<thead>
<tr>
<th>Size-Class</th>
<th>Towns</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Medium Towns</td>
<td>50.00</td>
<td>0.00</td>
</tr>
<tr>
<td>II</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>III</td>
<td>100.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Small Town</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>IV</td>
<td>-50.00</td>
<td>0.00</td>
</tr>
<tr>
<td>V</td>
<td>0.00</td>
<td>-50.00</td>
</tr>
<tr>
<td>VI</td>
<td>-40.00</td>
<td>-33.33</td>
</tr>
</tbody>
</table>

Till 1981, there was no class I town. In 1981, the towns of Hisar and Bhiwani have shown growth rate of class I towns from 0 in 1961 to 50.00 percent in 1991. Similarly the population growth rate has increased from nil in 1961-71 to 74.20 percent in 1981-91. The growth of medium towns has declined from 50 per cent in 1961-71 to 16.67 percent in 1981-91. Similarly the growth rate of population has also decreased from 59.57 percent to 0.26 percent in 1991. This is because during 1961 and 1971, there were only 2 towns i.e., Hisar and Bhiwani. In 1981, the towns of Hisar and Bhiwani were promoted to class I. One more class II town i.e., Sirsa also got promotion in class I category in 1991, and the town of Hansi was only class II town in 1991. In small town group the growth rate has shown an increase from -8.74 per cent in 1961-71 to 50.54 per cent in 1981-91 Census. This growth is natural, and very few small towns have been up-graded to the medium town category. Class VI towns have shown negative growth rate, because there were four towns in 1961, but in 1971 and 1981, there were one town and in 1991, there was no town in this category (Fig. 2. VII).

During 1961-71 period, the medium towns were the dominant category. In 1971-81, the small towns were dominant, while in 1981-91, cities and small towns were dominant. This is because during 1981, medium towns crossed over to cities boundary.
Growth Rate of Towns and Population in Western Plain
(1961-71 to 1981-91)

Fig. 2.VII
2.6.1.5 Distribution of Towns and Population in Southern Plain - The distribution of towns in southern plain like the other two regions is also uneven. The proportion of small towns in all the years from 1961, have been 70 per cent and above (Table-2.8). But the proportion of population has declined over the years from nearly 30 per cent in 1961 to only 16 per cent in 1991. Though efforts have been made to develop the small and medium towns to arrest the growth of cities the figures show a reverse trend. Until 1971 there were no class I town in the region. There were even no class II town in 1961. Therefore the class III towns accounted for 29.42 per cent of the towns and 70.45 per cent of the population.

In 1971 with the emergence of the 2 towns Faridabad and Gurgaon as class II town the proportionate share of population living in class III towns declined sharply. The decline in the proportion of population continued even during the next years and in 1991 only 2.41 per cent of the urban population of the southern plain were concentrated in class III towns. The number also declined as the cities and class II towns gradually gained importance between 1971 and 1991. The magnetic pull of the the two class I cities has been much stronger and therefore the proportionate share of town and population of small and medium town show a declining trend (Fig. 2.VIII).

Table-2.8

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Town</td>
<td>Popn.</td>
<td>Town</td>
<td>Popn.</td>
</tr>
<tr>
<td>I</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Medium Towns</td>
<td>29.24</td>
<td>70.45</td>
<td>29.41</td>
<td>72.87</td>
</tr>
<tr>
<td>II</td>
<td>0.00</td>
<td>0.00</td>
<td>11.76</td>
<td>40.86</td>
</tr>
<tr>
<td>III</td>
<td>29.41</td>
<td>70.45</td>
<td>17.65</td>
<td>32.01</td>
</tr>
<tr>
<td>Small Towns</td>
<td>70.58</td>
<td>29.56</td>
<td>70.59</td>
<td>27.13</td>
</tr>
<tr>
<td>IV</td>
<td>11.76</td>
<td>9.06</td>
<td>17.65</td>
<td>12.95</td>
</tr>
<tr>
<td>V</td>
<td>23.53</td>
<td>11.70</td>
<td>35.29</td>
<td>11.63</td>
</tr>
<tr>
<td>VI</td>
<td>35.29</td>
<td>8.80</td>
<td>17.65</td>
<td>2.55</td>
</tr>
</tbody>
</table>
Proportion of Towns and Population according to Different Size Class in Southern Plain (1961-1991)

Fig. 2.VIII
first time in 1991 Census and as the total number of class III towns declined from 5 to 3, the growth rate registered was negative. But during the same period 53.05 per cent of the population growth was registered for the medium towns (Fig. 2.IX).

