CHAPTER 6
SPATIAL PATTERNS AND STRUCTURE

The spatial structure of a city can be defined in terms of the functions performed by it, the characteristics of its resident population and the form given to it by its physical structures. It, therefore, comprises a set of entities, functions, people, infrastructure and landuse, all of which are both interdependent and interactive among themselves and the environment (1).

The study of the spatial structure of cities has been a major concern in urban geographical studies. A number of theories, models and techniques have been formulated to describe and explain it. The three most widely recognized theories of urban spatial structure are Concentric Zone, Sector and Multiple Nuclei Theories. The Concentric Zone Theory was first conceptualized by Friedrich Engels in the mid-eighteenth century, when he noted the residential segregation of the population of Manchester city on the basis of class (2). This theory was, however, formally developed by Burgess, a sociologist at the University of Chicago in 1925 (3). According to Burgess, the growth of any town occurs by way of a radial expansion from the centre, so as to form a series of concentric zones or circles. He observed and described five such zones in Chicago. These were (i) the Central Business District (ii) the Zone of Transition and Social Deterioration (iii) the houses of factory workers (iv) the Residential Zone of High Class apartment buildings or single family dwellings and (v) the Commuter's Zone, which extended beyond the city limits and consisted of suburban areas. Burgess used the ecological processes of invasion and succession to explain the emergence of these successive zones. He further demonstrated that many social phenomena were spatially distributed in a series of gradients away from the centre for example, the incidence of poverty, ethnicity and delinquency tends to decrease outwards from the City Centre (4). The Sector Theory was developed by Hoyt in 1939 (5). He used spatial variations in the rent patterns of 142 American cities to conclude that the form of the city did not comprise of concentric circles but sectors. The sectoral pattern of city growth was partly explained by the filtering process. This theory emphasized the direction of city growth, in this case, towards the high rental residential sectors. In 1945, Harris and Ullman proposed the
Multiple Nuclei Theory, suggesting that cities tend to grow around several distinct nuclei (6). The development of separate nuclei, and therefore, differentiated zones, reflects a combination of four factors (i) specialized requirements (ii) concentration and cohesion (iii) economy and (iv) the detrimental nature of unlike functions (7).

Following these theories, Mann and Robson proposed models that were essentially a combination of the Concentric Zone and Sector theories. While Mann's model took into consideration such factors as the age of houses and direction of prevailing winds, Robson added the elements of socio-economy, age structure and housing environment (8). Expectedly, most cities exhibit a combination of these theories, since the spatial patterns of urban structure are so complex and intricate that they remain unexplained by anyone of these theories alone. The search for empirical validity for understanding the structure of cities led to the formulation of the Social Area Analysis and Factorial Ecology techniques in the mid-1950s. The former, proposed by Shevky, Williams and Bell, was developed as a theory of social differentiation. Its widespread application has been facilitated by its ability to classify urban areas in cities using the three constructs of Social Rank, Urbanization and Segregation. Measurable indices for each of these constructs makes the classification of social areas in cities possible (9). Factorial Ecology provided an improvement over the Social Area Analysis technique. It employs factor analysis to identify the underlying structural dimensions from a set of selected socio-economic characteristics.

These theories and techniques were essentially developed in the context of the Western world to understand the characteristics of urban growth in western cities. It was soon realized that these could not have universal validity, owing to the differences in socio-economic organization, culture, technology and historical backgrounds of western and non-western urban areas. Sjoberg (1960) generalized the structure of non-western cities as 'Centre-Rich and Periphery-Poor' with a single centre (10). This characteristic found expression in the Inverse Concentric Zone Model which stated that in non-western cities, social class is inversely related to distance from the City Centre (11). Important interpretations of the internal structure of non-western cities include those by Whiteford (1960), Gulick (1967), Abu-Lughod (1969), McGee (1969), Griffin and Ford (1980), Howell (1989), and Ford (1996) (12).
CHANDIGARH CITY
Location of Annules
1971

Fig. 58
CHANDIGARH CITY
Location of Annules
1981

Fig. 59
CHANDIGARH CITY
Location of Annules
1991
The spatial structure of Indian cities has been the focus of a number of studies. Smailes, in his landmark study of Indian cities, identified the indigenous and the anglicized sections of the Indian city (13). Ashok Dutt proposed two models for Indian cities, the Colonial and the Bazaar-based city models, reiterating the dual structure of most Indian cities (14). Studies on Indian cities have also been conducted within the framework of Factorial Ecology. These have emphasized the effect of both traditional attributes as caste and more contemporary attributes like industrialization and modernization (15). The studies are unanimous on the effect exerted by the City Centre, in terms of dominance and distance, and reflected in the characteristic congested and densely populated city centres, associated with the traditional requirements of proximity, prestige and protection available near the core. The requirement of protection or defence may have diminished over time, but prestige and proximity continue to be strong centrifugal forces.

In the context of such traditional structure and factors, Chandigarh represents a contemporary urban structure which lacks the element of historicity. The internal structure of Chandigarh, like that of other cities, is a product of the physical structure and socio-economic characteristics of population. However, in the case of Chandigarh, the structure has also been mediated through a meticulous plan framework. The latter attribute, thus, places Chandigarh in a separate class. In a study of the spatial patterns and structure of the city, the basic focus has to be on two aspects (i) patterns that have emerged, and (ii) given the planned framework, the difference between the patterns found in Chandigarh and those in evolved towns. Equally necessary is to understand the underlying processes and the nature of the operating mechanisms that distinguish different parts of the city from each other. Specifically, the attempt in this chapter is to (i) describe the socio-economic structure of different parts of the city with reference to the core, in order to understand the role of distance from the central parts of the city in shaping spatial patterns, (ii) the changes in the spatial patterns with the growth and development of the city, and (iii) the effect of the plan framework on these patterns.

**Methodology**

Starting from the City Centre located in Sector 17, five successive annules have been identified in the city for each of the four census years (Figs.57-60) (16). The first
annule, representing the central parts of the city, comprises of Sectors contiguous to Sector 17 on all sides. These are Sectors 8,9,10,16,18,21,22 and 23. The second annule comprises of Sectors contiguous to those included in the first annule. These are Sectors 2,3,4,5,6,7, 11, 15,19, 20, 24, 33, 34, 35, 36 and 37. On the same principle, the third annule comprises of Sectors 1,12,14,25,26,27,30,32,38,40,41,42,43,44,45 and 46. The fourth annule includes Sectors 28,29,31,39 and 47, and the fifth annule comprises of the functionally segregated Industrial Area. Since different Sectors in the city, belonging to Phase I and Phase II of the city plan, emerged at different points in time, therefore, depending on the development status of the Sectors, the number of Sectors constituting individual annules varies during different census years. Thus, the development of new Sectors with the same locational attribute as the already developed ones, would result in an expansion in the area of the annule, and growth in population and other attributes.

Graphs have been drawn to visualize the changes in the characteristics of different annules, and therefore, in the spatial structure of the city with reference to location and distance from the central parts of the city (Figs.61-64).

The chapter begins with a discussion of the generalities of city structure as identified from the graphs. This is followed by a detailed discussion of the demographic, socio-economic and morphological characteristics of each annule and the changes therein from 1961 to 1991. In addition, the characteristics of Peripheral Areas, comprising slums and labour colonies, and Urban Outgrowths have also been described.

GENERALITIES

The annulewise distribution of population and other socio-economic attributes in Chandigarh in 1961 reflects the early stage in the development of the city, the almost singular influence of housing and infrastructure that had been developed for the government employees, and the large scale construction activity associated with the settlement of the city. Broadly, the distribution of population and socio-economic attributes conformed to the fairly well established relationship of a decline in the levels of concentration and proportions with increasing distance from the City Centre. The exception to this general pattern were the peripheral areas and those areas dominated
**TABLE 30: CHANDIGARH CITY: ANNUALWISE PHYSICAL, SOCIAL AND ECONOMIC ATTRIBUTES**

<table>
<thead>
<tr>
<th>Annule</th>
<th>Year</th>
<th>Constituent Sectors</th>
<th>Target Population</th>
<th>Area (sq. kms)</th>
<th>Total Population</th>
<th>Density (person per sq. km.)</th>
<th>*Sex Ratio</th>
<th>Literacy</th>
<th>Workforce</th>
<th>Scheduled Castes Population</th>
<th>Census Occ. Houses</th>
<th>No. of Households</th>
<th>Size of Households</th>
</tr>
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<td>8,9128.13</td>
<td>31,389</td>
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<td>3523</td>
<td>687</td>
<td>21,538</td>
<td>11,294</td>
<td>731</td>
<td>6933</td>
<td>7006</td>
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<tr>
<td></td>
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<td>82,900</td>
<td>8.9119.09</td>
<td>73,223</td>
<td>33.49</td>
<td>(133.27)</td>
<td>8218</td>
<td>792</td>
<td>55,050</td>
<td>23,697</td>
<td>1,883</td>
<td>16,480</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8218</td>
<td>792</td>
<td>(105)</td>
<td>23,697</td>
<td>(109.67)</td>
<td>1,883</td>
<td>16,480</td>
<td>16,623</td>
<td>137.27</td>
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<tr>
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<td>8218</td>
<td>792</td>
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<td>23,697</td>
<td>(109.67)</td>
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<td>16,480</td>
<td>16,623</td>
<td>137.27</td>
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<td>8.9115.23</td>
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<td>24.30</td>
<td>(26.05)</td>
<td>10,359</td>
<td>798</td>
<td>71,862</td>
<td>32,865</td>
<td>3,012</td>
<td>19,277</td>
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<td>32,865</td>
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<td>1991</td>
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<td>8.9112.80</td>
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<td>(-14.30)</td>
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<td>8,876</td>
<td>827</td>
<td>(29)</td>
<td>8,876</td>
<td>(29)</td>
<td>63,355</td>
<td>28,073</td>
<td>2,973</td>
<td>16,563</td>
</tr>
<tr>
<td>II</td>
<td>1961</td>
<td>2,3,4,5,6,7,11,15,19,20,24</td>
<td>81,000</td>
<td>7.9325.03</td>
<td>29,256</td>
<td>32.75</td>
<td>3689</td>
<td>635</td>
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<td>5,372</td>
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<td>49,075</td>
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<td>762</td>
<td>(127)</td>
<td>5,372</td>
<td>(127)</td>
<td>49,075</td>
<td>23,766</td>
<td>7,974</td>
<td>17,028</td>
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<td>1981</td>
<td>As above</td>
<td>158,400</td>
<td>13.4022.90</td>
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<td>33.00</td>
<td>(74.12)</td>
<td>9,354</td>
<td>824</td>
<td>95,668</td>
<td>42,095</td>
<td>28,007</td>
<td>28,356</td>
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<td></td>
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<td>9,354</td>
<td>824</td>
<td>(62)</td>
<td>9,354</td>
<td>(62)</td>
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<td>42,095</td>
<td>28,007</td>
<td>28,356</td>
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<tr>
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<td>158,400</td>
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Note: 1. Figures in italics indicate proportion.  
2. Figures in parentheses indicate rate of growth.  
*Sex ratio refers to females per 1000 males.
<table>
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<th>Year</th>
<th>Constituent Sectors</th>
<th>Target Population</th>
<th>Area (sq. kms.)</th>
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<th>Density (person per sq. km.)</th>
<th>*Sex Ratio</th>
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<th>Workforce</th>
<th>Scheduled Caste Population</th>
<th>Census Occ. Houses</th>
<th>No. of Households</th>
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</thead>
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<td>1,12,14,26, 27,30</td>
<td>49,300</td>
<td>11.86</td>
<td>19,764</td>
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<td>549</td>
<td>11,369</td>
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<tr>
<td>1971</td>
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<td>84,300</td>
<td>14.00</td>
<td>37,766 (91.08)</td>
<td>17.26</td>
<td>2698</td>
<td>689</td>
<td>24,297</td>
<td>64.34 (113.73)</td>
<td>12,324</td>
<td>32.63</td>
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<tr>
<td>1981</td>
<td>As above plus 40,41,42,43, 44,45,46</td>
<td>181,800</td>
<td>22.68</td>
<td>90,927 (140.76)</td>
<td>23.95</td>
<td>4009</td>
<td>697</td>
<td>33,239</td>
<td>36.56 (169.71)</td>
<td>17,657</td>
<td>19.42</td>
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<td>181,800</td>
<td>21.05</td>
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<td>27.40 (98.52)</td>
<td>6,646</td>
<td>848</td>
<td>46,391</td>
<td>39.57 (18.45)</td>
<td>20,914</td>
<td>14.95</td>
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<td>1961</td>
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<td>2.33</td>
<td>214</td>
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<td>154</td>
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<td>Above plus 31,47</td>
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<td>16,311 (7521.96)</td>
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<td>9514</td>
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<td>32.34</td>
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<tr>
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<td>5.55</td>
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<td>7116</td>
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<td>50,655 (28.27)</td>
<td>9.92</td>
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<td>853</td>
<td>37,103</td>
<td>73.24 (44.17)</td>
<td>15,660</td>
<td>31.0</td>
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Note: 1. Figures in italics indicate proportion.
2. Figures in parentheses indicate rate of growth
*Sex ratio refers to females per 1000 males.

