

SUBURBANIZATION AND DEMOGRAPHIC CHANGES IN THE  
DELHI FRINGE AREA, 1951-71

by

MAHESH KUMAR PACHAURI  
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DATE

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DEAN

We accept this thesis as conforming to  
the required standard

Dr. Charles N. Forward

Dr. Malcolm A. Micklewright

Dr. Izzud-Din Pal

Dr. William H. Alkire

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Supervisor: Professor C.N. Forward

### ABSTRACT

This study is concerned with the impact of the city of Delhi on the rural settlements of its fringe in terms of the processes involved in changing the socio-economic and demographic structure. The study revealed that there are substantial differences between India and the United States in these aspects. The spatial heterogeneity of suburbanisation in the Delhi area required identification of four ecological regions, namely, the city, suburbs, fringe and rural area. Since the transition from urban to rural is not abrupt, the fringe was divided into four units of a decreasing order of urban influence: the true urban fringe, partial urban fringe, partial rural fringe and true rural fringe. These were defined by a technique involving the superimposition of maps prepared for four Indices of suburbanisation: considering sex ratio, density of population, ratio of farm workers and ratio of tertiary workers.

Historical evolution, population growth and migrational patterns were found to be main determinants of the suburbanisation process in the region. The incorporated area after 1951 was approximately half of the total urban area of Delhi in 1971, which included 21 percent of the rural settlements under study. The rural population of Delhi Union

Territory which amounted to approximately 49 percent of the total in 1901 was reduced to only 10 percent by 1971. Study of the physical and structural processes of suburbanisation revealed that the maximum urban impact was visible on the rural settlements located up to 16-19 kilometers away from the city centre.

The socio-economic and demographic characteristics were hypothesised to vary with levels of suburbanisation in a logical order in various ecological units over time. The study revealed that the density of population in the region was positively related with the level of suburbanisation. The high degree of compactness of the city was indicated by the steep gradients of density from the city to peripheral rural areas in 1961, and in the 1951-61 period invading waves of suburbanization caused the depopulation of the agrarian community. Consequently, the population change during 1951-61 showed a negative relationship with the level of suburbanization, but during 1961-71 there was a positive relationship. The sex ratio showed a negative correlation with the level of suburbanization.

The study of the social fabric revealed that settlements with a high level of suburbanisation have small families. The high ratio of households per house in the urban fringe may be explained by the shortage of dwelling units, the high ratio of rented accommodation and the tendency to

maintain a single family system. The equality of sexes in literacy was higher in settlements with high suburbanisation. The availability of jobs in different locations in different periods resulted from two different relationships of workers with the level of suburbanisation. The female participation in the work force decreased in the fringe with increase in suburbanisation. However, their participation in the city during 1961-71 increased greatly, as they were attracted to higher-paying jobs.

The ratio of workers in primary occupations was low near the city, since farm-land was lost to urban land uses. However, there were some deviations from the general trend in case of female primary workers due to local factors. The ratio of secondary sector workers was high in the zones of high suburbanisation, though there were some exceptions because of the 'site factor'. The ratio of tertiary workers, conforming to the hypothesis, was positively related with the level of suburbanisation. The percentage change during 1961-71 in all three occupational categories showed that changes were generally greater in the case of female workers than of male workers. The variations of male workers were at a maximum in the rural fringe, while those of female workers were at a maximum in the urban fringe.

A comparative study of the Delhi fringe with those of United States cities revealed differences in the suburbanisation process and the location of various demographic and socio-economic factors.

The basic problem of the Delhi fringe is its unplanned use of land and growth of population, and its lack of civic amenities and responsible administration. It requires integrated planning at the metropolitan level, with three main thrusts: population planning, land use planning and economic planning.

Examiners :

[REDACTED]  
(DR. C.N. FORWARD)

[REDACTED]  
(DR. M.A. WICKLEWRIGHT)

[REDACTED]  
(DR. I.D. PAL)

[REDACTED]  
(DR. W.H. ALKIRE)

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## CHAPTER I - INTRODUCTION AND METHODOLOGY

### INTRODUCTION

The high density of population in cities, the rapid means of transportation and the development of industrial and residential suburbs in the city region are the main causes of the expansion of the 'social city' outside the city limits. Mackenzie (1933) recognised the metropolitan region itself as the child of the modern facilities of transportation and communication.<sup>1</sup> The centrifugal trend - the shift of the population from the heart to the limbs - is at work in most of the metropolitan areas of the world.<sup>2</sup> This trend has been visible in London for the last hundred years.<sup>3</sup> As centripetal movement is one of the factors in urbanization, the centrifugal trend is one of the forces of suburbanization. This process of suburbanization has given birth to the 'fringe' - a distinctive zone neither urban nor rural. 27, 91 12

Looking at urbanization from the demographic point of view, that is, as the proportion of the population living in towns and cities, India is in the midst of a gigantic urban increase.<sup>4</sup> An important aspect of this is the growth of the large metropolitan areas which have expanded into the surrounding countryside, bringing about a significant change in the life style of rural

community living in the areas identified as the 'rural-urban fringe'. An important characteristic is that urban influence has changed the outlook, social values, family structure and occupational composition of this region.<sup>5</sup> At the same time, the fringe has neither entirely shed its rural characteristics nor adopted urban features. However, the hypothesis regarding 'metropolitan dominance' states that in modern society the metropolis has tended more and more to control the conditions of life of the population in surrounding areas.<sup>6</sup> The extent of the zone of metropolitan dominance depends upon the intensity of the urbanisation process, defined by Carter (1972) in terms of the 'multiplications of points of population concentration' and the increase of the sizes of individual concentrations.<sup>7</sup>

Lampard (1965) suggested three concepts of urbanisation - behavioural, structural and demographic.<sup>8</sup> The first of these is concerned with the experience of individuals and their patterns of behaviour; the second is related to the activities of the population and changes in the economic structure and the third is primarily related to the concentration of population. Simply stated, urbanization can be defined as functional, structural, spatial and demographic growth when it is confined within the city limits and suburbanisation as the process

when these changes and growth extend beyond the limits of the city. Wirth (1938), however, differentiated between 'urbanization' and 'urbanism'. He formulated a theory of 'urbanism' based on the existing knowledge of social groups, where superficiality and the transitory character of urban social relations develop and where the clock and traffic signals are symbolic of the basis of our social order.<sup>9</sup>

Urbanism as a way of life is not confined to cities and towns, although it emerges from the great metropolitan centers. It is a way of behaving and that means one can be very urban in thinking and conduct although he may live in a village.<sup>10</sup> Urbanism, when extended beyond the corporate limits of the city, can be termed 'suburbanism' or suburbanization. Fava (1956) defined and brought out the main characteristics of 'suburbanism as a way of life'. Her paper investigated two questions; whether suburbanism as an ecological phenomenon is also accompanied by suburbanism as a social-psychological state, that is by suburbanism as a distinct way of life, and what conceptual approaches are likely to be fruitful in investigating the suburban way of life. She suggested that suburbanism is a way of life, as well as an ecological phenomenon, and accepted the hypothesis that suburban residents are

selected social-psychological types oriented towards neighbouring and other rural values and practices.<sup>11</sup>

It may be concluded that suburbanization denotes the extension of urban values, functions, land uses and demographic traits in the fringe settlements of the central cities. The process of suburbanization is in its infancy in India, but the great metropolitan cities like Delhi are exceptions. Within the last seventy years the population of the Delhi Union Territory has changed from 50 to 90 percent urban. This is mainly because of the high rural in-migration, increase in the city population and the extension of the urban limits of Delhi, incorporating the adjacent rural population. The fringe of Delhi is not only absorbing the migrants from the central city, but also the migrants from nearby rural areas. Now it has new colonies of the rich; old rural settlements engulfed by urban sprawl but yet not fully transformed; and unauthorized colonies of poor and lower middle class people in juxtaposition. Their characteristics are different from the people living in the Western city fringes where the majority of the people are of urban origin.

The purpose of the present study is to obtain information on the impact made by the spatial extension

of the city or its values on the villages of the fringe and to analyse the socio-economic and demographic characteristics, with a view to suggesting a planning programme for regional development. Such studies may be approached in two ways. The first focuses attention on the process of change of the rural communities living in the fringe under the influence of metropolitan growth and \* second highlights the colonization of the fringe and its consequent transformation by the urban folk. The present study adopts the first approach. However, since the study deals with the temporal process of suburbanization and many villages are now within the urban limits, the urban impact on these villages by the colonization of the fringe has also been studied. Since not all of the villages in the Delhi fringe have experienced the same intensity of urban influence, the fringe has been divided into several ecological regions of various levels of suburbanization. The study provides insight into the extent and intensity of the suburbanization process. It is expressed in terms of the socio-economic and demographic transformation of each ecological unit, by comparing each unit with the city and the suburban towns of the Delhi Metropolitan Region during the period 1951-71.

## LITERATURE REVIEW

Dynamism at the Edge of the City

Urban geography has been influenced strongly by the concepts of changing urban phenomena in terms of distance from the city centre. The centre has often been used as a point of reference from which the patterns of population, retailing and manufacturing have been appraised.<sup>12</sup> Von Thunen's (1826) scheme of land utilization in which he suggested concentric belts about the central city is probably the first such study which gave birth to the idea of changing phenomena away from the city centre.<sup>13</sup> Burgess (1923)<sup>14</sup> and Park (1936)<sup>15</sup> in their study of residential location and population distribution in cities conceived a similar system of concentric zones. Hoyt (1939)<sup>16</sup> and Harris and Ullman (1945)<sup>17</sup>, though, rejected the concentric pattern, but the concept of changing phenomena in a semi-concentric or sectoral pattern was found to be valid in later studies.<sup>18</sup>

Recent years have witnessed an expanded interest in the intra-urban variations of population density. The common view on this subject is that population density declines with distance from the centre of the city, a formulation based on the study undertaken in the late nineteenth century by Bleicher (1892) in Germany.<sup>19</sup> Notwithstanding the early German work, most of the con-

temporary studies are based on the pioneering investigations of Clark (1951).<sup>20</sup> The major findings of all such studies are: population density decreases from the centre of the city; more growth of population occurs at the periphery than at the centre; and there is a distinction between western and non-western cities in terms of density gradients.<sup>21</sup> Berry (1963) pointed out that 'in the west density gradients fall as cities grow; in non-western cities they remain constant. Hence, whereas both degree of compactness and crowding diminishes in the western cities through time, non-western cities experience overcrowding, constant compactness and a lower degree of expansion at the periphery than in the west'.<sup>22</sup> This suggests that in the non-western cities the peripheral shift of the 'crest of the wave (zone of the most rapid growth) of urban expansion' also differs through time from that of the western cities.<sup>23</sup> The most characteristic feature of present day urbanism is that of the dispersion of population from the city to the surrounding areas, as a result of which the suburbs gained their 'social significance'.<sup>24</sup> The population studies in most of the standard metropolitan statistical areas of North America show that the suburban rings are growing faster than the central cities.<sup>25</sup> The population change in these urban areas is the result of two opposed

streams, country to city and city to suburbs, with the latter gradually overwhelming the former. Johnston (1967) in his study of Melbourne also suggested that 'the majority of in-migrants to the city will first reside in the inner rental housing areas and will slowly proceed from there towards the outer suburbs'.<sup>26</sup>

#### Fringe: Development of the concept

The high cost of land within the city and the space needs of urban functions resulted in a shift of residences and institutions to outside the city limits. Various terms have been used to express the nature of this process, such as 'tidal wave',<sup>27</sup> 'leap frog',<sup>28</sup> and 'urban sprawl'.<sup>29</sup> 'Tidal-wave' and 'leap-frog' connote the discontinuous process in the distribution of urban phenomena in the fringe, while 'urban-sprawl' connotes a continuous process of suburbanization. The extent of this rural-urban fringe zone depends upon the intensity of the transformation within the central city and the degree of expansion of the transport, technologic and civic amenities in the fringe. In many cases the 'economic and sociological city', the area within which the people live the 'urban way of life', has extended far beyond the city limits. In other cases the farms on which the people live the 'rural way of life' are found

within the political boundaries of cities.<sup>30</sup> Much of the research has been focused on the distinctive physical characteristics and land use of the fringe and the distinctive social, population and economic characteristics of its occupants.

The peripheral areas of cities, now called the rural-urban fringe, received little attention until Burgess (1923) put forward his classical model of concentric zones. The fringe was not recognized separately in his scheme, but formed a part of one of the identified zones. For a long time the urban fringe remained a 'geographical no man's land' neglected both by geographers concerned with the internal structure of the city and planners making regional plans for the city hinterland. It has been called the 'institutional desert' because of the lack of planning and social amenities.<sup>31</sup>

Lively (1953) put forward three hypotheses regarding the rural-urban fringe: that the fringe occupies a position within a single rural-urban continuum; that it shows an overlapping of rural and urban distributions, creating confusion within the areas of overlap; and that the rural-urban fringe represents characteristics of both rural and urban, with some new ones found only in the fringe.<sup>32</sup>

### The Terms used

Smith (1937) was probably the first to use the term 'fringe'. He used the 'urban fringe' for the built-up area just outside the corporate limits of the city.<sup>33</sup> Black (1939)<sup>34</sup> used the term 'city fringe', while Wehrwein (1940)<sup>35</sup> and Salter (1940)<sup>36</sup> both used the term 'rural-urban fringe'. Thus began the recognition of the phenomenon. A vast literature on the fringe appeared during ensuing 30 years concerning its conceptualization, delineation, land use and agriculture, the land conversion process, the socio-economic and demographic characteristics and the problems and planning of the fringe. One of the important features of the fringe literature is the almost complete absence of explicit reference to the subject outside North America up to the end of the 1960's.<sup>37</sup>

Various terms, such as exurbia, suburban zone, country-city fringe, rural-urban fringe, urban fringe, commuting zone, urban shadow, have been used to describe the area outside the city and diverse attempts have been made to clarify these terms. Russwurm (1975) locationally defined the 'suburban zone' as the continuous built-up area and the 'commuting zone' as the entire area from which the people come to work in the city. He also used the term 'urban fringe' for the area adjoining the built-

up city and 'urban shadow zone' for the space between 'urban fringe' and 'rural'.<sup>38</sup> Kurtz and Eicher (1958), on the basis of location, land characteristics, growth and density, occupation and the governmental structure, differentiated between the 'fringe' and the 'suburbs'.<sup>39</sup> Martin (1957) used the term 'satellite rural area' in a very broad sense and included all varieties of suburbs, satellite cities, fringe areas, commuter zones and other such areas under the immediate influence of the central city.<sup>40</sup> Duncan and Reiss (1956), while studying the Chicago fringe community, differentiated between the urban fringe, rural non-farm and rural farm categories of the fringe community provided in the American census.<sup>41</sup> Mayers and Beegle (1947) used the terms 'true fringe', 'partial fringe' and 'adjacent rural' townships based on the percentages of non-village rural non-farm population outside Detroit.<sup>42</sup> Andrews (1942) differentiated qualitatively between 'urban fringe' and 'rural-urban fringe'.<sup>43</sup> Pryor (1968) also identified the two sub-sections of the fringe. He used the term 'urban fringe' for the zone contiguous with the central city, having a higher median density and a higher rate of land conversion into urban. His 'rural fringe' lay beyond the urban fringe, having a higher proportion of farm population and a lower density than the median for the total rural-urban fringe.<sup>44</sup>

### Definition and the Delimitation of the Fringe

Most of the studies on the fringe define and delimit it, based on the land use and social characteristics. Delimitation on social characteristics faces many difficulties. The intense interaction of the fringe settlements with the central city makes the distinction between urban and rural social structure difficult. The occupations upon which some authors have based their definitions and delimitations of the fringe provide an imperfect guide, since with easier methods of travel both urban and rural jobs may be undertaken by the members of the same family. Johnson (1976) was, therefore, inclined to think that land use rather than the social and employment factors would provide a more reliable guide to the character of the fringe.<sup>45</sup> But the non-availability of detailed land use maps and aerial photographs makes studies based on them impossible. This is especially true in the case of India where aerial photographs are not released for research purposes. Therefore, in India the social factors provide a better framework for delimitation of the fringe. The following review of definitions of the fringe gives insight into the related concepts and criteria for this investigation.

Wehrwein (1942) defined the rural-urban fringe as 'the area of transition between well recognized urban

land uses and the area devoted to agriculture' and suggested that the rural-urban fringe can better be identified in terms of land uses, or modifications of land uses, than in any other way.<sup>46</sup> Arpke (1942), adopting the cultural approach, defined the urban fringe as the place where 'cultural development takes place outside the political boundaries of the central cities and extends to the areas of predominantly agricultural activity'. He suggested the political boundary of the central city as its inner limit.<sup>47</sup> Andrews (1942), considering land use as an important element, defined the rural-urban fringe as 'that area adjoining the urban fringe (which he defines as the active expansion sector of the compact economic city) outward from the economic city in which there is an intermingling of characteristically agricultural and characteristically urban land uses... this area is to be defined less as an active expansion area of the city and more as a transition area...'.<sup>48</sup>

Beegle (1947), using a functional criterion, defined the fringe as having 50 percent or more non-village rural non-farm (NV-RNF) residents after eliminating all urban, rural farm and incorporated village dwellers.<sup>49</sup> Mayer and Beegle (1947) later used the same

criterion for delimiting the Detroit fringe and identified four categories of the fringe, ranging from less than 25 to a maximum of 100 percent NV-RNF population, and also two broad categories of true-fringe and partial-fringe townships.<sup>50</sup> Rodehaver (1946) defined the rural-urban fringe as 'that area in which the land is utilized in an urban manner while at the same time certain attributes of rural are present as well'. His study of the 49 sectors near Madison was based on the three criteria of proportion of non-farm families to the total, the density of non-farm families per square mile and the assessed valuation of land and buildings per acre.<sup>51</sup> Throop (1948), emphasizing the administrative criterion defined the suburban zone as the 'unincorporated, semi-urban, semi-rural portion of the metropolis in which the governmental unit is not vested with the general powers commonly delegated to incorporated governmental units'.<sup>52</sup>

Blizzard and Anderson (1952) based their methodology of delineation of the fringe around Williamsport on reconnaissance and inspection. They identified the outer boundary of the fringe where agricultural land uses predominated and inner boundary where full city utility services ended. They defined the 'fringe as an area of land use contrasts...contrasts in economic enterprises and in levels of living...'.<sup>53</sup> In Columbia, Missouri,

Gist (1952) included all country families who resided at least half a mile beyond the city's boundary and who had one or more members of the household gainfully employed in the city of Columbia.<sup>54</sup> MaKain and Burnight (1953) identified the fringe within the Hartford Metropolitan Area based on the four criteria: (1) towns containing only rural population, (2) towns within easy commuting distance of urban centres, (3) towns having a population increase of over 60 percent, and, (4) towns having 75 percent of their population increase derived from net immigration.<sup>55</sup> Queen and Carpenter (1953)<sup>56</sup>, Duncan and Reiss (1956)<sup>57</sup> and Pahl (1965)<sup>58</sup> used the census figures on the administrative areal units to identify the fringe.

Pryor (1968) defined the rural-urban fringe as 'the zone of transition in land use, social and demographic characteristics'. He presented a model showing retreat of the rural fringe with the increase of the urban fringe. He suggested it to be a 'process-response model' where urbanization (growth in city size and in the percentage of urban population) results in land use conversion (decline in agricultural acreage and in the percentage of rural population).<sup>59</sup> Russwurm (1975) used 70 percent or more population in non-farm occupations to identify the urban fringe and further divided it into four sections based on the various degrees of density.<sup>60</sup>

The complexities of delimitation techniques are the result of the complex nature of the fringe itself. A single fringe may show an 'urban continuum' at one point, at another it may have an 'overlap' of rural and urban features, and at yet another it may show 'distinct' characteristics. There appear to be two general approaches in the delimitation of the fringe; one is to present definite delimitation techniques, applying certain statistical values to the minor civil divisions, while the other is to present generalized concepts based on the observation of the fringe area.

Again, there are definitions which exclude or include the incorporated territory in the fringe. Wehrwein's and Andrews' belong to the former category, while the Arpke's and Throop's belong to the latter. Some studies have tried to identify the sub-divisions of the fringe, while other have not. Only in a few has the fringe been identified as non-homogeneous. One or two have used a combination of various factors, giving equal weight to all, but none have applied a definite scale of factors used to identify the various sections of the fringe, based on the intensity of the urban impact.

### The Suburbs

At this stage it is important to identify the other units of the urban region and differentiate between them.

Jaco and Belknap (1953) considered the 'fringe' as including suburbs, satellite cities and other territory located immediately outside the central city whose labour force is engaged in non-farm activities.<sup>61</sup> However, there are vast differences between the socio-economic characteristics of the fringe and the suburbs. For example, the Delhi fringe has approximately 33 percent farm workers, while the suburbs have less than 4 percent.

The suburban zone is an extended zone of the city and is different from the 'suburbs'. The suburban zone is a continuously built-up area just outside the central city which includes the urban fringe, as well as a few suburbs within it. The suburbs are distinct urban entities located in or outside the corporate limits of the city, but closely integrated into the economic life of the city.<sup>62</sup> Harris (1943) considered those urban places as suburbs which were within the limits of the metropolitan district, but outside the central city.<sup>63</sup>

Again, the suburban zone is different from the 'commuters zone' which may be far more extensive, the entire zone from which the people come to work in the city, including the suburbs. The 'urban fringe' is less inclusive than the commuting zone or the hinterland.<sup>64</sup> The most clear-cut distinction of the various ecological

units of the urban region has been presented by Boscoff (1970). He indicated various characteristics of the units and distinguished between the suburbs, urban fringe, exurbia and the satellite city.<sup>65</sup> However, there is no consensus on definitions or criteria for urban fringe, rural fringe, exurbia, central city or suburbs.

#### Socio-Economic Characteristics of the Fringe

Golledge (1960) suggested that under the urban invasion the peripheral areas of the city develop various characteristics, such as a changing pattern of land occupancy, smaller farm sizes, more intensive production of crops, more mobile population, rapid residential expansion and incomplete provision of public utility services.<sup>66</sup> The physical transformation of the fringe affects the quality of life, levels of living and the socio-economic and demographic structure of its residents. This produces a distinctive form typical of the fringe. Various studies deal with the process of suburbanization, the socio-economic life and demographic and ecological factors in the fringe, the land conversion process from agricultural to urban land uses, the socio-psychological factors of the fringe population, the reasons for their migration to the fringe and the problems and the planning approaches to the fringe. Most of the studies overlap in two or more of the above aspects in their analyses. Studies dealing with the socio-economic transformation of the people living in the fringe are the most numerous.

Four types of people have been identified as living in the fringe: (1) people who moved to the fringe for a better environment, less congestion, large plots and low taxes, such as in the United States city fringes, (2) people who were living in settlements that became incorporated as a result of the physical expansion of the city, (3) people who were in settlements not yet incorporated, but who were experiencing the impact of suburbanization in their rural location, and, (4) rural people who migrated to the fringe for economic reasons. The characteristics of the people in the fringe depend upon whether they migrated from the rural areas or from the central city, and how long they have been in the fringe. It has been observed that the longer they stay in the fringe the more they adopt the 'suburban way of life' leaving behind the 'rural way of life'. The fringe where the rich people are moving from the central cities will be different from the fringe where the poor and lower middle class people are coming from the rural areas and small towns in search of work. This appears to be the major difference between the United States metropolitan fringes and the Delhi metropolitan fringe. Clark (1966) also expressed the same view and suggested that the suburban society 'differs from the urban society in that it is an urban society not yet complete. Much of what makes up a society is carried with them by the people moving from

the city to the country but much is left behind'.<sup>67</sup>

The major work on the socio-economic and demographic characteristics of the people living in the fringe appeared in the late 1940's and afterwards, especially by American sociologists. They developed the main themes on the characteristics of the fringe population and compared them with the characteristics of the people living in the central cities and in rural areas. Some of the important findings of their work are quoted as follows :

Rodehaver (1947):

"(Rural people) migrated to the fringe in search of employment and education, whereas later (urban people) moved to escape the congestion of their former city environment."<sup>68</sup>

Mayer and Beegle (1947):

"The fertility ratio... for Detroit city is 272, for the true fringe 433 and for the partial fringe 450."<sup>69</sup>

Beegle (1947):

"Sex ratios (number of males per 100 females) for the fringe, adjacent farm and urban areas are 114, 114 and 102 respectively."

"...rural farm population characteristically contains large proportions of children, small proportions in the productive years and fairly large proportions of aged persons; the urban population has a deficiency of children, high proportions in the productive ages and relatively few aged persons."<sup>70</sup>

Blizzard and Anderson (1952):

"The fringe presents...the conversion of buildings both in degree and type...contains many unfinished structures, some occupied and some unoccupied.... Undeveloped plotted land is a definite fringe phenomenon."<sup>71</sup>

Queen and Carpenter (1953):

"The fringe areas clearly display both an intermediate position between urban and rural characteristics and a lower socio-economic status than the city."

"The fringe resembles the city most closely with regard to industry and employment, least with regard to fertility and gainful employment of women."<sup>72</sup>

Duncan and Reiss Jr. (1956):

"Central cities have relatively more females than do suburbs."

"Suburban population is younger than the central city... high fertility ratio and high dependency ratio in suburbs."

"More married persons in suburbs and fringe; more widowed and divorced in central city and more separated in central city."

"Persons whose residence was a farm constitute a slightly larger percentage of in-migrants in the central city than in the suburbs."

"Educational attainments of suburbs and urban fringe people are higher than of the people of the central city."

"Female labour force participation (percentage of females) is higher in central cities than in suburbs. In the case of males the rate of labour force participation (percentage of males) is higher in the suburbs and the urban fringe."

"The median income of individuals is greater in the suburbs than the median income of individuals in the central city."

"...higher level of socio-economic status in the suburbs as compared with the central city labour force. The suburbs have somewhat higher proportions of employed in the white collar occupations."<sup>73</sup>

Clawson (1971):

"The suburbs have failed to meet the needs of a very large segment of the population - the poorer.."74

Thorns (1972):

"... outflow (from the city) was principally of the middle class, the wealthier element of the population which left increasingly only the poorer section of the population... The suburban exodus was principally by young couples with children seeking their own homes."75

Farley (1976) in his study of suburban population growth in United States cities concluded that the suburban rings have grown faster than the central cities; the rise in income in the suburbs was somewhat greater than in the cities; suburban rings attracted high status residents from their central cities and contained a richer population; and educational attainments and socio-economic status increased somewhat more within the suburbs than in central cities.<sup>76</sup>

#### Fringe studies in India: A Cross-Cultural Pattern

The peripheral expansion of Indian cities is limited and is generally confined to the large metropolitan areas. Brush (1962) also noted the 'slight development of fringe' and 'absence of urban sprawl in the Indian urban fringe'.<sup>77</sup> The centrifugal forces are weak in India. Most of the x fringe dwellers walk to work and use cycles because of the low wages and inadequate means of transportation, hence, they prefer to stay near the work place, that is, the city.

As a result, the density gradients are very sharp in the peripheries. Peripheral expansion and suburbanization are dependent on the intensity of urbanization, which was low in India up to 1951. India was less urbanized in 1951 than was the United States in 1901. Urbanization in India was slow because of its slow economic development.<sup>78</sup>

Rural to urban migration in India plays an important role in urbanization and is a widespread phenomenon. Sovani (1966) noted the dominance of rural migration in Asian cities because of the economic pressure in the countryside.<sup>79</sup> The peripheral expansion of Delhi city up to 1951 was limited, though in-migration was high, especially due to the influx of the refugees after the partition of India in 1947. Population density within the city limits increased. After 1951, however, suburbanization occurred. The city limits were extended during this period and 88 villages were incorporated into the city. In addition to the increase in urbanization two processes emerged: (1) suburbanization, whereby city people moved to the periphery from the city centre, and (2) depopulation, whereby the rural community declined because of out-migration and many villages became deserted in the process.<sup>80</sup> The incorporated zone now has old rural settlements (the urban villages), unauthorized colonies of

the poor and lower middle class migrants from the nearby villages and small towns, and rich colonies of the migrants from the central city. As a result of urbanization, the impact of the city on the nearby rural settlements also increased and gave birth to the fringe, showing different levels and gradients of suburbanization. As the city extended its sphere of influence many small nearby towns became the suburbs of Delhi. The suburban towns of Delhi are not the product of suburbanization, rather, they predate the beginning of suburbanization and it was in a later stage that they become the suburbs of Delhi. The industries and residences, rather than giving birth to the new suburbs, concentrated in the pre-existing towns around Delhi.

Since the fringe is a new phenomenon in the urban regions of India, its study has received relatively little attention in the geographical research. R.L. Singh (1955) in his urban study of Banaras was the first to consider the city-umland (city-region) as an integrated part of the urban study.<sup>81</sup> He adopted a western technique for delimitation and worked out the limits of newspaper circulation, bus service, milk, vegetable and grain supply zones to the city. The borrowed technique proved quite unsuitable, which is indicated by his use of Banaras Hindi newspaper circulation to determine the outer boundary of the city

umland, though the circulation area was five times larger than that covered by the other criteria of delimitation. This criterion holds very little value in the Indian context because of the low rural literacy and the low circulation of the newspaper in rural India.

Except for the limitations of some of the criteria used, Singh's study established a precedent, and later generated many valuable studies on the city-region relationship. Most of these studies incorporated improved techniques for delimiting the city umland, but the basic criteria remained similar to those used in Singh's study, although some were omitted and some new ones were added.<sup>82</sup> The importance of hinterland studies for comprehensive city-region planning has now been realized. Alam (1972), after identifying the Hyderabad metropolitan region, delimited its core area (primary planning area) based on the 'principal elements' (mostly urban amenities) and the 'reflective elements' (mostly demographic elements).<sup>83</sup> Nangia (1976) identified the Delhi fringe within the Delhi metropolitan region, applying the boundary-girdle technique, using density, growth, relative change in density, an index of interactance, sex ratio and number of non-farm workers.<sup>84</sup> Ellefsen (1962) in his study of the city-hinterland relationship in India commented on the small areal extent

of the Indian city hinterland and the existence of gradations in the degree of urbanization.<sup>85</sup>

One of the main characteristics of the fringe studies in India is the total absence of the use of land use data and the heavy reliance on the socio-economic and demographic figures of the census. Hence, the fringe in India is more an 'ecological region' because the true nature of the fringe cannot be represented in the absence of land use data. Secondly, the socio-economic statistics are not sufficiently detailed to portray the real social structure of the fringe. However, at least the figures are available for the smallest areal unit, that is, the village in the Indian census. Therefore, suburbanization has been measured in terms of the changes in census figures for these villages which resulted from urban influence.