The growth rates of small towns as a whole was zero, as the total number of towns after changing hierarchies remained the same. The growth rate of population was 35.79 per cent. The major share was contributed by the class IV towns with 111.46 per cent population growth rate between 1961-71. One class V town of 1961 was added the Class IV list of 1971 making the total to three towns. The growth rate of 50 per cent for the class V towns and a population growth rate of 47.05 per cent during 1961-71 was due to the upgradation of three class VI towns Farrukhnagar, Kanina and Pataudi to class V town. The negative growth rate of towns and population for the class VI category can be explained by this fact. No towns emerged in the class VI category in 1971. The number of towns thus were reduced from 6 to 3 and though in absolute term the population of the three class VI towns increased from 7021 to 8919 in 1971 the deduction of population of the other towns has been responsible for a negative growth rate. During 1971-81 the medium towns shows a negative growth rate for population as well as towns. The two class II towns Faridabad and Gurgaon of 1971 entered as Class I town in 1981 and Rewari entered the Class II category. Palwal and Narnaund only remained in the class III category. This reshuffling of towns and their accompanying population is responsible for the negative growth rate.

Table-2.9
Growth Rate of Towns and Population in Southern Plain (1961-1991)

<table>
<thead>
<tr>
<th>Size-Class</th>
<th>Towns</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Medium Towns</td>
<td>-40</td>
<td>0</td>
</tr>
<tr>
<td>II</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>III</td>
<td>-40</td>
<td>-33.33</td>
</tr>
<tr>
<td>Small Towns</td>
<td>0</td>
<td>16.67</td>
</tr>
<tr>
<td>IV</td>
<td>50</td>
<td>33.33</td>
</tr>
<tr>
<td>V</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>VI</td>
<td>-50</td>
<td>-66.67</td>
</tr>
</tbody>
</table>

During 1981-91 decade the number of class II town increased from 1 to 2, an increase of 100 per cent and the population also increased by 115.55 per cent. Hodal a
Growth Rate of Towns and Population in Southern Plain
(1961-71 to 1981-91)

Year and Size Class
- Town
- Population

Fig. 2.IX
class IV town was promoted to Class III town and was the only class III town in 1991 in the southern plain. The up-gradation of class III towns of 1981 to class II towns decreased the number and hence the growth-rate.

The growth rate of class IV towns between 1981-91 was 75 per cent and population growth rate was 71.85 per cent. Though the towns interchanged their place as the population increased the total number of class V towns remained the same and hence the town growth is zero but the growth rate of population was 14.10 per cent. The only class VI town Ateli of 1981 and 1991 registered a considerably high growth rate (48.91 per cent).

The overall picture thus emerges is that the medium towns are gaining in importance in the eastern and southern plain with rapid upgradation of towns from the lower category, this phenomena is relatively low in the western plain. In the western plain the gap between the cities and small urban centres is quite high which needs to be minimized.

The southern plain like the eastern plain have a well-connected transport network with NH 2 and NH 10, and close proximity to the capital of Delhi. On the other hand western plain known as the “Bhiwani Bagar” is largely occupied by sandy mounds, the topography is desert type which experiences active wind erosion and the water table is deep. Agricultural produce is limited mainly to cotton, gram and oil seeds. The infertile hinterland thus does not encourage the development of urban centres. The places, which are either crossed by rivers or highways or railways, are developing fast.