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<th>Annexe</th>
<th>Year</th>
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<th>Area (sq. kms)</th>
<th>Total Population</th>
<th>Density (person per sq. km)</th>
<th>*Sex Ratio</th>
<th>Literacy</th>
<th>Workforce</th>
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<th>Census Occ. Houses</th>
<th>No. of Households</th>
<th>Size of Households</th>
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<td>283.5</td>
<td>310</td>
<td>252</td>
<td>650</td>
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<td>271</td>
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<tr>
<td>1971</td>
<td>Above plus Industrial Area Ph-II</td>
<td>6.17</td>
<td>1406</td>
<td>0.65</td>
<td>227</td>
<td>444</td>
<td>825</td>
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<td>4,976</td>
<td>4,527</td>
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<td>646</td>
<td>6,987</td>
<td>7408</td>
<td>129,21</td>
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<td>Peripherals</td>
<td>1961</td>
<td>Temporary hutments</td>
<td>6684</td>
<td>7.48</td>
<td>-</td>
<td>661</td>
<td>1534</td>
<td>3227</td>
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<td>1690</td>
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<td>1.47</td>
<td>17,530</td>
<td>8.02</td>
<td>11,925</td>
<td>674</td>
<td>5,931</td>
<td>6,897</td>
<td>4,590</td>
<td>4,378</td>
<td>4,443</td>
<td>3.94</td>
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<td>1981</td>
<td>Ram Darbar, Korsan, Dadu Majra</td>
<td>0.56</td>
<td>13,792</td>
<td>3.63</td>
<td>24,629</td>
<td>778</td>
<td>4,704</td>
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<td>Outgrowths</td>
<td>1981</td>
<td>Buterla, Badheri</td>
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<td>5871</td>
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<td>53,373</td>
<td>714</td>
<td>2931</td>
<td>2033</td>
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<td>691</td>
<td>4016</td>
<td>2273</td>
<td>973</td>
<td>1637</td>
<td>1637</td>
<td>3.95</td>
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Note: 1. Figures in italics indicate proportion.
2. Figures in parentheses indicate rate of growth.
*Sex ratio refers to females per 1000 males.
CHANDIGARH CITY
Annular Structure
1961

Note: Height of bar is equal to 100 per cent value for Literacy, Workforce, and Scheduled Castes Population, and 1000 males for Sex Ratio. Density refers to persons per hectare.

Fig. 61
by secondary or tertiary functions, for example, industrial/wholesale commercial/ bulk transport areas.

In 1961, the central Sectors comprising the first annule, or what may be termed as the core, had the highest proportion of city population (35.15 per cent), closely followed by the second annule (32.75 per cent) formed by Sectors located around the central annule. Thus, about 68 per cent of the city population lived within a radius of roughly one and a half to two kms from the City Centre (Fig.61 and Table 30). An additional 22 per cent lived in the third annule, formed by Sectors having a peripheral location with reference to the central Sectors. Together these three annules accounted for 90 per cent of the city population. The fourth annule, housing the industrial workers, and the fifth annule, comprising the Industrial Area, accounted for only 0.25 and 1.04 per cent of the city population respectively. Both these annules were special function areas in a sense, and covered only a small proportion of the total area of the city as compared to other annules. However, the peripheral areas of the city had a much higher proportion of city population (7.48 per cent) as compared to the Industrial Area and the housing associated with it. Thus, if the fourth and fifth annules are considered specific cases, the annular structure of population in Chandigarh in 1961 followed an inverse relationship with increasing distance from the central Sectors, that is, a decline in the proportion of city population from 35.15 per cent in the central Sectors to 7.48 per cent in the peripheral areas. This inverse relationship could also be observed in the distribution of other characteristics of population in the city in 1961. The density of population declined from 3523 persons per sq. km. in the first annule to 91.8 persons per sq. km. in the fourth annule housing the industrial workers (Fig.61). The Industrial Area, however, had a higher density of 283.5 persons per sq. km. Similarly, the sex ratio declined from 687 in the first annule to 217 females per 1000 males in the fourth annule. It increased in the fifth annule and peripheral areas to 310 and 661 females per 1000 males respectively. The proportion of literates declined from 68.61 per cent in the first annule to 18.69 per cent in the fourth annule. However, it increased to 27 per cent in the fifth annule formed by the Industrial Area, only to decline to 22.95 per cent in the peripheral areas which included slums and temporary huts.
Note: Height of bar is equal to 100 per cent value for Literacy, Workforce, and Scheduled Castes Population, and 1000 males for Sex Ratio. Density refers to persons per hectare.
Note: Height of bar is equal to 100 per cent value for Literacy, Workforce, and Scheduled Castes Population, and 1000 males for Sex Ratio. Density refers to persons per hectare.

Fig. 63
In comparison to these attributes, the distribution of workers and Scheduled Castes population showed a positive relationship with distance from the City Centre (Fig.61). In 1961, the proportion of workers in the first annule was 36 per cent and was only marginally higher in the second annule (36.53 per cent). It was 40.52 per cent in the third annule. It increased to 71.96 and 69.89 per cent in the fourth and fifth annules, housing the industrial workers and the Industrial Area respectively. In the peripheral areas it was 48.27 per cent (Table 30). The distribution of Scheduled Castes population also generally followed a similar pattern, that is, of higher proportions with increasing distance from the central Sectors. In general, irrespective of the inverse or positive relationship with increasing distance from the City Centre, a marked change in the distribution pattern occurred after the third annule. In 1991, in fact, this annule was to emerge as the largest in the city, housing the highest proportion of city population.

The development of nine new Sectors in the Second Phase of the city plan added an element of dynamism to the city structure in 1971. Generally, the distribution pattern of population, density of population, sex ratio and literacy remained inversely correlated to distance from the City Centre (Fig.62). A more even distribution of workers emerged among the various annules in the city. The proportion of workers was 32.36, 33.01, 32.63 and 32.34 per cent in the first, second, third and fourth annules respectively. It increased to 54.76 per cent in the Industrial Area forming the fifth annule, only to decline again to 39.34 per cent in the peripheral areas (Table 30). The proportion of Scheduled Castes population increased upto the third annule to decline in the fourth and fifth annules, only to increase and be the highest in the peripheral areas (Fig.62).

By 1981, the number of Phase II Sectors in the city had increased to seventeen, nine of these had been enumerated for the first time in 1971 and an additional eight in 1981. In addition to the development of these Sectors, there had been infilling, considerable in many cases, in the Phase I Sectors. The first annule, formed by the central Sectors, was no longer the area of highest proportion of city population. It was replaced by the second annule (33 per cent). In fact, the proportion of city population living in the first and third annules was almost the same, 24.3 and 23.95 per cent respectively (Fig.63). Except for this shift, the patterns of distribution of population in the city conformed to the pattern identified earlier, that is, a decline in the proportion of
Note: Height of bar is equal to 100 per cent value for Literacy, Workforce, and Scheduled Castes Population, and 1000 males for Sex Ratio. Density refers to persons per hectare.

Fig. 64
population with increasing distance from the City Centre. The pattern of distribution of other attributes of population was also broadly similar to the one identified earlier, with the exception that the second annule now either had higher values, for example, proportion of city population and sex ratio, or values that were only marginally lower, as compared to the first annule, for example, the proportion of literates. This could be taken as an indication of (i) higher levels of growth and concentration of population in the outer Sectors, and (ii) a fair level of stability in the population of the central Sectors in which infilling could be the major process in place of new developments.

The annular structure of distribution of population in Chandigarh in 1991 is characterized by an accentuation of many of the trends that had became discernable in 1981 (Fig.64). There was a further outward shift in the area with the largest proportion of city population. The relationship with increasing distance from the central parts of the city had now emerged as positive. This was in sharp contrast to the initial pattern in 1961. The proportion of city population living in the first, second and third annules in 1991 was 15.49, 25.31 and 27.40 per cent respectively (Table 30). Interestingly, the peripheral areas had a marginally higher proportion of city population as compared to the first annule. The density of population in the first annule was no longer the highest among the various annules. The sex ratio improved, though marginally, with increasing distance from the central parts of the city, but continued to be low in the Industrial Area and the peripheries. Literacy declined with distance from the centre and was low in the Industrial Area and on the peripheries. The distribution of workforce followed a pattern similar to that of literacy, except that the fifth annule and the peripheral areas had a higher proportion of workers as compared to the inner annules. The relationship between distance from the City Centre and the proportion of Scheduled Castes population continued to be positive.

The various annules identified in the city have a fair degree of internal differentiation in terms of the time lag in the development of their constituent Sectors, the levels of population concentration, housing and infrastructure as proposed in the city plan, and advantages offered by the location of individual Sectors. A description of the inter and intra-annular patterns of distribution of population and other socio-economic attributes is given below.
SPATIAL STRUCTURE

Annule I

This annule consists of Sectors 8,9,10,16,18,21,22 and 23 which adjoin the City Centre in Sector 17 and surround it on all sides (Fig. 60). Together these Sectors constitute the central part of the city and can, therefore, be considered as forming its core. These Sectors were the earliest to be developed and settled in Chandigarh. This annule covers an area of 8.91 sq. kms. There has been no change in the area of this annule since 1961. However, its proportion in the total area in the city has declined between 1961 and 1991, from 28.13 in 1961 to 19.09 per cent in 1971, 15.23 per cent in 1981 and 12.8 per cent in 1991 (Table 30). The successive decline in the proportion of this annule’s area was due to the expansion of the city and the consequent increase in its area.

Except for Sector 17, which houses the City Centre and has highly restricted housing, this annule is mainly residential in nature. Among its constituent Sectors, numbers 8,9,18 and 21 developed mainly with private housing and Sectors 10,16,22 and 23 with private as well as public housing. The public housing in Sectors 10 and 16 was developed for higher categories of government employees, with houses on plots measuring 2 to 6 kanals (1000 to 3000 sq. yards). In comparison, public housing in Sectors 22 and 23 was developed for the lower and middle-ranked employees, with houses built on plots measuring 5 to 7.5 marlas (75 to 112.5 sq. yards). The private houses in Sectors located on both sides of the Madhya Marg, that is Sectors 8, 9 and 10 located to its north and Sectors 16 and 18 located to its south, have a predominance of large-sized plots (1 kanal or 500 sq. yards to over 5 kanals or 2500 sq. yards). In comparison, Sectors 21, 22 and 23, comprising the southern margin of this annule and located to the north of Dakshin Marg, house small-sized plots ranging between 5 to 10 marlas (75 to 150 sq. yards) for private housing.

The size of plots for housing in the private sector and the category of government employees to be housed in public housing are fair indicators of the socio-economic status of the residents of a Sector. This, in turn, reflects the marked internal heterogeneity within this annule, with higher income groups located in the northern and central Sectors and mainly middle and lower income groups in the southern Sectors.
This annule was planned for a total population of 82,900 persons. In 1961, it had a population of 31,389 persons, constituting 35.15 per cent of the total city population. This was the highest proportion of population living in any of the annules identified in the city in 1961. This was related to the early development of its constituent Sectors and the consequent concentration of population in these. These Sectors, therefore, have an element of early development, an attribute comparable to the central parts of evolved towns. Within this annule, Sector 22, which functioned as the commercial and business centre of the city during the early years of Chandigarh’s development, was the most populous Sector (11,974 persons) in the city. Sector 23, adjoining Sector 22, was the third-most populous Sector (9615 persons) in the city in 1961, the second being Sector 20 (11,006 persons). Together Sectors 22 and 23 had 68.7 per cent of the population of this annule. In 1971, the population of the annule had increased to 73,223 persons, registering a growth rate of 133.27 per cent during 1961-71. The bulk of this population was concentrated in Sectors 21,22 and 23, which together accounted for 70.5 per cent of the total population of this annule. The remaining 29.5 per cent was in Sectors 8,9,10,16 and 18. In fact, the population of Sectors 22 and 23 in 1971 exceeded their proposed populations, and that of Sector 21 was just within the planned target. As already mentioned, housing in these three Sectors was proposed mainly for middle and lower income groups. Interestingly, although the proportion of the city population residing in this annule declined from 35.15 per cent in 1961 to 33.49 per cent in 1971, it continued to be the main area of concentration of city population. The decline in the proportion of city population living in this annule was associated with the development of nine new Sectors in Phase II of the city’s development and the consequent spreading of the population, rather than a decline in absolute numbers.

In 1981, the population of this annule further increased by 19,073 and was registered to be 92,296 persons. This was significantly higher than the planned population of 82,900 persons for this annule. However, the proportion of the total city population living in this annule declined further from 33.49 per cent in 1971 to 24.3 per cent in 1981. The population growth rate of this annule also declined from 133.27 per cent during 1961-71 to 26.05 per cent during 1971-81. The steady decline in the proportion of city population living in this annule, as well as a decelerating rate of growth, and the fact that
its population was in excess of its planned population suggests an almost complete filling up of the Sectors located in this annule by 1981. Such filling up of residential Sectors can only be discerned in a planned city like Chandigarh. The bulk of the population of this annule continued to be concentrated in Sectors 21, 22 and 23. The populations of all the Sectors in this annule either exceeded (Sectors 9, 16, 21, 22, 23) or were just within (Sectors 8, 10, 18) their planned targets in 1981.