The American cities are now in the 'post fringe' stage, where the fringe is dominated by suburbs with a full range of urban amenities. The fringe development in India is not voluntary but involuntary and urbanism has been thrust upon the nearby rural community. There is a wide cultural gap between the rural-urban fringe and the main city, widely spoken of as the rural-urban dichotomy in India. The major urban impact on the fringe

is visible in land use, agricultural practices and land values, but little in socio-economic transformation and still less in urban amenities.<sup>86</sup>

The fringe in India is inhabited by people low in socio-economic status or of middle class background.<sup>87</sup> It is a zone of new slums,<sup>88</sup> mud-walled dwellings,<sup>89</sup> and unauthorized colonies where civic amenities are essentially lacking. The ratio of non-farm workers and the density of population are higher in the fringe than in the rural areas, yet still very low compared with the city. The sex ratio and literacy are lower in the Indian fringe than in United States city fringes<sup>90</sup> and land use is changing rapidly from agricultural to residential and institutional. It is this sudden paucity of characteristics associated with an urban way of life that leads to the often made statement that urbanism in India stops at the edge of the city. As a result of this Ellefsen (1962) was inclined to rule out the possibility of a rural-urban fringe in Indian cities.<sup>91</sup>

#### IDENTIFICATION OF THE PROBLEM AND THE OBJECTIVES OF THE STUDY

The literature survey leads to the conclusion that there are substantial differences between United States and India in the processes of fringe and suburban development and the socio-economic characteristics of the people

living there. They derive mainly from differences in industrialization, economic structure and the resultant variations in the life styles of the two regions. The problems identified for the present study of the Delhi Metropolitan Region can be stated in the form of questions:

- (1) What is the process of urbanization and sub-urbanization in the region?
- (2) Is the process of suburbanization homogenous? If not, what are the various ecological units in the region?
- (3) Do the ecological units have similar socio-economic and demographic characteristics? If not, how do these characteristics differ and are they changing in space and time?

The aims of the study are to analyse the process of suburbanization in the region in terms of socio-economic and demographic characteristics, to provide a comparative study of the United States and India, to trace the internal heterogeneity within the fringe, to identify the problems of the fringe and to suggest possible planning approaches. The study thus comprises a three dimensional analysis - temporal, spatial and comparative.

Based on the literature survey and the problems identified, the following broad hypotheses are framed and tested in the present study:

- (1) Suburbanization is not homogeneous in the city region and it tends to wane with distance from the city.
- (2) The rural settlements in the city region show various levels of urban impact in terms of socio-economic and demographic characteristics.
- (3) The spatial extent and the form of the various ecological units will change with time, with the indices of suburbanization also changing their characteristics with time.
- (4) Suburbanization is not a continuous phenomenon in space. It will be more marked along the transportation corridors and will bulge outward along them. In other locations it may develop in a mosaic form.
- (5) The settlements incorporated within the city limits over time will have a more strongly suburban character than the settlements outside it.

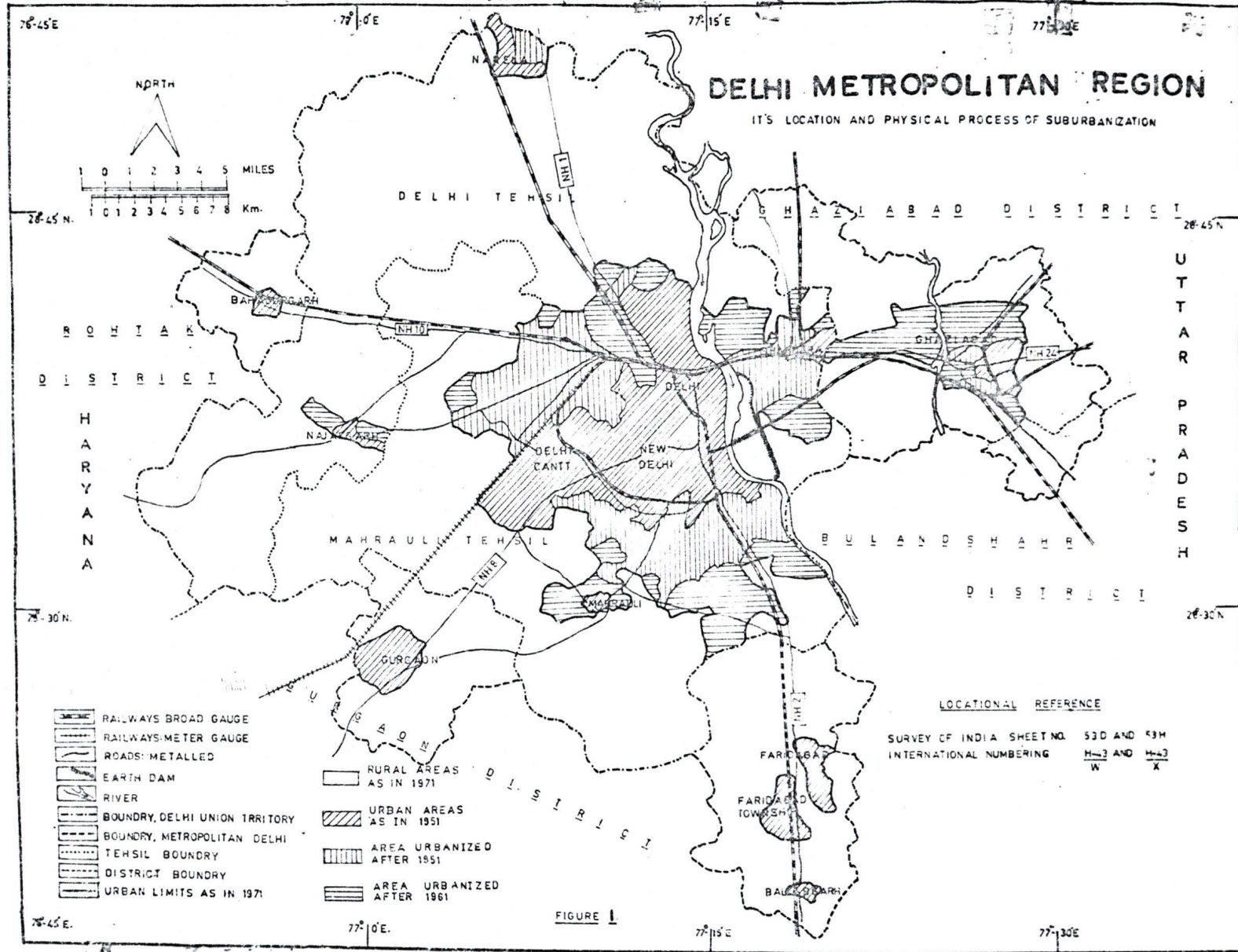
#### METHODOLOGY

##### The Delhi Metropolitan Region

The study area is the Delhi Metropolitan Region, as delimited by the Delhi Development Authority in 1957, with the help of the Town and Country Planning Organization and Ministry of Health, Government of India.<sup>92</sup> With a view to coordinating planning for the contiguous area

around Delhi, the regional plan deals with the following four areas: Delhi urban, Delhi rural, Delhi metropolitan area (Figure 1) and the National Capital Region (N.C.R.). The N.C.R. forms a part of a still wider Central Yamuna Valley Resource Region, extending from 75 to 115 miles from Delhi. Within the N.C.R. the Metropolitan Delhi Area forms a core, having strong daily interaction with the city.

The research and field studies conducted by the D.D.A. revealed that the towns within a radius of 25 miles around Delhi are under a strong and intense influence of the metropolis in terms of their population growth, population structure, retail and wholesale trade and daily interaction with the city. Nangia (1976)<sup>93</sup> also justified the present definition of the Delhi metropolitan region up to 25 miles, as Berry and others (1968)<sup>94</sup> did for the metropolitan regions in America. Nangia (1976) further proved the validity of her delimitation by applying various statistical methods (mean, variance, simple correlation and distance-decay functions), quantitative techniques (nearest neighbour distance, principles of graph theory and gravitation models) and cartographic techniques (points, areas, lines, breakpoints and graphical methods). She further delimited the zones of different intensities of metro-



politan influence, while scrutinizing the situation at the village level.

The Delhi Development Authority, for the purpose of intensive and integrated planning, divided the rural settlements of the Union Territory of Delhi into three tracts and identified them as the rural-tract (having 69 percent of total land under cultivation), the compact urban-tract (62 percent land under cultivation) and the rural built-up tract (51 percent land under cultivation). Four more areas outside the Union Territory of Delhi have been included in the Delhi Metropolitan Area. They are: (1) villages around Ghaziabad (75 percent of land under cultivation), (2) villages around Bahadurgarh (87 percent of land under cultivation), (3) villages around Gurgaon (70 percent of land under cultivation) and (4) villages around Faridabad and Ballabgarh (58 percent of land under cultivation).<sup>95</sup>

There were 10 towns in the Union Territory of Delhi in 1951. They were Delhi Cantt., Civil Lines, Delhi Fort, Walled City, New Delhi, West Delhi, Narela, Mehrauli, Najafgarh and Shahdra.<sup>96</sup> Since the first six of these towns were linked together with the continuous built-up area, they have jointly been called the Central City or the City of Delhi in the present study. The remaining four towns, Narela, Mehrauli, Najafgarh and Shahdra, have been called the suburban towns because they were separated from the continuous built-up area of the central city. The

other suburban towns were Ghaziabad, Gurgaon, Bahadurgarh, Faridabad, Faridabad Township and Ballabgarh. The Delhi Metropolitan Region in the present study thus includes 484 villages (APPENDIX III),<sup>97</sup> 10 suburban towns and one city (Table 1 and figure 2). The towns have been called the suburban towns because of their interaction with the central city and their location within the limits of Delhi Metropolitan Area. The village, which is the smallest administrative unit, has been used for the spatial analysis. The temporal study includes the 1951, 1961 and 1971 census figures at village, town and city levels.

#### Delimitation of the Fringe and Identification of the Ecological Units

Within the Delhi Metropolitan Area there is a core area of metropolitan impact which is becoming rapidly urbanized. The area is served by the city-based essential services, such as transportation and retailing, and has strong interaction with the city in terms of labour supply. The city transport system (Delhi Transport Corporation) has extended the labour catchment area far beyond the city limits. The extension of the urban functions and the development of residential and industrial colonies outside the city limits has forced the city planners to incorporate the adjacent rural areas into the city to restrict land speculation and unplanned development. As a result, 88

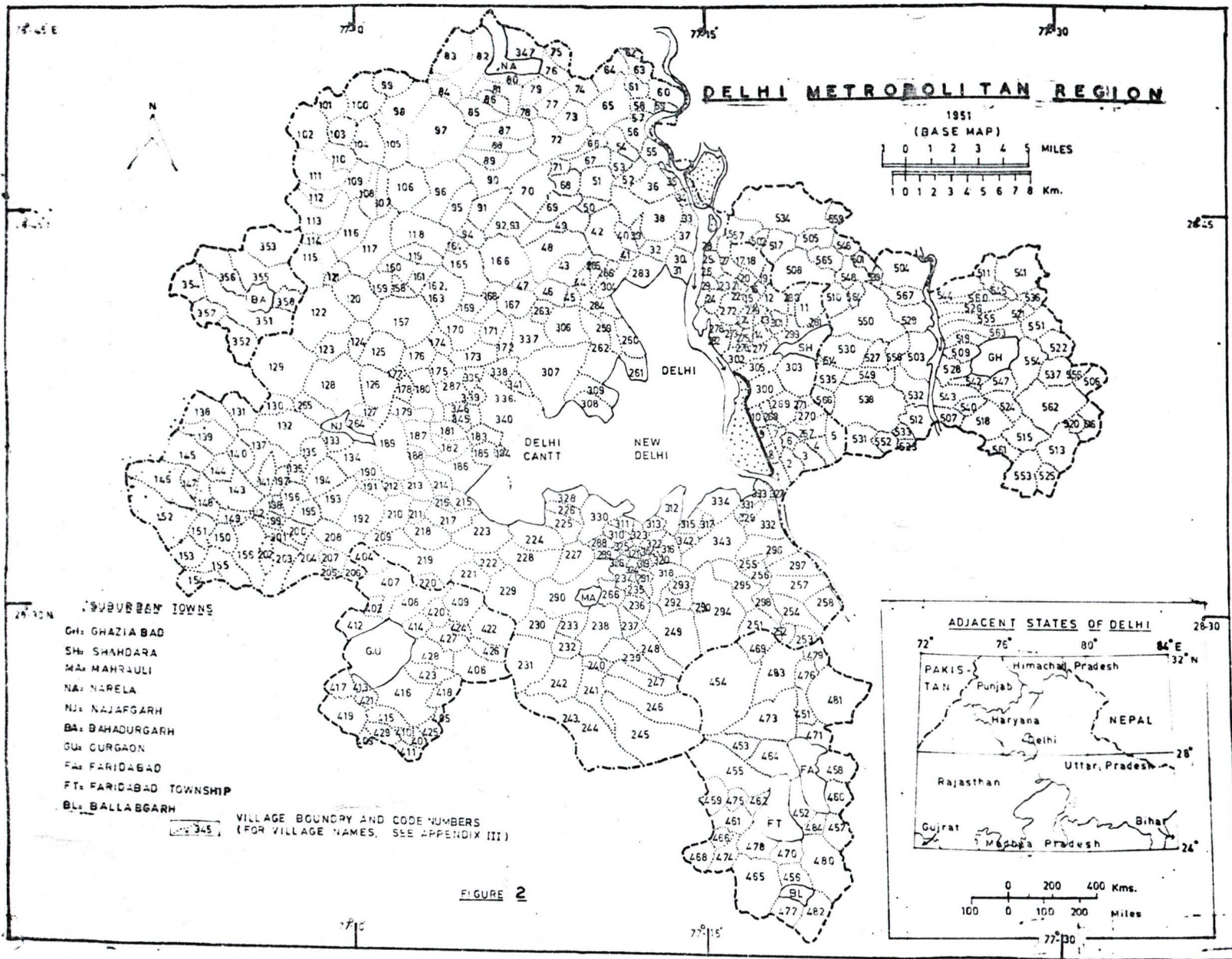


TABLE 1

(A) ADMINISTRATIVE UNITS IN THE DELHI METROPOLITAN REGION-1951

State/District/ Tehsil	City	Suburban Towns	Number of Villages
1. Union Territory of Delhi.	1. Delhi City (Delhi Cantt, Civil Lines, Fort, Walled City, New Delhi & West Delhi.)	1. Narela 2. Shahdara 3. Mehrauli 4. Najafgarh	346
2. Punjab D. Rohtak T. Bahadurgarh	-	5. Bahadurgarh	8
D. Gurgaon T. Gurgaon	-	6. Gurgaon	29
D. Gurgaon T. Ballabhgarh	-	7. Faridabad 8. Faridabad Township 9. Ballabhgarh	34
3. Uttar Pradesh D. Meerut T. Ghaziabad	-	10. Ghaziabad	60
D. Bulandsher T. Sikandrabad	-	-	7
<u>Total Administrative Units</u>	<u>1</u>	<u>10</u>	<u>484</u>

(B) NUMBER OF VILLAGES UNDER STUDY IN 1951, 1961 and 1971 CENSUS

<u>Villages</u>	<u>1951</u>	<u>1961</u>	<u>1971</u>
1. Total Villages	484	484	484
2. Uninhabited Villages	*	35	24
3. Villages for which the figures are not available	59	2	14
4. Villages for which the figures are not available because of incorporation	*	3	15
5. Villages used in analysis	425	444	431

\* No information.

rural settlements were incorporated into the city during the period 1951-71. This is a zone where 'urbanism' and urban functions are extending and 'rurality' and the agricultural activities are retreating. This zone is the 'fringe' in the sense that it is experiencing an intensive land conversion process and socio-economic transformation from rural to urban. As such, the term 'fringe' in this study has been used for the zone of transitional socio-economic and demographic characteristics reflected in the rural population as a result of the urban invasion.

There are various techniques that may be used to delimit the fringe of a city. One commonly used method is the superimposition of maps of the individual factors delimiting the fringe and the identification of boundary girdles. Ottomaul (1915) was probably the first to use this method.<sup>98</sup> Green (1955) also applied the superimposition of boundary method to the seven variables for delimiting the boundary between the two major cities of New York and Boston.<sup>99</sup> Singh (1955) delimited the umland of Banaras after superimposition of maps showing supply zones of the various commodities moving to the city.<sup>100</sup> Learmonth and others (1961) used the same technique to delimit the planning region in Mysore state in India.<sup>101</sup>

The delimitation of the fringe based on the identification of the break-points in the gradients of some

selected parameters is another method.<sup>102</sup> Nangia (1974), for example, used those 'isolines' for the 'boundary girdle' which showed a 'break point' in the mean values at certain distances from the city of Delhi.<sup>103</sup> The study, based on the 1961 census figures and the village as the unit, shows a definite break point in the percentage of farm workers at a distance of 11 miles.<sup>104</sup> The isolines of 60 and 75 per cent non-farm workers (along with the other isolines used in the girdle), in fact, are the inner and outer boundaries of the rural-urban fringe of Delhi. Her analysis of the five variables selected<sup>105</sup> leads to the conclusion that the higher the percentage of workers in non-agricultural occupations the higher will be the number of males per 1000 females in the population. The percentage of non-farm workers to total workers is the most significant factor in the identification of the fringe.

The delimitation technique used in the present study differs from those cited above. Besides using demographic criteria, they have used land uses and inter-linkages of goods and services in the delimitation of the fringe. But the real reflection of the urban invasion and its impact on the surrounding rural community can only be traced in the socio-economic and demographic transformation of the population, not through the study of urban land use and functions arising in the fringe, since they are the causes of transformation and not the consequence. The inter-linkages are again the reflection of the level

of transformation and must be considered secondary to the socio-economic factors. Because the term 'fringe' in this study has been used for the transitional socio-economic and demographic characteristics, the villages in transition have been termed the 'fringe villages'.

The four following demographic and economic criteria, here called the 'indices of suburbanization', have been used to delimit the Delhi fringe as of 1951:

- (1) Density of population (persons per Sq.Km.).
- (2) Sex ratio (females per 1000 males).
- (3) Proportion of population in agriculture.
- (4) Proportion of population in commerce, transport and other service occupations (tertiary occupations).

The validity of these indices for the delimitation of the fringe has been proven in previous studies.<sup>106</sup> The hypothesis concerning these indices of suburbanization is that the density of population will be high, the sex ratio will be low, the ratio of population in agriculture will be low and the ratio of population in tertiary occupations will be high where the level of suburbanization is high (that is, more urban and less rural). The reverse will be true where the level of suburbanization is low (that is, more rural and less urban). The villages of the Delhi Metropolitan Region were placed in two categories, 'fringe

villages' and 'rural villages', according to the scale given in Table 2.

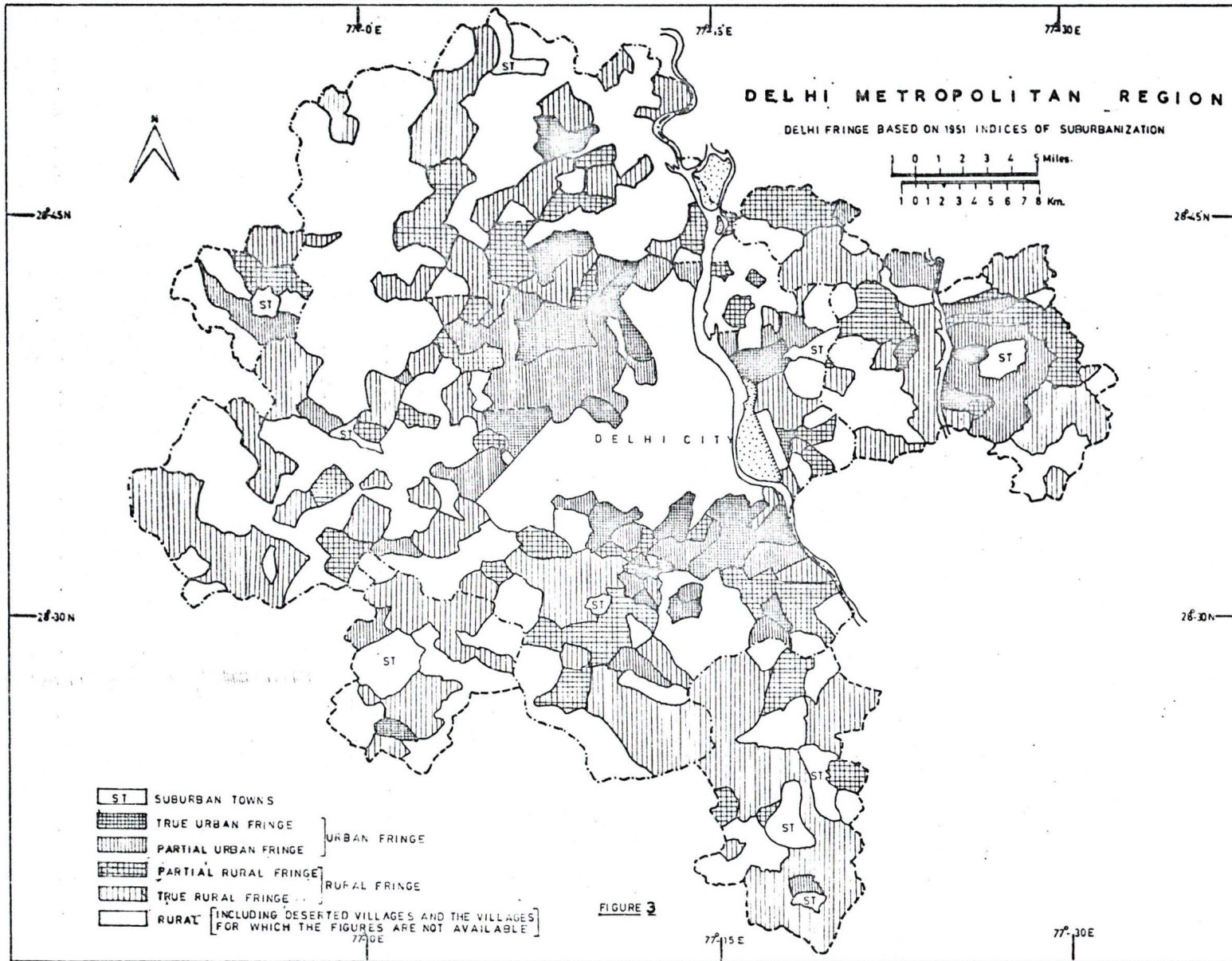
TABLE 2 : SCALE OF SUBURBANIZATION INDICES.

<u>Village Types</u>	<u>Demographic Indices</u>		<u>Occupational Indices</u>	
	Density	Sex Ratio	Proportion of population in Agriculture	Proportion of population in Tertiary Occupations
Fringe	Density above the mean	Sex Ratio below the mean	Farm population below the mean	Population in Tertiary sector above the mean
Metropolitan Mean for Indices of Suburbanization in 1951	254 Km <sup>2</sup>	845 <sup>0</sup> /100	53%	32%
Rural Villages	Density below the mean	Sex Ratio above the mean	Farm population above the mean	Population in Tertiary sector below the mean
Individual/Cumulative Weightage	1/1	1/2	1/3	1/4

The densities and ratios were calculated for all of the 425 inhabited rural settlements and they were classified as 'fringe' or 'rural' types according to their deviation from the metropolitan mean. It was found that 149 were rural and the remaining 276 were fringe

villages. In other words, the 'fringe villages' satisfied a minimum of one and a maximum of four indices of suburbanization, while 'rural villages' satisfied none of the indices. The majority of fringe villages were concentrated near the outer limits of the city or along the transport routes (Figure 3). The villages which satisfied only one index of suburbanization were located away from the city and transport routes and can be considered as having experienced a low urban impact. The villages which satisfied all four indices were located near the city and transport routes and had a high urban impact.

Relatively little research has been done in an attempt to determine various levels of urban impact. However, three of the studies previously cited did address this question. Mayers and Beegle (1947) recognized the true-fringe (50-100 percent Non-Village Rural Non-Farm (NV-RNF) population), partial-fringe (25-49 percent NV-RNF population) and adjacent rural townships (0-24 percent NV-RNF population).<sup>107</sup> Russwurm (1975) based his classification on the density of population between Stanford and Toronto: rural (0-24 persons per sq. mile), semi-rural (25-49 persons per sq. mile), semi-urban (50-119 persons per sq. mile) and urbanized (120 and above persons per sq. mile).<sup>108</sup> Pryor (1968) used land use, density of occupied dwellings and population density, but



failed to provide any definite scale, except in case of land use.<sup>109</sup>

In the present study four different indices were used instead of one, as in the above studies, and equal importance was assigned to each of the four indices of suburbanization. The fringe villages of Delhi Metropolitan Region were thus further subdivided into four ecological types (Table 3).<sup>110</sup>

TABLE 3 : TYPES OF ECOLOGICAL REGIONS IN THE DELHI METROPOLITAN REGION.

Criteria	Weight- age	Levels of Sub- urbani- zation	Minor Eco- logical Units	Major Eco- logical Units
1. Villages satisfying all the four indices of suburbanization	4	Very High	True Urban-Fringe	Urban Fringe
2. Villages satisfying any three indices of suburbanization	3	High	Partial Urban Fringe	Urban Fringe
3. Villages satisfying any two indices of suburbanization.	2	Medium	Partial Rural Fringe	Rural Fringe
4. Villages satisfying only one index of suburbanization.	1	Low	True Rural Fringe	Rural Fringe
5. Villages satisfying none of the four indices of suburbanization.	0	Very Low	Rural	Rural

The weightage method was preferred over the boundary girdle because the latter fails to identify the villages

experiencing various levels of urban impact, within and outside the girdle lines. Similar problems arise in the gradient study of concentric rings and its break-point technique. The concentric zones give only part of the information which remains hidden within each zone. The concentric zones do not show the details of suburban expansion, as the fringe growth is very uneven in the metropolitan space. The method that was used overcomes the problems arising out of the 'leap-frog' process of fringe development. The fringe so defined is not always a 'locational fringe', located near the city limits, but rather, it is a 'functional fringe' scattered like a mosaic over the metropolitan surface, though still inclined to be near the city.

The Delhi Metropolitan Region thus has been divided into the various ecological units of city, suburban towns, true urban fringe, partial urban fringe, partial rural fringe, true rural fringe and rural. The fringe has been delimited according to the 1951 suburbanization indices applied to the rural settlements outside the corporate limits of 1951 Delhi city. The census figure of 1951, 1961 and 1971 have been used in the study on the 1951 space (Table 4). Other methodological notes are as follows :

- (1) It is important to mention here that 88 villages were incorporated into the city and suburban towns

Table 4: DISTRIBUTION OF SETTLEMENTS IN THE ECOLOGICAL REGIONS

<u>Ecological Regions</u>	<u>Weightage</u>	<u>1951</u>	<u>1961</u>	<u>1971</u>
1. City		1	1	1
2. Suburban Towns		10	10	10
-----				
3. True Urban Fringe	4	30	28	33
4. Partial Urban Fringe	3	54	62	49
5. Urban Fringe (3+4)	3-4	84	90	82
6. Partial Rural Fringe	2	60	66	63
7. True Rural Fringe	1	132	138	137
8. Rural Fringe (6+7)	1-2	192	204	200
9. Rural	0	149	150	149
10. Total (5+8+9)		425	444	431
11. Uninhabited Villages		*	35	24
12. Incorporated Villages		*	3	15
13. Settlements with figures not available		59	2	14
14. Total (10+11+12+13)		484	484	484
15. Total Settlements (1+2+14)		495	495	495
-----				
* No Information				

upto 1971. The population figures for these villages were derived from the urban population. These villages are called 'urban villages'.

- (2) Similarly, the four suburban towns - Shahdara, Narela, Najafgarh and Mehrauli - were incorporated into Delhi city in 1971, and like the 'urban villages', their populations, also, have been separated from the Delhi city total.

- (3) The Delhi city population figures for 1961 and 1971 have been derived after subtracting the population figures of 'urban villages' and suburban towns which were incorporated into the city.
- (4) The areas of the villages and the suburban towns have been used as they were in 1951 for calculations of density. But since the new urban colonies have arisen on the occupied areas of the villages, the area of Delhi city was derived, for the density calculations, by adding the area of incorporated villages and subtracting the area of incorporated suburban towns.
- (5) Various terms used in the study have been defined and presented in Appendix I.

#### CONCLUSION

The aim of the study is to focus attention on the process of suburbanization in terms of socio-economic and demographic transformation of the rural community living in the incorporated and unincorporated city region, and to determine the structural differences between the fringe and suburban towns of Delhi Metropolitan Region. The basic hypothesis posed in the present study is that the rural population in the areas under the immediate influence of the city differ systematically from the more remote rural population. Since the transition from the urban to rural

is not abrupt, the rural settlements have been classed into various ecological units, showing various levels of urban influence. The area of study, the Delhi Metropolitan Region, is a third planning region identified by the Delhi Development Authority. The Delhi fringe has been identified on the basis of a weightage technique and superimposition of the maps, rather than the boundary-girdle or break point technique. Density, sex ratio, farm workers and tertiary workers were used as the indices of suburbanization. The fringe thus delimited can better be called a 'functional fringe' than a 'locational fringe'.

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104. The 10-11 mile zone around the city can safely be taken as the fringe boundary between the agricultural and non-agricultural workers. The analysis of the workers engaged in manufacturing, trade and commerce and other services also shows that a break point in the mean values exists some 10 miles from the city. See Nangia, S. 1976. op.cit., (Chapter III).
105. The five variables are: population density in 1961; relative change in population density during 1951-61; population growth in 1951-61; sex composition in 1961 and non-farm workers in 1961.
106. See Ellefsen, R.A. 1962. op.cit., p.99; Alam, S.M. 1972. op.cit., p.250; Nangia, S. 1976. op.cit., pp.83-91.
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110. Without going into the details of the definition of 'ecology', the various categories of the 'fringe villages' thus delimited have been called 'Ecological Regions' or units, because they represent relatively distinctive population features and cultural and social organizations. They are both geographically limited and socio-culturally homogeneous, and form part of a broader ecological region, that is the 'fringe'. The 'suburbs' and the 'city' are the other ecological units of the urban region.

For detailed discussion see Boscoff, A. 1970. op.cit., Chapters 5 and 7).

## Chapter 2 SUBURBANIZATION : ITS DETERMINANTS

### INTRODUCTION

The transformation within the central city is the main factor responsible for similar changes in adjacent territory. The historical, physical and population growth of Delhi city and the migration patterns are the main forces of change in the city region. Only a brief review of these factors is attempted, though they are major forces in shaping the socio-economic and demographic structure of the fringe and the suburban towns of Delhi.