2.7 Application of Rank-Size Rule: - Two conflicting schools of thought have dominated the studies of city-size distributions. One of these, The ‘Law of the Primate City’, which (associated with the name of Mark Jefferson) suggests a primate pattern of city-size distribution, where the entire settlement system is overshadowed by one settlement, which dominates the entire spectrum of the region’s activities. Not only does this settlement stand out over and above the other settlements in the region but it also hinders the emergence of other settlements of considerable size. In contrast to this sort of spatial structuring is the ‘rank-size’ suggested by George K. Zipf.
The occurrence of rank-size or primate city pattern have variously been related with differing levels of economic development. The rank-size rule is often related with large territories, a long tradition of urbanization and a complex political and economic system. On the other hand, small territories with a short tradition of urbanization and a simple political system are said to have a primate city pattern. However, inspite of their general appeal, these relationships cannot be regarded as universally applicable.

According to this rule the population of a town is related with its rank in the following form of Pareto’s\textsuperscript{128} distribution.

\[ P_r = KR^b \] (i)

Where \( P_r \) is the population of the town whose rank is \( R \). While \( K \) and \( b \) are the constants.

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

\[ Y = a - bX \] (ii)

Where \( Y = \log P_r \)

and \( X = \log R \)

and \( a = \log K \)

Appendix I (a), I (b), I (c) and I (d) give the population of Haryana’s towns in 1961, 1971, 1981 and 1991 with their ranks. These population and their ranks have been converted into their logarithms and a regression line is fitted in the usual manner.

\[ a = \bar{y} - b \bar{x} \]

\[ b = \frac{\sum XY - \frac{\sum X \sum Y}{n}}{\sum X^2 - \frac{(\sum X)^2}{n}} \]

\[ K = \text{Antilog of } a \]

The original equation from the values of the constants as found above could be written as in case of 1961.

\[ P_r = 313987R^{-1.02752321} \]

If in the above equation, we put \( R = 1, 2, 3, 4 \) and 5 etc., we get the estimated populations of cities ranking 1st, 2nd, 3rd, 4th and 5th etc., according to the rank-size rule. The actual population of a city is rarely exactly equal to the estimated population but may be close to it, as no city system fits completely into a rank-size rule. The population of four Census years of Haryana State viz., 1961, 1971, 1981 and 1991 are estimated according to the fitted rank-size relationship given in above equation.

Keeping in view the rank-size scale, we have calculated the population for small and medium towns of Haryana and seen that the actual population of the town is different from expected calculated figures. The discrepancy between the calculated figures and the actual population represents the degree of deviation from the rank-size rule \{Appendix II (a), II (b), II (c) and II (d)\}. As shown in these Appendix, in 1961, the top four (Rohtak, Ambala, Karnal and Panipat) and 43rd to 60th towns have positive percentage difference, while from 5th town to 42nd towns have negative percentage difference \{see Appendix II (a)\}. Similarly in 1971, first four (Karnal, Hisar, Panipat and Faridabad) and 39th to 63rd towns have positive percentage difference, while from 5th to 38th towns have negative percentage difference \{see Appendix II (b)\}. Again in 1981, first four (Sirsa, Kaithal, Jind and Rewari) and 46th to 66th towns have positive percentage difference, while from 5th to 45th towns have negative percentage difference \{see Appendix II (c)\}. In 1991, first four (Jind, Thanesar, Rewari, Kaithal) and 57th to 78th towns have positive percentage difference, while from 5th to 56th towns have negative percentage difference \{see Appendix II (d)\}. This trend gives the impression that the towns, which were in the middle or shown negative percentage difference (i.e. actual population greater than estimated population) are developing fast due to Government policies or suitable environment or nearness to big town or city or the location of the town on important transport routes. Even though except some towns, all others have shown very low difference, which shows that the rank-size application does not exist.

Thus if on a log graph paper, the population \( (P_r) \) of towns of an area are plotted on Y-axis and their ranks \( (R) \) plotted on X-axis, we will get a scatter diagram
which closely form a straight line having a negative slope. If the actual and estimated populations are plotted on the log paper some towns or cities have both the points so close to one another that they seem to merge into one, though as mentioned earlier, complete equality between the two points is a rarity. The diagrams are given in Figs. 2.X (a), 2.X (b), 2.X (c) and 2.X (d).

2.7.1 Regional Analysis of Rank-Size Relationship: - In eastern plain, the log graph between actual and estimated population clearly indicates that Rank-Size rule does not apply. The following analysis also reveals that majority of towns have shown negative percentage difference, which means that all the towns are larger than their estimated size. It is also observed that the towns showing negative percentage difference indicate more population than as estimated and vice-versa. One more interesting fact came to light that the larger towns are showing lower actual size than the expected size.