The inertia of the core, first discernable through a small absolute increase in population during 1971-81, became more marked in 1991, when the absolute population of this annule registered a decline by 13,208 persons in 1991. Though not substantial in absolute numbers, it can certainly be considered symptomatic. The population decline resulted in a negative growth rate of 14.30 per cent during 1981-91. Thus, while the population of this annule had exceeded its planned target of 82,900 persons in 1981, it declined to 79,088 persons in 1991. Also the proportion of the city population living in this annule declined further, from 24.3 per cent in 1981 to 15.49 per cent in 1991. Unlike the previous decades, this time the decline was in absolute terms also. The proportion of population living in this annule in 1991 was approximately the same as that residing in the peripheral areas of the city (Table 30). The decline in population in the core Sectors reflects the limited possibility of expansion in housing facilities. This may also have prompted a spill over and shifting to new Sectors.

The population density in the first annule has consistently been high, a characteristic feature of the central areas of Indian towns and cities. In 1961, the population density of this annule (3523 persons per sq. km.) was the second-highest among the five annules identified in the city. It was also considerably higher than the city average of 2819 persons per sq. km. This is amply reflected in the high proportion of census occupied residential houses (32.81 per cent) and number of households (32.47 per cent) registered in this annule in 1961. The average size of households in this annule (4.48 persons) was also the largest in the city in 1961. During the next two decades, an intensification of development in the constituent Sectors of this annule resulted in its emerging as the most densely populated area in Chandigarh (8218 and 10,359 persons per sq. km. in 1971 and 1981 respectively). It was also during this period that the annule emerged as an extremely congested area, with a high degree of residential crowding, a
feature commonly found in central areas of most Indian cities. The ratio between census houses and the actual number of house structures was more than 2 in all the Sectors in this annule in 1981, suggesting a high degree of apportioning and vertical development. Further, the number of persons per house was more than 10 in all the constituent Sectors of this annule. There was also a steady increase in the size of household in this annule, from 4.40 persons in 1971 to 4.64 persons in 1981, the highest in the city. However, the first signs of stagnation revealed by a small growth of population during 1971-81 were also reflected in a decline in the percentage of both the census occupied residential houses and the number of households registered in this annule. In case of the former, the decline was from 32.81 per cent in 1961 to 32.29 per cent in 1971 and 23.02 per cent in 1981, and in case of the latter, from 32.47 per cent in 1961 to 32.24 per cent in 1971 and 23.28 per cent in 1981. This decline was mainly associated with the expansion and development of housing in other parts of the city. It also suggests that the population in this annule had become fairly stabilized at the same time.

The absolute decline in population of this annule in 1991 also resulted in a decline in its population density by 1483 persons per sq. km. Thus, from being the most densely populated area in the city since 1971, it was now ranked third with a density of 8876 persons per sq. km. This decline was also reflected in a decline in the average size of household, from 4.64 persons in 1981 to 4.59 persons in 1991. The percentage of both census occupied houses (14.71 per cent) and the number of households (15.02 per cent) in this annule in 1991 were among the lowest in the city. Nevertheless, levels of residential crowding continued to be very high.

In terms of the socio-economic characteristics of its population, this annule has consistently registered a fairly high sex ratio, an extremely high literacy rate, a moderate proportion of workers and a low proportion of Scheduled Castes population. The high sex ratio in this annule may be associated with the well-developed housing infrastructure, providing a conducive family-type living environment. In fact, the sex ratio of population of this annule increased from 687 females per 1000 males in 1961 to 827 females per 1000 males in 1991. The figures for 1971 and 1981 were 792 and 798 females per 1000 males respectively. Interestingly, while there was an absolute decline in the population of this annule during 1981-91, the sex ratio in this annule improved. It
may, therefore, be assumed that the out-moving population comprised largely of males rather than females.

Since 1961 this annule has registered the highest proportion of literates among the five annules identified in the city. Further, this proportion has consistently been higher than the city average. The proportion of literates in this annule was 68.61 per cent in 1961 which increased to 80.10 per cent in 1991. The figures for 1971 and 1981 were 75.18 and 77.86 per cent respectively. In comparison, the average literacy rates for Chandigarh city have been 60.53, 66.3, 68 and 70 per cent respectively in 1961, 1971, 1981 and 1991. The rate of growth of the literate population in this annule during 1961-71 (155.59 per cent) and 1971-81 (30.54 per cent) was higher than its population growth rate (133.27 and 26.05 per cent during 1961-71 and 1971-81 respectively). Interestingly, even though there was a decline in the number of literate persons during 1981-91 by 8,507 persons, the proportion of literates increased from 77.86 per cent in 1981 to 80.10 per cent in 1991. This suggests that the overall decline in population in this annule during 1981-91 was largely restricted to the non-literate segment of its population.

The proportion of workers in this annule (36 per cent) was at its highest in 1961, even though this was the lowest proportion among the five annules identified in the city. This was associated with the early development of the Sectors and government housing in these, which promoted family type living. In 1971, although the number of workers increased from 11,294 persons in 1961 to 23,697 persons in 1971, at a growth rate of 109.67 per cent, the proportion of workers in this annule declined from 36 per cent in 1961 to 32.36 per cent in 1971. This decline was related to the continued expansion in housing facilities. In 1981, the proportion of workers in this annule increased to 35.61 per cent. However, this increase was a part of the trend at the city level rather than something specific to the Sectors of this annule. The proportion of workers was marginally lower in 1991 (35.5 per cent). This was associated with a decline in the number of workers by 14.58 per cent during 1981-91. The almost similar level of workforce in 1981 and 1991 also indicates, as suggested earlier, a stabilization of population in this annule.

The Scheduled Castes population in this annule has consistently formed only a small proportion of the annule’s population since 1961, despite an increase in its
proportion over the decades (2.32 per cent in 1961, 2.57 per cent in 1971, 3.26 per cent in 1981 and 3.76 per cent in 1991). The proportion of Scheduled Castes persons in this annule has always been the lowest among the five annules identified in the city. However, the growth rate of Scheduled Castes population in this annule has consistently been higher than the growth rates for all other attributes of population (Table 30). The high rates of growth of Scheduled Castes population in this annule are related to a small base of this population. The low proportion of this section of society in this annule conforms to the low levels of Scheduled Castes population in the central areas of Indian cities.

The functional structure of this annule and its constituent Sectors has become increasingly diversified with the development of the city. Proximity to the City Centre has prompted the development of major commercial ribbons to the north of Sector 17 in Sectors 8 and 9 along Madhya Marg, and to its south, in Sector 22 along the V3 road dividing Sectors 17 and 22, and on the V3 road dividing Sectors 21 and 22 (Fig.65). This has promoted the development of Sector 22 as a major commercial area once again. This Sector functioned as the City Centre prior to the complete development of Sector 17 in the mid-1970s. There has also been significant commercial development in Sector 22 along the V2 road dividing it from Sector 35. In addition, Sector 22 also has a rehri market, the first of its kind in the city and probably the largest one as well. In addition to functioning as Sector markets, some of the planned markets in this annule have developed into specialized markets. For example, Sector 21 (scooter repair; fish and mutton markets) and Sector 18 (wholesale hardware and electrical spares).

The limited possibility for expansion of the Capitol Complex has resulted in the construction of buildings for housing additional administrative offices in Sector 9 along the Jan Marg. These include offices of the Punjab Government, U.T. Secretariat, Police Headquarters, Chandigarh Housing Board etc. A part of the Educational Zone of the city is located in Sector 10 on the north-western margins of this annule. This Sector houses the D.A.V. college, the Home Science and Fine Arts colleges and the Women's Polytechnic. In addition, this annule has developed a fair concentration of schools, including several reputed private institutions, particularly in Sectors 8 and 9.
The largest stretch of planned green area in the city, the Leisure Valley, passes through Sectors 10, 16 and 23 located on the western margins of the annule. Within this green belt, the Fitness Trails, Sculpture Park, Rose Garden, Shanti Kunj, Traffic Park and Tennis and Cricket Stadia have been developed. Thus, apart from the mandatory green belts, these three Sectors have additional open green space which functions as a recreational facility for the entire city population and is one of the major tourist attractions in the city.

**Annule II**

The second annule comprises of Sectors 2, 3, 4, 5, 6, 7, 11, 15, 19, 20, 24, 33, 34, 35, 36 and 37 and is located contiguous to the first annule (Fig. 60). The Sectors in this annule differ from each other in terms of their planned densities, income groups, housing facilities and period of development. Their common feature is their location with reference to the central and early developed Sectors in the first annule and proximity to the City Centre.

The area covered by this annule has increased with the growth of the city and the development of new Sectors. In 1961, this annule comprised of Sectors which had developed during Phase I, and covered an area of 7.93 sq. kms forming 25.03 per cent of the total area of the city. Due to the inclusion of the Phase II Sectors, the area covered by this annule increased to 13.40 sq. kms in 1971, accounting for 28.71 per cent of the total city area (Fig. 58 and Table 30). Since 1971, the area covered by this annule has not changed, although its proportion in the total city area has declined from 28.71 per cent in 1971 to 22.9 per cent in 1981 and 19.24 per cent in 1991. The decline has been due to the expansion of the city.

Among the Sectors in the annule, Sectors 2, 3, 4 and 5 are located on the northern margins of the city and have large sized private and public plots covering more than 6 kanals (3000 sq. yards each). These Sectors were planned for a total population of 600 persons each as low density high income group areas. In addition to these, Sector 6, also located to the north of the city, developed as an institutional area with restricted housing and having the residence of the Governors of Punjab and Haryana. In comparison to these, Sectors 7, 19 and 20, located on the eastern periphery, and Sectors 11 and 15, located on the western periphery, were planned with mixed housing, private and public,
the latter mainly for middle and lower ranked employees. Sector 24, also located on the western periphery, developed with public and institutional housing. In comparison, the Phase II Sectors of this annule, numbers 33, 34, 35, 36, and 37, located on its southern margin, initially developed with private housing and later the Chandigarh Housing Board developed EWS housing in Sector 37 and HIG and MIG flats in Sectors 33 and 36.

In 1961, this annule had a population of 29,256 persons against its planned population of 81,000 persons. Its population formed 32.75 per cent of the total city population, the second highest among the five identified annules. The first annule or the core had the highest proportion (35.15 per cent) of the city population. Approximately 94 per cent of the annule’s population was concentrated in Sectors 7, 19 and 20, which formed its eastern margin, and in Sectors 11, 15 and 24, which formed the western margin. In comparison, the Sectors forming its northern margin had only 6 per cent of its population. These were the high income low density Sectors (numbers 2 to 6). To their south, are located the northern Sectors of the first annule, which also developed as low density high income Sectors. With the inclusion of five newly developed Phase II Sectors in 1971, the target population of this annule increased to 158,400 persons in 1971 (Table 30). Its total population also increased and was registered as 71,983 persons in 1971. This was approximately 50 per cent of its planned target. The population growth rate during 1961-71 (146.04 per cent) was marginally higher than the city average for the same period (144.89 per cent). Only 7.5 per cent of the annule’s population in 1971 was in the newly enumerated Phase II Sectors, and an additional 3.02 per cent in the low density northern Sectors. Thus, the bulk of the population continued to be concentrated in the earlier developed Phase I Sectors. The small base of population in the northern Sectors and the undeveloped nature of the Phase II Sectors in this annule, resulted in only a marginal increase in the proportion of city population living in this annule (from 32.75 per cent in 1961 to 32.9 per cent in 1971). However, this continued to be the second highest proportion of city population among the five annules in the city in 1971.

In 1981, this annule emerged as the most populous area in the city, recording a population of 125,340 persons. The proportion of population living in this annule increased marginally, from 32.9 per cent in 1971 to 33 per cent in 1981. However, it was considerably higher than the proportion of city population living in the core (24.3 per
cent) which, until this decade, had been the zone of highest concentration of city population. The vitality of this annule is also reflected in the fact that six of its constituent Sectors, which had developed during Phase I, exceeded their planned populations in 1981. In addition, the Phase II Sectors in the annule recorded the highest population growth rates in the city during 1971-81. However, the rate of population growth of this annule declined from 146.04 per cent during 1961-71 to 74.12 per cent during 1971-81. This was the second lowest growth rate among the five annules during this period, the lowest being in the first annule. This trend of decelerating growth rates when absolute populations are close to or in excess of the planned targets has already been identified in the decadal pattern for individual Sectors. During the following decade, 1981-91, the growth rate of population in this annule declined further, with many of its Phase I Sectors registering negative rates of growth.