### HISTORICAL GROWTH OF THE CITY

Delhi is one of the oldest cities of India, discussed in the holy books of Ramayana and Mahabharat. The place Indraprastha<sup>111</sup>, located on the banks of the river Jamuna, approximately 3 kilometers east of the present Connaught Place, has its reference in the Mahabharat period. Since then Delhi has occupied a number of different sites during the various dynasties and periods.<sup>112</sup> These sites shifted within the present 1971 urban limits of the city from east to south, south to north, and finally north to the present centre where New Delhi, as the capital of independent India, is located. In other words, the 1971 urban limits of Delhi just managed to include all the old sites of Delhi. The only difference is that a continuously built-up area now

fills the vacant gaps, and the present city now has all the old sites of Delhi within its lap.

The district of Delhi came into existence in 1819, when it was still a part of the former Punjab. Its administrative control crossed over to the eastern banks of the Jamuna when 160 villages were included in Delhi. But later on these villages were transferred to the Ghaziabad tehsil of district Meerut of Uttar Pradesh State. In 1912, a new province of Delhi was created, though with a reduced area, since the Sonapat tehsil was merged with district Rohtak and Ballabgarh tehsil was made part of Gurgaon district, both part of the former Punjab state. In 1915, the province of Delhi was enlarged again by including Shahdara and its nearby 65 villages of tehsil Ghaziabad. In 1951 the urban Delhi area was divided into 10 towns. In 1961 all these towns were merged and only three units of urban Delhi were identified, Delhi, New Delhi and Delhi Cantt., and this pattern continues today. The present Delhi is a union territory and rural Delhi is divided into the two tehsils of Delhi and Mehrauli (Figure 1)<sup>113</sup>.

#### PHYSICAL GROWTH OF THE CITY

In the first half of the 19th century, Delhi was confined to the Shahjahanabad, the walled city. The British first settled in the Kashmiri Gate area on the north side

within the walled city, but soon moved outside the fortification farther north. They established an entirely new settlement known as the Civil-lines in north Delhi. The settlement near the Indraprastha in the southeast of the walled city formed a suburb with thatched huts and poorly constructed houses. The suburbs of Shahjahanabad walled city also developed in Paharganj in the southwest and in Subzi Mandi in the northwest.

The British decided to shift the capital from Calcutta to Delhi in 1911 and the agricultural land of Raisina villages south of Shahjahanabad was acquired where New Delhi came into existence as the new capital of British India in 1919. With the decision to shift the Cantonment from the Civil Lines to south Delhi, 10,000 acres of land was acquired to the southwest of the new capital. Another 1,000 acres of land was developed in the north of the Cantonment for the Imperial Agricultural Research Institute, now known as the Indian Agricultural Research Institute, Pusa. After the partition of India in 1947, millions of refugees came to Delhi from Pakistan. They were given shelter in three main camps, Kingsway Camp (with 300,000 inmates) in the north, Karolbagh in the west and Shahdara in the east across the river Jamuna. Thereafter the new colonies developed at new location, specially towards the

south and west of New Delhi, to rehabilitate the refugees permanently<sup>114</sup>.

The stage was now set for the physical growth of the city, aided by government, new colonies and development of the transport network, industries and trade. The growth of the city towards the east was restricted by the Jamuna until the 1960's because there was only one bridge across the river. But after that four new bridges were constructed, including one exclusively for the railways. As a result of these processes the area of urban Delhi is constantly increasing in all directions (Table 5). A total of 146 villages were incorporated into Delhi up to 1971. The process of incorporation was especially fast between 1951 and 1971 when 88 villages, with the total area of 60,518 acres, were incorporated into the urban limits of Delhi (Table 6). The villages within the urban limits were restricted to growth within the 'Lal-Dora' (red line),

Table 5 : AREA OF URBAN DELHI

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<u>Year</u>	<u>Area (Km<sup>2</sup>)</u>
1901	43.25
1911	43.25
1921	168.09
1931	169.64
1941	174.31
1951	195.54
1961	326.34
1971	446.30

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Source: Census of India, District Census Handbook, Delhi, 1951, 1961 and 1971

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a boundary line of the original settlement, to prevent unauthorized construction. However, many unauthorized residential and commercial settlements have arisen within and outside the urban villages, and the Delhi Development Authority has shifted many of them to the periphery of the

Table 6 : VILLAGES INCORPORATED IN DELHI URBAN

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<u>Period of Incorporation</u>	<u>Number of villages Incorporated</u>
1880	2*
1911	3*
1921	31*
1931-1951	22**
1951-1961	48***
1961-1971	40****
Proposed-1981	35*

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- Sources:
- \* P.C.Jain, 'Village Settlements in Urban Delhi', (Unpublished Thesis) T.C.P.O., New Delhi, 1968.
  - \*\* V.K.Tyagi, 'Urban Villages of Delhi: Structural Pattern and Transformation', (Unpublished Ph.D. Thesis), Delhi School of Economics, Delhi, 1976, p.56.
  - \*\*\* Census of India, District Census Handbook, Delhi, 1961.
  - \*\*\*\* Census of India, District Census Handbook, Delhi, 1971.
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city. By 1971 Delhi had already crossed the urban limits proposed by the Town and Country Planning Organization for 1981. The urban villages of Delhi, incorporated during 1951-71, constituted approximately 60 percent of the Delhi urban area (excluding Delhi suburban towns) in 1971. They

also constituted approximately 4 percent of the total Delhi urban population (excluding Delhi suburban towns) in 1961 and .9 percent in 1971 (Table 7).

Table 7: VILLAGES INCORPORATED IN DELHI AND SUBURBAN TOWNS

Year	<u>Incorporation in Delhi</u>			<u>Incorporation in Suburban Towns</u>		
	No. of Villages	Area Km <sup>2</sup>	Popula- tion.	No. of Villages	Area Km <sup>2</sup>	Population
1961	48	125.18	88,947	3	15.54	2,559
1971	38	124.74	30,292	12	29.44	9,800
Total	86	249.92	119,239	15	44.98	11,359

Source: Computed from District Census Handbook, Delhi, Census of India, 1961 and 1971.

#### POPULATION GROWTH IN THE CITY

In 1971 Delhi ranked third behind Calcutta and Bombay among the cities of India, but its growth of population during the period 1961-71 was the highest of the three. In 1961-71 the growth rate of Delhi Urban Agglomeration<sup>115</sup> was approximately 55 percent during the period while that of Calcutta was only 20 percent. Again, while the Calcutta Municipal Corporation experienced only an 8 percent population growth during the 1961-71 period, the Delhi Municipal Corporation (D.M.C.) had a 60 percent growth. The maximum

gain was in the D.M.C. Urban while New Delhi lost population (Table 8). The Delhi rural areas also lost some of their population. A major factor accounting for this apparent rural to urban shift was the fact that 40 villages of the adjacent rural areas were incorporated into the urban limits during the period 1961-71.

Table 8: PERCENTAGE OF POPULATION IN THE UNION TERRITORY OF DELHI AND ITS SUBDIVISIONS, 1961-1971

	<u>1961</u>	<u>1971</u>	<u>Difference</u>
Delhi Rural	11.3	10.3	-1.0
Delhi Urban	88.7	89.7	+1.0
1. D.M.C. Urban	77.6	80.9	+3.3
2. New Delhi	9.8	7.4	-2.4
3. Delhi Cantt.	1.3	1.4	+0.1
Delhi Union Territory	100.0	100.0	

Source: Census of India, District Census Handbook, Delhi, 1971.

The pace of urbanization in the Union Territory of Delhi has been rapid since 1901 (Table 9). The urban population of Delhi increased from 51 percent in 1901 to 90 percent in 1971 owing to three factors:

- (1) High in-migration, especially during 1941-51.
- (2) High population increase within the Delhi urban area.
- (3) Incorporation of the adjacent rural population as a result of extension of the urban limits.

Table 9: RURAL AND URBAN POPULATION OF DELHI UNION  
TERRITORY IN PERCENTAGE, 1901-1971

Year	Delhi Rural	Delhi Urban (including suburban towns)	Rural/Urban Ratio
1901	48.6	51.4	1/1.1
1911	43.7	56.3	1/1.3
1921	37.7	62.3	1/1.7
1931	29.7	70.3	1/2.4
1941	24.2	75.8	1/3.1
1951	17.6	82.4	1/4.7
1961	11.3	88.7	1/7.8
1971*	10.3	89.7	1/8.7

Source: Census of India, District Census Handbook, Delhi, 1961, p.15

\*Computed from the Census of India, District Census Handbook, Delhi, 1971.

The percentage increases in 1941-51 were high, both in the urban and rural populations of Delhi because of the refugee migrants following the 1947 partition of India, and many of them settled in the rural areas adjacent to the city (Table 10). The rural population decrease during 1951-61 can be attributed to the loss to urban incorporation and low growth of the rural population. The increase in the rural population during 1961-71 was caused by the outward migration of urban population and the concentration of the rural immigrants in the periphery of the city. The increase in the rural population since 1931, despite the

Table 10: DECENNIAL PERCENTAGE VARIATION IN RURAL, URBAN AND TOTAL POPULATION OF THE DELHI UNION TERRITORY, 1901-71

Decade	Rural Population	Urban Population (including Suburban Towns)	Total Population
1901-11	- 8.2	11.7	2.0
1911-21	1.7	30.7	18.0
1921-31	2.6	47.0	30.3
1931-41	17.7	55.5	44.3
1941-51	39.9	106.6	90.0
1951-61	- 2.4	64.2	52.4
1961-71*	39.9	54.6	52.9

Sources: Census of India, District Census Handbook, Delhi, 1961, p.15

\*Computed from Census of India, District Handbook, Delhi, 1971.

decrease in the number of inhabited villages, supports the validity of such a conclusion (Table 11).

Table 11: NUMBER OF INHABITED VILLAGES IN THE DELHI UNION TERRITORY, 1921-71

Year	1921	1931	1941	1951	1961	1971
Number of inhabited villages.	314	307	305	304	276	243

Source: Census of India, Delhi Series 27, General Population, Pt.II-A, 1971, p.11.

It is difficult to study the process of suburbanization when the urban limits of Delhi have extended farther

into rural space in each decade and when migration figures are not available at the village unit level. However, some attempt has been made to trace the population changes in the city, suburban towns and rural areas of Metropolitan Delhi (Table 12).

Table 12: PERCENTAGES OF POPULATION IN THE ECOLOGICAL REGIONS OF METROPOLITAN DELHI, 1951-71

Ecological Regions	1951	1961	Difference 1951-61	1971	Difference 1961-71
1. Delhi City	70.06	74.04	3.98	72.22	-1.82
2. Suburban Towns	8.29	8.60	0.31	9.66	1.06
3. Rural-Urban Fringe	16.08	12.06	-4.02	12.96	0.90
Urban Fringe	7.79	4.52	-3.27	5.62	1.10
Rural Fringe	8.29	7.54	-0.75	7.34	-0.20
4. Rural	5.57	5.30	-0.27	5.16	-0.14
Total Metropolitan Rural (3+4)	21.65	17.36	-4.29	18.12	0.76
Total Metropolitan Delhi (1+2+3+4)	100.00	100.00		100.00	

The major portion of the metropolitan population, of course, lives in the city. The increase in the percentage share of the city population in 1961 was due especially to the establishment of new residential colonies in the incorporated area, while the decrease in 1971 resulted from the shift of population to suburban towns and rural-urban fringe. The share of the metropolitan population in the

suburban towns increased steadily because the suburbs not only provided cheap accommodation to the immigrants, but also provided employment to them and to city dwellers. The share of the rural-urban fringe, especially the urban fringe, was reduced in 1961 as a result of the depopulation of many rural settlements whose residents shifted to the city when agricultural land, the basis of their employment, diminished. Many of the fringe residents in this period also shifted to the nearby industrial suburban towns, because of better work opportunities in the industries, rather than retreating back to the rural areas. The increasing share of the metropolitan population held by the suburban towns and the decreasing share of it held by the rural areas also helps to explain this fact. The increase in shares of the metropolitan population in the suburban towns and the urban fringe by 1971 resulted from the outward movement of population from the central city and also the concentration of immigrants in these peripheral sections.

#### MIGRATION PATTERN IN THE REGION

The socio-economic and demographic characteristics of the fringe population depend upon the origins of the migrants coming to the fringe. Although migration figures at village level are not available in the Indian census, some valid conclusions can be derived from

differences in the sex ratios, densities and growth of population. The figures on migrants displaced by the partition in the 1951 census is another important indicator of migrational trends in the Delhi metropolitan region. The displaced people accounted for approximately 33 percent of the population of Delhi city and 42 percent of that of the suburban towns in 1951. The main centres of refugee concentration were Shahdara, Faridabad and Ghaziabad. The rural settlements in the Delhi fringe also shared a large portion of these migrants. For example, more than 19 percent of the population of the urban fringe of Delhi in 1951 were refugees. In addition, the low sex ratio and the high density of the population in the fringe settlements near the city at all three census periods imply that there was a high migrant population in the fringe.

The migrants constituted 62 percent of the total population of Delhi Union Territory in 1961, and approximately 26 percent came from Uttar Pradesh and 21 percent from Punjab. The important feature of this migration was that approximately 66 percent of the migrants were from rural and only 31 percent from urban areas of these two States. In 1971 nearly 1,450,000 people were reported to have been born outside of the Delhi Union Territory out of its total population of about 4,060,000 (Table 13). Some 800,000 came from the rural areas of the other states and approxi-

Table 13: IN-MIGRANTS BY PLACE OF BIRTH AND NATIVE BORN  
 ENUMERATED IN RURAL AND URBAN AREAS IN THE  
 UNION TERRITORY OF DELHI, 1971

Place of Birth	Enumerated in Rural or Urban Area of Delhi			
	Rural	Urban	Total	
I. States in India beyond the Delhi Union Territory				
A. Haryana	Rural	44,784	110,495	155,279
	Urban	7,478	69,083	76,561
	Unclassified	180	1,811	1,991
B. Punjab	Rural	1,580	73,101	74,681
	Urban	1,260	107,473	108,733
	Unclassified	31	3,459	3,490
C. Rajasthan	Rural	13,816	80,058	93,874
	Urban	1,791	37,668	39,459
	Unclassified	223	2,857	3,080
D. Uttar Pradesh	Rural	37,083	373,282	410,365
	Urban	7,057	248,285	255,342
	Unclassified	300	7,234	7,534
E. Other States	Rural	2,045	73,080	75,125
	Urban	1,510	139,803	141,313
	Unclassified	73	6,097	6,170
F. Total (A-E)	Rural	99,308	710,017	809,325
	Urban	19,096	602,312	621,408
	Unclassified	807	21,458	22,265
II. Born in other Countries				
G. Pakistan		4,272	483,017	487,289
H. Other Countries		604	19,931	20,535
I. Total (G-H)		4,876	502,948	507,824
III. Born within the State of Delhi Union Territory.				
	Rural	281,629	8,546	290,175
	Urban	12,627	1,799,983	1,812,610
	Unclassified	332	1,759	2,091
IV. Total Population of Delhi Union Territory.				
		418,675	3,647,023	4,065,698

Source: Census of India 1971, Delhi, (Series 27), Migration Tables D-1, pp.10-12.

mately 100,000 settled in the rural areas of Delhi (rural to rural migration). The remaining 700,000 settled in the urban areas (rural to urban migration). Approximately 620,000 came from urban areas of the other states; 600,000 settled in the city (urban to urban migration) and only 20,000 settled in the rural areas of Delhi Union Territory (urban to rural migration). The majority of the migrants came to Delhi from the four states of India: Haryana, Punjab, Rajasthan and Uttar Pradesh. It is interesting to note that the majority of the migrants from Haryana and Punjab were from urban and the majority from Rajasthan and Uttar Pradesh were from rural areas. The migrants from Pakistan constituted more than the 30 percent of the total.

#### CONCLUSION

The shifts in the historical site of Delhi have occurred within the limits of the present suburbanized area. Suburbanization, which started early in the present century, simply filled the gaps left between the old sites of Delhi. The incorporated area after 1951 was approximately half of the total urban area of Delhi in 1971. The rapid growth of population and migration in the region contributed greatly to the process of suburbanization. The growth in commercial and industrial activities, and means of communication, further extended

and intensified the grip of the central city over its region. As a result of this the 49 percent of rural population in 1901 was reduced to only 10 percent in the following seventy years. The immigrants to Delhi came not only from rural areas, but also from urban areas of the adjacent states. Likewise, they not only concentrated in the central city and the suburban towns, but also in the rural areas of the metropolitan region, a trend established by the displaced persons following partition. These historical, physical and migrational factors not only augmented suburbanization in the region, but also shaped the socio-economic and demographic structure of the fringe population.

## REFERENCES AND FOOTNOTES

111. It is one of the five 'Pats' (meaning extended places) referred in the Mahabharata, the other four being Sonipat, Baghpat, Panipat and Tilpat.
112. Following is the list of the various sites of Delhi belonging to the various dynasties and periods:
- A. HINDU PERIOD
1. Indraprastha - Delhi of Pandavas
  2. Suraj Kund - Delhi of King Anangpal
  3. Mehrauli - Delhi of Raipithora
- B. MUGHAL PERIOD
4. Khilokari or Naya Shahr - Delhi of Kaiabad
  5. Siri - Delhi of Allauddin Khilji
  6. Tughlakabad - Delhi of Gayasuddin Tughlak
  7. Jahanpanah - Delhi of Mohammad Adil Shah
  8. Firozabad - Delhi of Firozshah Tughlak
  9. Khizrabad - Delhi of Kiraj Khan
  10. Kotla Mubarakpur - Delhi of Mubarak Shah
  11. Dinapanah - Delhi of Humayun
  12. Shergarh - Delhi of Sher Shah Suri
  13. Salamgarh - Delhi of Salim Shah
  14. Shahjahanabad - Delhi of Shah Jahan
- C. BRITISH PERIOD
15. Civil Lines -
  16. New Delhi - Lutyen's Delhi
113. Census of India, District Census Handbook, Delhi, (Series 27), 1971, pp.10-11.
114. Mitra, Asok, 1970, Delhi Capital City, Thompson Press, New Delhi, p.8.
115. It includes Delhi Cantt., New Delhi and Delhi. The Delhi includes the suburban towns of Shahdara, Mehrauli, Najafgarh and Narela.

CHAPTER 3 SUBURBANIZATION : ITS PROCESS

## INTRODUCTION

The discussion in the previous chapter showed that historical, physical and population growth and migration trends work as powerful forces which regulate the process of suburbanization in the region. There are various indices through which the intensity and extent of the suburbanization process can be studied, usually derived from demographic, social and economic data. The indices used in the present study are sex ratio, distribution of farm workers, density of population and workers in the tertiary sector, as discussed in the previous section. However, the distribution of farm workers, density of population and growth of the population in the rural metropolitan region as a whole are considered here in order to assess their validity as indices of suburbanization. The process of suburbanization was analyzed at three levels: first, when space remains fixed, second, when time remains fixed, and third, when both space and time are changing. The changes in the number of villages in each ecological segment of the fringe indicated various levels of suburbanization.

THE PHYSICAL AND STRUCTURAL PROCESSES<sup>116</sup>

The process of suburbanization can be studied in its physical, structural, behavioural and demographic pers-

pectives. The present discussion concentrates only on the physical and structural processes in Delhi Union Territory. The technique adopted is that of gradients and the aim is to determine how suburbanization in the rural community decreases with distance from the city limits. The zone of urban impact which was found to extend up to 29 Km. from the city centre was delimited by tracing the break point values in the non-farm population, sex ratio and non-farm land.<sup>117</sup> The physical process was identified through the study of the extension of the physical limits of the city and urban amenities (phone, tap water, electricity, pukka road facilities and bus services), the incidence of non-farm and the density of population. The structural process was identified through the study of ratio of non-farm workers and the ratio of workers to total population.

The physical process of suburbanization in terms of the villages incorporated into the urban limits of Delhi was discussed in the previous section, however, it is interesting to note that all the villages incorporated up to 1971 were located within a radius of 16 Km. from the city centre. The additional villages planned for incorporation up to 1981 were located within a radius of 19 Km. The map of ecological regions shows that the majority of the villages of the 'urban fringe' are located around Delhi up to a distance of 19 Km. from the city centre,

suggesting this as the outer limit of suburbanization.

The urban amenities in the city region are available in the form of tap water, telephone, electricity and pukka (tar, bricked or cemented) road facilities. The number of villages having these amenities is high up to a certain distance and after that their number decreases. The study indicated that a maximum number of such villages was located in the 16-19 kilometer zone in the case of tap water and phone facilities (Table 15), and in the 16-25 kilometer zone in the case of pukka road and electric supply facilities (Table 14).

Table 14: URBAN AMENITIES IN THE RURAL AREAS OF DELHI UNION TERRITORY, 1971.

Distance from Delhi Railway Station in km.	Number of villages having electric supply	Number of villages with pukka road	Total	Percent
6-10	15	12	27	7
11-15	30	26	56	15
16-25	102	91	193	51
26-50	56	49	105	27
Total	203	178	381	100

Source: Census of India, Town and Village Directory, Delhi, (27) Part X A-B, 1971

The loss of the farm land as a result of urban impact is more marked up to 16 kilometers from the city

centre than in the region beyond it. The city bus service (Delhi Transport Corporation) is a good indicator of urban interaction with the rural hinterland and a maximum number of city bus terminals is located in the 19-22 kilometer zone. It can be assumed, however, that the settlements lying between the city and the terminal villages also are being served by the buses. Therefore, the settlements located in the concentric zones nearest the city will be served by the largest number of buses. However, the location of a city bus terminal in a village is a better index of suburbanization than the number of buses passing through the village because it indicates a high public demand for the terminals and, therefore, a high degree of interaction between the villages and the city. The density of population, though a demographic factor, can also be looked upon as a physical indicator in the process of suburbanization. The investigations revealed that density decreases constantly beyond a break-point located approximately at the 16 km. limit, which may be interpreted as the outer suburban boundary. The ratio of non-farm workers and the ratio of workers to total population are indicators of the structural process of suburbanization. In terms of the ratio of non-farm workers to total workers the break-point lies about 16 kilometers from the city and the ratio decreases beyond this point (Table 15). Of course, agricultural land

decreases in acreage toward the city. In fact, use for agriculture often is abandoned long before the land is actually converted into urban uses.

It is difficult to ascertain the validity of the ratio of workers as a factor in determining suburbanization.<sup>118</sup> However, it is logical to expect that the ratio of workers to the total population would be highest in the zones nearest the city because of the availability of employment there. The ratio of workers decreases constantly outward beyond the 16-19 kilometers zone.<sup>119</sup> It can be suggested, therefore, that the 19 kilometer limit forms the outer zone of maximum urban impact (Table 15).

The average extent of suburbanization in terms of the physical and structural processes may be demarcated as 16-19 kilometers on the basis of the distinct break in values shown in the column 'total ranks' in table 15. This is supported also by the fact that most of the 'urban fringe' settlements are located within this zone. The 19 kilometer radius also includes all the settlements planned to be incorporated up to 1981 by the Delhi Development Authority.

Table 15: GRADIENTS OF THE PHYSICAL AND STRUCTURAL PROCESSES OF SUBURBANISATION IN THE FRINGE VILLAGES OF THE UNION TERRITORY OF DELHI, 1971

Kilo- meter Zones from the City Centre (Connaught Place)	No. of villa- ges in Zones	Percent of vill- ages having Phone & tap water	R A N K S	Mean den- sity in Km <sup>2</sup>	R A N K S	Per- cent non- farm land	R A N K S	Mean Ratio of non- farm work- ers in Per- cent	R A N K S	Mean ratio of work- ers in Per- cent	R A N K S	Per- cent of DTC Term- inal Vill- ages	R A N K S	TOTAL OF RANKS
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6.4- 9.6	17	23.5	2	910	7	46	6	75	7	34	6	11.7	1	29
9.6-12.8	37	40.5	4	554	5	45	5	57	4	30	4	21.6	4	26
12.8-16.0	38	44.7	5	637	6	37	4	68	6	30	4	21.0	2	27
16.0-19.2	47	48.9	6	511	4	30	3	59	5	32	5	21.2	3	26
19.2-22.4	40	32.5	3	458	3	29	2	50	3	28	3	37.5	6	20
22.4-25.6	32	21.8	1	322	1	24	1	45	2	26	2	40.6	7	14
25.6-28.8	27	51.8	7	330	2	24	1	39	1	22	1	33.3	5	17

## DENSITY OF POPULATION

The number of villages in the high density category is increasing, while the number in the low density category is decreasing (Table 16). This implies that not only is density increasing, but also that the area of high density is expanding outward from the city with time. The spatial distribution of density is shown in Figures 4, 5 and 6. In 1951 the high density zones were mainly concentrated south of the city, with some pockets in the trans-Yamuna settlements on the eastern side. The medium density pockets were located northwest of the city and also around Ghaziabad. In 1961, also, the high density areas were located to the south of the city, while the medium density pockets were scattered all along the transport corridors towards Shahdara in the east, Narela in the north and Gurgaon in the southwest. In 1971 the high density zones were scattered all around the city, especially between the 1951 and 1971 urban limits of Delhi. The medium density was found mainly around all the major suburban towns. The suburbanization process was quite intensive to the south and west of the city.

Table 16: DENSITY OF POPULATION IN DELHI METROPOLITAN REGION

Density Grades Persons per km <sup>2</sup>	Nature of Suburba- nization	1951 No.of Villages	Per- cent	1961 No.of Vill- ages.	Per- cent	1971 No.of Villa- ges.	Per- cent
Less 400	Low	347	81.6	313	70.5	223	51.7
400-800	Medium	54	12.7	91	20.5	144	33.4
Above 800	High	24	5.7	40	9.0	64	14.9
Total		425	100.0	444	100.0	431	100.0



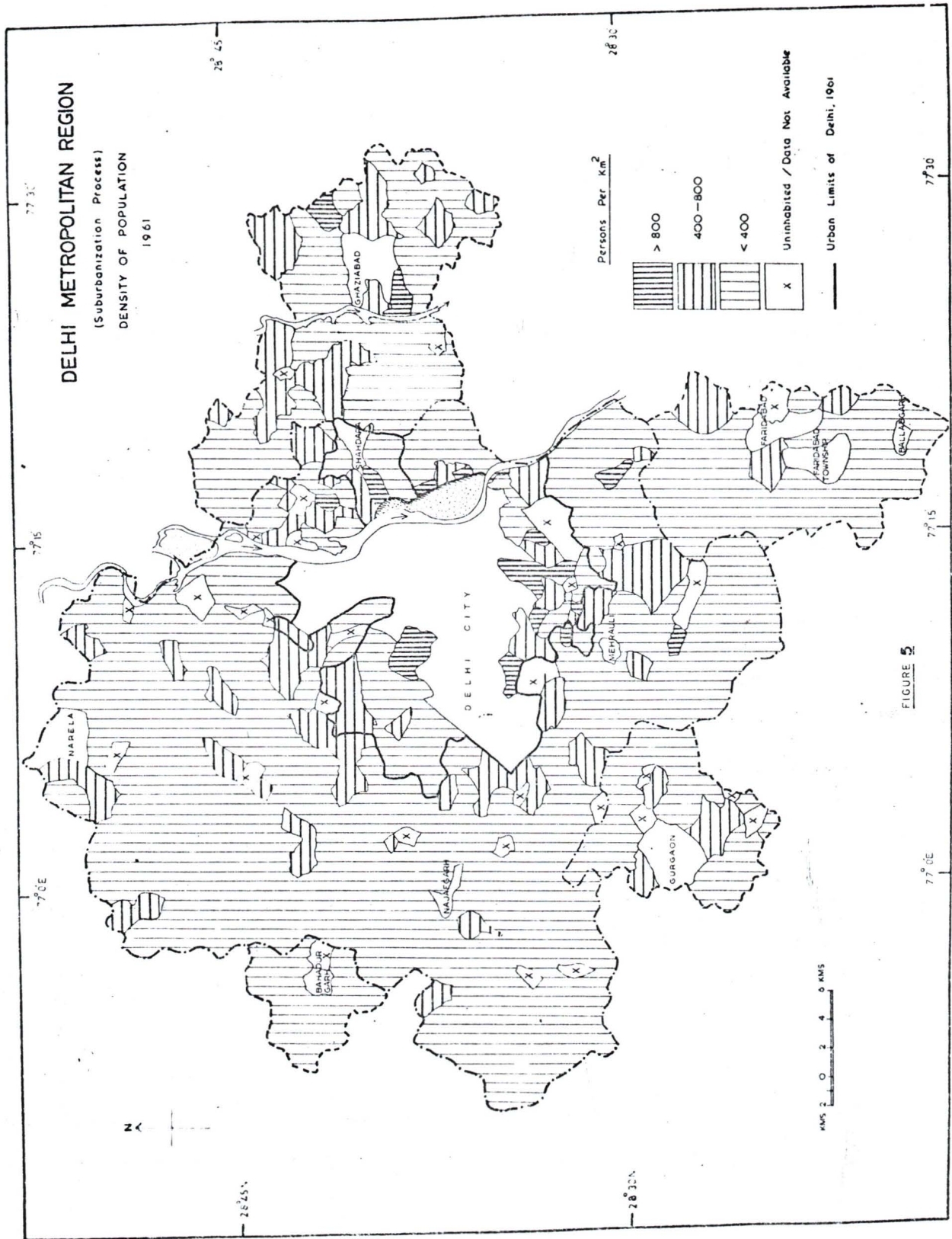


FIGURE 5

77° 00'

77° 30'