2.7.1.1 Rank-Size Relationship in Eastern Plain - In eastern plain, in 1991, the towns of Jind, Thanesar, Gohana, Pehowa etc. have shown lower population growth than the estimated, while the towns (Kaithal, Panchkula Urban Estate, Bahadurgarh etc.) have shown higher population growth than the estimated population {Appendix III (b) and Fig. 2.XI (a)}.

Medium and Small towns in Eastern Haryana Plain

Medium Towns: In 1991, in Class II, except the town of Jind all other towns (Thanesar, Kaithal, Panchkula U.E., Bahadurgarh) have shown higher population growth than the estimated population. While in Class III towns except Narwana, Shahbad, Kalka all other towns (Gohana, Pehowa, Gharaunda, Jhajjar, Cheeka, Ganaur, Safidon) have shown lower population growth than the estimated one {Appendix III (d) and Fig. 2.XI (b)}.

Small Towns: In Class IV towns except Ladwa, Samalkha, Assandh, Taraori all other towns (Pundri, Maham, Kalanaur, Beri, Nilokheri, Naraingarh, Kharkhod, Kalayat, Babiyal, Sadaura, Julana, Indri, Siwani, Radaur, Uchana) have shown higher population than the estimated population. While all the towns in Class V (Pinjore (Rural), Buria, Kheri Sampla, Chhachhrauli, Mustafabad, Bilaspur, Farakhpur,
TOWNS OF HARYANA
RANK-SIZE RELATIONSHIP, 1961

Fig. 2.X(a)

TOWNS OF HARYANA
RANK-SIZE RELATIONSHIP, 1971

Fig. 2.X(b)
TOWNS OF HARYANA
RANK-SIZE RELATIONSHIP, 1981

RANK

- ESTI. POPULATION
- ACTUAL POPULATION

Fig. 2.X(c)

TOWNS OF HARYANA
RANK-SIZE RELATIONSHIP, 1991

RANK

- ESTI. POPULATION
- ACTUAL POPULATION

Fig. 2.X(d)
TOWNS OF EASTERN HARYANA PLAIN
RANK-SIZE RELATIONSHIP, 1991

Fig. 2.XI(a)

MEDIUM TOWNS OF EASTERN HARYANA PLAIN
RANK-SIZE RELATIONSHIP, 1991

Fig. 2.XI(b)
H.M.T. Pinjore) and Class VI (Uncha Siwana) have lower population than the estimated \{Appendix III (d) and Fig 2.XI (c)}.

2.7.1.2 Rank-Size Relationship in Western Plain - Similarly in Western Haryana Plain, in 1991, the towns of Hansi, Fatehabad, Loharu, Uklanamandi, Tosham, Jakhalmandi have lower population than the estimated population, while the towns of Mandi Dabwali, Charkhi Dadri, Barwala, Ellenabad, Kalianwali, Mahendragarh, Ratia, Narnaund have shown higher population than the estimated population \{Appendix IV (b) and Fig 2.XII (a)}.

Small and Medium Towns in Western Haryana Plain: 1991

Medium Towns: In 1991, in Class II the only town of Hansi has shown positive percentage difference. Class III town except Barwala and Ellenabad, all other towns (Fatehabad, Mandi Dabwali, Charkhi Dadri) have shown negative percentage difference (higher population than the estimated population) \{Appendix IV (d) and Fig 2.XII (b)}.

Small Towns: In Class IV, except Kalianwali all other towns (Ratia, Narnaund) have shown negative percentage difference. But in Class V except Loharu and Jakhalmandi, other two towns (Uklanamandi and Tosham) have shown negative percentage difference \{Appendix IV (d) and Fig. 2.XII (c)}.