In 1991, the population of this annule increased by only 3,895 persons over a period of ten years and was 129,235 persons. There was also a considerable decline in the proportion of the city population housed in this annule, from 33 per cent in 1981 to 25.31 per cent in 1991. Consequently, from being the area of highest concentration of the city population in 1981, this annule was now ranked second in 1991. Within this annule, the low density northern Sectors accounted for 2.02 per cent, the earlier developed Phase I Sectors for 62.3 per cent and the Phase II Sectors for 35.65 per cent of the total population of the annule. The comparative figures for 1971 (3.02, 89.48 and 7.5 per cent respectively) and for 1981 (2.07, 69.15 and 28.78 per cent respectively) reflect a steady decline in the proportion of population living in the Phase I Sectors and the vitality of the Phase II Sectors over the past two decades. This is also suggestive of a southward shift in the area of population concentration in this annule as well as in the city. The rate of population growth in this annule during 1981-91 was sluggish (3.10 per cent). A decline in the absolute population was registered in as many as seven Phase I Sectors, which were also the most populous Sectors in this annule. However, inspite of the low growth, and even decline, the population of some of the Phase I Sectors (numbers 3, 5, 7, 11, 20, and 24) continued to be in excess of their planned targets. Interestingly, the total population of this annule in 1991 was approximately 18 per cent short of its planned
target of 158,400 persons, suggesting the possibility of future growth, particularly in the Phase II Sectors of the annule.

This annule, like the core, has consistently been a densely populated area. In 1961, it registered the highest population density among the five annules identified in the city (3689 persons per sq. km.), despite five of its eleven constituent Sectors being developed as low density areas. The high density of population in this annule is also reflected in its having the highest number and proportion of census houses (7225 or 34.2 per cent) and households (7415 or 34.37 per cent) in the city in 1961. The comparatively small size of household in this annule during this decade (3.94 persons) may be associated with the developing nature of its constituent Sectors. The addition of five largely undeveloped Phase II Sectors (numbers 33 to 37) in 1971 resulted in this annule being ranked second among the five annules in the city in terms of population density (5372 persons per sq. km.), the highest density being recorded in the first annule (8218 persons per sq. km.). This annule continued to have the highest number and proportion of census houses (17,028 or 33.36 per cent) as well as households (17,260 or 33.48 per cent) among the five annules identified in the city in 1971. There was an increase in the average size of household in this annule from 3.94 persons in 1961 to 4.17 persons in 1971. This may be associated with the developments in housing.

In 1981, this annule continued to be next only to the core in terms of population density (9354 persons per sq. km.). This annule had the highest number and proportion of census houses (28,007 or 33.44 per cent) and households (28,356 or 33.25 per cent) in the city, a position it has consistently maintained since 1961. The size of households increased further from 4.17 persons in 1971 to 4.42 persons in 1981, reflecting expansion in housing. As in the case of the first annule, many of the Sectors in this annule also had a fair degree of apportioning of houses and vertical development. This was particularly true of the moderate and high density Phase I Sectors. For example, the ratio between the census houses and number of house structures was more than 2 in Sectors 11,15,19 and 20. The number of persons per house in these Sectors was also more than 10, suggesting a high degree of residential crowding. In view of the fact that the populations of these particular Sectors had already exceeded or were close to their planned targets in 1981, it can be suggested that these Sectors had reached the saturation
point in terms of housing facilities. Indeed, these Sectors registered an absolute decline in their populations in 1991. In comparison to these, the newly developed Phase II Sectors (numbers 33 to 37) formed the areas for new housing development, private, institutional and by the Chandigarh Housing Board.

In 1991, this annule emerged as the most densely populated area in Chandigarh with a density of 9644 persons per sq. km., replacing the core or the first annule. The growth in density, by 290 persons per sq. km. during 1981-91, was related mainly to an intensification of development in the Phase II Sectors of this annule. However, the proportion of census houses and households in this annule declined considerably from 33.44 per cent in 1981 to 25.01 per cent in 1991 in case of the former, and from 33.25 per cent in 1981 to 25.34 per cent in 1991 in case of the latter. This decline may be attributed more to the development and expansion of housing in other parts of Chandigarh, rather than some substantial structural change in this annule. Thus, after registering the highest number and proportion of census houses and households since 1961, this annule was ranked second in 1991.

Within this annule, in spite of declining populations, Sectors 7, 11, 15, 19 and 20 continued to be among the most crowded areas in the city, having a high degree of apportioning and vertical development. The low density northern Sectors (numbers 2 to 5) also had a fairly high degree of apportioning, mainly in the form of servants quarters and annexes. In Sector 5, for example, the ratio between census houses and number of house structures was 1 : 2.35. In comparison, the high ratio between these in the Phase II Sectors, for example, 1 : 1.92 in Sector 34 and 1 : 1.91 in Sector 37, was associated with multistoried housing development.

In terms of socio-economic characteristics, this annule, like the first one, is characterized by a high sex ratio, a very high literacy rate and a moderate proportion of workers. However, unlike the low proportion of Scheduled Castes population in the first annule, this annule contains a significant proportion of this section of society. The high sex ratio in this annule may be associated with the well developed housing infrastructure, promoting family-type living. The sex ratio in this annule increased from 635 females per 1000 males in 1961 to 861 females per 1000 males in 1991. This annule has consistently recorded very high rates of literacy, in fact, the second highest among the
five annules identified in the city, the highest being in the first annule. The proportion of literates in the second annule increased from 64.8 per cent in 1961 to 79.42 per cent in 1991. The rates of growth in literate population in this annule (158.83, 94.94 and 7.28 per cent during 1961-71, 1971-81 and 1981-91 respectively) were higher than the average rates of population growth in the annule (146.04, 74.12 and 3.10 per cent respectively). Among its constituent Sectors, Sector 11, forming a part of the education zone in the city, registered the highest proportion of literates in the city in all the decades except 1981.

In 1961, the proportion of workers in this annule (36.53 per cent) was one of the lowest in the city and was considerably lower than the city average of 39.35 per cent. As in the case of the first annule, this was associated mainly with the development of family-type housing, and a population comprising of government employees and their dependents. During 1961-71, in spite of recording a growth rate of 122.34 per cent, the proportion of workers in this annule declined from 36.53 per cent in 1961 to 33.01 per cent in 1971. This could also be associated with the expansion in housing, particularly in the Phase I Sectors. Interestingly, these Sectors also comprised the most populous areas in this annule. However, since 1981, the proportion of workers in this annule has increased to 33.58 per cent in 1981 and to 34.56 per cent in 1991. This increase may be associated with the establishment and development of new work areas in the Phase II Sectors of this annule, for example, offices and business establishments in the city sub-centre in Sector 34, government offices in Sectors 33 and 34, educational institutions in Sector 36, hotels and offices in Sector 35, and in such adjoining areas as Mohali and the Industrial Area. However, in keeping with the general trend, the rate of growth of workforce has been declining continuously, from 122.34 per cent during 1961-71 to 77.12 per cent during 1971-81 and 6.11 per cent during 1981-91.

The Scheduled Castes population formed a significant proportion of the annule’s population in both 1961 as well as 1971, 10 and 11.10 per cent respectively. This was higher than the city average for the same period (8.5 and 9.82 per cent respectively). This could be attributed to the ongoing construction and development activities in various Sectors of this annule, and the presence of unauthorized settlements in Sectors 33, 34, 35 and 37. However, in 1981, the proportion of Scheduled Castes persons declined to 8.55 per cent and has since remained constant (Table 30). This
decline was mainly related to the removal of unauthorized colonies from the Phase II Sectors of this annule. Interestingly, the low density high income northern Sectors in this annule (numbers 2 to 6) have consistently recorded fairly high proportions of Scheduled Castes population. This could be associated with institutional employment as in MLA flats and hostels in Sectors 3 and 4 and with the presence of domestic workers. Since these Sectors have small total populations, even a marginal absolute increase results in a seemingly high percentage figure. Sector 24, located on the western margins of this annule is another Sector which has consistently recorded high proportions of Scheduled Castes population, associated mainly with the location of institutional housing in this Sector.

Due to its proximity to the central Sectors as well as the newly developed Phase II Sectors, this annule has developed important commercial, administrative, educational and recreational functions. By far the most significant commercial development has been the establishment of the city sub-centre in Sector 34, the objective being the decentralization of city-level functions from the City Centre in Sector 17. In addition, an almost complete commercial axis has developed along the V3 road running through Sectors 35 and 22 and joining the City Centre in Sector 17.

The Sector shopping centres in Sectors 11,15,19,35 and 37 are located in proximity to institutional areas and cater to a large inter-sector population. Government and private offices have developed in Sector 19 on the Madhya Marg, in Sector 33 on the Dakshin Marg and in Sector 36 on the V3 road. Sector 11 in this annule forms a part of the educational zone in the city. Among the Phase II Sectors, Sector 36 has a concentration of educational institutions. Schools are well distributed throughout this annule. Interestingly, none of the northern low density Sectors (numbers 2 to 6) located in this annule have either educational facilities or Sector shopping centres. A part of the Leisure Valley, the stretch of green space running through the city, is located in Sector 3 and has been developed as the Bougainvillea Garden. Its extension in Sector 36 has been developed as the Hibiscus Garden and the Garden of Fragrance. In addition, the Terraced Garden has been developed in Sector 33. Sector 7 has a sports complex, while the city’s only golf course is located in Sector 6.
Annule III

The third annule identified for Chandigarh comprises mainly of Sectors located on the peripheries of the city – Sector 1 in the north, Sectors 12,14,25 and 38 in the west and Sectors 40,41,42,43,44,45 and 46 in the south. The Sectors forming the eastern margins of this annule, numbers 26,27,30 and 32, do not form the eastern periphery of the city (Fig.60). The Sectors comprising this annule belong to both phases of the development of the city, Sectors upto number 30 belong to Phase I and Sector 31 onwards to Phase II. Important qualitative differences exist between the Phase I and Phase II Sectors of this annule in terms of their functional character, nature of housing, period of development, socio-economic attributes and planned population levels.

It 1961, this annule comprised of Sectors 1,12,14,25,26,27 and 30, all of which developed during Phase I of the development of Chandigarh (Fig.57). It covered an area of 11.86 sq. kms or 37.44 per cent of the total city area. The inclusion of two new Phase II Sectors, numbers 32 and 38, in 1971 resulted in an increase in its area from 11.86 sq. km. to 14 sq. km. but the proportion of area under this annule declined to 30 per cent of the city area due to an increase in the total area of the city (Fig.58 and Table 30). The area of this annule increased to 22.68 sq. kms in 1981, constituting 38.76 per cent of the total city area. This increase followed the inclusion of seven new Phase II Sectors, numbers 40 to 46 (Fig.59). In 1991, this annule occupied 30.23 per cent of the total city area. At present, this annule is the largest among the five annules identified in the city in terms of area covered and proportion of the total city area. All the Phase I Sectors in this annule, excluding Sector 27, are institutional areas with restricted housing facilities. These include the Capitol Complex in Sector 1, the campuses of the PGI, the Engineering and Architecture colleges in Sector 12, the Panjab University Campus in Sector 14, additional housing for the university employees in Sector 25, educational institutions and the wholesale market and bulk goods transport area in Sector 26, and the campus of the CSIO and ISTC in Sector 30. In comparison, Sector 27 was planned as a residential area with mainly small sized private plots (7.5 to 10 marlas or 112.5 to 150 sq. yards) and government housing for the middle and lower income groups (Type X to XIII). The Phase II Sectors in this annule initially developed with private housing. The Chandigarh Housing Board later built HIG, MIG, LIG and EWS houses. In addition, institutional
housing also developed in many of these Sectors. Among the Phase II Sectors of this annule, Sector 32 has institutional and EWS housing, Sectors 38 and 40 house HIG and EWS flats, Sector 41 has CHB flats and two urban outgrowths, Sector 42 has institutional housing, HIG flats and the Census Town of Attawa and Sectors 43, 44, 45 and 46 have a high proportion of CHB flats. The Census Town of Burail is located in Sector 45.

In 1961, this annule had a population of 19,764 persons which formed 22.12 per cent of the total city population in comparison to the two inner annules, which had 35.15 and 32.75 per cent respectively (Table 30). The lower proportion in the third annule was mainly due to the undeveloped nature of most of the constituent Sectors and restricted housing facilities. In 1971, two new Phase II Sectors, numbers 32 and 38, located on the south-eastern and south-western margins of the city respectively, were included in this annule. The population of this annule increased by 18,002 persons in 1971 and was 37,766 persons. The bulk of the population was concentrated in the Phase I Sectors, particularly in Sectors 12, 14, 25 and 27, which together accounted for 83 per cent of the total population of this annule. Among these, Sector 27 exceeded its planned population in 1971, that is, within a decade of its first enumeration in 1961. In comparison, the two new Phase II Sectors, 32 and 38 accounted for only 3.85 per cent of the annule’s population. Inspite of registering an absolute increase, the proportion of city population housed in this annule declined from 22.12 per cent in 1961 to 17.26 per cent in 1971 due to a higher concentration of population in the inner annules. The growth rate of population of this annule during 1961-71 (91.08 per cent) was much lower than the one recorded by the first (133.27 per cent) and the second annules (146.04 per cent) as well as the average city growth rate (144.89 per cent) during the same period.