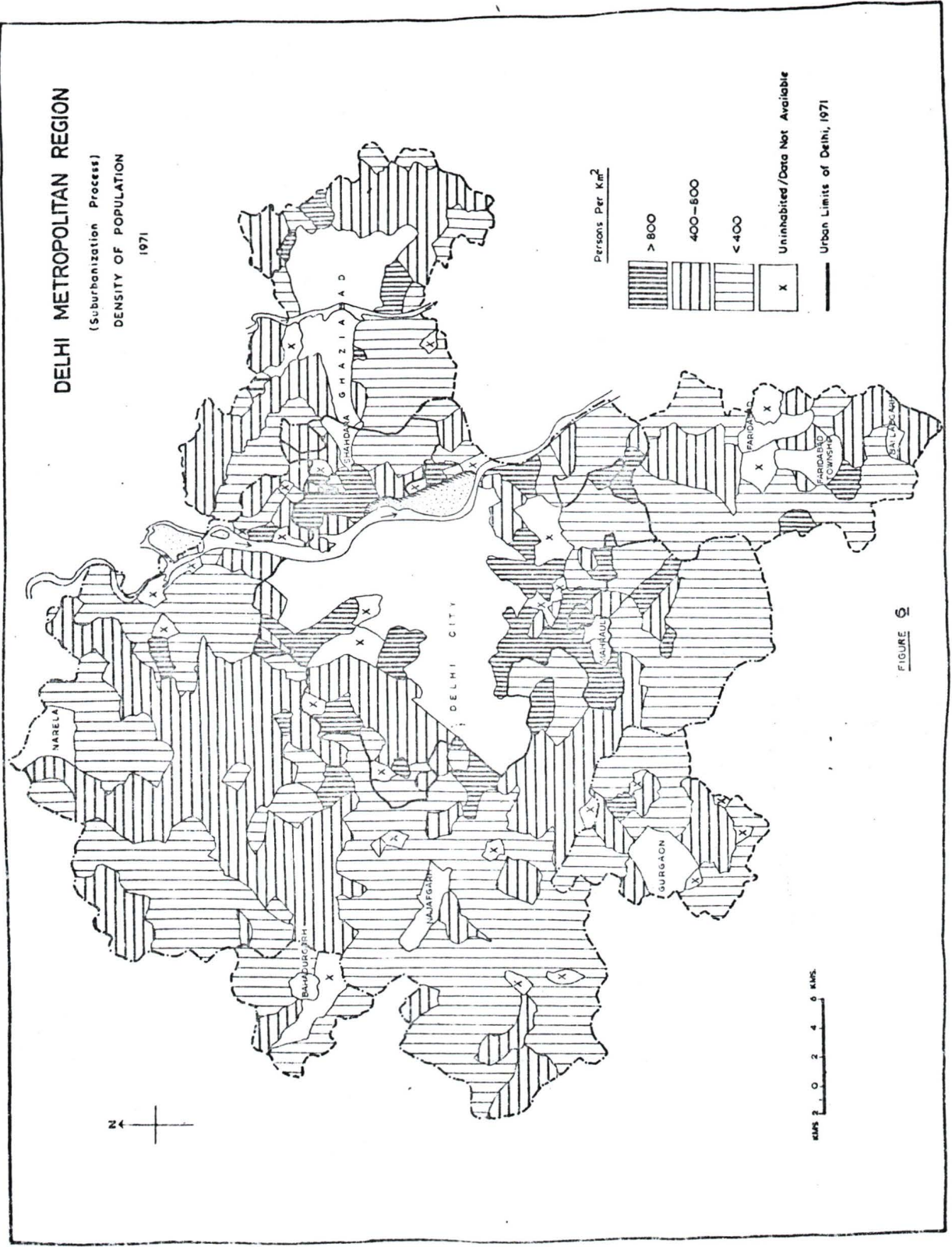


FIGURE 5

## GROWTH OF POPULATION

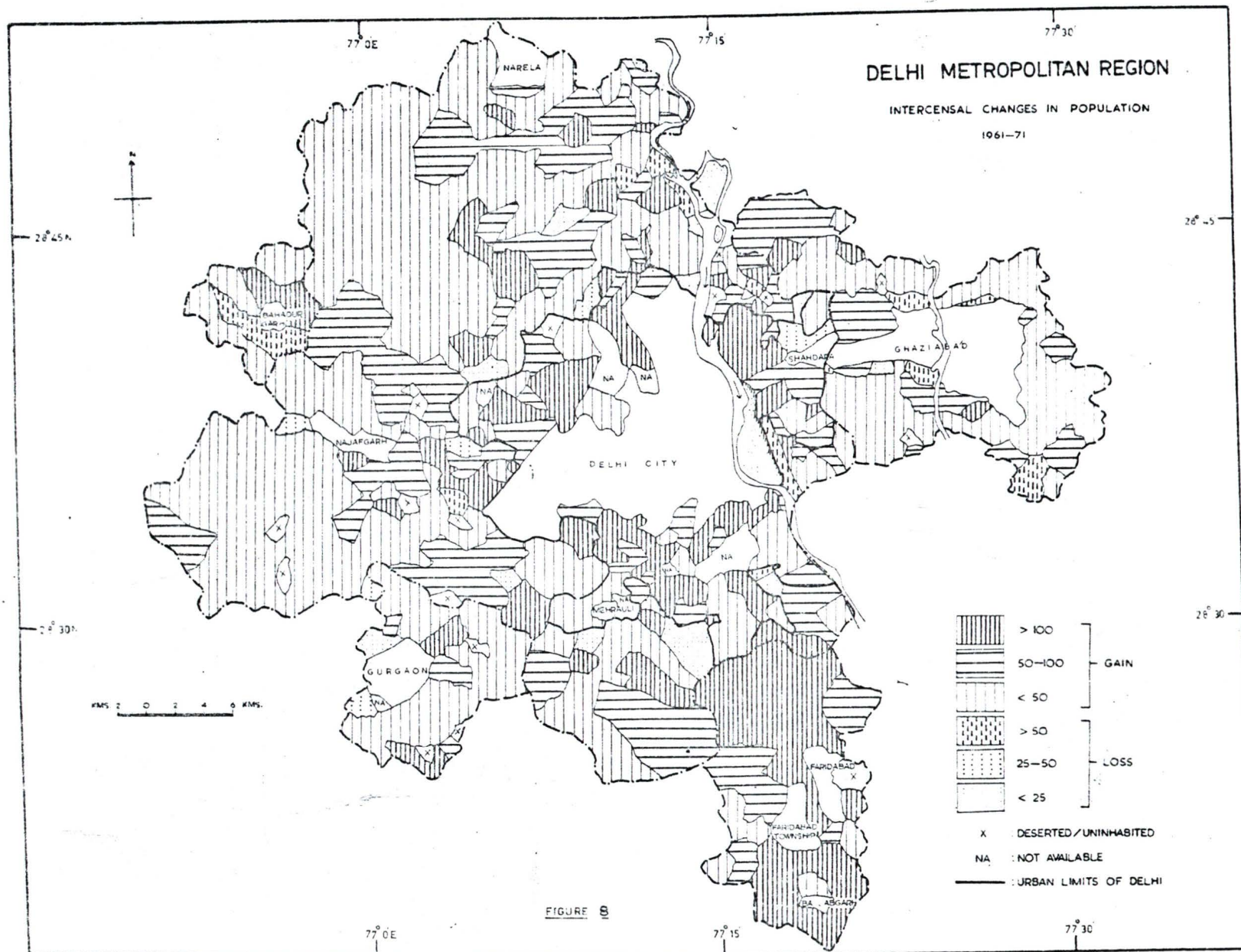
The areas which had a high density of population in 1951 experienced low population growth between 1951 and 1961. The study revealed that the number of villages having more than 50 percent gain in population increased in 1961-71 compared with previous decade (Table 17). Conversely, the settlements that experienced loss of population decreased in number in 1961-71.

The majority of the villages located between the 1951 and 1961 urban limits lost population during the earlier period. However, population growth in these villages in the next decade was high and the majority of them gained more than 100 percent population increase (Figures 7 and 8). This indicates that incorporation first rebuffs population and later attracts it. In the

Table 17: INTER-CENSAL CHANGE IN THE POPULATION OF THE DELHI METROPOLITAN REGION, 1951-61 and 1961-71

Change In Percent	Nature of Suburbanization	1951-61		1961-71	
		Number of Villages	Per- cent	Number of Villages	Per cent
<u>Percent Gain</u>					
Above 100	High	86	19.2	100	22.4
50 -100	Medium	73	16.3	96	21.5
Below 50	Low	251	53.8	213	47.8
<u>Percent Loss</u>					
Below 25		14	3.1	13	2.9
25 - 50		14	3.1	8	1.8
Above 50		20	4.5	16	3.6
Total		448	100.0	446	100.0





process of incorporation many villages are either uprooted or the inhabitants shift to the urban areas or retreat back to the rural areas. Later on, these villages experience a high growth of population. There is some resettlement of the old residents and new migrants arrive, both from rural and urban areas. The pockets of loss of population are shifted outward successively with the increase in suburbanization. The study also revealed that almost all the villages around the Faridabad-Ballabgarh industrial complex experienced a phenomenal population growth in 1961-71. Suburbanization in terms of growth of population clearly was moving outward along the transport routes in all directions.

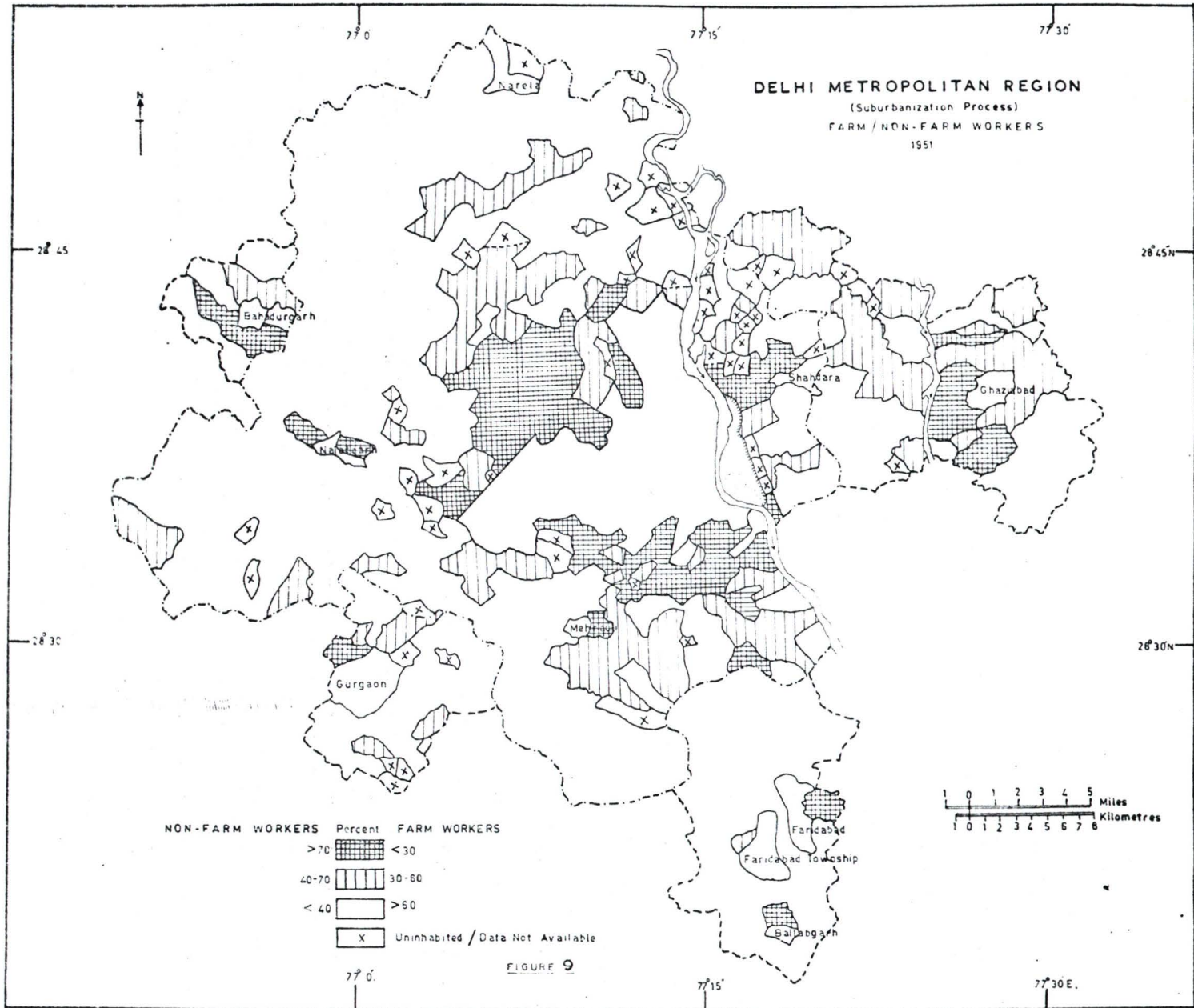
#### FARM WORKERS

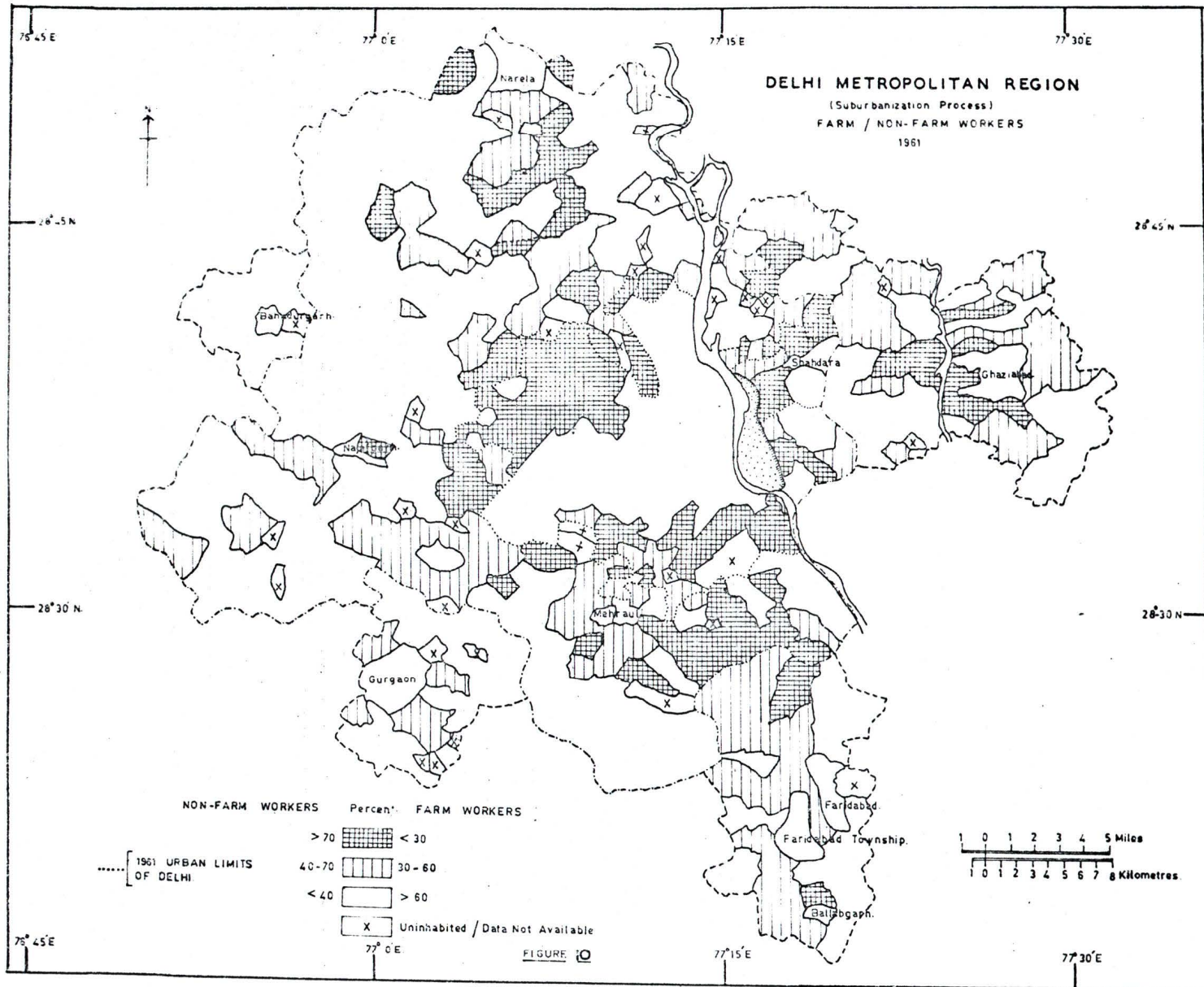
The changes in the distribution of farm workers not only explain the changes in the occupational structure, but also help to explain the changing nature of land use in the region. The ratio of farm workers to total workers is one of the most important factors explaining the process of suburbanization. The low ratio of farm workers is an indication of high suburbanization and the increase in the number of villages with low ratios is indicative of the intensification of the suburban process in the region (Table 18).

The spatial distribution of villages with less than 30 percent farm workers in 1951 shows that the majority are located just outside the city limits and that they project north and east along the transport routes (Figure 9). Suburbanization further intensified by 1961 in the sense that the villages which were medium (30-60 percent farm workers in 1951) were then having high suburbanization (below 30 percent farm workers). The villages in the medium category extended from Narela town in the north to Ballabgarh in the south and Ghaziabad in the east (Figure 10). The intensity of suburbanization in 1971 was clear by the fact that more than 76 percent of the villages in the Delhi Metropolitan Region had less than 60 percent farm workers. The majority of the villages in the Ghaziabad and Faridabad transport corridors had less than 30 percent farm workers by 1971, both being important industrial towns (Figure 11). Also, the majority of villages in the Narela, Gurgaon and Ballabgarh corridor had 30 to 60 percent farm workers, indicating the non-industrial bases of these towns. (Figure 12).

#### SPATIAL AND TEMPORAL ANALYSIS

The process of suburbanization can be studied in two perspectives- space and time. However, several perspectives may be gained by giving a primary emphasis to one and a





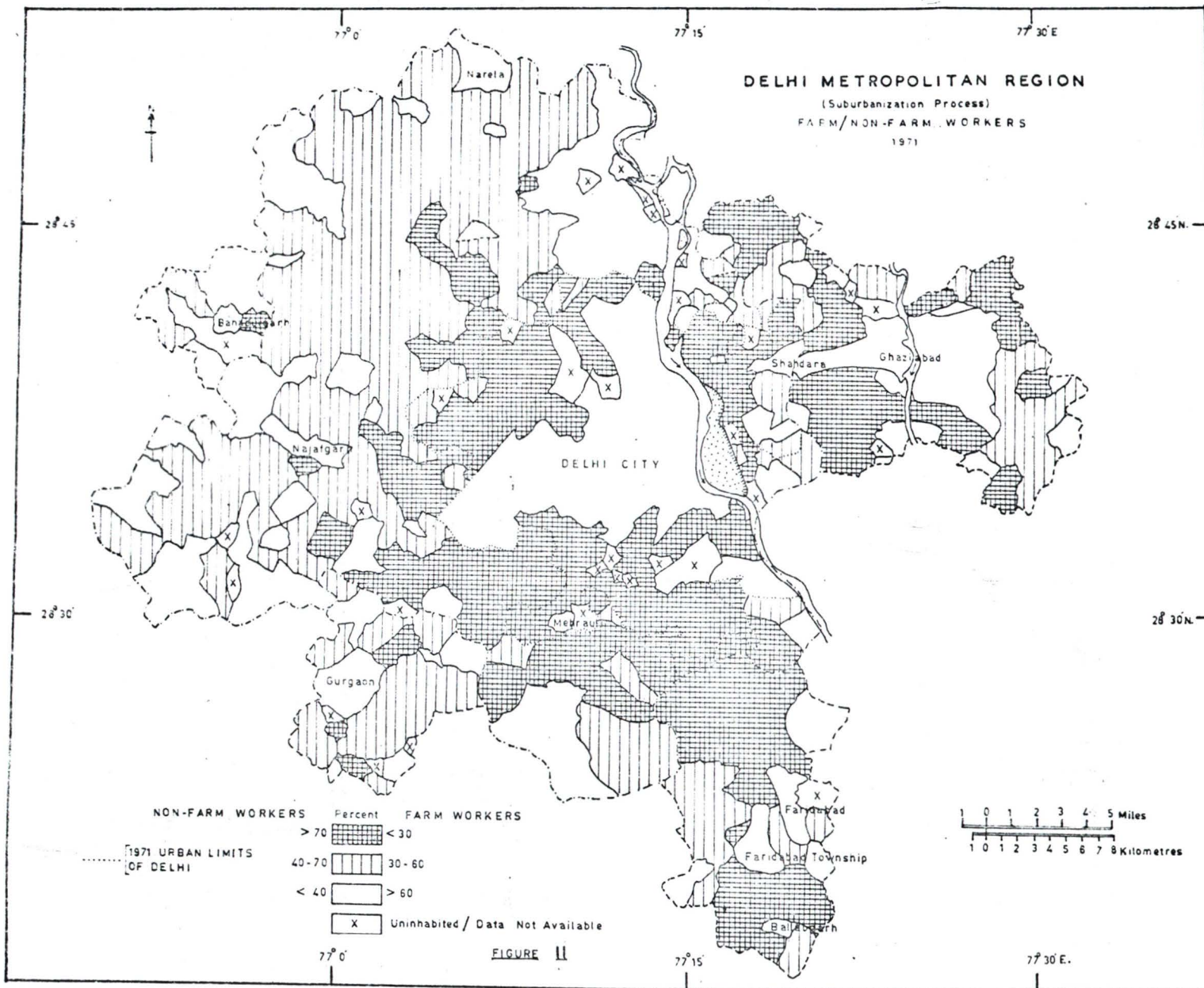


FIGURE 11

Table 18: DISTRIBUTION OF FARM WORKERS IN THE DELHI METROPOLITAN REGION

Percent Farm Workers	Nature of Suburbanization	1951		1961		1971	
		No. of Villages	Per-cent	No. of Villages	Per-cent	No. of Villages	Per-cent
Below 30	High	60	14.1	97	21.9	166	38.5
30 - 60	Medium	81	19.1	116	26.1	164	38.1
Above 60	Low	284	66.8	231	52.0	101	23.4
Total		425	100.0	444	100.0	431	100.0

secondary emphasis to the other. With the help of Table 19, using the metropolitan means of the density, sex ratio, farm worker and tertiary worker indices of suburbanization, three types of studies can be generated to analyze the process of suburbanization. These types based on the importance of the spatial or temporal factors have been named:

Type I - Temporal analysis

Type II - Tempo-Spatial analysis

Type III - Spatio-Temporal analysis

The ecological regions have been identified for each type using the technique discussed in the methodological section of Chapter I.

#### TYPE I : TEMPORAL ANALYSIS

The delineation of the fringe and its sub-regions is based on the 1951 index of suburbanization. The region

Table 19: INDICES OF SUBURBANIZATION EXPRESSED AS THE MEAN OF RURAL SETTLEMENTS IN THE DELHI METROPOLITAN REGION

Year	Level of Suburbanization	Density Km <sup>2</sup> .	Sex Ratio (females to 100 males)	Farm workers (Per-cent)	Territory Workers (Percent)
1951	Low	254.37	845.43	53.35	31.50
1961	Medium	309.89	835.45	43.68	27.37
1971	High	511.75	795.75	26.93	40.07

thus identified remains fixed as it was in 1951, but the socio-economic and demographic characteristics changed during the 1951- 71 period. The number of rural settlements in each ecological region remained the same, excluding those for which the figures were not available in one census or another (Table 4). As the present study is based on the type I approach, the process of suburbanization and the resultant changes in the socio-economic and demographic characteristics are presented in the following chapters (Figure 3).

#### TYPE II : TEMPO-SPATIAL ANALYSIS

This study, in which the space changes over the time period has been termed a tempo-spatial study. However, the spatial changes are less marked in this type than in type III. In spite of the large variations

in the indices of suburbanization in time, space variations are minor. The ecological regions in this study have been identified based on the respective year's mean index, hence, the number of rural settlements in each ecological unit has changed with time (Table 20 and Figures 3, 12, 13).

The process of tempo-spatial suburbanization has been explained in terms of the number of villages as they changed from one segment of the fringe to another. The index of suburbanization is higher in 1961 compared with 1951, except in the case of tertiary workers.<sup>121</sup> The number of villages in the fringe, especially in the urban fringe, has also increased. This implies that the process of suburbanization has not only intensified in time, but has also extended spatially in 1961. The 1971 index is also higher than the 1961. The number of villages in the fringe has declined during 1961-71 and has increased in the rural category. This fact helps to infer that suburbanization, though it was higher in 1971 than in 1961, had not extended spatially.

#### TYPE III : SPATIO-TEMPORAL ANALYSIS

The fringe in this type was identified in all three census period using the 1951 index of suburbanization (Table 21 and figures 3, 14 and 15). Here,

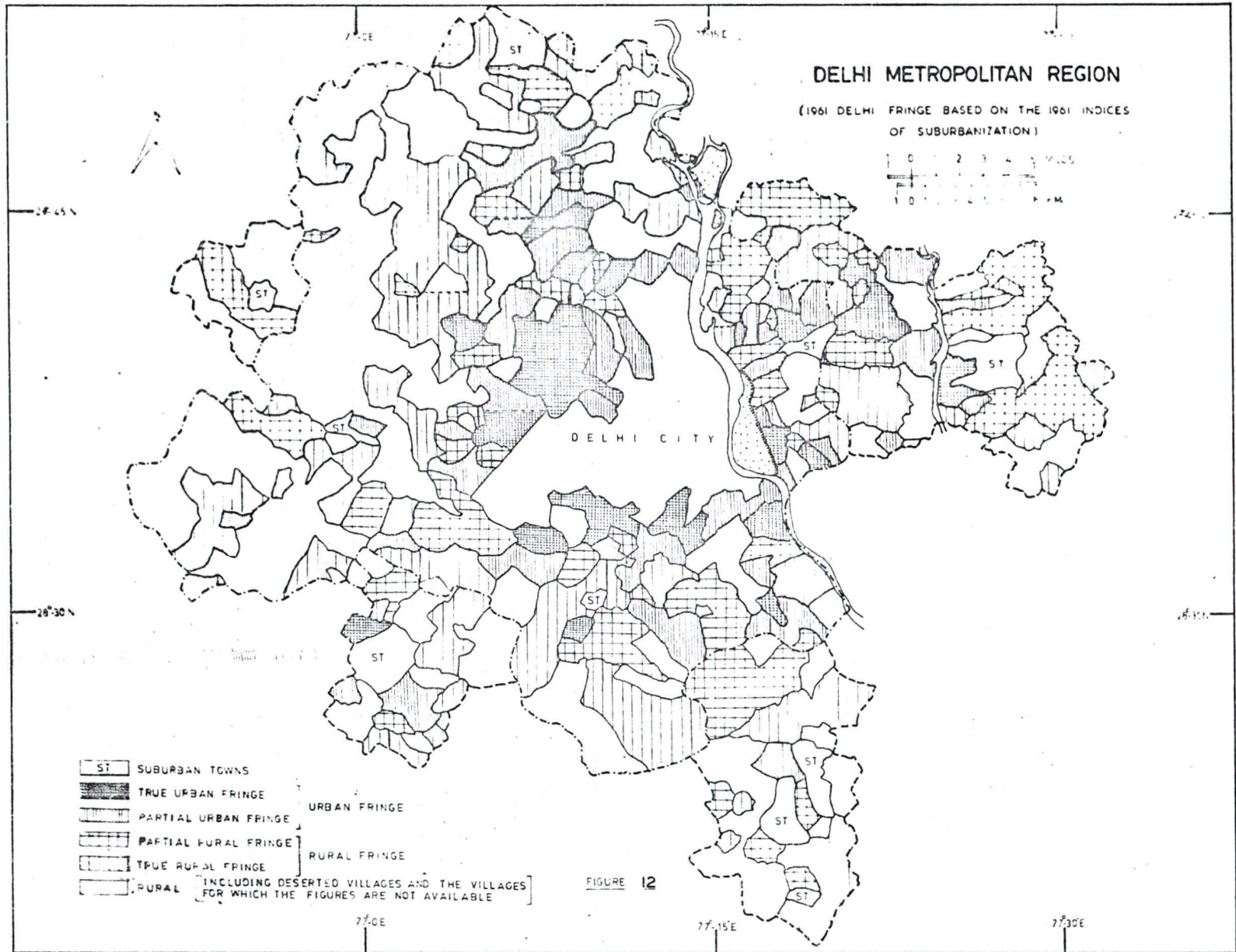




Table 20: DISTRIBUTION OF SETTLEMENTS IN THE ECOLOGICAL REGIONS - TYPE II

Ecological Regions	Weightage	Level of Suburbanization	1951 (used 1951 index)	1961 (used 1961 index)	1971 (used 1971 index)
1. City	-	-	1	1	1
2. Suburbs	-	-	10	10	10
-----					
3. True Urban Fringe	4	Very High	30	37	36
4. Partial Urban Fringe	3	High	54	71	65
5. Urban Fringe (3+4)	3-4		84	108	101
6. Partial Rural Fringe	2	Medium	60	92	71
7. True Rural Fringe	1	Low	132	119	106
8. Rural Fringe (6+7)	1-2		192	211	177
9. Rural	0	Very low	149	125	153
10. Total (5+8+9)			425	444	431
-----					
11. Uninhabited Villages			*	35	24
12. Incorporated Villages for which figure are not available			*	3	15
13. Other Village for which the figures are not available.			59	2	14
14. Total Rural Settlements (10+11+12+13)			484	484	484