2.7.1.3 Rank-Size Relationship in Southern Plain - In Southern Haryana Plain also, in 1991, the towns of Rewari, Hodal Mahendragarh, Sohna, Haileymandi, Taoru Bawal, Punahana and Ateli have shown positive percentage difference, While the towns of Palwal, Narnaund, Ferozepur Jhirka, Pataudi and Dharuhera, Kanina, Farrukhnagar, Hathin, Nuh, Hassanpur, Dundahera) have shown negative percentage \{Appendix V (b) and Fig. 2.XIII (a)}.

Small and Medium Towns in Southern Haryana Plain

Medium Towns: In 1991, in Class II except Rewari all other towns (Palwal, Narnaund) have shown negative percentage difference. In Class III the only town of Hodal has shown positive percentage difference \{Appendix V (d) and Fig. 2.XIII (b)}.
SMALL TOWNS OF EASTERN HARYANA PLAIN
RANK-SIZE RELATIONSHIP, 1991

Fig. 2.XI(c)

TOWNS OF WESTERN HARYANA PLAIN
RANK-SIZE RELATIONSHIP, 1991

Fig. 2.XII(a)
MEDIUM TOWNS OF WESTERN HARYANA PLAIN
RANK-SIZE RELATIONSHIP, 1991

RANK

ESTI. POPULATION
----- ACTUAL POPULATION

Fig. 2.XII(b)

SMALL TOWNS OF WESTERN HARYANA PLAIN
RANK-SIZE RELATIONSHIP, 1991

RANK

ESTI. POPULATION
----- ACTUAL POPULATION

Fig. 2.XII(c)
TOWNS OF SOUTHERN HARYANA PLAIN
RANK-SIZE RELATIONSHIP, 1991

Fig. 2.XIII(a)

MEDIUM TOWNS OF SOUTHERN HARYANA PLAIN
RANK-SIZE RELATIONSHIP, 1991

Fig. 2.XIII(b)
Small Towns: In Class IV, except the towns of Mahendragarh, Sohna, Haileymandi all other towns (Taoru, Ferozepur Jhirka, Pataudi, Dharuhera) have shown negative percentage difference. But in Class V all the towns (Bawal, Punahana, Kanina, Farrukhnagar, Hathin, Nuh, Hassanpur, Dundahera) have shown negative percentage difference. In Class VI only town of Areli has shown positive percentage difference {Appendix V (d) and Fig. 2.XIII (c)}.

In the above mentioned analysis of Haryana Plains, the following observations are made in the expected and actual population size in 1991. In eastern plain, in medium towns seven out of fifteen towns have shown negative percentage difference, while eight have shown positive percentage difference. In small towns, fifteen out of twenty-eight towns have shown negative percentage difference, and thirteen other towns have shown positive percentage difference. In western plain, in medium towns three out of six towns have shown negative percentage difference, while three other have shown positive percentage difference. While in small towns four out of seven towns have shown negative percentage difference, and three other towns have shown positive percentage difference. In southern plain, in medium towns two out of four towns have shown negative percentage difference, while two other have shown positive percentage difference. While in small towns, twelve out of sixteen towns have shown negative percentage difference, and four other towns have shown positive percentage difference. This shows that most of the towns have more actual population than the expected population and hence rank-size doesn’t exist.

2.8 Nearest Neighbour Analysis: - The evolution of the settlement pattern of any area is governed by a number of forces, which vary from one region to another, and hence we get varying patterns in the spatial distribution of settlements. The conventional visual judgement of the settlement patterns as sparse, dispersed, agglomerated has been replaced by more scientific judgements of their characterisation with the help of nearest neighbour index. King and Dacey have done much of the pioneering works of this kind in geography.

Nearest neighbour analysis helps in distinguishing three kinds of basic distribution of points (settlements on an area) namely (i) uniform, (ii) random, and
SMALL TOWNS OF SOUTHERN HARYANA PLAIN
RANK-SIZE RELATIONSHIP, 1991

![Graph showing rank-size relationship with estimated and actual population data]

Fig. 2.XIII(c)
(iii) clustered. The problem of the nearest neighbour analysis is that of finding a single index for any given pattern, running on a continuous scale, i.e., from one extreme when all the points are clustered to the other extreme, a situation in which all the points are distributed uniformly.