In 1981, Sectors 40 to 46 were included in this annule. Locationally, these are also peripheral Sectors (Fig.59). The population of this annule increased by 53,161 persons and was 90,927 persons. This was approximately half of the proposed targets of 181,800 persons. The proportion of city population housed in this annule increased from 17.26 per cent in 1971 to 23.95 per cent in 1981. This proportion was almost the same as that housed in the first annule or the core in 1981 (24.3 per cent). However, while the central annule had already emerged as an area of decline, this annule was an area of dynamic growth. This is reflected in the fact that this annule was one of the two annules
in the city which recorded a higher rate of growth during this decade (140.76 per cent) as compared to the previous decade (91.08 per cent). The other such annule was the fifth annule or the Industrial Area. The Phase I Sectors in this annule accounted for 77 per cent of the population. Among these, the population of Sectors 12, 25, 26, 27 and 30 exceeded their proposed target. In comparison, among the Phase II Sectors of this annule, Sectors 32 and 38 accounted for 12.6 per cent of the annule's population, as against 3.85 per cent in 1971, and Sectors 40 to 46, enumerated for the first time in 1981, accounted for 10.40 per cent of the total annule population. The bulk of the population of this annule was, thus, concentrated in the Phase I Sectors.

In 1991, this annule registered a further increase of 48,969 persons, to record a population of 139,896 persons. It, thus, replaced the second annule as the most populous annule in the city. The proportion of city population housed in this annule increased from 23.95 per cent in 1981 to 27.4 per cent in 1991. This was the highest proportion among the various annules, and highlights the important trend of a growing concentration of population in the peripheral Sectors of Chandigarh, particularly those located in the southern part of the city. Approximately 64 per cent of the population of this annule was in the Phase II Sectors (numbers 32, 38, 40 to 46) and the remaining 36 per cent in the Phase I Sectors (numbers 1, 12, 14, 25, 26, 27, 30). During the previous decade, the comparative figures had been 23 and 77 per cent for the Phase II and Phase I Sectors respectively. This indicates, as was true for the second annule as well, a major shift in the area of concentration of population in this annule. The population of this annule in 1991 was still well short of the planned target of 181,800 persons, suggesting the potential for future growth, particularly in the Phase II Sectors. In 1991, the populations of Sectors 12, 25, 27 and 30, all Phase I Sectors, continued to be in excess of their planned populations. Interestingly, Sector 41, a Phase II Sector, also exceeded its proposed population of 12,000 persons by 1,070 persons in 1991, that is, within a decade of its first enumeration in 1981. This Sector was the only Phase II Sector in the city to have a population higher than its planned target. The rate of growth of population in this annule (53.27 per cent) during 1981-91 was the second highest among the various annules in the city, the highest being in the fifth annule or the Industrial Area. Within this annule, the Phase II Sectors emerged as some of the fastest growing Sectors in the city.
The population density in this annule has consistently been lower than the city average. This may be attributed to the restricted housing facilities in most of the Phase I Sectors included in this annule. In addition, the annule has as many as five Sectors (numbers 1, 12, 26, 42, and 43) developed as low density areas. In 1961, the population density in this annule was 1666.4 persons per sq. km. The comparative figures for the first and second annules were 3523 and 3689 persons per sq. km. respectively (Table 30). The low population density of this annule was also reflected in the small number and proportion of census houses (4734 or 22.4 per cent) and households (4838 or 22.42 per cent). The size of household was 4.08 persons. The inclusion of Sectors 32 and 38 and the development of the Phase I Sectors in 1971 resulted in an increase in the population density by 1032 persons. However, the population density of 2698 persons per sq. km. in 1971 was the second lowest among the five annules in the city, and substantially lower than the population density in the core (8218 persons per sq. km.) and in the second annule (5372 persons per sq. km.). Even though the number of census houses in this annule increased, from 4734 in 1961 to 8021 in 1971 and that of the census households from 4838 in 1961 to 8085 in 1971, the proportion of census houses and households in this annule declined considerably from 22.4 per cent in 1961 to 15.72 per cent in 1971 in case of census houses, and from 22.42 per cent in 1961 to 15.68 per cent in 1971 in case of households. This decline was associated both with the restricted housing facilities in most of the Sectors of this annule and with the expansion in housing in the two inner annules.

In 1981, although the population density of this annule increased from 2698 persons per sq. km. in 1971 to 4009 persons per sq. km., it continued to be much lower than the density figures of the first and second annules (10,359 and 9354 persons per sq. km. respectively). Further, this annule accounted for 23 per cent of the total census houses and households in the city, as compared to the figure of about 16 per cent in 1971. The size of households (4.62 persons) was also higher than the city average of 4.45 persons. This dynamism in partly associated with the activities of the Chandigarh Housing Board, which were concentrated in the southern Phase II Sectors and comprise of multistoried blocks of flats built on comparatively smaller plots of land, thus resulting in a high intensity of development.
In 1991, this annule recorded a population density of 6646 persons per sq. km. Even though this represented a growth by 2637 persons per sq. km. during 1981-91, it continued to be lower than the density of population in the inner two annules (8876 and 9644 persons per sq. km. respectively). The consistent low density of the annule may be related to the restricted housing facilities in most of the Phase I Sectors of this annule. However, this annule had the highest proportion of census houses and households in the city (27.06 and 26.81 per cent respectively). This may be associated with the multistoried blocks of HIG, MIG, LIG and EWS flats constructed by the Chandigarh Housing Board in the southern Phase II Sectors of this annule (numbers 32, 38, and 40 to 46). The ratio between the census houses and the number of house structures was more than 1 in these Sectors. For example, it was as high as 1 : 2.80 in Sector 38, 1 : 2.61 in Sector 41 and 1 : 2.34 in Sector 42. The number of persons per house in the southern Sectors was, on an average, more than 10. In comparison, the restricted nature of housing in most of the Phase I Sectors of this annule (numbers 1, 12, 14) and the dominantly horizontal development of housing in the slum areas (Sectors 25 and 26) resulted in an almost 1 : 1 ratio between the census houses and number of house structures. Thus, apportioning in the Phase I Sectors of this annule is not as common as in the Phase I Sectors of the inner two annules.

In 1961, this annule recorded a sex ratio of 549 females per 1000 males. This was lower than the city average of 625 females per 1000 males and considerably lower than the sex ratio in the two inner annules (687 and 635 females per 1000 males respectively). The sex ratio in this annule remained low in 1971 as well as 1981, and was the second lowest among the five annules identified in the city. The low sex ratio till 1981 may be associated with the restricted housing facilities in most of the Phase I Sectors of this annule and the undeveloped nature of the Phase II Sectors. During 1981-1991, the sex ratio increased by 151 females per 1000 males, and was 848 females per 1000 males in 1991. This, for the first time, was higher than the city average of 817 females per 1000 males, and was the third highest among the five annules. The second and fourth annules registered higher sex ratios (861 and 853 females per 1000 males respectively). This growth in sex ratio during 1981-91 may be specifically associated.
with the expansion of housing, particularly in the southern Phase II Sectors (numbers 32, 38, and 40 to 46).

Like sex ratio, literacy rates in this annule remained fairly low until 1981. In 1961, 57.52 per cent of the annule’s population were registered as literate. This was lower than the city average of 60.53 per cent, and considerably lower than the literacy rates of the first and second annules (68.61 and 64.8 per cent respectively) (Table 30). Even though the proportion of literates in this annule increased to 64.34 per cent in 1971, it was lower than the city average of 66.30 per cent and much lower than the proportion of literates in the inner two annules (75.18 and 68.17 per cent respectively). Among the Sectors of this annule, the proportion of literates was higher than the city and annule average in Sectors 12, 14 and 27. Among these, the former two house the PGI, the Engineering and Architecture Colleges and the Panjab University respectively, and the latter Sector is an early developed residential area of the city. The low proportion of literates in the other Sectors of this annule may be associated with the presence of slums and squatter settlements (Sectors 25, 26, 30, 32, 38), the functional nature of the area, for example, wholesale goods and bulk transport in Sector 26, and the early stage of development of Sectors 32 and 38. The proportion of literates in this annule declined from 64.34 per cent in 1971 to 57.66 per cent in 1981. This was due more to an increase in the number of non-literate rather than a decrease in the number of literates. In fact, the number of literates in the annule increased to 52,427 persons in 1981 from 24,297 persons in 1971 (growth of 115.75 per cent). In 1991, the proportion of literates in this annule increased from 57.66 per cent in 1981 to 74.4 per cent. This, for the first time, was higher than the city average of 70 per cent, but continued to be lower than the proportion of literates in the two inner annules (80.10 and 79.42 per cent respectively). The rise in the proportion of literates in this annule during 1981-91 may be associated with the development of the Phase II Sectors, while most of the Phase I Sectors continued to have low literacy rates.

This annule has registered a fluctuating proportion of workers during various decades. In 1961 it was 40.52 per cent, higher than the city average of 39.35 per cent as well as the proportion of workers in the two inner annules (36 and 36.53 per cent respectively). The comparatively high proportion of workers in this annule in 1961 may
be associated with the construction activities then taking place in its constituent Sectors. Approximately 32 per cent of the total workers in this annule were enumerated in the ‘construction’ category. In some of the Sectors this proportion was very high, for example, in Sector 1, 70 per cent of the total workforce was enumerated in this category. In 1971, the proportion of workers in this annule declined from 40.52 per cent in 1961 to 32.63 per cent. This decline may be associated with a greater increase in the number of non-workers, related with the expansion of family housing facilities in Sectors 12, 14, 27 and 30 and the large resident student population of such institutions as the PGI, the Engineering college, the University and CSIO. In comparison, the proportion of workers was high in Sector 1, housing the Capitol Complex, in Sector 25, due to the presence of slums, in Sector 26, on account of its functional nature, and in Sectors 32 and 38 owing to their recency of settlement. During the following decade, the proportion of workers increased from 32.63 per cent in 1971 to 36.56 per cent in 1981. This was the second highest proportion among the five annules identified in the city, the highest being in the fifth annule or the Industrial Area. The proportion of workers for the city as a whole was 35 per cent. Within this annule, the Sectors having a large student population (numbers 12, 14, and 30) and those developed mainly as residential Sectors (27, 32, and 38) recorded comparatively lower proportions of workers. In comparison, the functional nature of Sector 1 (Capitol Complex), and 26 (institutions, wholesale markets, bulk goods transport area) contributed to a comparatively higher proportion of workers in these Sectors. Similarly, due to the ongoing construction activities and proximity to work areas, the proportion of workers in the newly enumerated Phase II Sectors (numbers 40 to 46) was high, that is, above the annule average of 36.56 per cent. In 1991, the proportion of workers in this annule once again declined and was 33.16 per cent, approximately the same as in other annules in the city, except the Industrial Area, where it was higher. The decline in the proportion of workers in this annule may be associated with the expansion of housing, particularly in the Phase II Sectors of this annule.

This annule has consistently recorded a high proportion of Scheduled Castes population, associated mainly with the peripheral location of most of its constituent Sectors. This conforms to the pattern generally associated with evolved towns. In 1961, the proportion of Scheduled Castes persons in this annule was 9.13 per cent, the third
highest among the five annules, higher proportions being in the fourth and second annules respectively. In 1971, the proportion of Scheduled Castes population in this annule further increased to 14.27 per cent. This was the highest proportion among the five annules identified in the city. Within the annule, the proportion of Scheduled Castes population was as high as 75.06 per cent in Sector 25, an area comprising mainly of slums and squatter settlements. This annule continued to have the highest proportion of Scheduled Castes population in the city in 1981 also (19.42 per cent). This was related as much to the increase in the population of slums and labour colonies in Sectors 25 and 26, as to the development of EWS housing in Sectors 12, 26, 30, 32 and 38. In addition, the peripheral location of most of the Sectors comprising this annule, must also have attracted a higher proportion of Scheduled Castes persons in comparison to the two inner annules in the city. During the following decade, the proportion of Scheduled Castes population in this annule declined from 19.42 per cent in 1981 to 14.95 per cent in 1991, although there was an absolute increase by 3257 persons. Thus, from having the highest proportion of Scheduled Castes persons in the city since 1971, it was now ranked second. The highest proportion of Scheduled Castes persons in 1991 was in the fifth annule or the Industrial Area. Within this annule, there was a relocation of slums and labour colonies from Sector 26 to new areas called East of Sector 26 and East Extension, which resulted in a decline in the proportion of Scheduled Castes persons from 25.36 per cent in 1981 to 6.84 per cent in this Sector. The proportion of Scheduled Castes persons continued to be comparatively high in Sector 1 (39.62 per cent), Sector 12 (22.7 per cent), Sector 25 (76.5 per cent), Sector 32 (17.89 per cent) and Sector 38 (23.79 per cent). These Sectors have consistently recorded a high proportion of Scheduled Castes population.