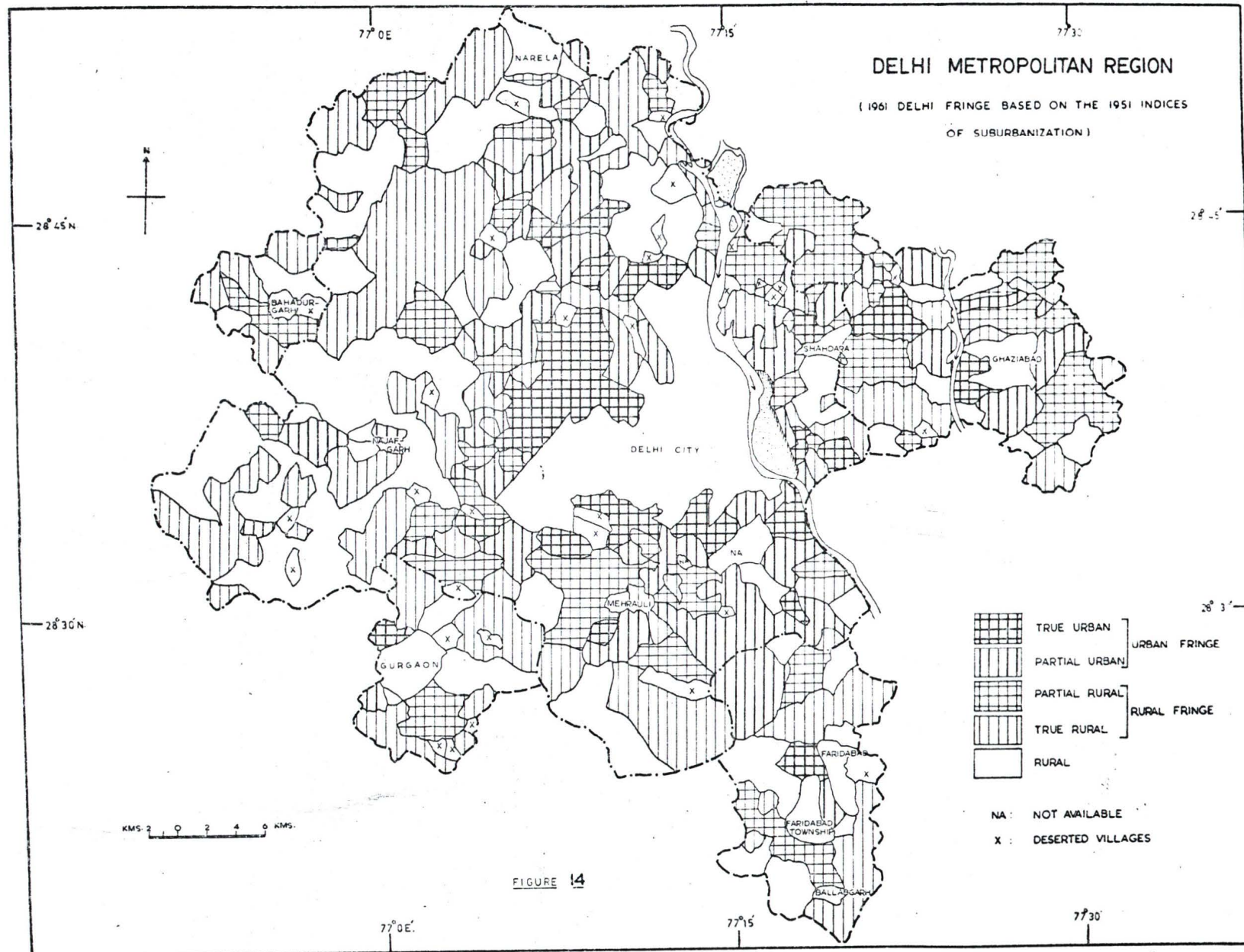
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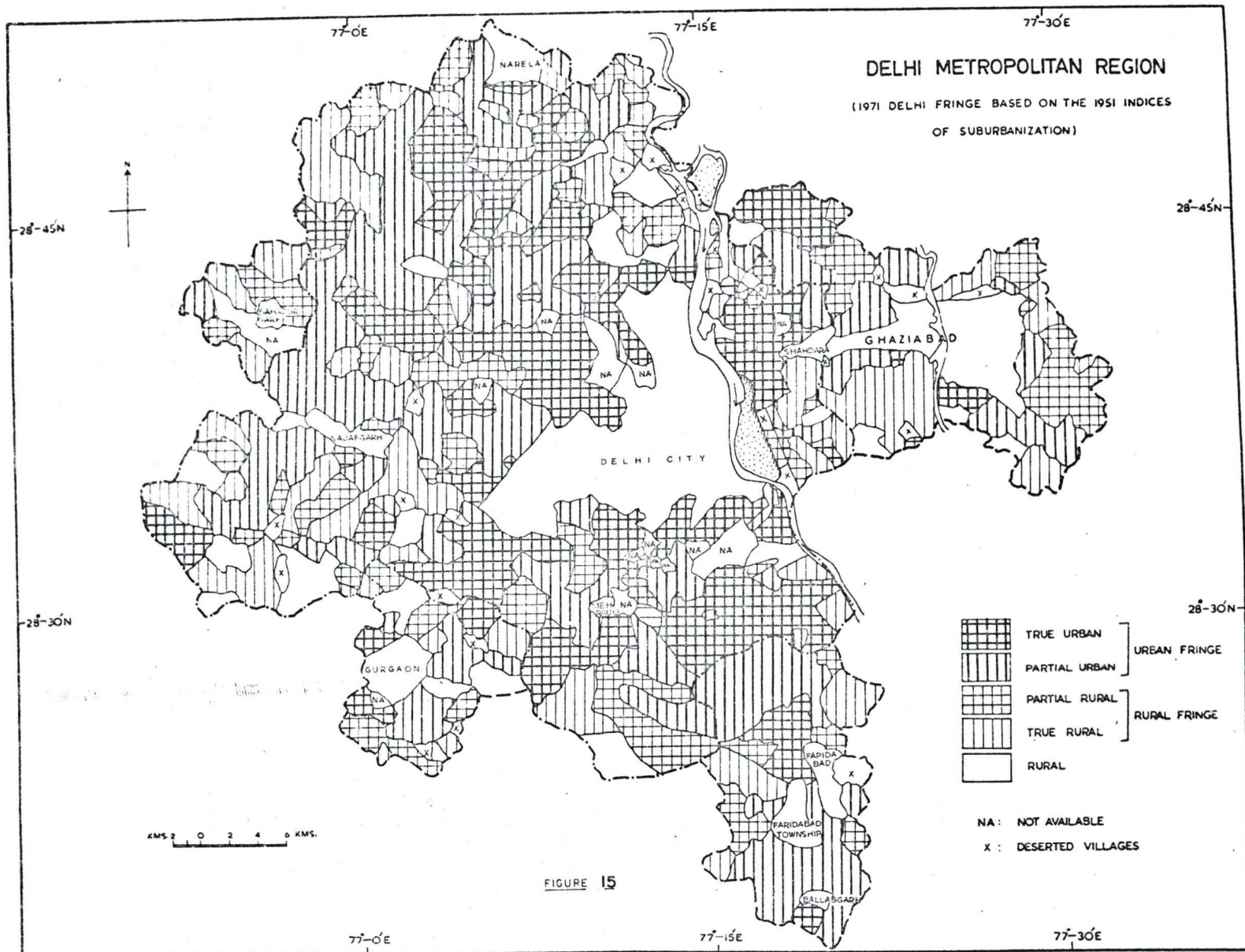
again, the spatio-temporal pattern of the suburbanization process has been explained in terms of the number of villages changing from one ecological unit to another. In the urban fringe category there were approximately three times as many villages in 1971 as there were in 1951, while in the rural category there was only one-fifth the number there were earlier. The study thus reveals the rapid spatial change in the process of suburbanization in the region, along with the increase in its intensity.

Table 21: DISTRIBUTION OF SETTLEMENTS IN THE ECOLOGICAL REGIONS TYPE-III (1951 Index used for Identification).

Ecological Regions	Weightage	Levels of Suburbanization	1951	1961	1971
1. City	-	-	1	1	1
2. Suburbs	-	-	10	10	10
3. True Urban Fringe	4	Very High	30	43	109
4. Partial Urban Fringe	3	High	54	86	134
5. Urban Fringe (3+4)	3-4		84	129	243
6. Partial Rural Fringe	2	Medium	60	83	76
7. True Rural Fringe	1	Low	132	131	81
8. Rural Fringe (6+7)	1-2		192	214	157
9. Rural	0	Very Low	149	101	31
10. Total (5+8+9)			425	444	431
11. Uninhabited Villages			*	35	24
12. Incorporated Villages for which the figures are not available			*	3	15
13. Other Villages for which the figures are not available			59	2	14
14. Total Rural Settlements (10+11+12+13)			484	484	484

\* No Information





## CONCLUSION

The term 'suburbanisation process' has been used for the temporal and spatial changes of socio-economic and demographic characteristics of the fringe. The physical process of suburbanisation has been studied in terms of incorporation, expansion of urban amenities like tap water, phone, city bus service, electricity and pukka road facilities. The structural process of suburbanisation has been studied in terms of non-farm workers and the ratio of workers to the total population. The gradient study of the above factors in the city hinterland indicated that the level of suburbanisation is decreasing away from the city and that the maximum urban impact is visible up to the 16-19 kilometre zone away from the city centre.

Indices of suburbanisation based on density, sex ratio, farm workers and tertiary workers have been prepared for 1951, 1961 and 1971. A detailed spatial and temporal study of density, farm workers and growth of the population was made. The changes in the number of villages in each category and time period helped to infer that the density of population is increasing away from the city; the ratio of farm workers is decreasing away from the city; and the growth of population is highest in areas near the city. The loss of population in the villages located on

the periphery of the city foreshadows the urban invasion. Three distinct approaches to the study of the five ecological groups have been identified, based on the 1951, 1961 and 1971 indices of suburbanization. However, Type I has been selected for the present study, since it provides an analysis of socio-economic and demographic changes in a fixed space rather than in a space which changes with time, as in Type II and Type III.

## REFERENCES AND FOOTNOTES

116. This discussion is based on the study, 'Suburbanization: Physical and Structural Process - A Case Study of Delhi', submitted by the author to the Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi, 1979.
117. Pachauri M.K. 1979. Delineation of the Fringe and the Gradients of the Socio-economic and Demographic Characteristics in the Rural Metropolitan Fringe Community with Special reference to Delhi, Unpublished Seminar paper, Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi.
118. For example, the ratio of the workers to the total population in the Delhi Union Territory in 1971 was the reverse of that in 1961; Urban 31.65 percent in 1961 and 30.62 percent in 1971; Rural 35.97 percent in 1961 and 26.62 percent in 1971.
119. This is contrary to the findings in the case of the Madras hinterland where the ratio of workers to the total population decreased towards the city. See Samuel M.J. A Study of Uniqueness and Generality of the City Hinterland Relationship: A case Study of Madras, (Unpublished), Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi, 1978.
120. The values in this table are derived in the following manner:
- 1951 Farm workers =  $\frac{\text{Persons getting livelihood from occupational categories No. I+II+III+IV}}{\text{Total Population.}} \times 100$
- 1951 Tertiary workers =  $\frac{\text{Persons getting livelihood from occupational categories No. VI+VII+VIII}}{\text{Total Population.}} \times 100$
- 1961 & 1971= Farm workers  $\frac{\text{Total of workers in occupational categories No. VII+VIII+IX}}{\text{Total workers (Total cat. I to IX)}} \times 100$
- N.B. For occupational categories see Appendix II.

121. The figures for the ratio of the tertiary workers in 1951 and 1961 were 32 and 27 percent, respectively. The decrease in the ratio of the tertiary workers in 1961 could be the result of two factors: (1) the 1951 figures for the tertiary workers also include the dependents, (2) the high ratio in 1951 may also result from the fact that the 1951 tertiary workers figures probably also include the category III and VI workers of 1961, since these categories were not recognized separately in 1951, but were considered with 'Other Services' (Cat.VIII).

## Chapter 4 DEMOGRAPHIC CHARACTERISTICS

### INTRODUCTION

The socio-economic and demographic characteristics analysed in the following sections are based on a type I study, where the ecological regions in the rural metropolitan area have been identified based on the 1951 index of suburbanization. Hence, the fixed space as it was in 1951 has been used to project 1951, 1961 and 1971 socio-economic and demographic features. The demographic characteristics discussed are population growth and rate of change, density of population and sex ratio. A high density of population is considered to represent high suburbanization. The growth of population will be low in the areas of high density and high in the areas of low density. However, a high growth of population in areas of high density is an indication of further concentration and hence an increase in suburbanization. A low sex ratio is an important indicator of urban characteristics, hence, it was hypothesized that the areas of low sex ratio have high suburbanization.

### DENSITY OF POPULATION

The density of population is an important indicator of the suburbanization process (table 22). The density gradients are very sharp as one moves from the city limits to the rural area. The density in the suburban

towns in 1971 was approximately half that of the city, while in 1951 it was only one-third. This greater gain by the suburbs occurred because they not only absorbed in-migrants from outside the region, but also received extra population from the city. The density of the

Table 22: DENSITY OF POPULATION AND LEVELS OF SUBURBANIZATION

Ecological Regions	122 Density in Km <sup>2</sup>			123 Levels of Sub-urbanization- 1971	
	1951	1961	1971	Percent from Rural	Deviation from Urban
City	7465.27	7279.64	7994.47	100.00	0.00
Suburbs	2601.52	3271.52	4132.95	49.46	50.54
-----					
True Urban Fringe	761.05	650.92	1212.92	11.24	88.70
Partial Urban Fringe	386.61	370.90	878.13	6.86	93.14
Partial Rural Fringe	259.64	322.87	515.55	2.11	97.89
True Rural Fringe	207.73	250.58	394.30	0.52	99.48
Rural	162.23	234.24	254.25	0.00	100.00
Total	254.37	309.89	511.75		
-----					
Urban Fringe	516.65	445.63	998.25		
Rural Fringe	223.16	271.69	429.70		

122 and 123 : see footnotes

population in the city in 1961 was less than in 1951. This was due to the fact that after the 1951 Indian census 48 villages were incorporated into the city. As a result of this, the area of the city increased from 195.54 Km<sup>2</sup> in 1951 to 326.34 Km<sup>2</sup> in

1961. Besides this the industrial suburbs of Faridabad and Ghaziabad also pulled a large number of people from the city, especially the displaced persons and the residents of the 'urban villages'.

Although the density of population in the fringe of Delhi decreases as one moves away from the city, it is increasing in all of the ecological regions over time. However, it is not always the nearness of the city which attracts high density: it occurs also because of the 'suburbanism' which has been induced even in the settlements located away from the city. For example, many of the villages of the urban-fringe category are not so near the city as the villages of the rural fringe. This is especially true in the cases of those villages which have large populations and are located away from the city, but along the transport routes. The urban fringe has always had a higher density of population than the rural fringe, though both have gained approximately the same density increase over time. The increase in density in the rural areas was higher than in either the urban fringe or rural fringe during the 1951-71 period. This was because the vacant rural areas where new industries were arising drew a greater share of the additional population. The decline of density in the urban fringe in 1961 indicates an important element of suburbanization; the decline of

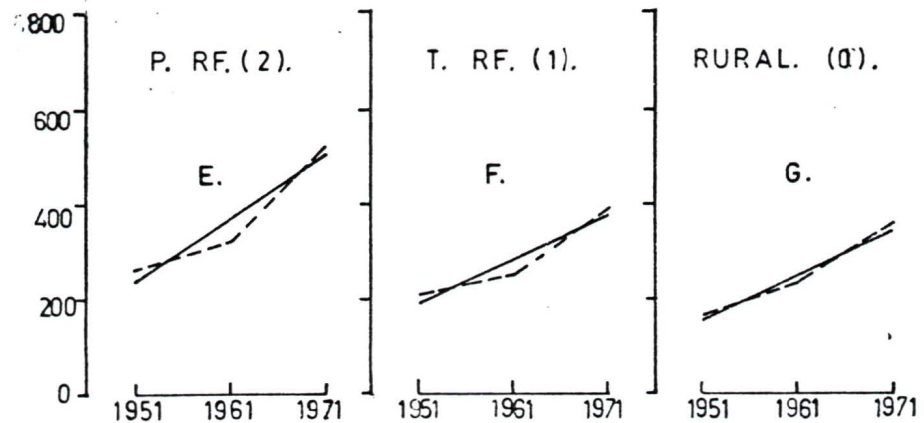
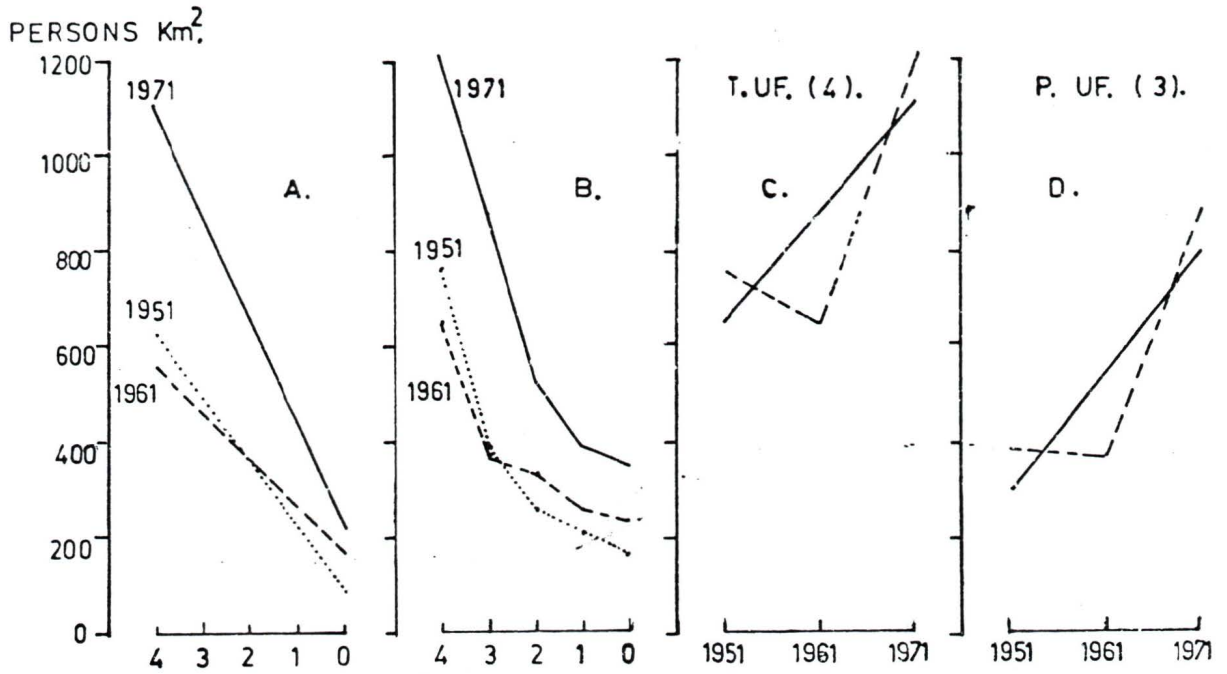
population in many of the incorporated rural settlements as a result of the suburban thrust.

The study of Figure 16A and B shows that the gradients of density in the region were steeper in 1951 than in 1961. The trend lines of density for the various ecological units reveal that the density of the population is increasing with time, though density variations are lower in the settlements away from the city, as indicated by the reduction in steepness of the trend lines (Figure 16-C-G). Using density as the scale of urbanization, it was found that even the suburban towns were approximately only half 'urban' and the true urban fringe only 11 per cent urban (Table 22). However, suburbanization in the Delhi Metropolitan Region is increasing with time.

#### POPULATION GROWTH

The higher growth of the city population in 1951-61 than in 1961-71 was due to the high migration to the city in this period (table 23). In 1961 migrants constituted 62 percent of the total population in the union territory of Delhi. The growth of population in the city in 1951-61 was higher than in the suburbs because of the high immigration to the city and better job opportunities. But in the next decade population growth was higher in the suburbs than in the city. This can be attributed to migration to the suburbs, not only from the nearby rural areas, but also

DENSITY GRADIENTS IN DELHI METROPOLITAN REGION



<u>WEIGHTAGE</u>	<u>LEVELS OF SUBURBANIZATION</u>	<u>ECOLOGICAL REGIONS</u>
4	VERY HIGH	TRUE URBAN FRINGE
3	HIGH	PARTIAL URBAN FRINGE
2	MEDIUM	PARTIAL RURAL FRINGE
1	LOW	TRUE RURAL FRINGE
0	VERY LOW	RURAL

Fig. 16. A-G.

from the city because job and residential opportunities in the industrial suburbs increased during that period.

Table 23: INTER-CENSAL POPULATION VARIATIONS AND RATE OF CHANGE IN THE DELHI METROPOLITAN REGION IN PERCENTAGE

Ecological Regions	Population Variations <sup>124</sup> 1951-61	1961-71	Rate of Change 1951-71 <sup>125</sup>
City	59.86	50.75	4.13
Suburbs	56.78	73.70	4.63
-----			
True Urban Fringe	-25.75	93.60	1.79
Partial Urban Fringe	5.22	85.11	3.22
Partial Rural Fringe	38.02	51.72	3.54
True Rural Fringe	37.33	49.57	3.45
Rural	44.01	50.29	3.68
Total	21.89	60.44	3.23
-----			
Urban Fringe	-10.62	88.72	2.56
Rural Fringe	37.56	50.32	3.48

124 and 125 : see footnotes

The growth of the population in the total fringe and rural area was far higher in 1961-71 (60 percent) than in 1951-61 (22 percent). The major share of this increase occurred in the urban fringe. Most of the villages of the urban fringe were now 'urban villages' and were providing cheap accommodation to migrants who wished to be near the city for work. The urban fringe had lost population in 1951-61 as a result of the process of suburbanization and loss of agricultural land. This was followed by a

tremendous growth in the 1961-71 period because the urban functions and land uses by then were well established in the urban fringe. The growth of the population in the rural fringe and rural villages in 1961-71 was also substantial, because industrial activities developed in the suburbs and along the transport routes near which these villages were located. It is interesting to note that these processes produced a growth of population in the Delhi fringe that was increasing away from the city in 1951-61 but decreasing away from it in 1961-71.

A high growth of population is not always an indication of high suburbanization. For example, the decline of population in the urban fringe during 1951-61 was an indication of the beginning of suburbanization, while the growth of population during 1961-71 indicated the rapid advance of suburbanization. However, the areas representing high suburbanization (urban fringe) experienced a low rate of change in population during the whole 1951-71 period, while the opposite occurred in areas of low suburbanism (rural and rural fringe) (Figures 17A and B).

#### SEX RATIO

The sex ratio is one of the most sensitive aspects of population composition, since it records the effects of selective migration. It not only reflects the family structure, but also the economic condition of the region.

Because the ecological regions reflect various levels of urban and suburban characteristics one can expect variations in the sex ratios in the different ecological regions. Urban character is represented by a low sex ratio, hence, it was expected that the segments of the fringe having high suburbanization would have a low sex ratio, while the rural areas would retain a high ratio.

In accordance with expectations, the sex ratio increases with decrease in the level of suburbanization. For example, the sex ratio in the true urban fringe in 1951 was 760, while in the rural areas it was 929 (Table 24). The sex ratio is also decreasing in time as the level of suburbanization is increasing. There are, however, some exceptions to this trend. The most notable is that the sex ratio in the true urban fringe in 1961 was higher than in 1951. This can be attributed to the fact that after the incorporation of the villages many of the males either migrated to the central city or industrial suburbs for jobs or retreated back to the agricultural fields in the rural area. The low sex ratio in the urban fringe is also an indication of the migratory nature of its population. The landless male labourers flock to the peripheries of the big cities, leaving their families behind. The new industries and the urban functions arising in the urban fringe are able to provide them jobs at relatively higher wages than they were getting while working in the fields.

Table 24: SEX RATIO AND THE LEVELS OF SUBURBANIZATION  
IN THE DELHI METROPOLITAN REGION (Females  
per 1000 males)

Ecological Regions	Sex Ratio <sup>126</sup>			Levels of Sub-urbanization <sup>123</sup> in sex Ratio <sup>126</sup> 1971	
	1951	1961	1971	Percent Deviation from Rural	Percent Deviation from Urban
City	750.22	775.60	799.26	100	0
Suburbs	859.05	827.68	803.18	77	23
-----					
True Urban Fringe	760.24	785.58	764.47	305	-205
Partial Urban Fringe	801.39	797.50	779.43	217	-117
Partial Rural Fringe	831.94	815.39	767.24	289	-189
True Rural Fringe	870.88	857.90	807.16	54	46
Rural	929.28	863.73	816.32	0	100
Total	845.43	835.45	795.75		
-----					
Urban Fringe	780.10	792.65	772.88		
Rural Fringe	857.23	842.93	792.98		

123 and 126: see footnotes

The increasing trend of the sex ratio in the city is an indication that the migrants have become settled there, leading a normal family life in the city. The reverse is true in the suburban towns where the sex ratio is declining, indicating a continuing concentration of migrants in the suburbs.

Three stages in the history of the sex variations in the region can be identified:

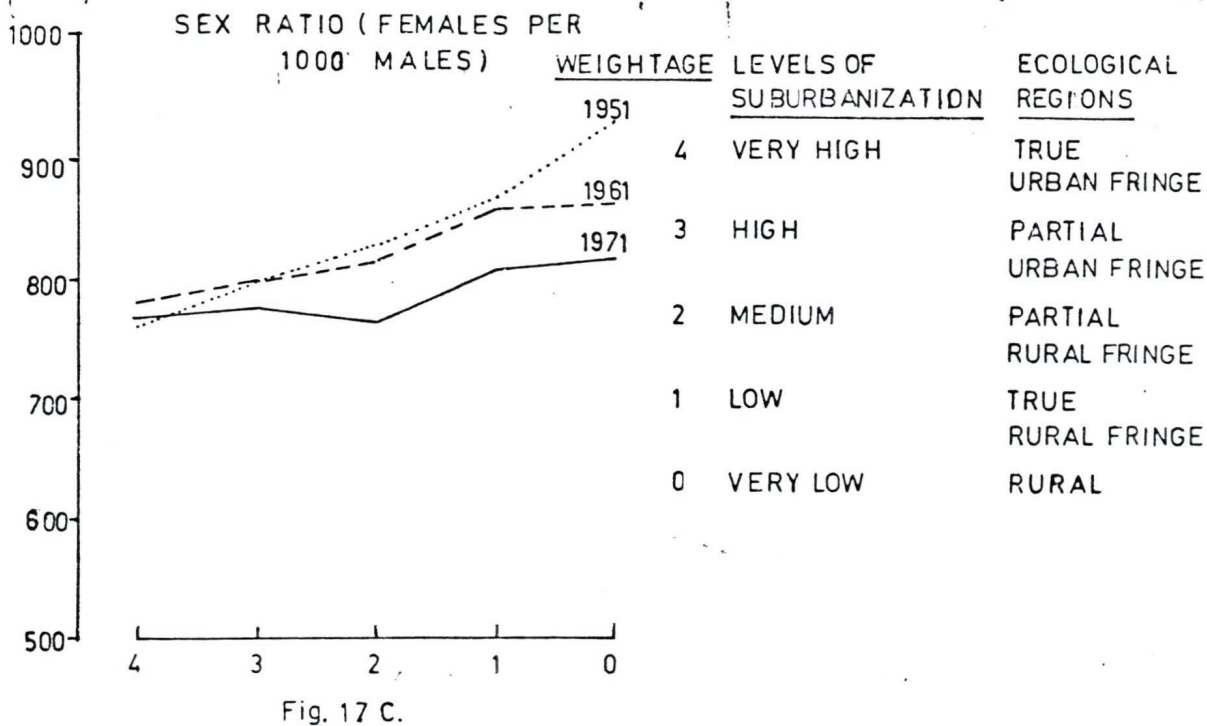
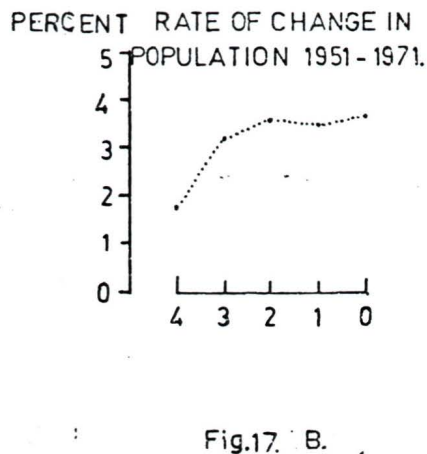
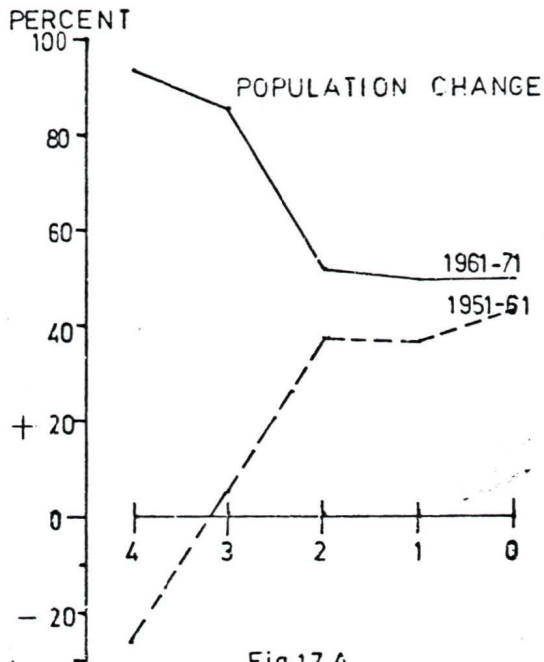
- (1) In the first stage when the process of suburbanization increases the sex ratio tends to decline. In this process the rural sex ratio decreases to be at par with the urban sex ratio.
- (2) In the second stage when 'urbanization' is high and quite intensive the sex ratio tends to increase.
- (3) An equilibrium is achieved when the whole suburban region becomes urban in character and the sex ratios of urban and suburban areas are similar.

A limited picture of these stages is presented in Figure 17-C. The graph reveals the fact that the sex ratio is declining in all segments of the fringe and that the gradients become less steep over time. The declining trend of the sex ratio in Delhi Metropolitan Region as a whole is in accordance to the trend visible in India's population.<sup>127</sup>

#### CONCLUSION

The process of suburbanization in this section has been studied in terms of the three demographic characteristics - density, population growth and sex ratio. It was hypothesized that the density and growth of the population would be high and the sex ratio low in the areas of high suburbanization. The study showed that these hypotheses have been confirmed in general, although there were some minor deviations. For example, the expectation was that

DEMOGRAPHIC CHANGES IN DELHI METROPOLITAN REGION:



as the level of suburbanization increases, the density would also increase, both spatially and temporally. But this was not true in the case of density in 1961 in the urban fringe where it decreased even though the level of suburbanization was high. It became apparent that the invading waves of suburbanization may temporarily depopulate the agrarian communities. Density gradients were found to be very steep from the city to the rural area. As a result, the true urban fringe was only 11 percent urban according to the rural-urban scale.

The growth of population and the level of suburbanization have shown two different relationships during 1951-61 and 1961-71. During the first decade growth was negatively related to suburbanization: growth was low in the urban fringe and high in the rural fringe. However, the actual decline of population in the urban fringe was also a result of the process of suburbanization. Growth in 1961-71 was positively related with the level of suburbanization, as growth was now high in the urban fringe and low in the rural fringe.

The sex ratio in the region is decreasing with the increase in the level of suburbanization. However, there are some deviations from this trend because of certain migrational characteristics. The rural and urban sex ratios are changing, the urban increasing and the rural

decreasing over time. The low sex ratio in the urban fringe is an indication of the concentration there of the landless migrant labourers who stay at the periphery to be near sources of employment, but away from the high rent accommodation of the city.

## REFERENCES AND FOOTNOTES

$$122. \text{ Density of population} = \frac{\text{Total population}}{\text{Total area in Km}^2}$$

$$123. \text{ Levels of suburbanization} = \frac{M_r - R_m}{U_m - R_m} / 100$$

where:  $M_r$  = mean of the region under consideration

$R_m$  = rural mean

$U_m$  = urban mean

$$124. \text{ Population change} = \frac{P_2 - P_1}{P_1} \times 100$$

where:  $P_2$  = population of the later year

$P_1$  = population of the earlier year

$$125. \text{ Rate of population change} = \frac{(P_2 - P_1) / T}{(P_2 + P_1) / 2} \times 100$$

where :  $P_2$  = population of the later year

$P_1$  = population of the earlier year

$T$  = total number of years under consideration

$$126. \text{ Sex ratio} = \frac{\text{Total number of females in a unit}}{\text{Total number of males in a unit}} \times 1000$$

127. Mitra, Asok. 1979. Implications of Declining Sex Ratio in India's Population, Allied Publishers, New Delhi, pp 9-15.