The nearest neighbour technique was originally devised by Plant Ecologists Clark and Evans\(^{130}\), who applied the formula to an analysis of the species of plant communities. Later M.F. Dacey\(^{131}\) followed this approach and tested it in geographical context. It measures the deviation of any spatial pattern of the distribution from randomness. Assuming the distribution of points as random and the probability distribution of the distance between points and their first nearest neighbour as normal the expected mean nearest neighbour distance \(D_r\) between the points in a given area. This method has been used to study spatial distribution of settlements in the region, which denotes the ratio of actual mean of the nearest settlement distance to the expected distance. The nearest neighbour technique has been applied to analyse the (a) distribution of settlements, (b) classwise distribution of settlements and (c) all the settlements.

**Methodology** - First of all the distance between settlements was taken in centimetres. Then these distances were converted into kilometres and all these distances were added and divided by the total number of settlements taken, here it is. For this following formula has been used

\[
As \, R = \frac{\overline{ra}}{\overline{re}}
\]

Where \(\overline{ra}\) = Mean of observed distance in a given area

\[
\overline{re} = \frac{1}{2\sqrt{P}}
\]

Where \(P = \frac{N}{A}\)


\(^{130}\)Ibid.

When $\bar{e}$ is the mean of expected distance in a given area.

$P$ = is density of settlements  
$N$ = is number of settlements, and  
$A$ = is the area of the region.

The ratio of observed mean distance $\bar{e}$ is known as nearest neighbour statistics (R). The R value range from 0.0 (completely clustered), through 1.0 (random) to 2.149 (uniform).

The nearest neighbour values have been calculated for all small and medium towns of Haryana for the years 1961, 1971, 1981 and 1991 in Appendix VI (a), VI (b), VI (c) and VI (d) and Haryana Plains (Eastern, Western and Southern) in Appendix VII (a), VII (b), VIII (a), VIII (b), IX (a) and IX (b).

Table 2.10 (a)  
Nearest Neighbour Analysis of Towns of Haryana (1961-1991)

<table>
<thead>
<tr>
<th>Years</th>
<th>$\bar{e} = 1/2\sqrt{P}$</th>
<th>$\bar{r}a$</th>
<th>$R = \bar{e}/ \bar{r}a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>13.93</td>
<td>20.18</td>
<td>1.45</td>
</tr>
<tr>
<td>1971</td>
<td>13.80</td>
<td>19.05</td>
<td>1.38</td>
</tr>
<tr>
<td>1981</td>
<td>12.94</td>
<td>16.17</td>
<td>1.25</td>
</tr>
<tr>
<td>1991</td>
<td>11.90</td>
<td>15.97</td>
<td>1.34</td>
</tr>
</tbody>
</table>

Source: Calculated from Census of India.

As Table 2.10 (a) reveals that the value of nearest neighbour statistics (R) in all the Census years (1961-1991) lies between 1.0 (random) to 2.149 (uniform). The towns of the Haryana in 1961 were between random and uniform. But in the succeeding Census years, the values were more towards random except in 1991. This shows that as the number of towns increases the value of R shifts from uniform to random and then towards clustered (Figs. 2.XIV (a), 2.XIV (b), 2.XIV (c) and 2.XIV (d)).

In 1961, in all the plain, the values were more towards the uniform pattern than towards random distribution. As in western plain, the value of R is 1.68, while in southern and eastern plains the values are 1.58 and 1.52 respectively (Table 2.10 (b)).
HARYANA
Nearest Neighbour Analysis of Small and Medium Towns
1961

Fig. 2.XIV(a)

HIMACHAL PRADESH

Nearest Neighbour Analysis of Small and Medium Towns
1971

Fig. 2.XIV(b)
HARYANA
Nearest Neighbour Analysis
of Small and Medium Towns
1981

HARYANA
Nearest Neighbour Analysis
of Small and Medium Towns
1991

Fig. 2.XIV(c)

Fig. 2.XIV(d)
**Table 2.10 (b)**


<table>
<thead>
<tr>
<th>Years</th>
<th>Eastern Plain</th>
<th>Western Plain</th>
<th>Southern Plain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$r_e = \sqrt{1/p}$</td>
<td>$r_a$</td>
<td>$R = r_e / r_a$</td>
</tr>
<tr>
<td>1961</td>
<td>13.26</td>
<td>20.17</td>
<td>1.52</td>
</tr>
<tr>
<td>1971</td>
<td>12.82</td>
<td>18.38</td>
<td>1.43</td>
</tr>
<tr>
<td>1991</td>
<td>10.89</td>
<td>13.86</td>
<td>1.27</td>
</tr>
</tbody>
</table>