Functionally, this annule houses a variety of institutions and other establishments. In particular, the southern Phase II Sectors (numbers 32, 38 and 40 to 46) have emerged as sites of new work areas. These Sectors also enjoy locational proximity to work areas in the adjacent Sectors and areas. However, unlike the inner two annules, the Sectors comprising this annule do not have any major commercial area or specialized markets other than the Sector shopping centres at present. However, large areas in Sectors 40, 41, 44 and 46, along the V3 roads, have been reserved for future commercial development. Further, almost half of Sector 43 has been reserved for the development of
the second city sub-centre and a second ISBT. Sectors 12 and 14, housing the PGI, the Engineering and the Architecture colleges and the Panjab University, and located on the western margin of the annule, form part of the Educational Zone in the city. In addition, a number of educational and professional institutions have also developed in other Sectors of this annule. Sector 26 has two reputed private schools, two undergraduate colleges and three training institutions, Sector 30 has the Central Scientific Instruments Organization (CSIO) and the Indo-Swiss Training Centre (ISTC), Sector 32 has the Government Medical College and its Campus, the offices and campus of the Survey of India, an undergraduate college and four training institutes, Sector 42 has the Hotel Management and Food Craft Institutes, Sector 45 has one undergraduate college, while Sector 46 has an undergraduate and Ayurvedic colleges. In addition, all the Sectors of this annule, excluding Sector 1, have a fair distribution of government and private schools. Sector 1 houses the Capitol Complex, and is therefore, the administrative centre of the city. In terms of recreation facilities, a part of the Leisure Valley runs through Sector 42. A Sports Complex and Hockey Stadium have also been developed in this Sector.

Annule IV

The fourth annule comprises of five Sectors, numbers 28, 29, 31 and 47, located in the south-east, and Sector 39 located on the south-western margins of the city (Fig.60). The area of this annule has increased with the addition of new Sectors during different decades (Table 30). In 1961, this annule comprised Sectors 28 and 29, and covered an area of 2.33 sq. kms (Fig.57). With the inclusion of Sectors 31 and 47 in 1971, the annule remained limited in location to the south-eastern margins of the city, but its area increased to 4.47 sq. kms (Fig.58). With the addition of Sector 39 in 1981, the area of this annule increased further to 5.55 sq. kms., forming 9.48 per cent of the total area of the city (Fig.59 and Table 30). There has not been any change either in its area or constituent Sectors after 1981. It is the smallest among the various annules identified in Chandigarh.

Among the Sectors in this annule, Sectors 28 and 29 developed during Phase I with housing for workers from the adjacent Industrial Area. Of these, the former Sector was proposed as a high density Sector. Later, private and institutional housing (Tribune
Colony) also developed in this Sector. Sector 29 is one of the few Phase I Sectors in which EWS housing has been provided. Sectors 31, 39 and 47 developed during Phase II. Sectors 31 and 47 have private housing for defence personnel due to their proximity to the Air Force Base. In addition, the Chandigarh Housing Board has also constructed EWS and LIG housing in Sector 47, which was proposed as a high density area. Sector 39 has mainly institutional housing for the Institute of Microbial Technology (IMTECH) and Central Government employees.

In 1961, this annule, consisting only of Sectors 28 and 29, had a population of 214 persons forming 0.25 per cent of the total city population. This was the lowest proportion of population among the five annules identified in the city. With the addition of Sectors 31 and 47 in 1971, its population increased by 16,097 during 1961-71 and was 16,311 persons in 1971. This represented a phenomenally high growth rate of 7521.96 per cent, the highest among the five annules identified in the city. This population was, however, well short of the planned population (71,300 persons) of its constituent Sectors, indicating the possibilities of future growth. The proportion of city population housed in this annule increased from 0.25 per cent in 1961 to 7.45 per cent in 1971. This was the second lowest proportion among the five annules. In 1971, approximately 75 per cent of the population of this annule was living in Sectors 28 and 29, and the remaining 25 per cent in Sectors 31 and 47. The former two Sectors were the fastest growing areas in Chandigarh during 1961-71. In 1981, this annule registered a population of 39,492 persons or an absolute increase of 23,181 persons. The vitality of this annule during 1971-81 is reflected in its high growth rate of 142.12 per cent, the second highest among the five annules, and a small but growing concentration of city population (7.4 per cent in 1971 to 10.4 per cent in 1981). The expansion of housing in Sectors 28, 29, 31 and 47, and the proximity of this annule to new work areas within the Phase II Sectors as well as in the adjoining areas were the main contributing factors to the growth of population in this annule. In 1991, the population of this annule was 50,655 persons. It had registered an absolute increase of 11,163 persons since 1981. This was still fairly short of the planned population of 81,300 persons, implying a high potential for future growth. However, there was a marginal decline in the proportion of city population housed in this annule, from 10.4 per cent in 1981 to 9.92 per cent in 1991. The decline in proportion of
population was associated more with higher levels of concentration in other parts of the city, rather than an absolute decrease in the population of this annule.

The population density in this annule has been increasing since 1961 following developments and expansion in housing infrastructure. In 1961, the density of population of this annule was 91.84 persons per sq. km., the lowest among the annules in the city. In 1971, the population density was 3649 persons per sq. km. In terms of density of population, this annule was now ranked third among the five annules in the city, next only to the two inner annules. There was a close correspondence between the number of census houses and households in this annule in 1961 as well as 1971. This may be associated with the provision of industrial housing, comprising small units, in Sectors 28 and 29, and with institutional housing for defence personnel in Sectors 31 and 47. The nature of housing, thus, did not permit much apportioning or vertical development. The size of households in both 1961 and 1971 (3.05 and 3.76 persons respectively) in this annule was lower than the city average (4.13 and 4.24 persons respectively). In 1981, the population density in this annule had increased by 3467 persons per sq. km. and was 7116 persons per sq. km. It continued to be the third highest among the various annules in the city. The census houses and households in this annule comprised approximately 11 per cent of the city total. The average size of household increased from 3.76 in 1971 to 4.23 persons in 1981. For the first time, the ratio between census houses and number of house structures was more than 1 for all the Sectors in this annule, suggesting intensive vertical development and apportioning. In 1991, the population density of this annule was 9128 persons per sq. km., an increase of 2012 persons per sq. km. since 1981. In terms of population density, this annule ranked second among the five annules, next only to the second annule. Significantly, the density of population in this annule was higher than the one recorded by the core or the first annule (8876 persons per sq. km.). The number of census houses and households as well as the size of household in this annule also increased during 1981-91 (Table 30). The ratio between the number of census houses and number of house structures was more than 1 in all its constituent Sectors, suggesting vertical development and apportioning.

In 1961, the sex ratio in this annule was the lowest (217 females per 1000 males) among the various annules in the city. This was associated with the recency of settlement
in Sectors 28 and 29, and the presence of housing for industrial workers in these Sectors which then alone comprised this annule. However, with the development of housing in other Sectors, this annule recorded comparatively higher sex ratio values in 1971, 1981 and 1991 (Table 30). Interestingly, this annule ranked first in sex ratio among the five annules in the city in 1971 as well as 1981. However, in 1991, it registered a sex ratio of 853 females per 1000 and was ranked second, next only to the second annule which recorded a sex ratio of 861 females per 1000 males.

The proportion of literates in this annule in 1961 was the lowest in the city (18.69 per cent). After registering a growth in literacy during 1961-71 at a phenomenal rate of 23685 per cent, the proportion of literates in this annule increased to 58.32 per cent in 1971. However, this continued to be the lowest proportion of literates among the five annules. This could be associated with the presence of industrial housing in Sectors 28 and 29 and the undeveloped nature of Sectors 31 and 47. In 1981, the proportion of literates further increased to 64.92 per cent, the third highest in the city, behind the two inner annules. While the proportion of literate population in this annule increased further to 73.24 per cent in 1991, it ranked fourth among the annules in the city.

This annule recorded the highest proportion of workers in the city (71.69 per cent) in 1961. As much as 77 per cent of its workforce was engaged in 'construction' activities. The expansion in housing and associated infrastructure during the next decade promoted family-type living and resulted in a decline in the proportion of workers to 32.34 per cent in 1971 and further to 26.75 per cent in 1981. The proportion of workers in this annule in 1971 as well as 1981 was the lowest in the city, inspite of the fact that this annule recorded an absolute increase of 5122 workers during 1961-71 and 5290 workers during 1971-81. In 1991, the establishment of new work areas and institutions in this annule and in the adjacent area, resulted in an increase in the proportion of workers to 31 per cent. This was broadly comparable to the three inner annules, in which also approximately one-third of the total population was registered as workers in 1991.

The annule registered the highest proportion of Scheduled Castes population in the city in 1961 (41.58 per cent). This, coupled with a low literacy rate (18.69 per cent) and a high proportion of workers (71.96 per cent), suggests the presence of an unskilled population. This could have been associated with its peripheral location with reference to
the city, but proximity to the Industrial Area. The proportion of Scheduled Castes population in this annule declined to 9.78 per cent in 1971, although it had recorded a growth rate of 1693 per cent during 1961-71. This suggest a higher increase in the non-Scheduled Castes population in this annule. In the next decade, the development of EWS and LIG housing, along with the peripheral location of this annule resulted in an increase in the proportion of Scheduled Castes population in this annule, from 9.78 per cent in 1971 to 13.47 per cent in 1981. It was now ranked third among the various annules after the third and the fifth annules. There was only a marginal increase in the proportion of Scheduled Castes population in 1991 (13.87 per cent).

At present this annule is mainly residential in nature. Some administrative offices are located in Sector 28 along the Madhya Marg and the offices of The Tribune, a well known regional daily, is in Sector 29. This annule is well served by a number of schools. In addition, an industrial training institute is located in Sector 28, while the IMTECH and its campus is in Sector 39. In this latter Sector, area for such research institutes as the Regional Drug Testing Centre, Meterology Centre etc. has also been reserved. Sectors 31 and 47 have clubs and schools specifically meant for the defence personnel. A specialized Iron and Steel market is located in Sector 29. In addition, land has been reserved for institutional and commercial use in Sectors 31, 39 and 47.

Annule V

The fifth annule comprises entirely of a functional zone, the Industrial Area (Phase I and II), located on the eastern margin of the city (Fig.60). The area is located in close proximity to the Railway Station and the wholesale market and bulk goods transport area in Sector 26. Since Chandigarh was planned as an administrative city, only a minor role for industry was perceived and the type of industries to be permitted were to be strictly regulated and restricted to non-polluting units. However, the development of Chandigarh as a major regional centre and triple administrative unit facilitated industrial development. The Industrial Area has, thus, emerged as a major functional zone in the city. In 1961, this annule comprised only of the Industrial Area Phase I which was developed along with the first thirty Sectors of the city. It covered an area of 3.28 sq. kms., including a forest area located on its eastern margins, adjacent to a seasonal stream. With the enumeration of the Second Phase of Industrial Area in 1971, the total area of
this annule increased to 6.17 sq. km. Housing for the industrial workers was developed in the adjacent Sectors 28 and 29. Some housing was also developed within the Industrial Area.

In 1961, the Industrial Area had a population of 930 persons, forming 1.04 per cent of the total city population. In 1971, the population of this annule had increased to 1406 persons, registering a growth rate of 51.18 per cent during 1961-71. This was the lowest rate of population growth among the five annules during 1961-71. The proportion of city population housed in this annule declined from 1.04 per cent in 1961 to 0.65 per cent in 1971, although there was an absolute increase of 476 persons over its 1961 population. This was due to a higher increase of population in other parts of the city. By 1981, however, this annule had shrugged off its initial sluggish growth. The population grew at the rate of 642 per cent during 1971-81, the highest in the city. In 1981, its population constituted 2.75 per cent of the total city population. The comparative figure was only 0.65 per cent in 1971. In 1991, it recorded a population of 18,208 persons which comprised 3.56 per cent of the total city population. Its growth rate during 1981-91 (74.61 per cent), continued to be the highest among the various annules in the city.

This annule has consistently registered a low population density. In 1961, its population density was 283.5 persons per sq. km. which increased to 2951 persons per sq. km. in 1991. The corresponding figures for 1971 and 1981 were 227 and 1690 persons per sq. km. The sparse population density may be associated with the limited housing facilities available within the Industrial Area and the large area covered by this annule. In 1991, this annule had only about 5 per cent of the total houses and households in the city. Further, this annule has consistently registered the smallest size of households among the five annules. This is expected in view of the functional nature of this annule. The close correspondence between the numbers of census houses and the number of households in this area reflects the institutional nature of housing and a fairly low extent of apportioning of residential units.

The socio-economic attributes of this annule reflect its functional nature, a low sex ratio, low literacy rates and a high proportion of workers as well as Scheduled Castes population. The sex ratio, 310, 444, 572 and 646 females per 1000 males in 1961, 1971,
1981 and 1991 respectively, has been the lowest among the five annules and consistently lower than the city average.

In 1961, 27.09 per cent of the population of this annule was registered as literate. Even though this proportion increased to 58.67 per cent in 1971, it continued to be the lowest among the five annules. Further, despite recording a growth in literacy by 504.0 per cent and 40.33 per cent during 1971-81 and 1981-91 respectively, the proportion of literates in this annule declined from 58.67 per cent in 1971 to 47.75 per cent in 1981 and 38.37 per cent in 1991. This suggests an increase in the non-literate population of this annule.

The high proportion of workers in this annule is to be expected. It was as high as 69.89 per cent in 1961. Even though there has been an absolute increase in the number of workers in this annule, their proportion in its population has declined over the years, 54.76, 43.41 and 40.69 per cent in 1971, 1981 and 1991 respectively. Inspite of this, the annule has consistently recorded one of the highest proportion of workers in the city.