Chapter 5. SOCIAL CHARACTERISTICS

## INTRODUCTION

Changes in social characteristics are a major consequence of the process of suburbanization. The social characteristics analyzed were: displaced persons and scheduled castes<sup>128</sup>, housing density (persons per house), housing facilities, family size, literacy, ratio of workers, and the dependency ratio. Although census data on displaced persons and scheduled castes are incomplete, there is sufficient information available to permit consideration of their role in the fringe. The housing conditions in the region were studied in terms of the ratio of persons per house<sup>129</sup> and the ratio of households per house. In order to get a picture of the house building activities in relation to the process of suburbanization, the average number of houses per inhabited settlement has been calculated. Family size has been studied as the ratio of persons per household. Literacy is one of the most important factors in defining levels of suburbanization because of the vast differences, not only in the rural and urban populations of India, but also between males and females.<sup>130</sup> Differences in literacy between sexes have been measured with the help of a literacy equality index.

The ratio of workers and the dependency ratio are other indicators of the levels of suburbanization. The

ratio of non-workers represents dependency within the population. Included are non-working females, aged persons and children. Unfortunately, figures on the working population are not available in the 1951 census where figures on the 'livelihood patterns' were presented instead. Hence, the 1951 figures include both workers and their dependents. Also, there is a difference in the definition of 'workers' in the 1961 and 1971 censuses.<sup>131</sup> The difference in the reference period by one week in 1971 causes a slight decrease in the working population figures in 1971, making temporal comparisons difficult. However, the spatial analysis does not face such difficulties because of the definitional changes.

#### DISPLACED PERSONS AND SCHEDULED CASTES

Information on displaced persons is available in the 1951 census only (Table 25). These are the migrants from Pakistan who were settled in the city and its region after the partition of India in 1947. They came not only from rural areas, but also from the urban centres. The majority settled in the city and suburbs, where special camps were set up for them, and the rest settled in the periphery. These migrants contributed a 23 percent share to the total population of the true urban fringe. During the 1951-61 period many of these migrants moved inside the city, as they improved their economic status and were able to construct their own accommodations or were able to

Table 25: DISPLACED PERSONS AND THE SCHEDULED CASTES,  
1951-1971

Ecological Regions	Displaced <sup>133</sup> Persons 1951	Scheduled <sup>134</sup> Castes 1961	Scheduled <sup>134</sup> Castes 1971
City	32.77	11.14	14.13
Suburbs	41.57	11.93	12.59
-----			
True Urban Fringe	22.91	19.70	20.54
Partial Urban Fringe	15.13	22.27	24.79
Partial Rural Fringe	1.94	24.11	22.22
True Rural Fringe	2.03	19.88	19.88
Rural	1.23	23.70	25.68
Total	7.96	22.04	22.81
-----			
Urban Fringe	19.11	21.55	22.94
Rural Fringe	2.00	21.35	20.70

133 and 134: see footnotes

afford the high rent accommodations of the city. This is clear from the fact that the density of the population in the urban fringe had declined in 1961 and also that population growth was negative during 1951-61. These conclusions are contrary to the findings of Johnston (1967) in his study of Melbourne where he suggested that the migrants to the city will first reside in the inner city rental housing areas and will slowly proceed from there towards the outer suburbs.<sup>132</sup>

The distribution of the scheduled castes in the region is not regulated by the suburbanization factors, rather, it is regulated by the caste system, dominant in rural India. Every rural settlement in India has one or two dominant castes. There are many villages where the scheduled castes form the majority. The urban fringe had a higher percentage of scheduled castes than the rural fringe in 1971, but the rural area had the highest of all, nearly 26 percent of the total population. The city and suburbs had significantly lower percentages, with the city's slightly exceeding that of the suburbs (Table 25). This distribution pattern can be explained in the light of some of the socio-economic conditions of the scheduled castes. The scheduled castes in the rural areas are generally illiterate and landless and work as farm labourers. As such, most of them stay in the rural areas. Another group of scheduled castes is concentrated in the urban fringe where they work as unskilled labourers and where they are able to get better wages than on the farms. The increase in the ratio of the scheduled castes in the city and urban fringe during 1961-71 is indicative of their success in finding urban jobs. This has been facilitated by the government which has reserved positions for them in government services.

## HOUSING AND FAMILY CONDITIONS

Housing conditions have been studied in terms of persons per house, households per house and houses per settlement. Changes in these ratios reflect the house building activities which depend upon the process of suburbanization. The number of houses per settlement is higher in the urban fringe than in rural fringe and increases over time as suburbanization advances. (Table 26). The decline in the number of houses in the urban fringe of 1961 is the result of depopulation of this zone. The agricultural land of this zone was acquired by the Delhi Development Authority, settlements were uprooted and many of the people moved to the city or to suburbs. The loss of these settlements and the lack of house building activity were the main causes of the increase in the ratio of persons per house in the urban fringe from 5.63 in 1951 to 6.55 in 1961 (Figure 18A). The ratio of persons per house is lowest in the urban fringe and increases outward to the rural area where family size is largest. The high ratio of persons per house in 1961 resulted from the low house building activity combined with a high increase in population.

In general, the ratio of households per house was high in the city and low in the rural areas because of the general shortage of houses and the divided or single family

Table 26: PERSONS PER HOUSE AND THE NUMBER OF HOUSES PER SETTLEMENT, 1951-71.

Ecological Regions	Per House <sup>135</sup>			Houses per Inhabited Settlement <sup>136</sup>		
	1951	1961	1971	1951	1961	1971
City	5.54	7.52	6.08			
Suburbs	6.28	5.67	6.47	2,609.8	4,528.5	6,871.5
-----						
True Urban Fringe	5.50	6.67	5.64	476.7	312.1	607.8
Partial Urban Fr.	5.77	6.50	5.45	241.3	196.1	547.8
Partial Rural Fr.	6.11	6.32	6.16	154.7	187.7	305.9
True Rural Fringe	6.51	6.78	6.61	124.7	157.4	243.2
Rural	5.98	6.68	6.37	123.4	158.0	250.9
Total	5.99	6.63	6.11	168.1	176.6	317.6
-----						
Urban Fringe	5.63	6.55	5.53	325.4	229.0	571.9
Rural Fringe	6.37	6.61	6.45	134.1	167.2	262.9

135,136: see footnotes

system in the city (Table 27 and Figure 18B). The ratios of households per house in the true urban fringe, city and rural area were exactly the same in 1951 (1.05). In the case of the first two there were sufficient houses to accommodate even the divided families, while in the third case the number of houses was small, but sufficient to accommodate the 'joint families', a common feature of rural areas. With the advance of suburbanization and the tendency toward single family organization, high ratios appeared in 1961 in the urban fringe. Although the number of persons per house in the rural fringe

has always been high (6.45 in 1971), there has not been a real housing shortage, owing to the joint family system. A high rate of house construction in the city and the urban fringe by 1971 ameliorated the housing shortage there, but the situation in the suburban towns worsened.

Table 27: HOUSEHOLDS PER HOUSE, 1951-1971<sup>137</sup>

Ecological Regions	1951	1961	1971
City	1.05	1.49	1.22
Suburbs	1.26	1.13	1.27
-----			
True Urban Fringe	1.05	1.26	1.12
Partial Urban Fringe	1.13	1.21	1.10
Partial Rural Fringe	1.13	1.08	1.07
True Rural Fringe	1.12	1.06	1.07
Rural	1.05	1.08	1.05
Total	1.09	1.12	1.08
-----			
Urban Fringe	1.08	1.23	1.11
Rural Fringe	1.13	1.07	1.07

137: see footnotes

Family size is a good indicator of suburbanization because small families are characteristic of urban areas. As the level of suburbanization decreases away from the city, the size of family increases (Table 28 and Figure 18C). In the city and the urban fringe family size decreased over two decades. The reverse was true in the suburbs, perhaps because

## HOUSING CONDITIONS IN DELHI METROPOLITAN REGION.

4 True Urban Fringe      2 Partial Rural Fringe      0 Rural  
 3 Partial Urban Fringe      1 True Rural Fringe

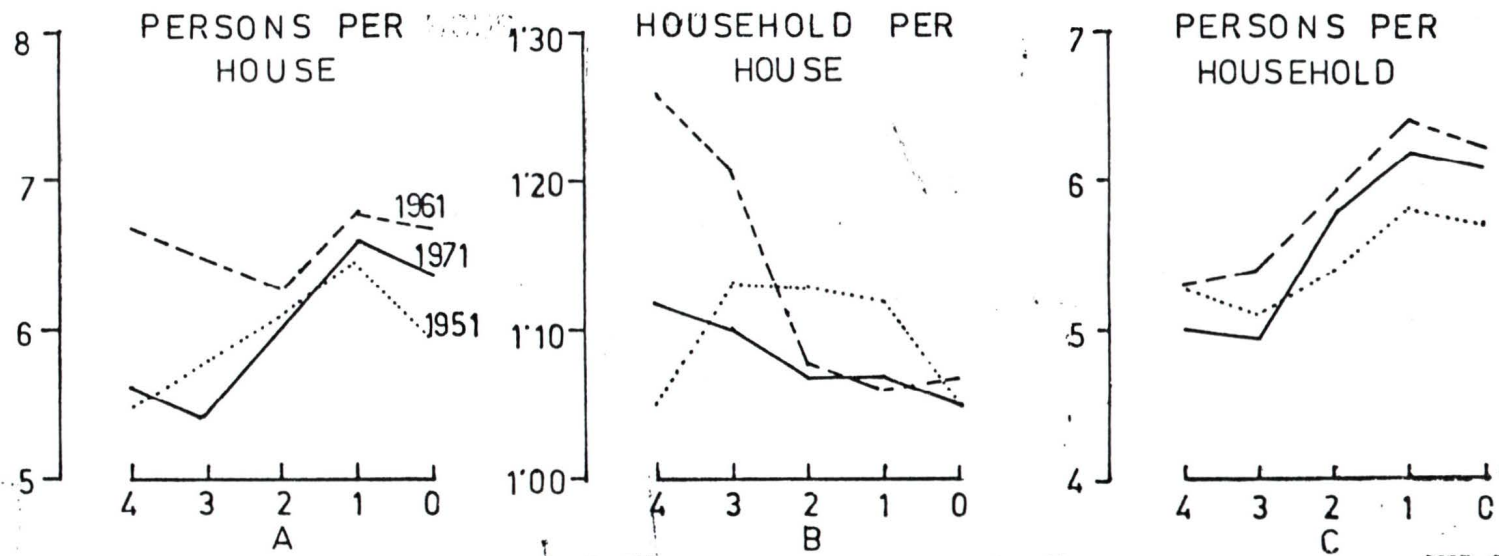


Fig. 18.

of the large number of rural migrants who generally have large numbers of children and maintain joint family systems.

Table 28: FAMILY SIZE (Persons per Household), 1951-1971<sup>138</sup>

Ecological Regions	1951	1961	1971
City	5.29	5.04	4.99
Suburbs	4.98	5.00	5.11
-----			
True Urban Fringe	5.27	5.32	5.04
Partial Urban Fringe	5.12	5.38	4.95
Partial Rural Fringe	5.39	5.85	5.78
True Rural Fringe	5.81	6.39	6.16
Rural	5.72	6.20	6.07
Total	5.50	5.93	5.67
-----			
Urban Fringe	5.20	5.35	4.99
Rural Fringe	5.66	6.19	6.02

138 : see footnotes

## LITERACY

Literacy decreases from high levels in the city to low levels in the rural areas (Table 29). The trend lines of all three census years are parallel to each other (Figure 19A). However, the literacy gradients are steep only between the true urban fringe and the partial rural fringe. Contrary to expectations, literacy was higher in the rural areas in 1951 than in the rural fringe. One factor may be that the rural areas are being influenced by the nearby suburbs. Another is that the rural areas probably had better educational facilities

than the rural fringe. Also literacy was higher in the suburbs in 1951 than in the city. This was mainly due to exceptionally low female literacy and the high ratio of illiterate migrants in the city in 1951.

The trends of male literacy were similar to those of the total population, but differed especially in 1951 when the rural male literacy was considerably higher than in some sections of the fringe (Figure 19B). This may be accounted for by the shift of illiterate males from rural areas to the city and suburbs to work as unskilled labourers there, leaving behind the literate males. The increase in male literacy in the whole region was higher during 1951-61 than during 1961-71, probably because of the high demand for literate males in urban employment that prevailed at that time.

Female literacy followed the same pattern, but at a much lower level than male literacy. The urban fringe females were more literate than those of the rural fringe, however, the gain in female literacy was greater in the rural fringe than in the urban fringe during 1961-71 (Figure 19C). This was due to the special emphasis placed on female literacy in rural educational programmes. Female literacy in the city in 1951 was lower than in the suburbs. This was because the displaced females who settled in the city after the partition of India in 1947 were generally illiterate. However, there was a remarkable gain of 32 percent in female literacy in 1961.

Table 29: LITERACY, 1951-1971 (Figures in Percentages)

Ecological Regions	1951			1961			1971		
	139 Total	140 Male	141 Female	139 Total	140 Male	141 Female	139 Total	140 Male	141 Female
City	39.42	56.93	16.07	57.00	63.93	48.06	60.00	66.09	52.38
Suburbs	39.89	50.75	27.25	49.02	59.65	36.17	53.80	61.69	43.98
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
True Urban Fringe	23.82	31.99	13.07	37.08	49.00	21.92	45.00	56.25	30.27
Partial Urban Fringe	19.37	27.83	8.82	32.75	45.98	16.16	41.74	52.27	28.23
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Partial Rural Fringe	13.36	20.43	4.85	23.25	35.77	7.89	34.04	46.54	17.74
True Rural Fringe	13.83	22.53	3.85	24.16	38.05	7.98	34.24	47.27	18.09
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rural	14.57	24.75	3.61	23.53	36.51	8.51	33.44	46.80	17.08
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	16.77	25.58	6.36	26.61	39.76	10.85	36.75	49.15	21.12
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Urban Fringe	21.65	29.98	10.96	34.63	47.27	18.69	43.16	54.01	29.11
Rural Fringe	13.67	21.79	4.19	23.85	37.25	7.95	34.17	47.01	20.75

139, 140, 141: See footnotes.

LITERACY IN DELHI METROPOLITAN REGION

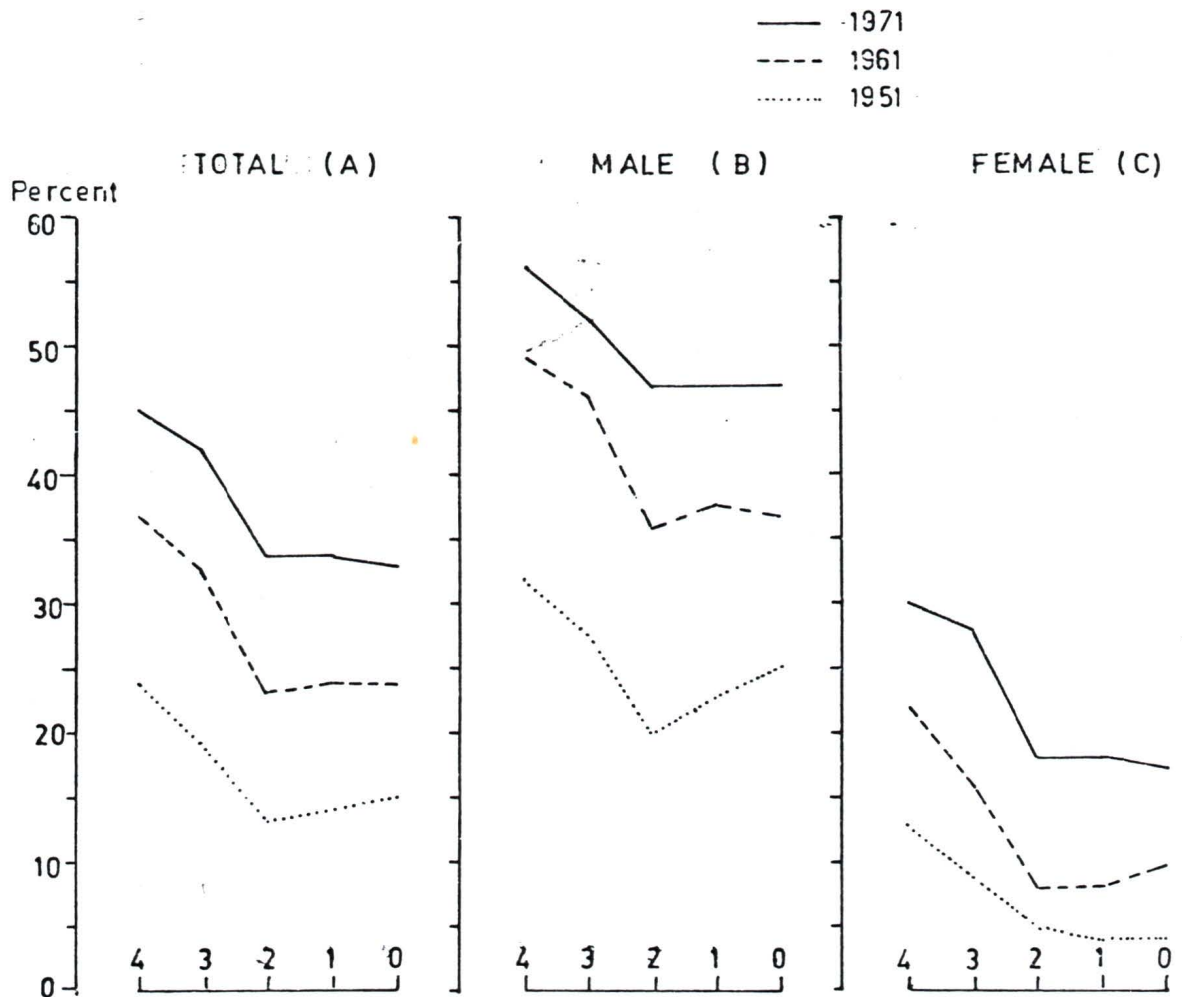


Fig.19 A-C.  
 4 TRUE URBAN FRINGE  
 3 PARTIAL URBAN FRINGE  
 2 PARTIAL RURAL FRINGE  
 1 TRUE RURAL FRINGE  
 0 RURAL

This may be attributed to the special emphasis on female education that was made, the migration of literate females to the city and the large demand for educated females in various urban jobs and in the government offices during the 1951-61 period.

The relationship between the sexes in literacy has been measured through an index. The index value of 100 indicates the complete equality between male and female literacy. A value less than 100 indicates a comparatively lower female literacy and a value more than 100 would indicate a higher female literacy. The index values are higher in the city and suburbs, indicating relatively less difference there between male and female literacy. The trend is strongly towards equalization of the sexes in all areas, but the decline of literacy away from the city persists (table 30).

Table 30: LITERACY EQUALITY INDEX, 1951-1971 <sup>142</sup>

Ecological Regions	1951	1961	1971
City	28.23	75.18	79.26
<u>Suburbs</u> - - - - -	<u>53.69</u> - - - - -	<u>60.64</u> - - - - -	<u>71.29</u> - - - - -
True Urban Fringe	40.86	44.73	53.81
Partial Urban Fringe	41.69	35.15	54.00
Partial Rural Fringe	23.74	22.06	38.11
True Rural Fringe	17.09	20.97	38.27
Rural	14.59	23.31	36.50
- - - - - <u>Total</u> - - - - -	<u>24.86</u> - - - - -	<u>27.29</u> - - - - -	<u>42.97</u> - - - - -
Urban Fringe	36.56	39.54	53.90
Rural Fringe	19.23	21.34	44.14
<u>142: see footnotes</u>			

## WORKERS

The hypothesis suggested that the ratio of workers to total population would be high in the fringe areas of the city because of the numerous, job-creating urban functions established there. The ratio was expected to decline outward from the city. Another recent study on the Delhi area pointed to this conclusion.<sup>143</sup> However, a study of the Madras hinterland suggested that the ratio of workers to total population would decrease as one approached the city.<sup>144</sup> The present study reveals that distinctly different patterns prevailed in 1961 and 1971 (Table 31).

Contrary to the hypothesis, the ratio in 1961 was low near the city and high in the rural areas. The following factors help to account for the low ratio of workers in the urban fringe in 1961:

- (1) The urban functions capable of providing jobs were not well established in the urban fringe.
- (2) The agricultural land was being acquired by the Delhi Development Authority. As a result, some of the farmers were forced to retreat back to the rural areas and many of them even shifted to the city and suburbs to take up urban jobs, leaving the non-workers behind in the urban fringe. Also, the female agricultural workers lost their jobs and were not

Table 31: RATIO OF WORKERS 1961-71

Ecological Regions	Total <sup>145</sup>		Male <sup>146</sup>		Female <sup>147</sup>	
	1961	1971	1961	1971	1961	1971
City	31.84	30.91	53.11	51.59	4.42	5.04
Suburbs	27.79	28.63	47.49	48.88	3.98	3.42
-----						
True Urban Fringe	30.06	28.69	48.33	48.95	6.80	2.20
Partial Urban fringe	33.09	28.80	50.26	48.73	11.55	3.23
-----						
Partial Rural fringe	35.09	29.51	50.61	49.31	16.06	3.72
True Rural Fringe	36.64	26.57	48.55	45.64	22.76	2.94
-----						
Rural	36.96	27.27	47.67	45.91	24.56	4.44
-----						
Total	35.22	27.86	48.80	47.24	18.96	3.43
-----						
Urban Fringe	31.85	28.75	49.52	48.83	9.56	2.78
Rural Fringe	36.10	27.60	49.27	46.92	20.48	3.21

145, 146, 147: See footnotes

absorbed into the urban labour force, owing to social and educational limitations. In the rural fringe the high ratio of workers came about because of the great need for cheap farm labour. There male, female and even the children work in large numbers.

The ratio of the workers in the suburbs was very low compared with that in the city, urban fringe or even the rural fringe. The suburban towns were neither rural nor urban and they did not offer many agricultural or urban jobs. Many of the Delhi suburbs were still residential in nature and industrial activities were not well established up to 1961.

By 1971 working conditions had changed and the ratio figures had reversed (Figure 20A). The decrease in the ratio of total workers in the whole metropolitan area can be attributed mainly to the decrease in the ratio of the female workers (giving due consideration to the definitional changes) in the same period. The differences in the ratio of workers between the urban and rural fringes were less in 1971 than in 1961 because of the overall transformation of the fringe where industrial activities increased greatly. The ratio of workers in the suburbs increased during 1961-71. The suburbs in 1971 became the main centres of industrial concentration and many workers living there commuted to the city for work.

The hypothesis that a high level of suburbanism produces a high ratio of workers is more valid in the case of male workers (Figure 20B). The high ratio of male workers in the urban fringe was the result of ample work opportunities there. The decrease in the ratio of the male workers in the city during 1961-71 may be explained by the increase in the number of unemployed, partly because male child workers were no longer participating in the labour force.

The changes in the ratio of female participation in the work force is an indication of the definite social transformation in the region. Contrary to the hypothesis, female participation was decreasing as the level of suburbanization was increasing (Figure 20C). The high ratio of female workers in the rural fringe in 1961 was due to the high concentration of primary activities there, in which the rural females generally participate. The decrease in 1971, both in the fringe and rural areas, resulted from the loss of primary activities in the region. The low ratio of female participation in the suburbs indicates that the heavy industrial jobs of these towns were mostly taken by males. However, the city females took more urban jobs and their participation in the city increased during 1961-71.

#### DEPENDENCY RATIO

A view of the non-workers as dependents leads to

### WORKERS IN DELHI METROPOLITAN REGION

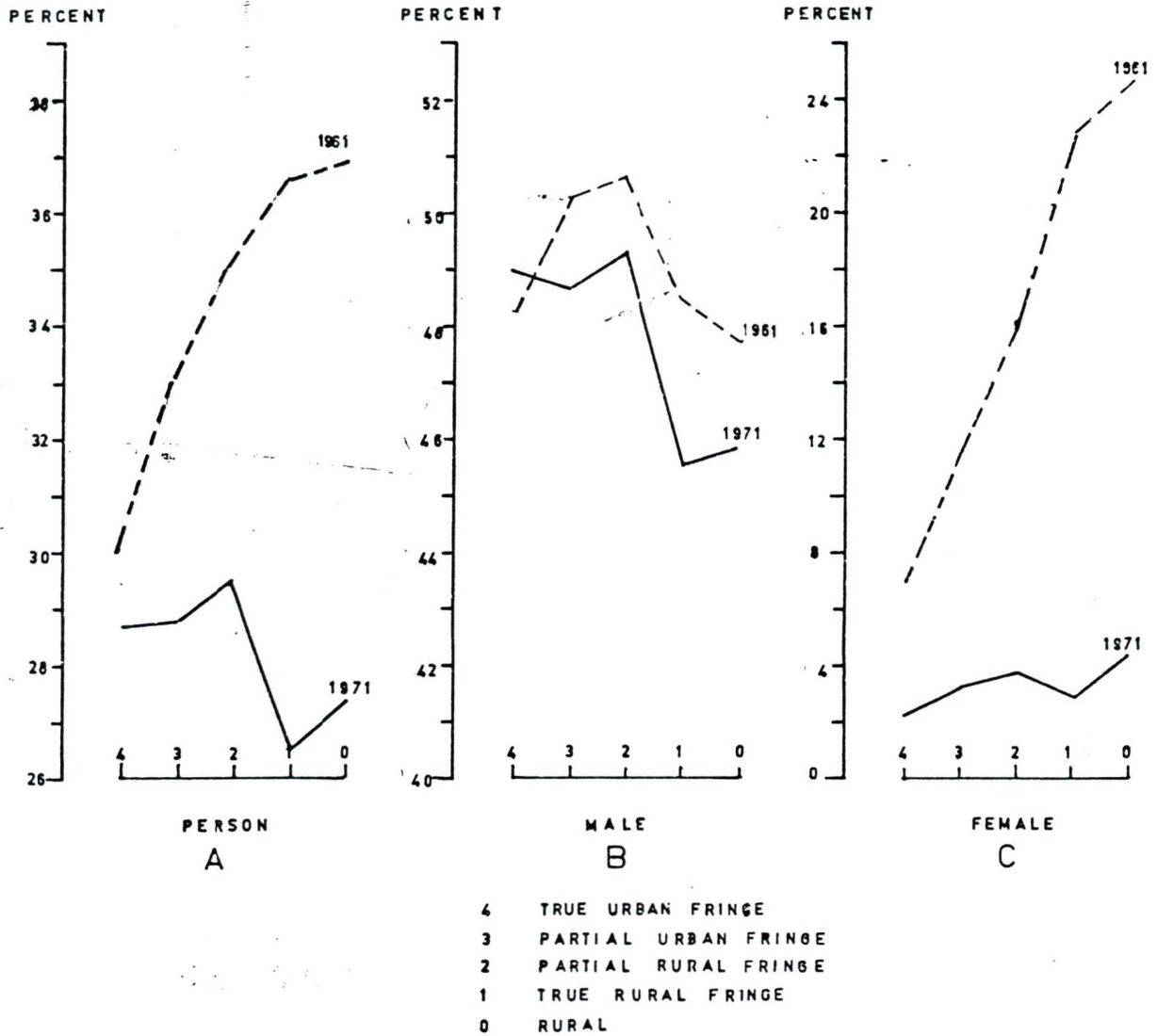


Fig. 20 A-C.

consideration of the dependency ratio, essentially reciprocal to the worker ratio (Table 32). In 1961 the ratio was high in areas of high suburbanization and low in areas of low suburbanization. The opposite held true in 1971. Whereas job opportunities were better in the rural fringe and rural areas in 1961 than in the urban, they were better in the city and urban fringe in 1971, and this affected the dependency ratio.

Table 32 : DEPENDENCY RATIO, 1961-71<sup>148</sup>

Ecological Regions	1961	1971
City	2.14	2.24
Suburbs	2.60	2.49
-----		
True Urban Fringe	2.32	2.49
Partial Urban Fringe	2.03	2.47
Partial Rural Fringe	1.85	2.39
True Rural Fringe	1.73	2.76
Rural	1.71	2.67
Total	1.84	2.59
-----		
Urban Fringe	2.14	2.47
Rural Fringe	1.77	2.62
-----		
148: see footnotes		

## CONCLUSION

The transformation of the social fabric is a true indication of the extent and intensity of the suburbanization process in the fringe. The study revealed that the displaced persons concentrated primarily near the city.

The migrants first resided on the periphery and later moved inside the city and to nearby colonies. The scheduled castes also were attracted to the city and flocked into the zones near the city. House building activities were higher in the fringe than in areas away from the city and the ratio of persons per house was low in the urban fringe and high in the rural fringe. This suggests that those settlements with a low level of suburbanization have large families. The high ratio of households per house in the urban fringe derived from the housing shortage, the high ratio of rented accommodation and the tendency to maintain a single family system with a high level of suburbanization. Literacy is increasing in the fringe with the increase in suburbanization. The approach to equality of the sexes in literacy is much higher near the city than in the rural areas. The ratio of workers provides two different conclusions: the ratio increased away from the city in 1961, but towards the city in 1971. This resulted from the availability of jobs in different locations in different periods. The female participation in the work force is a clear example of the impact of suburbanization. In 1961 the ratio of female workers was high, especially on the farms, but as the level of suburbanization increased in 1971 females participation in the work force in the fringe decreased because many of the fields in which they

worked were converted to urban uses. On the other hand, the participation rate of the urban females increased from 1961 to 1971, and for them urban jobs had become a social necessity.

## REFERENCES AND FOOTNOTES

128. The term 'scheduled castes' was applied to the 'Sudras' (one of the four main castes of India, namely, Brahmins, Kshatryas, Vaishyas and Sudras), the depressed classes, for the first time in the Government of India Act of 1935 and a list of scheduled castes was prepared in 1936. Under the Article 341 of the constitution of India, the President of India may specify the castes, races or tribes; or parts of or groups within castes, races or tribes; which shall for the purpose of the constitution be deemed to be 'scheduled castes'. Such scheduled castes can be identified separately for each state. Incidentally, the scheduled castes can be found only among Hindus and Sikhs.
129. The 1971 census defined a census house as 'a building... having a separate main entrance...inhabited or vacant... used for residential or non-residential purpose or both'. See S.C. Srivastwa 'Indian Census in Perspective', Census of India, Monograph No.1, 1971.
130. The 1971 census stated that a person 'who can both read and write with understanding in any language, is taken as literate. A person who can merely read but cannot write is not a literate. It is not necessary that a person who is literate should have received any formal education or should have passed any minimum educational standard.... . All children up to 4 years of age were treated as illiterate even if the child was going to school and had picked up reading and writing.....' There was no change in the definition of literacy in 1951 and 1961, except that there it was specified that literate persons must be able to read and write a letter. See S.C. Sriwastwa, ibid, 1971, p.164.
131. The 1961 census defined the person 'who was working but was absent from his work during the FIFTEEN DAYS preceding the day of enumeration due to illness or other causes, was regarded as a worker.... Work included not only actual work but effective supervision and direction of work'. See Sriwastwa, ibid, 1971, p.172.
- In the 1971 census the reference period was 'ONE WEEK prior to the date of enumeration.... A person who normally works but had been absent from the work during this reference period....should be treated as engaged in regular work....' See General Population Tables Pt.II-A. Delhi Series (27), Census of India 1971. p.118.
132. Johnston R.J. 1967. 'Some tests of Model of Intra-Urban Population Mobility: Melbourne, Australia', Urban Studies, Vol.6, No.1, pp34-57.