Source: Calculated from Census of India, data

In 1971, in western plain the nearest neighbour value (1.34) is more towards random followed by southern (1.40) and eastern plain (1.43). While in 1981, eastern plain (1.2) is more towards random followed by southern (1.40) and western plain (1.42). Same trend can be seen in 1991 (Table 2.10 (b)). Hence all the values of $R$ lie between 1.25 and 1.68 i.e. the distribution is more towards random in all the three plains. From 1961 to 1981, gradual decline has been observed. But in 1991, it has shown gradual increase in the values of towns in eastern plain. But in western plain, in 1971, it decreases while in 1981 and 1991, values increased gradually. In southern plain, in 1971, after decreasing from 1.58 (1961) to 1.40, it recorded the same value i.e. 1.40 (1981), but in 1991, it increased (Table 2.10 (b)) which indicates that the towns of Haryana are randomly spaced.

The case of small and medium towns of 1991, is somewhat different. In eastern plain, the value of small towns is 1.05 (close to random), while the value of medium towns is 1.44 (lies between random and uniform) (Table 2.10 (c) and Figs. 2.XV (a) and 2.XV (b)). But in the case of western plain, the value of small towns is less towards random and more towards uniform (1.68), but the value of medium towns is 2.07 (i.e. uniform) (Table 2.10 (c) and Figs. 2.XVI (a) and 2.XVI (b)). In southern plain, the value of small towns also lies between random and uniform (1.49), but the value of medium towns is 1.82 (i.e. less towards random and more towards uniform) (Table 2.10 (c) and Figs. 2.XVII (a) and 2.XVII (b)).
WESTERN HARYANA
Nearest Neighbour Analysis of Small Towns
1991

Fig. 2.XVI(a)

WESTERN HARYANA
Nearest Neighbour Analysis of Medium Towns
1991

Fig. 2.XVI(b)
SOUTHERN HARYANA
Nearest Neighbour Analysis
of Small Towns
1991

Fig. 2.XVII(a)

SOUTHERN HARYANA
Nearest Neighbour Analysis
of Medium Towns
1991

Fig. 2.XVII(b)
From the above analysis, it is clear that the nearest neighbour distance between towns of eastern plain is less in comparison to southern and western plain. This is because, in eastern plain, availability of good drinking and irrigational water from the Yamuna river and other canals, has enabled the progress in agriculture and development of new and existing towns. Well-established rail and road network, Green revolution of late 1960’s further gave impetus to the growth of mandi towns in this plain. While in southern plain, nearness to the National Capital Delhi boosted the growth of towns. But in western plain lack of sufficient water both for drinking and irrigation, good soils and good network of rails and roads, development is low.

2.9 Conclusion: - This chapter has analysed the size, growth and spatial distribution of small and medium towns of Haryana. The conclusions that emerge from the chapter are as follows. The increasingly rapid growth rate of urban population and its uneven nature has played an important role in altering the pattern of urban centres. The absolute size of the metropolitan complexes continues to rise. This also reveals the overall trend, such as, higher the size-class of urban centre, greater is the proportion of urban population. The class I towns of Haryana show a considerable increase in the percentages of population from 8.09 (1961) to 58.59 (1991). This increase is mainly due to the inclusion of eleven class I towns between 1961 and 1991. There was no class I town in Haryana before 1961. In 1961, Ambala Cantonment was the only town. The strength rose to two, with the addition of Rohtak. The maximum share of nine towns was added in 1981, raising the number of class I towns from 2 to 11. In 1991, strength rose to 12, with the addition of Sirsa town in this category.
The share of population in the medium towns (class II & III) has decreased from 65.16 per cent in 1961 to 27.01 in 1991. This is because of the increasing importance of Class I towns over the years. The number of towns has also decreased over the years. But in the small town groups, the proportion of population has decreased from 26.75 per cent in 1961 to 14.40 per cent in 1991. The number of towns has increased. In both the small and medium town group, higher the size class, higher is the growth. Therefore class IV towns are more important.