The peripheral nature of this annule and the availability of employment in the semi-skilled and informal section in the industrial units has resulted in a high proportion of Scheduled Castes population. In 1961, the Scheduled Castes population formed 8.49 per cent of the total annule population. The decline in their proportion during 1961-71 to 3.41 per cent can be seen as a temporary aberration, since during the following decades, this annule was to register one of the highest proportions of Scheduled Castes population in the city. The figures in 1981 and 1991 were 19.37 and 70.96 per cent respectively.

Functionally, apart from industrial units and factories, the Industrial Area also houses workshops of private and public transport services, poultry farms, slaughter houses, L.P.G. godowns and warehouses. With regard to urban services, this annule has one government school, a community centre, a hospital and a fire station.

**Peripheral Areas**

Inspite of the preparation of a formal detailed plan framework for the development of Chandigarh, a vital part of the Third World economies, the informal sector, was not planned for in the city plans. Consequently, with the development of the city, housing and other structures generally associated with the informal sector have emerged in Chandigarh as well. These areas, in their location, function, social and
economic characteristics, are similar to the ones found in evolved cities in India. Their presence and concentration on the peripheries of Chandigarh has been reinforced as much by market forces as by administrative decisions, particularly those related to the allotment of sites for the relocation of labour colonies and the establishment of transit settlements.

In 1961, the Peripheral Areas of Chandigarh comprised temporary hutments in Sectors 14,25 and 30. Together, these covered a small area and the sites were not clearly demarcated (Fig.57). In 1971, the peripheral areas included labour colonies in Sectors 14,26, and 30 and slum pockets located in other Sectors (Fig.58). These covered an area of 1.47 sq. kms or 3.15 per cent of the total city area. In 1981, the Peripheral Areas in Chandigarh comprised labour colonies located in three adjoining villages, Ram Darbar, Korsan and Dadu Majra (Fig.59). Together these covered an area of 0.56 sq. kms or 0.95 per cent of the total city area. By 1991, the Peripheral Areas had expanded considerably. These comprised slums and labour colonies located within the city limits, and EWS and Milkmen colonies located in villages adjacent to the city (Fig.60). Their area increased from 0.56 sq. kms in 1981 to 13.30 sq. kms in 1991 or 19.10 per cent of the total city area. This was larger in size than the two outer annules of the city, that is, the fourth and fifth annules. Locationally, the proximity of these slums and labour colonies to such work areas as the Capitol Complex, PGI, University, Industrial Area and the Wholesale Markets is striking.

In 1961, the slums in Sectors 14,25,30 had a population of 6,684 persons, which accounted for 7.48 per cent of the total population of the city. As the pace of development of the city quickened, a corresponding growth in the Peripheral Areas also took place. By 1971, their population had increased to 17,530 persons, constituting 8.02 per cent of the city population. The proportion of the city population residing in these areas was higher than the proportion living in the fourth and fifth annules of the city in both 1961 and 1971. The vitality of the Peripheral Areas is indicated by the higher growth rate of its population (162.27 per cent) as compared to the city average of 144.89 per cent during 1961-71. In 1981, the population of these areas declined by 3,738 persons or by 21.32 per cent. This was due to a change in the census demarcation of these areas. The colonies in Korsan, Ram Darbar and Dadu Majra had a population of 13,792 persons, which comprised 3.63 per cent of the total city population. By 1991, however, the
inclusion of other slums, labour, EWS and Milkmen colonies resulted in an increase by 71,800 persons or 521 per cent during 1981-91. The total population was 85,592 persons or 16.77 per cent of the city population in 1991. Significantly, this proportion was higher than that found in the two outer annules as well as the core or the first annule.

The Peripheral Areas in Chandigarh, as is true of other cities, are densely populated. In both 1971 and 1981, the population density of these areas (11,925 and 24,629 persons per sq. km. respectively) was higher than that recorded in any of the five annules identified for the city. In 1991, the population density declined by 18,194 persons per sq. km and was 6,435 persons per sq. km. This decline was due to the enumeration of a large number of new areas, resulting in an increase in the total area. Interestingly, the Peripheral Areas have registered a high and increasing proportion of both census houses and households, from 7.8 and 7.83 per cent respectively in 1961 to 16.41 and 16.15 per cent respectively in 1991. The figures for 1991 were higher than the proportion of census houses and households recorded in the outer two annules as well as the first annule or the core. The high density of population is also reflected in the size of household. It was fairly small in 1961 and 1971 (3.95 and 3.94 persons respectively). However in 1981 (4.5 persons) and 1991 (4.62 persons) it was marginally higher than the city average of 4.45 persons. Since these settlements mainly comprise of small sized one room tenements, the level of residential crowding is very high.

In terms of the various socio-economic attributes, the Peripheral Areas, in 1961, had a sex ratio of 661 females per 1000 males. This was higher than the city average (625 females per 1000 males) and all the annules, except the first annule or the core. The sex ratio of the Peripheral Areas improved to 674 and 778 females per 1000 males in 1971 and 1981 respectively. These figures were, however, lower than the city average of 752 and 780 females per 1000 males for 1971 and 1981 respectively. In 1991, the sex ratio of the Peripheral Areas declined by 40 females per 1000 males, and was 738 females per 1000 males. This was much lower than the city average of 817 females per 1000 males.

The Peripheral Areas, expectedly, have low literacy levels, 22.95, 33.83, 34.11 and 46.59 per cent in 1961, 1971, 1981 and 1991 respectively. Even though there has
been an increase in the number of literates, the proportion of literates has consistently remained lower than the city average.

Axiomatically, these areas have a high proportion of workers. It was as high as 48.27 per cent in 1961. Approximately 68 per cent of the workforce was enumerated in the 'construction' sector in 1961. Even though the proportion of workers declined from 48.27 per cent in 1961 to 39.34 per cent in 1971, there was an absolute increase by 3670 workers, or a growth rate of 107.3 per cent during 1961-71. During this decade, approximately 30 per cent of the workforce was enumerated in the 'services' category and 22 per cent in 'construction'. During the following two decades, the proportion of workers declined further to 34.43 per cent in 1981 and 34.19 per cent in 1991. However the decline was marginal. This and the moderate sex ratio attests to the presence of women and dependents in these areas. Services, construction and trade and commerce were the major occupations.

The proportion of Scheduled Castes persons in these Areas has consistently been more than one-fourth of the population and among the highest in the city. In 1961, the Scheduled Castes population comprised 28.88 per cent of the total population. This declined marginally to 26.18 per cent, despite registering an absolute increase by 2659 persons, a growth of 137.70 per cent during 1961-71. The proportion of Scheduled Castes population increased from 26.18 per cent in 1971 to 55.62 per cent in 1981 to decline again to 29.39 per cent in 1991. The decline during 1981-91 was despite an absolute increase by 17,484 persons or a growth by 228.0 per cent.

Outgrowths

In the 1981 census, two urban Outgrowths, Buterla and Badheri, were identified for Chandigarh. These have developed around former village settlements of the same name, and are located within Sector 41, a high density Phase II Sector (Fig.59). Together, these Outgrowths cover an area of 0.11 sq. kms., forming 0.19 and 0.16 per cent of the total city area in 1981 and 1991 respectively. The area of Buterla is 0.05 sq. kms and that of Badheri, 0.06 sq. kms. In 1981, the combined population of these two Outgrowths was 5,871 persons forming 1.57 per cent of the total city population. While Buterla registered 2,407 persons, Badheri was the more populous of the two with a population of 3,464 persons. In 1991, their combined populations had increased to 6,471
persons, at a comparatively low growth rate of 10.22 per cent. Between the two Outgrowths, Buterla had a population of 2718 persons while Badheri registered 3753 persons in 1991. The small change in their populations suggests that these are not major areas of migrant labour.

Both Buterla and Badheri are densely settled areas. In 1981, the former had a density of 48,140 persons per sq. km, and the latter, 57,733 persons per sq. km. Thus, the combined population density, 53,373 persons per sq. km., was extremely high and considerably higher than the population density in the various annules in the city. In 1991, the density of the two Outgrowths increased further by 5454 persons per sq. km., and was 58,827 persons per sq. km. The population density of Buterla was 54,360 persons per sq. km., and of Badheri, 62,550 persons per sq. km. The average size of the households in these Outgrowths in 1981 as well as in 1991 (3.88 and 3.95 persons respectively) was lower than the city average (4.45 persons). The Outgrowths had less than 2 per cent of the total number of census houses and households in the city in 1981 as well as 1991.

Among the various socio-economic attributes, these Outgrowths have a low sex ratio (714 and 691 females per 1000 males in 1981 and 1991 respectively) as compared to the city average of 780 and 817 females per 1000 males respectively.

The literacy rates of the Outgrowths have been significantly lower than the city average, 49.92 and 62.06 per cent as compared to 68 and 70 per cent for the city in 1981 and 1991 respectively. However, the proportion of workers in the two Outgrowths in 1981 and 1991 (34.63 and 35.14 per cent respectively) was comparable to the city average of 34 per cent and is indicative of the presence of families in these Outgrowths.

In 1981, the proportion of Scheduled Castes population in the Outgrowths was 25.29 per cent. This was higher than the average for the city (12.63 per cent), and was also higher than the proportion of Scheduled Castes persons in any of the five annules in 1981. While the proportion of Scheduled Castes population in Buterla was 30.6 per cent in 1981, it was 21.59 per cent in Badheri. In 1991, this proportion declined to 16 per cent in case of the former and to 14.44 per cent in case of the latter. Even though, the average proportion of Scheduled Castes population for the Outgrowths
declined to 15.03 per cent in 1991 from 25.29 per cent in 1981, it continued to be among the highest in the city.

SUMMARY

The spatial structure of a city can be defined in terms of its functions, the characteristics of its population and the spatial manifestations of its physical form. Attempts to explain and describe these spatial patterns have led to the formulation of a number of theories and techniques, which usually emphasize the dominating role of the City Centre in influencing urban spatial patterns in terms of such attributes as housing, ethnicity and social status. However, inherent differences in historicity, culture and technology result in varying relationships between these attributes and the City Centre. Thus, while cities in developing countries have succinctly been described as ‘Centre-Rich and Periphery-Poor’, the reverse is generally true of cities in developed countries. Indian cities are characterized by a duality in structure, owing to a long urban tradition and the more recent colonial influence. Nevertheless, the City Centre has always functioned as a major social and morphological nuclei, and has been associated with such requirements as protection, prestige and proximity. The latter two factors continue to be important even today, reiterating the dominating influence of the City Centre.

In the context of the traditional structure and factors associated with Indian cities, Chandigarh represents a unique and contemporary urban structure. Its structure, like that of other cities, is a product of its physical form and socio-economic attributes of population. However, unlike other cities, the role of these factors has been mediated through a detailed plan framework. This chapter has attempted to describe the spatial structure of Chandigarh, particularly in terms of the increasing distance from the City Centre, the changes in the spatial patterns over time, and the effect of the plan provisions on these patterns. For this purpose, successive annules around the City Centre, Sector 17, were identified for each census year from 1961 onwards. Thus, Annule I comprises of the central Sectors located around Sector 17, that is, Sectors 8, 9, 10, 16, 18, 21, 22 and 23. Annule II includes Sectors contiguous to the first annule, that is, Sectors, 2,3,4,5,6,7,11,15,19,20,24,33,34,35,36 and 37. On the same principle, Annule III comprises of Sectors 1,12,14,25,26,27,30,32,38,40,41,42,43,44,45 and 46; Annule IV
includes Sectors 28, 29, 31, 39, and 47, and the functionally segregated Industrial Area forms the fifth Annule. The structure of the Peripheral Areas, comprising slums and labour colonies, and Outgrowths has also been described.

Since its inception there have been definite changes in the spatial structure of Chandigarh with reference to distance and location from the City Centre. In 1961, the distribution of population, density, sex ratio and literacy conformed to the well established relationship of a decline in the level of concentration with increasing distance from the City Centre. The exception to this general pattern were the Peripheral Areas, comprising of slums and temporary hutments, in which the proportions were higher. In comparison, the distribution of both workforce and Scheduled Castes population revealed a positive relationship with increasing distance from the City Centre. Nevertheless, irrespective of a positive or inverse relationship with distance from the City Centre, a significant change in the distribution patterns occurred after the third annule. By 1991, in fact, this annule was to emerge as the largest in the city, housing the highest proportion of city population. In 1971, the development of nine new Sectors in the Second Phase of the city’s plan added an element of dynamism to the city structure. Generally, the distribution of population, density, sex ratio and literacy remained inversely correlated with distance from the City Centre. However, a more even distribution of workers emerged, with the first four annules registering approximately 32 per cent of their population as workers. The proportion of workers was, expectedly, the highest in the fifth annule or Industrial Area (55 per cent). The proportion of Scheduled Castes persons continued to be the highest in the Peripheral Areas (26.18 per cent).