133. Displaced persons =  $\frac{\text{Displaced persons}}{\text{Total population}} \times 100$
134. Scheduled castes =  $\frac{\text{Scheduled castes}}{\text{Total population}} \times 100$
135. Persons per house =  $\frac{\text{Total population}}{\text{Total number of houses}} =$  (Density in house)
136. Number of houses per settlement =  $\frac{\text{Total number of houses}}{\text{Total inhabited settlements}}$
137. Households per house =  $\frac{\text{Total number of households}}{\text{Total number of houses}}$
138. Persons per household (Family size) =  $\frac{\text{Total population}}{\text{Total number of households}}$
139. Literacy (total) =  $\frac{\text{Total literates}}{\text{Total population}} \times 100$
140. Male literacy =  $\frac{\text{Total male literates}}{\text{Total male population}} \times 100$
141. Female literacy =  $\frac{\text{Total female literates}}{\text{Total female population}} \times 100$
142. Literacy equality index =  $\frac{\frac{\text{Total female literates}}{\text{Total female population}} \times 100}{\frac{\text{Total male literates}}{\text{Total male population}} \times 100} \times 100$
143. Pachauri M.K., op.cit., 1979.
144. Samuel M.J., op.cit., 1978
145. Ratio of workers =  $\frac{\text{Total workers}}{\text{Total population}} \times 100$
146. Ratio of male workers =  $\frac{\text{Total male workers}}{\text{Total male population}} \times 100$
147. Ratio of female workers =  $\frac{\text{Total female workers}}{\text{Total female population}} \times 100$
148. Total dependency ratio =  $\frac{\text{Total non-workers}}{\text{Total workers}}$

Chapter 6 : ECONOMIC CHARACTERISTICS : WORKERS IN  
THE PRIMARY SECTOR

INTRODUCTION

The economic transformation is an important indicator of the extent and intensity of the suburbanization process in the fringe of a city. A working hypothesis suggests that as the process of suburbanization increases the participation of the work force in tertiary activities increases, in secondary it remains stable and in primary it decreases. The primary sector workers were those belonging to the first four occupational categories in 1971, the first three in 1961 and the first four in 1951 (see appendix No.II). It is important to reiterate that the 1951 census does not provide information on the actual workers. Rather, it provides information on people who received their livelihood from different occupations, thus it includes the workers and their dependents. The 1961 and 1971 censuses provide separate information on workers and non-workers. However, the 1951 figures were made comparable with the later ones by calculating the percentage workers constituted of the total population in 1951. As long as there was no substantial difference in the ratio of the dependents, as seems likely, the 1951 figures are comparable with those of 1961 and 1971. For the sake of convenience the term 'workers' has been used for all people who were gaining their livelihood from any sector in 1951. The differences in the definitions of 'workers' in 1961 and 1971 posed little difficulty in determining the workers in the primary sector,

since the percentages for the various occupational groups were calculated from total workers and not from total population.

#### PRIMARY WORKERS

The hypothesis has been confirmed, as the study showed that the ratio of workers in the primary sector increases as one moves away from the area of high suburbanization (Table 33 and Figure 21A). As such, there were more primary workers in the rural and rural fringe than in the urban fringe. The ratio of primary workers has also decreased over the complete period with the increase in suburbanization, despite an anomaly in the urban fringe in 1961. The ratio of workers there was higher in 1961 than in 1951 because female participation in the primary sector increased exceptionally, owing to the changes in agricultural land use. Besides this, the category III workers of 1961 were not included in the primary category of 1951, hence, those figures are low. By 1971, however, the ratio of primary workers in the urban fringe was down to half that of 1961. This may be attributed to the fact that the urban fringe was more open to urban impact than any other ecological region. It is interesting to note the small increase in the ratio of primary workers in the city in 1971. This occurred because more primary workers were then living in the city, since their fields, orchards and plantations, though very small in area, were now within the city limits. The study also revealed that the urban fringe was 73 percent

urban, while the rural fringe was only 14 percent urban in the suburban scale of primary workers.

Table 33: WORKERS IN THE PRIMARY SECTOR AND LEVELS OF SUBURBANIZATION (Figures in Percentages)

Ecological Regions	Workers in the Primary Sector			Levels of Suburbanization 1971	
	1951 <sup>149</sup>	1961 <sup>150</sup>	1971 <sup>151</sup>	Deviations from Rural	Deviations from Urban
City	0.60	1.01	1.07	100	0
Suburbs	6.72	5.87	4.17	93	7
-----					
True Urban Fringe	21.34	20.37	11.03	76	24
Partial Urban Fringe	24.34	27.93	12.96	71	29
Partial Rural Fr.	57.57	44.30	28.49	34	66
True Rural Fringe	71.96	65.50	41.72	2	98
Rural	75.78	60.01	42.54	0	100
Total	53.35	50.67	30.48	29	71
-----					
Urban Fringe	22.81	25.00	12.10	73	27
Rural Fringe	66.98	58.35	36.77	14	86

149,150,151 and 152 : see footnotes

The spatial distribution of the male primary workers is similar to that of the total (Table 34). The decrease in the ratio of male primary workers over the period was more pronounced in the rural and rural fringe areas than in the urban fringe. This indicates that the process of suburbanization was more active in the rural and rural fringe (Figure 21B), mainly because the loss of agricultural land to urban uses, especially industries, was greater in these areas. The

PRIMARY WORKERS IN DELHI METROPOLITAN REGION

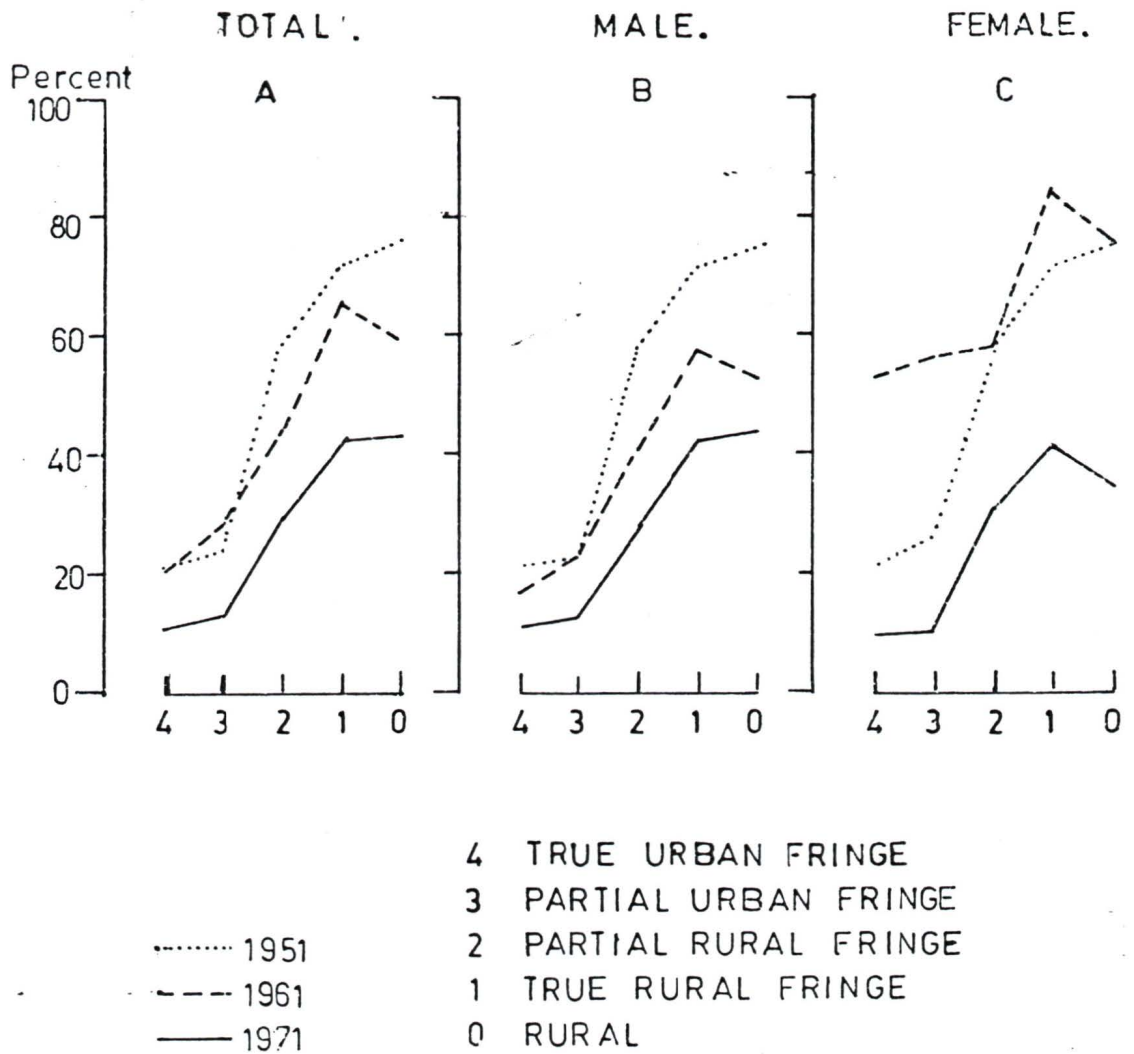


Fig. 21. A-C.

Table 34: MALE AND FEMALE PRIMARY WORKERS, (Figure in Percentages)

Ecological Regions	M A L E			F E M A L E		
	1951 <sup>153</sup>	1961 <sup>154</sup>	1971 <sup>155</sup>	1951 <sup>153</sup>	1961 <sup>154</sup>	1971 <sup>155</sup>
City	0.60	0.88	1.11	0.60	2.95	0.55
Suburbs	6.65	4.85	4.18	6.83	20.57	4.13
-----	-----	-----	-----	-----	-----	-----
True Urban Fringe	20.59	16.79	11.06	22.33	52.75	9.85
Partial Urban Fr.	22.94	22.87	13.05	26.10	55.61	10.98
Partial Rural Fr.	57.40	40.88	28.39	57.77	57.55	30.00
True Rural Fringe	71.75	57.61	41.72	72.20	85.16	41.82
Rural	75.26	52.69	43.15	76.35	76.40	34.64
Total	52.03	43.40	30.53	54.92	74.28	29.61
-----	-----	-----	-----	-----	-----	-----
Urban Fringe	21.72	20.50	12.17	25.20	54.31	10.57
Rural Fringe	66.72	51.56	36.75	67.29	77.78	37.11

153, 154 and 155 : see footnotes

male workers of these zones were now participating more in the manufacturing and construction activities of the rising industrial suburbs of Faridabad and Ghaziabad. In the suburbs generally the ratio of male primary workers decreased, owing to greater participation in the secondary and tertiary occupations. In contrast, the ratio increased in the city because many of the fields, orchards and plantations were now within the city limits. Many of the progressive farmers were now living in the city and supervising agricultural activities from there.

The pattern of female participation in the primary activities indicates the finer details of the process of suburbanization (Table 34 and Figure 21C). Their participation is high in the rural fringe and low in the urban fringe because, within the rural social structure, females predominantly work in the fields. But as urbanism increases and they become more literate they tend to withdraw from agricultural work. Contrary to this generalization, however, female participation in the primary occupations increased during 1951-61, with the increase in the level of suburbanization. Partly this was due to the differences between the 1951 and 1961 censuses in reporting occupational data, especially the non-inclusion in 1951 of the occupational category III of 1961. However, the exceptional increase in female primary workers, especially in the urban fringe, occurred mainly because the agricultural fields there were turned into 'kitchen gardens' as a result of the urban invasion. The cropping pattern changed and agriculture was now more intensive, which required more female participation. Besides this the male population left the uneconomic fields to take up urban jobs.

The decrease in the ratio of female primary workers during 1961-71 in all segments of the fringe reflects the rapid increase in suburbanization. As a result, the ratio of female primary workers was low in the urban fringe and high in the rural fringe. The lower ratio in the rural area than

in the rural fringe, both in 1961 and 1971, was because the rural females were now participating more in the secondary sector jobs coming up in the nearby suburbs. For example, more than 50 percent of the female workers were participating in secondary sector occupations in the rural areas in 1971. This case illustrates that the rural areas were experiencing more suburban impact than the rural fringe.

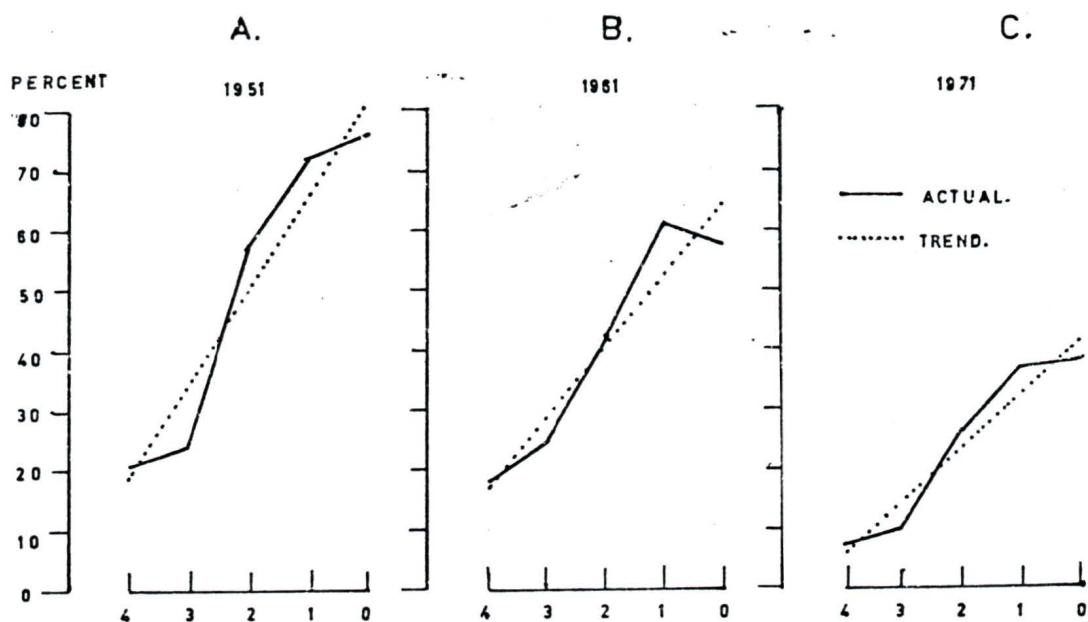
### Farm Workers

The changes in the ratio of farm workers are probably the most important economic indicators of the process of suburbanization. A decrease in the ratio of farm workers is an indication of increase in the level of suburbanization. This decrease in the rural settlements near the city is not only an indication of the socio-economic changes, but also of the changes in the land use pattern from predominantly rural to predominantly urban. The decrease in the ratio of farm workers with the increase in suburbanization was less during 1951-61 than 1961-71 (Table 35). This was due mainly to the acceleration of the land conversion process in the second decade. The trend lines (Figure 22) show that the ratio of farm workers was not only decreasing in space, but also over time, as indicated by the diminishing steepness of the lines.

### Cultivators

Cultivators and farm labourers are subdivisions of farm workers. The ratio of cultivators is regulated by the

## FARM WORKERS IN DELHI METROPOLITAN REGION.



- 4 TRUE URBAN FRINGE  
 3 PARTIAL URBAN FRINGE  
 2 PARTIAL RURAL FRINGE  
 1 TRUE RURAL FRINGE  
 0 RURAL

Fig. 22. A-C.

Table 35: FARM WORKERS (Figures in Percentages)

Ecological Regions	1951 <sup>156</sup>	1961 <sup>157</sup>	1971 <sup>158</sup>
City	0.60	0.33	0.33
Suburbs	6.72	5.04	3.65
-----			
True Urban Fringe	21.34	18.34	8.33
Partial Urban Fringe	24.34	25.19	9.48
Partial Rural Fringe	57.57	42.68	25.71
True Rural Fringe	71.96	62.61	38.03
Rural	75.78	58.14	38.22
Total	53.35	48.40	26.93
-----			
Urban Fringe	22.81	22.82	8.97
Rural Fringe	66.98	55.89	33.42

156,157 and 158 : see footnotes

land available for cultivation, hence, the trends are similar to those for farm workers, and for the same reasons (Table 36 and Figure 23). It is noteworthy that female participation in cultivation decreased greatly with the increase in suburbanization. In the first stage when suburbanization was first introduced and the agricultural land was diminishing, female participation in cultivation increased. Agriculture intensified with kitchen garden type of fields and greater female participation was required. As a result, the ratio of female workers as cultivators increased during 1951-61. In the second stage when suburbanization further intensified, even more agricultural land was lost, but also many females

Table 36: CULTIVATORS (Figures in Percentages)

Ecological Regions	Total			Male			Female		
	159 1951	160 1961	160 1971	161 1951	162 1961	162 1971	163 1951	164 1961	164 1971
City	0.60	0.27	0.15	0.60	0.22	0.15	0.60	0.89	0.06
Suburbs	5.84	3.90	2.04	5.74	3.09	2.10	5.97	15.48	1.04
True Urban Fringe	15.39	13.82	4.98	15.09	11.29	5.12	15.79	36.69	0.84
Partial Urban Fringe	21.01	21.62	6.09	19.93	17.42	6.27	22.37	44.56	2.66
Partial Rural Fringe	45.71	36.11	17.59	45.28	33.01	18.37	46.23	48.11	4.07
True Rural Fringe	62.56	57.40	29.05	62.50	49.78	29.71	62.63	76.40	16.48
Rural	65.26	52.99	28.03	65.00	45.46	29.62	65.55	69.88	7.80
Total	45.04	43.39	19.54	43.99	36.50	20.21	46.28	65.84	7.78
Urban Fringe	18.14	18.80	5.60	17.42	15.10	5.76	19.06	42.87	2.03
Rural Fringe	56.73	50.22	24.76	56.46	43.71	25.48	57.05	68.84	11.53

159, 160, 161, 162, 163 and 164: See footnotes.

withdrew from farm jobs for social reasons. The ratio of female cultivators decreased in the total metropolitan region from 66 percent in 1961 to only 8 percent in 1971.

### Agricultural Labourers

There are wide variations in the distribution of agricultural labourers in the various segments of the fringe, despite the expected negative relationship with the level of suburbanization (Table 37). The ratio of farm labourers was lower in 1961 than in 1951 or 1971 in the total metropolitan region. The high ratio in 1951 was caused partly by the inclusion of dependents in that year. By 1971 the intensity of agriculture and the change in cropping patterns required more farm labourers, especially when the landowners were engaged in other urban functions. The ratios of farm labourers in 1971 were not only high, but also the gradients were steep compared with those of 1961 (Figure 24A). In the city and suburbs the ratio of farm labourers, though very small, was steadily increasing. This was because more and more landless labourers were coming to the city to work in the off season, while still working in the fields in the agricultural season.

While the patterns of male agricultural labourers are similar to those of total, there are several differences worthy of note concerning the female patterns (Figures 24 B & C). In 1961, contrary to the hypothesis, the ratio of

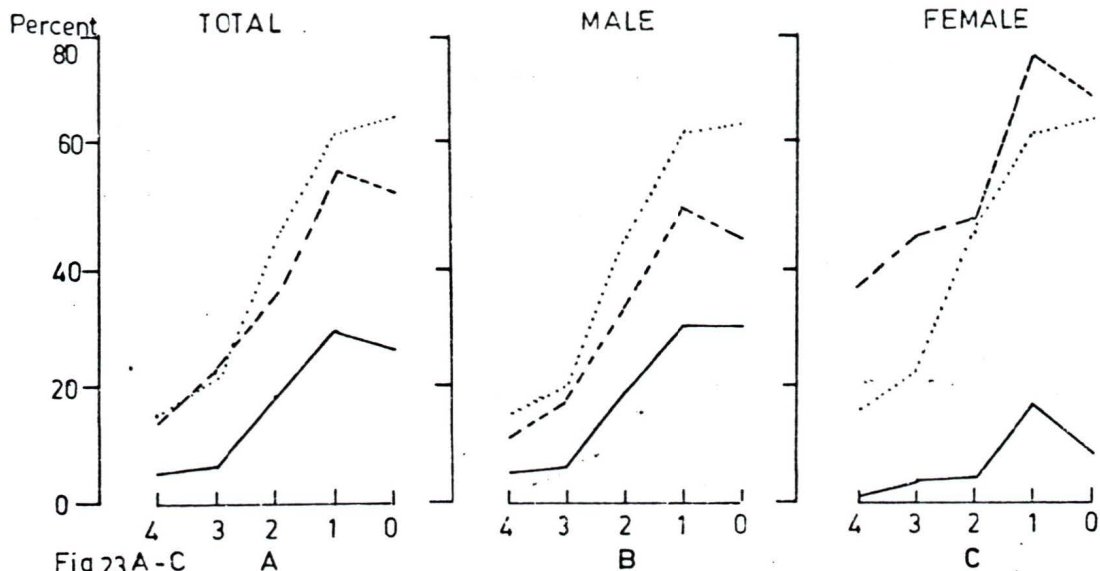
Table 37: AGRICULTURAL LABOURERS (Figures in Percentages)

Ecological Regions	Total			Male			Female		
	165 1951	166 1961	166 1971	165 1951	166 1961	166 1971	165 1951	166 1961	166 1971
City	0.02	0.06	0.18	0.02	0.05	0.18	0.02	0.25	0.25
Suburbs	0.88	1.14	1.61	0.91	0.93	1.55	0.86	4.25	2.65
-----									
True Urban Fringe	5.95	4.52	3.35	5.50	3.87	3.18	6.54	10.40	8.08
Partial Urban Fringe	3.33	3.57	3.39	3.01	3.00	3.20	3.73	6.71	6.96
-----									
Partial Rural fringe	11.86	6.57	8.12	12.12	6.07	7.61	11.54	8.50	16.80
True Rural Fringe	9.40	5.21	8.98	9.25	4.87	8.31	9.57	6.04	21.82
-----									
Rural	10.52	5.15	10.19	10.26	5.32	9.66	10.80	4.76	16.90
-----									
Total	8.31	5.01	7.39	8.04	4.66	6.92	8.64	6.07	15.64
-----									
Urban Fringe	4.67	4.02	3.37	4.30	3.42	3.19	5.14	7.97	7.34
Rural Fringe	10.25	5.67	8.66	10.26	5.31	8.05	10.24	6.70	19.82

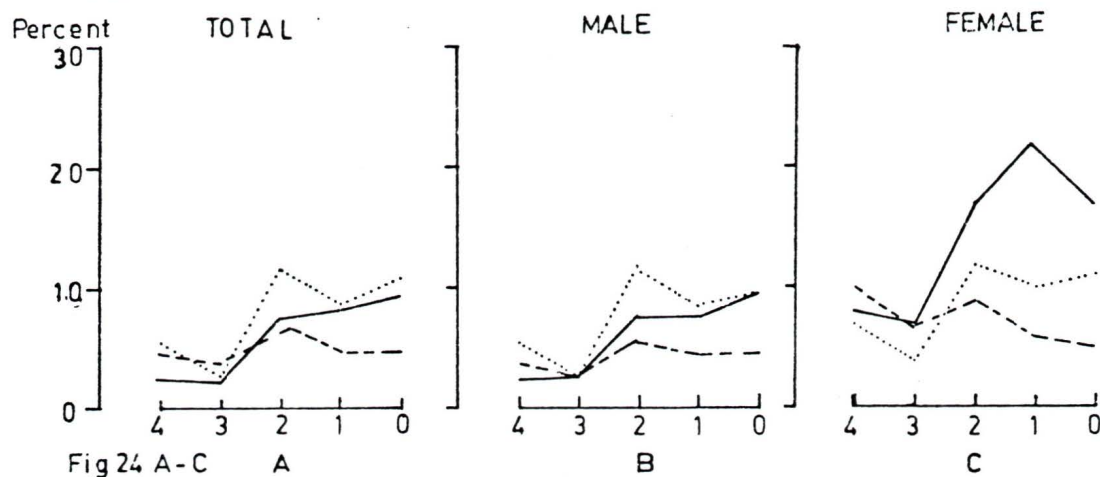
165 and 166: See footnotes

WORKERS IN PRIMARY OCCUPATIONS IN DELHI METROPOLITAN REGION

CULTIVATORS



AGRICULTURAL LABOURERS



- |       |      |   |                      |
|-------|------|---|----------------------|
| ..... | 1951 | 4 | TRUE URBAN FRINGE    |
| ----  | 1961 | 3 | PARTIAL URBAN FRINGE |
| ---   | 1971 | 2 | PARTIAL RURAL FRINGE |
| —     |      | 1 | TRUE RURAL FRINGE    |
|       |      | 0 | RURAL                |

female farm labourers was high in the urban fringe and low in the rural fringe. The reasons for this were explained in the primary workers section above. The opposite was true in 1971 when the ratio was low in the urban fringe and high in the rural fringe. The process of creation of smaller fields and altered cropping patterns, requiring increased female farm labour, that had occurred earlier in the urban fringe now prevailed in the rural fringe. The various stages of female participation as farm labourers are indicated in Table 38.

#### Workers in other Primary Activities

The other primary activities include livestock raising, forestry, hunting, plantation and orchard operation, mining and quarrying, and other allied activities. Because these activities are grouped with 'other services' (category VIII) in 1951 they cannot be isolated for comparison with those of the later censuses. The 1961 census provides these figures in category III and the 1971 census is similar, except that figures on mining and quarrying are given separately in category IV. Hence, the combination of categories III and IV in 1971 produces figures comparable with those of category III in 1961.

Most of the workers in other primary activities were located in the rural fringe. The percentages have increased, both in the rural and urban fringes during 1961-71 (Table 39).

Table 38: STAGES IN THE FEMALE PARTICIPATION IN THE WORK FORCE AS FARM LABOURERS, 1951-71

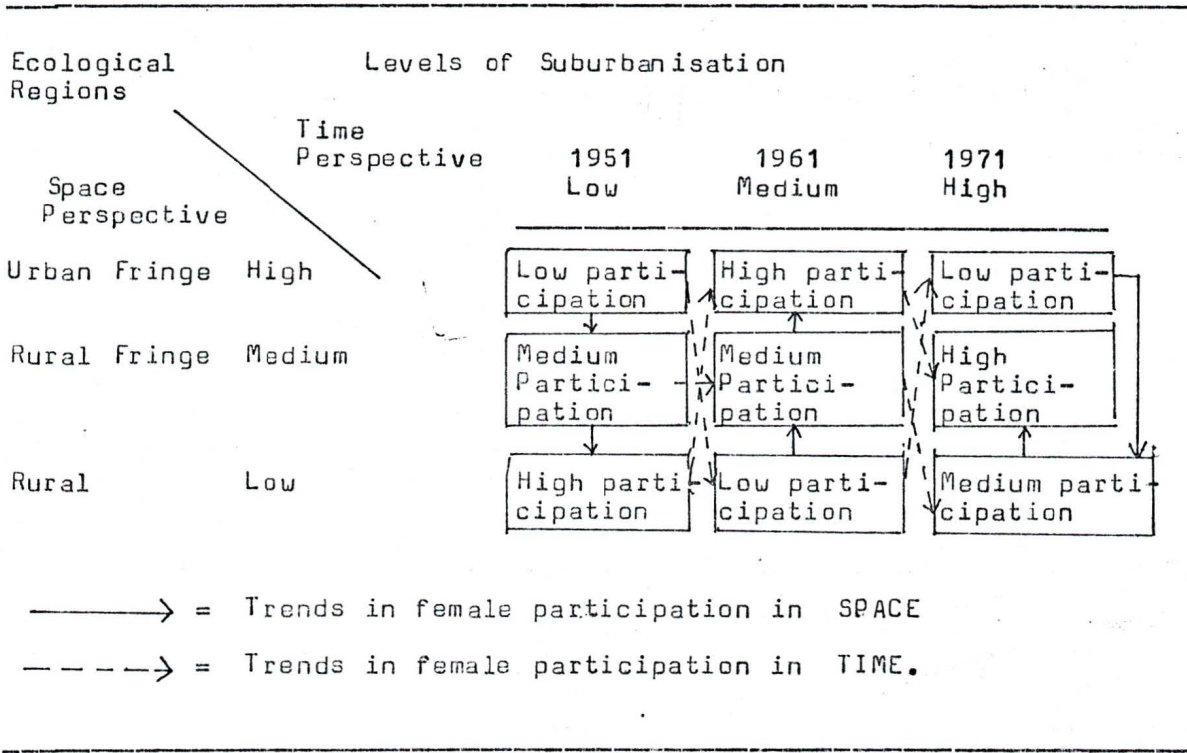


Table 39: WORKERS IN OTHER PRIMARY ACTIVITIES, 1961-71  
( Figure in Percentages)

Ecological Regions	Total		Male		Female		Workers in Mining and Quarrying- 1971		
	167	168	167	168	167	168	Total	Male	Female
	1961	1971	1961	1971	1961	1971			
City	0.68	0.74	0.61	0.78	1.81	0.24	0.01	0.01	0.01
Suburbs	0.83	0.52	0.83	0.53	0.84	0.44	0.03	0.03	0.01
-----									
<b>True</b> Urban Fringe	2.03	2.70	1.63	2.76	5.66	0.93	0.0	0.0	0.0
<b>Partial</b> Urban Fringe	2.74	3.48	2.45	3.58	4.34	1.36	1.92	1.99	0.39
-----									
<b>Partial</b> Rural Fringe	1.62	2.78	1.80	2.41	0.94	9.13	1.28	0.91	7.67
<b>True</b> Rural Fringe	2.89	3.69	2.96	3.70	2.72	3.52	2.13	2.14	2.00
-----									
<b>Rural</b>	1.87	4.32	1.91	3.87	1.76	9.94	3.18	2.69	9.33
-----									
<b>Total</b>	2.27	3.55	2.24	3.40	2.37	6.29	1.99	1.77	5.16
-----									
Urban Fringe	2.18	3.13	1.98	3.22	3.49	1.20	1.08	1.12	0.25
Rural Fringe	2.46	3.35	2.54	3.22	2.24	5.76	1.81	1.68	4.26

167, 168 and 169 : See footnotes.