The continuous increase and marked redistribution of population is the result of two political readjustment i.e. the partition of the country in 1947 and formation of Haryana as a separate political state in November 1966. The geographical location of Metropolitan -- Delhi in the south-east and Chandigarh in the north are no less important, and had greatly been responsible for the differential growth pattern of urban population and ‘lopsided urban development’ in the state. The stability and achievement of the great Green Revolution in the late sixties permitted the intensification of economic and social infrastructure programs, the modernization of agriculture and the progressive industrialization of economy further pushed the rural population to the urban areas.

Not only has there been a redistribution of population size class, there has also been uneven growth in the three plains of Haryana, depending on their location and availability of facilities. In Eastern Haryana Plain, availability of natural resources i.e., fertile soil, water from Yamuna, Ghaggar and Tangri rivers, for irrigation purpose indirectly promoted the development of a number of mandi towns. Good transport network has further strengthened their development. Therefore, majority of the towns of Haryana is found in this plain.

In the Southern Plain of Haryana, the availability of water from Yamuna, good transport network including National Highway No. 2 and National Highway No.10 and the geographical location of Delhi Metropolitan City has greatly been responsible for urban development of towns. In 1991, out of 90 towns, 26 were located in this plain. The Western Plain consists of only 15 towns and the comparative percentage of population is slightly lesser than southern plain. This is because of sandy mounds and desert type topography of this plain.
Application of the rank-size rule brings out the fact that the actual population of the town is different from the expected population. On the graph actual and estimated populations are plotted, which show that some towns have both the points so close to one another that they seem to merge into one, but the rank-size regularity does not exist in the towns of Haryana. The rank size rule analysis shows that most of the towns have shown negative percentage difference (i.e. actual population greater than estimated population) and are developing fast due to Government policies or suitable environment or nearness to any big town or city. Except some towns all others have shown very low difference, which shows that that the rank-size application does not exist. One more interesting fact came to light that most of the bigger or important towns are showing low population size than the expected one.

The nearest neighbour distance technique shows that the distribution of small and medium towns of Haryana is more towards random and less towards evenness. It has been observed that the value of Nearest Neighbour Statistics (R) in all the Census years (1961-1991) lies between 1.0 (random) to 2.149 (uniform). The towns of the Haryana in 1961 were nearly between random and uniform. But in the succeeding Census years, the values were more towards random except in 1991. This shows that as the number of towns increases the value of R shifts from uniforms to random and then finally completely clustered.

If this technique is applied for the plains, it is seen that the values in 1961 were more towards uniform than towards random, as in western plain, the value of R was 1.68, while in southern and eastern plains the values are 1.58 and 1.52 respectively. But in 1971, in western plain the nearest neighbour value (1.34) was more towards random followed by southern (1.40) and eastern plain (1.43). While in 1981, eastern plain (1.2) was more towards random followed by southern (1.40) and western plain (1.42). Same trend can be seen in 1991, which indicates that the towns are randomly spaced.

The case of small and medium towns of 1991 is somewhat different. In eastern plain, the value of small towns is 1.05 (close to random), while the value of medium towns is 1.44 (between random and uniform). But in the case of western plain, the value of small towns more towards uniform (1.68), but the value of medium towns is 2.07 (i.e. uniform). In southern plain, the value of small towns also lies
between random and uniform (1.49), but the value of medium towns is 1.82 (i.e. less towards random and more towards uniform).

From the above mentioned analysis, it is clear that the nearest neighbour distance between towns of eastern plain is less in comparison to southern and western plain. This is because, in eastern plain, availability of drinking and irrigational water from the Yamuna river and other canals, the progress in agriculture production has led to the development of new and existing towns. Well-established rail and road network, Green revolution of late 1960’s further gave impetus to the growth of mandi towns in this plain. While in southern plain, nearness to the National Capital Delhi boosted the growth of towns. But in western plain, lack of sufficient water both for drinking and irrigation, good soils and good network of rails and roads, development is slow.