The spatial structure of the city in 1981 was characterized by the development of eight additional Phase II Sectors and considerable infilling of the Phase I Sectors. Consequently, the first annule, comprising the central Sectors, was replaced by the second annule as the area of highest proportion of the city population. In fact, the proportion of city population living in the first and the third annules was almost the same (24.3 and 23.95 per cent respectively). This could be taken as an indication of higher levels of growth and concentration of population in the outer annules and Sectors and a stability of population in the central Sectors. Except for this shift, the pattern of distribution of population in the city conformed to the pattern identified earlier, that is, a
decline in the proportion of population, density, sex ratio and literacy with an increase in distance from the City Centre, while the reverse was true for the distribution of Scheduled Castes population. The next decade, 1991, saw a further outward shift in the area of highest proportion of city population, with the third annule having the largest concentration of city population (27.40 per cent). This was due to the limited expansion of housing possible within the earlier developed Sectors in the Chandigarh plan. More importantly, the relationship of most other attributes of population, such as, density and sex ratio, became positive with increasing distance from the City Centre. This was in sharp contrast to the 1961 pattern.

Significant intra and inter annular differences, in terms of the development of Sectors, planned density levels, housing facilities and infrastructure, can be identified. The first annule, comprising of Sectors located contiguous to the City Centre, represents the central parts of the city. These Sectors were among the earliest to be developed in Chandigarh, an attribute comparable to the central parts of evolved towns. This annule is mainly residential in nature. However, there are significant differences in the size of plots and the category of government employees to be housed in the Sectors of this annule. These differences are particularly marked between the northern and southern Sectors of this annule. This annule was the zone of highest concentration of city population in 1961 (35.15 per cent). Since then, a steady decline in this proportion, a decelerating rate of growth of population and a population in excess of its planned levels by 1981, suggests an almost complete infilling of the Sectors in this annule. Such filling up of residential Sectors can probably be discerned only in a planned city like Chandigarh. The inertia of the core that became apparent in 1981 became marked in 1991, with an absolute decline in its population by 13,208 persons. The proportion of population housed in this annule also declined from 24.3 per cent in 1981 to 15.49 per cent in 1991. This reflects the limited expansion of housing possible within a planned framework and the probable shifting out of the population from these Sectors. This annule has consistently registered a high density of population. The high ratio between census houses and the number of house structures suggests a high degree of apportioning and vertical development, indicating residential overcrowding. In this respect, this annule bears a striking resemblance to the central areas of evolved towns. This annule
has consistently registered a high proportion of literates (80.10 per cent in 1991), a high sex ratio (827 females per 1000 males), a moderate proportion of workers (35.5 per cent) and a low proportion of Scheduled Castes population (3.76 per cent). While the associations with the former three attributes include the presence of a well developed housing infrastructure, the latter attribute conforms to the generally low levels of Scheduled Castes population in the central areas of other Indian cities. Interestingly, despite the decline in the population of this annule during 1981-91, the sex ratio registered a growth by 27 females per 1000 males, and the proportion of literates increased from 77.86 per cent in 1981 to 80.10 per cent in 1991. The almost similar levels of workforce in 1981 and 1991 suggest a stabilization of population in this annule. The functional structure of the constituent Sectors of this annule has become increasingly diversified with the development of the city. The location of the City Centre in this annule has promoted significant commercial development, for example, major commercial ribbons, specialized and rehri markets, in the Sectors around it. This annule also has a well developed infrastructure of educational and recreational facilities. Despite being an area of intense crowding, its central location in the city, proximity to the City Centre, Capitol Complex and Educational Zone, and the presence of well developed urban infrastructure make this annule an area of intense competition.

The second annule, comprising eleven Phase I and five Phase II Sectors, is located in contiguity to the first annule. The Sectors comprising this annule differ from each other in terms of plot size, income levels and population densities, so far as the plan proposals are concerned. Their common feature is their location with reference to the central and early developed Sectors in the first annule and proximity to the City Centre. Among the Sectors in this annule, those located to the north were planned as low density areas with large sized private and public plots. The Sectors located to the east and west were planned with mixed private, public and institutional housing as medium and high density areas. The Phase II Sectors located on the southern margins were initially planned with private housing. Later CHB flats and institutional housing were developed in them.

Till 1971, this annule had the second highest proportion of city population. The bulk of the population of this annule was concentrated in the earlier developed Phase I
Sectors. In 1981, this annule emerged as the most populous area in the city, with a population of 125,340 persons, accounting for 33 per cent of the city population. It thus replaced the core as the zone of highest concentration of city population. The vitality of this annule was reflected in the fact that six out of its eleven constituent Phase I Sectors exceeded their planned populations in 1981. In addition, the Phase II Sectors in this annule registered the highest rates of population growth during 1971-81. In 1991, the proportion of city population housed in this annule declined from 33 per cent in 1981 to 25.31 per cent in 1991. Thus, from being the area of highest concentration of city population in 1981, this annule was now ranked second. More importantly, the Phase II Sectors accounted for a larger proportion of the annule’s population, suggesting a southward shift in the area of population concentration in the annule as well as the city. Even though the population of seven of its eleven constituent Phase I Sectors declined during this decade, the population of many of these continued to be in excess of their planned targets. In 1991, the total population of this annule was nearly 18 per cent short of its planned target of 158,400 persons, suggesting possibilities for future growth, particularly in the Phase II Sectors. Like the central Sectors forming the core, the second annule has also consistently registered a high population density. In 1991, it emerged as the most densely populated annule in the city (9644 persons per sq. km), despite decelerating growth rates and a decline in the proportion of city population housed in it.

Like the first annule, the second annule is also characterized by high literacy rates, high sex ratio and a moderate but growing proportion of workers (79.42 per cent, 861 females per 1000 males and 34.56 per cent respectively in 1991). While these characteristics are expected in view of the well developed public and private housing facilities in its constituent Sectors, the steadily increasing proportion of workers in this annule is specifically related to the development of new work areas in and around the Phase II Sectors of this annule. The proportion of Scheduled Castes population is low, but higher as compared to the core (8.54 per cent in the second annule and 3.76 per cent in the first annule in 1991). Since 1981, the Phase II Sectors of this annule, located south of Dakshin Marg, have become the focus of development activities, resulting in a southward shift in the areas of concentration of population, institutions, business and commercial establishments. The most important of these developments has been the
establishment of the first city sub-centre in Sector 34. It is possible to identify three
groups of Sectors within the second annule (i) the northern low density high status
Sectors having restricted housing facilities (ii) the central Sectors, which have emerged
as areas of decline following the saturation of existing housing facilities, but continue to
be areas of high crowding owing to their proximity to institutional areas, and (iii) the
southern Sectors, which have emerged as areas of infilling, dynamism and growth.

The third annule comprises of seven Phase I and nine Phase II Sectors located
on the northern, western and southern margins of the city. The Sectors included in it on
the eastern side do not form the eastern margins of the city. This annule is the largest
among the five annules in terms of the area covered (21.05 sq. kms). Important
differences exist between the Phase I and II Sectors of this annule in terms of their
functional character, nature of housing, period of development, socio-economic attributes
and planned population levels. All the Phase I Sectors in this annule, except Sector 27,
which is residential, are institutional areas with restricted housing. In comparison, the
Phase II Sectors, in addition to housing a number of institutions, have extensive multi-
storied residential development. Till 1981, this annule had a low proportion of the city
population (23.95 per cent), low density of population (4009 persons per sq. km.), low
sex ratio (697 females per 1000 males), low literacy rates (57.66 per cent) and a high
proportion of workers (36.56 per cent). This was associated with the restricted housing
facilities in most of the Phase I Sectors of this annule, and the early stage of development
of the Phase II Sectors. In 1991, however, there was a reversal of these attributes. The
annule emerged as the most populous area in the city, having the highest proportion of
city population among the five annules identified for Chandigarh (27.40 per cent).
Approximately 64 per cent of the population of this annule was in its Phase II Sectors,
and the remaining 36 per cent in the Phase I Sectors. During the previous decade, the
comparative figures had been 23 and 77 per cent respectively. This suggests, as in the
case of the second annule, a major shift in the area of concentration of population of this
annule. Further, the annule was characterized by a high sex ratio (848 females per 1000
males), high literacy rate (74.4 per cent) and a moderate proportion of workers (33.16 per
cent in 1991). Even though the population density in this annule increased by 2637
persons per sq. km. during 1981-91 and was 6646 persons per sq. km. in 1991, it was
lower than the population density in the inner two annules. The low population density in this annule may be related to the restricted housing facilities in most of the Phase I Sectors of this annule. The annule has consistently recorded a high proportion of Scheduled Castes population, in fact, the highest in the city since 1971, due to the peripheral location of most of its Sectors, the presence of slums and labour colonies, the development of EWS housing, and proximity to avenues of domestic and menial labour in such areas as the PGI, the University, the wholesale market and the Capitol Complex.

Functionally, this annule houses a variety of institutions and establishments. The southern Phase II Sectors, in particular, have emerged as sites of new work areas. Unlike the inner two annules, the Sectors comprising this annule do not have any major commercial area or specialized markets. Large portions within the southern Sectors in this annule have been reserved for future city-level commercial and institutional developments. The Phase I Sectors of this annule have emerged as areas of stagnation and even decline in absolute population, while the Phase II Sectors constitute one of the most dynamic areas in the city. The fact that the population of the Phase II Sectors included in this annule is still well short of the proposed targets, highlights the potential for future growth. This also suggests a shifting of the area of population concentration in the city from the core to the periphery, or more specifically to the southern periphery of the city.

The fourth annule comprises of five Sectors, four of which are located on the south-eastern and one on the south-western periphery of the city. It covers an area of 5.55 sq. km., and is the smallest among the five annules identified in the city. Locationally, the Sectors of this annule are similar to those comprising the third annule, and like it, have been growing rapidly. This annule has emerged as a densely populated area, with a small but growing concentration of population. The considerable gap between the actual and planned population of this annule (50,655 persons in 1991 in comparison to a target population of 81,300 persons) indicates its potential for growth in the future. This annule is mainly residential in nature, with private and institutional housing and HIG, LIG and EWS houses developed by the Chandigarh Housing Board. Its socio-economic character is, therefore, fairly predictable, a population with a high sex ratio, high proportion of literates and moderate proportion of workers (853 females per
1000 males, 73.25 per cent and 31 per cent respectively in 1991). However, its peripheral location with reference to the city and proximity to the Industrial Area have resulted in a high proportion of Scheduled Castes population living in it (13.87 per cent in 1991). Land for future development of offices and institutions has been reserved in the Phase II Sectors of this annule.

The fifth annule identified in the city comprises of the Industrial Area (Phase I and Phase II), located on the eastern margin of the city and forming a major functional zone. The Industrial Area is comparatively sparsely populated, mainly due to the limited availability of housing facilities (2951 persons per sq. km in 1991). In 1991, it accounted for 3.56 per cent of the total city population. Its functional nature is reflected in the socio-economic attributes of its population, namely, a low sex ratio, a low literacy rate, a high proportion of workers and a very high proportion of Scheduled Castes population (646 females per 1000 males, 38.37 per cent, 40.69 per cent and 70.96 per cent respectively in 1991).

The Peripheral Areas in Chandigarh comprise slums, squatter settlements, labour colonies and EWS housing areas. In their composition, the Peripheral Areas of the city resemble similar areas found in most Indian cities and towns. The emergence of these areas can be partly attributed to a surprising oversight in the formal plan framework of the city, which completely ignored the role of the informal sector in Chandigarh. The present location of these settlements on the peripheries in Chandigarh is related to remedial administrative decisions. The Peripheral Areas of Chandigarh consistently had a fairly high concentration of population. By 1991, the proportion of population living on the peripheries (16.77 per cent) was higher than the one living in the two outer annules (9.92 and 3.56 per cent respectively) as well as the first annule or the core of the city (15.49 per cent). As in other cities and towns, the Peripheral Areas in Chandigarh are densely populated (6435 persons per sq. km. in 1991). This coupled with a fairly large average size of the household (4.62 persons in 1991) attests to the congested living conditions. The sex ratio of population in these is moderate (738 females per 1000 males in 1991). The Peripheral Areas in Chandigarh are characterized, as is true of such areas in other cities, by low literacy rates (46.59 per cent), a workforce level comparable to the central annules (34.19 per cent), and a high proportion of Scheduled Castes population...
The location of the peripheral settlements in proximity to major work areas in the city is striking.

The two Outgrowths in the city, Buterla and Badheri, located in Sector 41, were first recognized by the census in 1981. These have developed around former village settlements of the same name. Even though they account for less than 2 per cent of the total city population, the highest population densities in the city occur in these (58827 persons per sq. km. in 1991). The Outgrowths are characterized by a low sex ratio (691 females per 1000 males), a low literacy rate (62.06 per cent), a moderate proportion of workers (35.14 per cent), a fairly high proportion of Scheduled Castes population (15.03 per cent), and a comparatively small average size of households (3.95 persons in 1991). Their presence within a planned city, like Chandigarh, may appear surprising, but is in reality a product of the general policy of acquiring only the land of villages leaving the settlement (abadi) area, which invariably whether a city is planned or evolved, emerges as a discordant area within the city.

References and Notes