The increase in the ratio of workers in this category can be explained by the fact that land use has changed in the fringe where livestock rearing (dairy farming), vegetable gardening and fruit growing were developing to meet the increasing urban demand for these products. Besides this, mining and quarrying activities were also increasing on the nearby ridges and river banks to meet the increasing demand in the city for building materials, such as stone, pebbles and sand. The overall patterns resemble those of other worker categories considered, but the ratio of female workers in this category increased significantly in the rural and rural fringe areas during the 1961-71 period. This was mainly because a large number of women were now participating in dairying and on plantations and orchards, while their men were engaged in the nearby heavy industries in the suburbs and in other jobs in the city. Many women were also engaged in mining and quarrying activities, especially in the southern rural belts where the majority were migrants from nearby Rajasthan State who were capable of doing the hard work of mining and quarrying.

#### CONCLUSION

It was hypothesized that participation of the work force in primary activities would decrease with increase in the level of suburbanization, both in time and space. With a few minor exceptions, the hypothesis was confirmed. However, the decrease was more marked in the rural fringe than

in the urban fringe. The changes in female participation in primary activities reveal many interesting phenomena. Initially, their participation, as expected, was low in areas of high suburbanization and high in areas of low suburbanization. But as the level of suburbanization increased in the rural areas, female participation first increased then decreased.

The decrease in the ratio of farm workers in the fringe was not only an indication of the increase in the level of suburbanization, but also of the change in land use from rural to urban, especially the altered cropping patterns that resulted. The trends of the female cultivators show that in the first stage when farm land was diminishing as a result of the urban invasion their participation in farming increased because the kitchen type of field and the intensity of cropping required it. But in the second stage when suburbanization was well established, as in the urban fringe, females withdrew from the farm jobs, probably because urbanism made them reluctant to take up rural jobs. In the case of farm labourers the analysis indicated that as suburbanization increased the ratio first decreased and then increased because of changes in agriculture and its pattern. The general pattern of labour participation in other primary occupations was high in the areas of low suburbanization, away from the city. However, participation increased during 1961-71, mainly because dairying, plantation, orchard and quarrying activities were increasing in the fringe to meet the demands of the city.

## REFERENCES AND FOOTNOTES

149. Persons getting livelihood from primary occupations =  $\frac{\text{Persons getting livelihood from the occupational categories I+II+III+IV}}{\text{Total population}} \times 100$
150. Workers in primary sector =  $\frac{\text{Workers in the occupational categories I+II+III}}{\text{Total workers (categories I to IX)}} \times 100$
151. Workers in primary sector =  $\frac{\text{Workers in the occupational categories I+II+III+IV}}{\text{Total workers (categories I to IX)}} \times 100$
152. Levels of suburbanization: deviations from rural/urban =  $\frac{Mr - Rm}{Um - Rm} / 100$   
 where Mr= mean of the region  
 Rm= rural mean  
 Um= urban mean
153. Males/ females getting livelihood from primary occupations =  $\frac{\text{Males/females getting livelihood from the occupational categories I+II+III+IV}}{\text{Male/female population}} \times 100$
154. Male/female primary sector workers =  $\frac{\text{Male/female workers in occupational categories I+II+III}}{\text{Male/female workers (categories I to IX)}} \times 100$
155. Male/female workers in primary sector =  $\frac{\text{Male/female workers in occupational categories I+II+III+IV}}{\text{Male/female workers (categories I to IX)}} \times 100$
156. Persons getting livelihood from farms = See reference No 149
157. Farm workers =  $\frac{\text{Persons in occupational category I+II}}{\text{Total workers (categories I to IX)}} \times 100$

158. Farm workers = See reference No. 157
159. Persons getting livelihood from cultivation =  $\frac{\text{Persons in the occupational categories I+II+IV}}{\text{Total population}} \times 100$
160. Cultivators =  $\frac{\text{Workers in occupational category I}}{\text{Total workers (categories I to IX)}} \times 100$
161. Males getting livelihood from cultivation =  $\frac{\text{Males in occupational categories I+II+IV}}{\text{Total male population}} \times 100$
162. Male cultivators =  $\frac{\text{Male workers in category I}}{\text{Total male workers (categories I to IX)}} \times 100$
163. Females getting livelihood from cultivation =  $\frac{\text{Females in occupational categories I+II+IV}}{\text{Total female population}} \times 100$
164. Female cultivators =  $\frac{\text{Female workers in category I}}{\text{Total female workers (category I to IX)}} \times 100$
165. Persons/males/females getting livelihood while working as agricultural labourers =  $\frac{\text{Persons/male/females in the occupational category III}}{\text{Total male/female population}} \times 100$
166. Persons/males/females as agricultural labourers =  $\frac{\text{Persons/males/females in occupational category II}}{\text{Persons/males/females (categories I to IX)}} \times 100$
167. Persons/males/females in other primary occupations (III) =  $\frac{\text{Persons/males/females in occupational category III}}{\text{Persons/males/females (categories I to IX)}} \times 100$

168. Persons/males/females  
in other primary  
occupation (III+IV) =  $\frac{\text{Persons/males/females in occupational categories III + IV}}{\text{Persons/males/females (categories I to IX)}} \times 100$
169. Persons/males/females  
in mining and quarrying =  $\frac{\text{Persons/males/females in occupational category IV}}{\text{Persons/males/females (categories I to IX)}} \times 100$

## Chapter 7: ECONOMIC CHARACTERISTICS : WORKERS IN THE SECONDARY SECTOR.

### INTRODUCTION

A working hypothesis for the secondary sector workers considered in this chapter is that the ratio of workers will increase in the fringe settlements over time and the ratio will be highest in the areas experiencing the greatest urban impact. In other words, the ratio will increase as the level of suburbanization increases, and will decline away from the city.

The secondary sector in 1961 included the three occupational categories of household industries, manufacturing and construction. In 1971 the first two categories were considered as two sections of manufacturing. Unfortunately, separate figures for these two were not available in 1951, as they were grouped together in 'production' (excluding agriculture). The figures for the workers in construction also were not available in 1951, being considered with 'other services'. Therefore, the occupational categories IV and V of 1961 and Va and Vb of 1971 were combined in the present study to make them comparable with category V of 1951 (Appendix II).

### SECONDARY WORKERS

In general, the ratio of secondary workers was high in the urban fringe and low in the rural fringe, though the differences became less pronounced over the period (Table 40

and Figure 25A). This confirms the hypothesis. The ratio of secondary workers was increasing in all of the ecological regions, more during 1951-61 (10 percent) than during 1961-71 (4 percent). The same was true of the city and suburbs. This is mainly because manufacturing activities in the region increased steadily since 1951.

Certain exceptions to the general pattern are worthy of comment. The ratios were higher in the partial urban fringe than in the true urban fringe, and higher in the rural area than in the true rural fringe. This indicates that the concentration of secondary workers is not only a factor of level of suburbanization, but also is a response to the specific location of manufacturing and construction activities in the partial urban fringe. The higher ratios in the rural areas were due to their nearness to the suburban towns where industry and construction were increasing. In the urban fringe the ratio was higher than in the suburbs in 1951 (24 versus 13 percent), but lower in 1961 (29 versus 37 percent). This change occurred because the major concentration of industrial and construction activities which was located mainly near the city in 1951 shifted to the suburban towns.

The distribution of male workers in the secondary sector occupations was very similar to that of total workers (Table 40 and Figure 25B). In general, the ratios tend to be slightly higher in most zones.

Table 40: WORKERS IN THE SECONDARY SECTOR  
(Figures in Percentages)

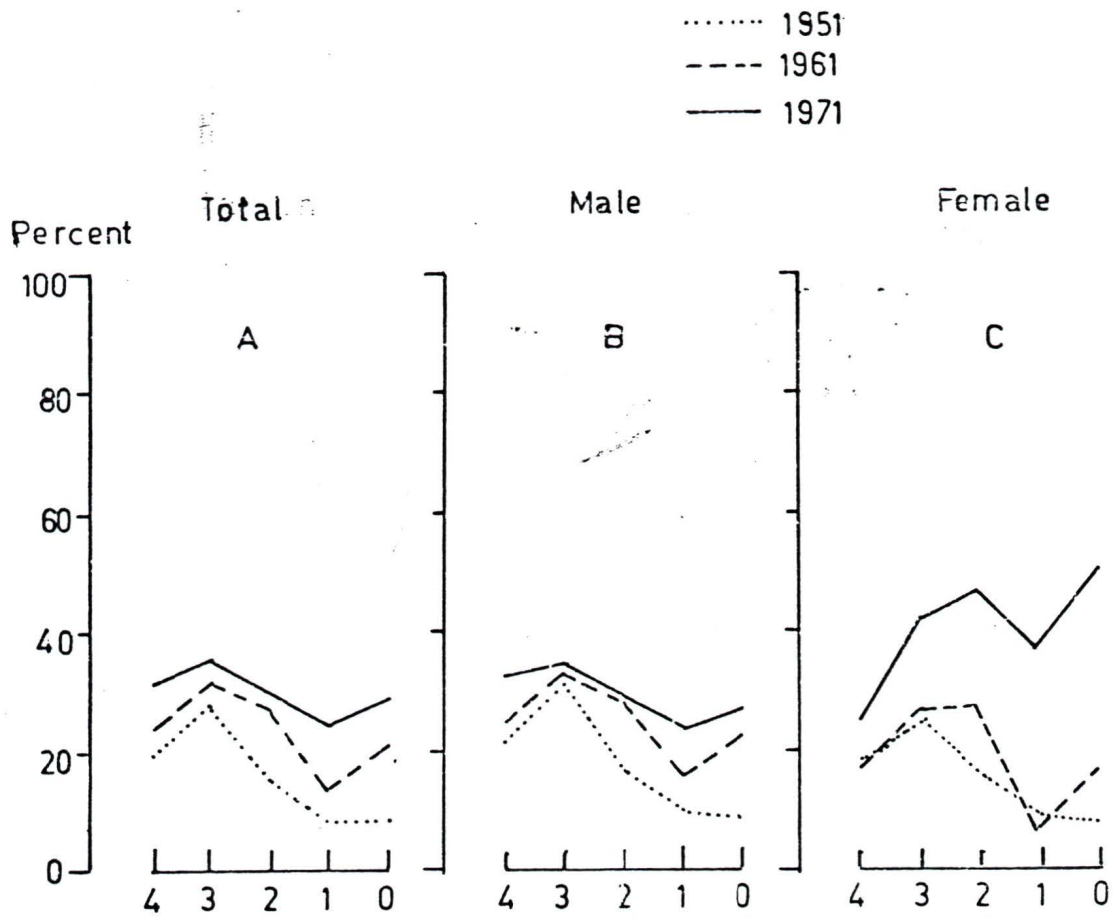
Ecological Regions	Total			Male			Female		
	170 1951	171 1961	172 1971	170 1951	171 1961	172 1971	170 1951	171 1961	172 1971
City	17.79	26.74	29.39	18.28	27.31	30.31	17.15	17.84	16.13
Suburbs	12.79	36.68	39.61	13.18	37.38	40.57	12.33	26.80	22.47
True Urban Fringe	19.45	23.71	31.31	20.62	24.56	31.55	17.91	15.95	24.51
Partial Urban Fringe	28.11	32.16	34.83	30.74	33.04	34.47	24.81	27.29	41.95
Partial Rural Fringe	16.16	28.10	29.95	16.58	27.94	28.97	15.65	28.70	46.95
True Rural Fringe	9.29	13.60	24.94	9.28	16.30	24.33	9.30	6.87	36.50
Rural	8.72	20.70	28.82	9.04	22.85	27.15	8.37	15.90	50.03
Total	15.15	22.02	29.45	16.25	23.72	28.67	14.02	15.36	43.00
Urban Fringe	23.68	28.87	33.31	25.51	29.60	33.18	21.33	24.15	35.98
Rural Fringe	11.67	18.48	26.81	11.84	20.50	26.07	11.46	12.72	40.66

170, 171 and 172: See footnotes

The 1951 female figures are not fully comparable with those of 1961 and 1971 because of the high female dependency ratio of 1951. However, the 1951 figures within the ecological regions can be compared. The spatial distribution of the female workers in 1951 was similar to that of the males, because up to that time there were no substantial changes in the female dependency and sex ratios in each zone (Table 40 and figure 25C).

A comparison of the figures for 1961 and 1971 reveals the radical changes of pattern that occurred in that decade. Although there were wide variations in the various segments of the fringe, female participation in the secondary sector occupations was higher in the urban fringe than in the rural in 1961, but in 1971 it was the reverse. One factor accounting for this switch was the outward shift in the location of industry and construction. Another was the effect of suburbanization on the female labour force. Women were shifting from primary to secondary, and increasingly into tertiary industries. For example, in the city in 1971, 83 percent of the females workers were participating in tertiary occupations, while only 16 percent were taking part in secondary. As against this, more than 50 percent of the females in rural areas were participating in secondary occupations and only 15 percent in tertiary. The shift in the peak ratios of female participation in the secondary sector away from the city is an indication of the corresponding shift in level of suburbanization. The peak which was located in the partial urban fringe

SECONDARY WORKERS IN DELHI METROPOLITAN REGION



- 4 True Urban Fringe
- 3 Partial Urban Fringe
- 2 Partial Rural Fringe
- 1 True Rural Fringe
- 0 Rural

Fig. 25 A-C.

in 1951 shifted to the partial rural fringe in 1961 and to the rural area in 1971 (Figure 25C). The influence of urbanism appears to encourage female participation in the tertiary sector rather than in the secondary. The ratio of females in the secondary sector decreased by approximately 2 percent in the city and 4 percent in the suburbs during 1961-71.

#### Workers in Household Industries

A household industry is defined in the census as one conducted by the head of the household himself or mainly by the members of the household at home within the village in rural areas or within the premises of a house in urban areas. Such an industry is not run on the scale of a registered factory. However, the main criterion is the participation of one or more members of the household.<sup>173</sup> Household industry is concerned with the production, processing, servicing or repair of articles or goods at small scale. Owing to the unavailability of figures for this category of workers in 1951, only the 1961 and 1971 figures have been analyzed.

According to the working hypothesis, the ratio of workers in household industry should be high in the areas of low suburbanization because those industries are generally associated with the rural areas in the form of cottage industries. In general this was the case in 1961, but less pronounced in 1971. The study shows that the participation of workers in household industry was higher in 1961 than in

1971 in the total metropolitan region, a decline that paved the way for heavy manufacturing (Table 41). In 1961 male participation exceeded female participation in the rural areas and rural fringe, whereas the reverse was true in the urban areas and urban fringe. By 1971 female participation in the more urbanized areas had dropped to levels more comparable with those of the males. It would appear that in 1961 the high cost of suburban living had forced many women to take up household industrial jobs at a time when their work opportunities on the farms were diminishing and their literacy was increasing. While the male workers found various types of urban jobs, the females found it convenient to work in household industries and stay at home, thus augmenting the family income (Figure 26). The sharp decrease in the ratio of female workers in the suburbs resulted from the growth of larger scale manufacturing there and the associated shift of workers into these plants. In the city the women who were working in the household industries in 1961 mostly shifted to tertiary occupations, mainly services.

#### Workers in Manufacturing

Figures on workers in manufacturing (excluding household industries) are available only in the 1961 and 1971 censuses. In 1951 manufacturing and household industries were grouped together in 'production (excluding agriculture). Manufacturing industries differ from household in that they are of greater size, employ a large number of workers, have a high investment,

Table 41: WORKERS IN THE HOUSEHOLD INDUSTRIES, 1961-71  
(Figures in Percentages)

Ecological Regions	1961 <sup>174</sup>			1971 <sup>175</sup>		
	Total	Male	Female	Total	Male	Female
City	1.69	1.43	5.70	2.17	2.18	1.97
Suburbs	3.19	2.32	15.71	2.08	2.05	2.69
-----						
True Urban Fringe	2.21	1.87	5.26	2.62	2.63	2.32
Partial Urban Fringe	5.03	4.73	6.61	3.89	3.94	3.00
Partial Rural Fringe	6.56	6.66	6.17	4.61	4.69	3.29
True Rural Fringe	5.31	5.86	3.95	2.90	2.95	1.86
Rural	4.87	5.38	3.72	2.72	2.82	1.39
Total	5.02	5.22	4.43	3.25	3.31	2.12
-----						
Urban Fringe	3.91	3.56	6.22	3.34	3.36	2.77
Rural Fringe	5.73	6.15	4.55	3.54	3.60	2.43

174,175: see footnotes

and a large scale, organized production. The location of such heavy industries is determined by the various economic and location factors. The high ratio of workers in manufacturing is not so much the result of suburbanization, but rather, manufacturing itself is a cause of suburbanization. Therefore, it may be hypothesized that there will be a positive relationship between suburbanization and the ratio of workers in manufacturing.

The study, confirming the hypothesis, revealed that the ratio of workers in manufacturing was high in the urban fringe and low in the rural fringe, although there are some exceptions

(Table 42 and Figure 27). The high ratio in the rural areas occurred because most of the villages there are located near the industrial suburbs. The ratio in the suburbs was higher than in the city, mainly because of the two major industrial suburbs of Faridabad in the south and Ghaziabad in the east. The locational effect is visible also in the partial urban fringe where the ratio of male and female workers in manufacturing was higher than in the more urbanized areas, due to the location there of certain industries. The ratio of male workers in manufacturing was higher in 1971 than in 1961 in all segments of the metropolitan region, confirming the hypothesis that industrialization and urbanization increase hand in hand.

Table 42: WORKERS IN MANUFACTURING 1961-71  
(Figures in Percentages)

Ecological Regions	1961 <sup>176</sup>			1971 <sup>177</sup>		
	Total	Male	Female	Total	Male	Female
City	20.74	21.62	7.03	21.61	22.75	7.06
Suburbs	29.05	30.49	8.41	33.98	34.92	17.04
-----						
True Urban Fringe	16.01	16.85	8.40	23.41	23.60	17.92
Partial Urban Fringe	23.88	24.57	20.11	23.51	23.23	28.95
Partial Rural Fringe	16.43	16.05	17.91	21.43	20.57	36.30
True Rural Fringe	6.25	7.91	2.11	19.13	18.63	28.67
Rural	13.59	14.62	11.30	24.25	22.38	48.05
Total	13.94	14.88	9.57	22.29	21.49	36.20
-----						
Urban Fringe	20.92	21.55	16.83	23.47	23.39	25.17
Rural Fringe	9.68	10.85	6.34	19.99	19.36	31.71

176, 177: see footnotes

A comparison of the female worker ratios in 1961 and 1971 reveals a reversal from a positive relationship to a negative one. The ratio of female workers was considerably higher in the fringe than in the rural fringe in 1961, but the opposite was true in 1971, despite a large increase in both zones. This was caused mainly by the fact that the rural females began participating more in manufacturing during the 1960's when farm land and primary activities were diminishing in the region. The increase in the ratios was greater in the rural areas (37 percent) and rural fringe (25 percent) than in the urban fringe (8 percent). There was also a higher increase in the ratio of female workers in the suburbs (9 percent) than in the city (.03 percent).

#### Workers in Construction

Construction is a localized phenomenon and the ratio of workers in this category will be high in those regions where construction activities are taking place on a large scale. However, it has a direct relationship with the land transformation process which is active in the zones near the city. It can be hypothesized that the level of suburbanization is positively correlated with the rate of participation of workers in construction activities.

Because census figures for workers in construction are not available for 1951, only 1961 and 1971 figures have been analyzed. The hypothesis was confirmed, as the ratios were high in the city, suburbs and in the urban fringe, and low in

the rural area and rural fringe ( Table 43 and Figure 28 ). The ratios in the suburbs declined relative to those in the city over the period because the major construction activities shifted to the city, especially large scale house building activities. The increase in ratios in construction with increase in suburbanization was more marked in the case of female participation than of male. This was due partly to the withdrawal of females from the primary activities of the urban fringe where agricultural land was being lost. The peak of female participation in construction, which was located in the partial rural fringe in 1961, had shifted to the partial urban fringe by 1971. The increase in female participation in construction in the city was contributed to especially by the female migrants from the nearby states of Uttar Pradesh, Rajasthan and Madhya Pradesh.

Table 43: WORKERS IN CONSTRUCTION, 1961-71 (Figures in Percentages)

Ecological Regions	1961			1971		
	Total	Male	Female	Total	Male	Female
City	4.31	4.26	5.11	5.51	5.38	7.10
Suburbs	4.44	4.57	2.68	3.55	3.60	2.74
-----						
True Urban Fringe	5.49	5.84	2.29	5.28	5.32	4.27
Partial Urban Fringe	3.25	3.74	0.57	7.43	7.30	10.00
Partial Rural Fringe	5.11	5.23	4.62	3.91	3.71	7.36
True Rural Fringe	2.04	2.53	0.81	2.91	2.75	5.97
Rural	2.24	2.85	0.88	1.85	1.95	0.59
Total	3.06	3.62	1.36	3.91	3.87	4.68
-----						
Urban Fringe	4.04	4.49	1.10	6.50	6.43	8.04
Rural Fringe	3.07	3.50	1.83	3.28	3.11	6.52
178 : see footnotes						

WORKERS IN SECONDARY OCCUPATIONS IN DELHI METROPOLITAN REGION

WORKERS IN MANUFACTURING.

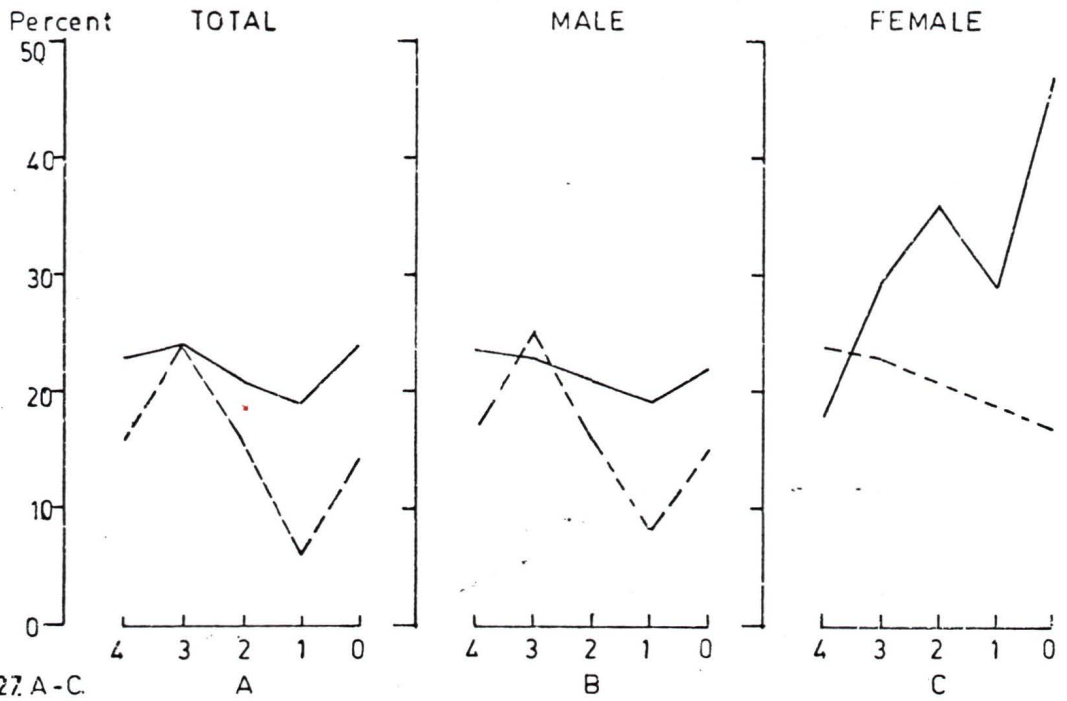


Fig. 27 A-C.

WORKERS IN HOUSEHOLD INDUSTRIES

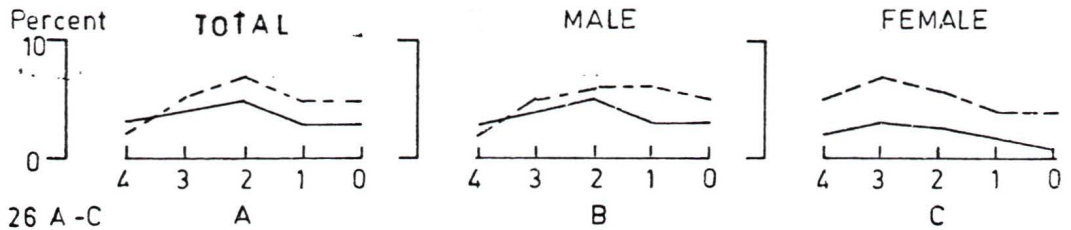


Fig 26 A-C

WORKERS IN CONSTRUCTION

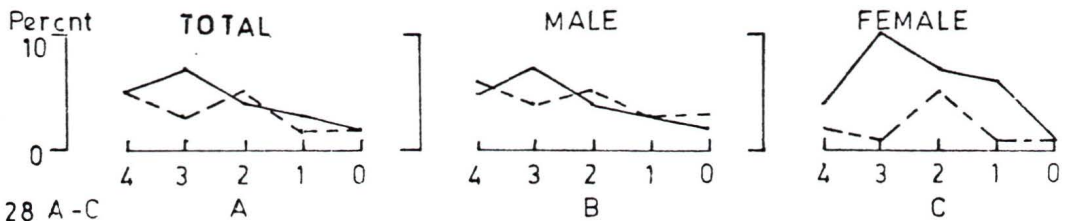


Fig 28 A-C

..... 1951  
 ---- 1961  
 ——— 1971

4 TRUE URBAN FRINGE  
 3 PARTIAL URBAN FRINGE  
 2 PARTIAL RURAL FRINGE  
 1 TRUE RURAL FRINGE  
 0 RURAL

## CONCLUSION

In general, the ratios of secondary workers were high in areas of high suburbanization and decreased away from the city where suburbanization was low. Ratios also increased over time as suburbanization advanced. However, there were breaks in the continuity of this spatial distribution, owing to irregularities in industrial location. For example, the ratios of male workers were high in the rural and partial urban fringe settlements accessible to industrial employment centres. In the case of female secondary workers a positive correlation with suburbanization in 1961 turned into a negative one by 1971 because urbanization had the effect of discouraging female participation in the secondary sector.

A consideration of the specific industry groups within the secondary sector indicated a number of variations from the general pattern. In household industries the ratios decreased with increase in urbanization, as expected, except in the case of the female labour force. It appeared that with increased urbanization females were encouraged to participate in household industries, especially in the urban fringe. In manufacturing the reverse was the case, with a positive relationship prevailing between ratios of workers and suburbanization. Again, female workers were the exception, not in 1961, but in 1971 when fewer females were attracted to the manufacturing jobs as the level of suburbanization increased. A positive relationship between suburbanization and the ratio of workers in construction prevailed for both male and female workers.

It was especially pronounced in the case of the female workers, though there were a few breaks in the continuity caused by site-specific construction activities.

## REFERENCES AND FOOTNOTES

170. Total/males/females getting livelihood from the secondary sector occupations =  $\frac{\text{Total/male/females in category V}}{\text{Total/male/female population}} \times 100$
171. Total/male/female workers in the secondary sector =  $\frac{\text{Total/male/female workers in categories IV, V and VI}}{\text{Total/male/female workers in categories I to IX}} \times 100$
172. Total/male/female workers in the secondary sector =  $\frac{\text{Total/male/female workers in categories Va, Vb and VI}}{\text{Total/male/female workers in categories I to IX.}} \times 100$
173. Census of India 1971, General Population Table, Series 27-Delhi, Pt. II-A, P.119, 1971.
174. Total/male/female workers in household industries =  $\frac{\text{Total/male/female workers in category IV}}{\text{Total/male/female workers in categories I to IX.}} \times 100$
175. Total/male/female workers in household industries =  $\frac{\text{Total/male/female workers in category Va}}{\text{Total/male/female workers in categories I to IX}} \times 100$
176. Total/male/female workers in manufacturing =  $\frac{\text{Total/male/female workers in category V}}{\text{Total/male/female workers in categories I to IX}} \times 100$
177. Total/male/female workers in manufacturing =  $\frac{\text{Total/male/female workers in category Vb}}{\text{Total/male/female workers in categories I to IX}} \times 100$
178. Total/male/female workers in construction =  $\frac{\text{Total/male/female workers in category VI}}{\text{Total/male/female workers in categories I to IX.}} \times 100$

Chapter 8 ; ECONOMIC CHARACTERISTICS: WORKERS IN THE TERTIARY SECTOR AND A COMPARISON OF WORKERS IN THE PRIMARY SECONDARY AND TERTIARY SECTORS BY ECOLOGICAL REGIONS

INTRODUCTION

The increase in the ratio of the tertiary workers is another important indicator of the transformation of the Delhi fringe. Settlements having a high ratio of tertiary workers can be considered more urban in nature than those with a high ratio of secondary workers because the occupations included in the tertiary sector are found mainly in the city. On the other hand, the secondary occupations, though urban by nature, may also be located in the rural areas, taking advantage of particular sites and the availability of cheap labour. Therefore, it can be hypothesized that as the level of suburbanization increases the ratio of tertiary workers will also increase. As indicated previously, the 1951 census data on tertiary workers are not comparable with those of 1961 and 1971, hence, they have been included only in the general discussion to indicate the continuity of the overall pattern. The 1951 figures refer to persons getting their livelihood from the tertiary occupations, thus including both workers and their dependents. Also, the 1951 census does not provide separate figures on the occupational categories III, IV and VI of 1971. These are probably included in category VIII (other services) of 1951 (see appendix II).

TERTIARY WORKERS

At all of the census dates studied the ratio of tertiary

workers decreased away from the city, confirming the hypothesis (Table 44 and Figure 29). The ratio of tertiary workers is higher in the urban fringe than in the rural fringe. The loss of agricultural land and associated primary employment in the urban fringe and the creation of new land uses providing tertiary jobs were major factors accounting for the high ratios there. The easy access of urban fringe dwellers to the city, facilitating their acquisition of urban jobs was another. The temporal analysis of the tertiary workers revealed that as the level of suburbanization increased over time the ratio of tertiary workers also increased. The increase in the intensity of suburbanization is also reflected by the fact that differences in the ratio of tertiary workers between the urban fringe and rural fringe were higher (18 percent) in 1971 than in 1961 (13 percent). The decrease in ratios in the city and suburbs during 1961-71 can be attributed to the increase in the ratios of secondary sector workers in these two segments, owing to the increase in construction and manufacturing activities.

The ratio of male workers in the tertiary occupations, conforming to the hypothesis, decreased away from the city and showed a positive relationship with the level of suburbanization. The difference in ratio between the urban and rural fringe was greater in 1961 (22 percent) than in 1971 (17 percent). This indicates the spatial spread of suburbanization in the region.

TERTIARY WORKERS IN DELHI METROPOLITAN REGION

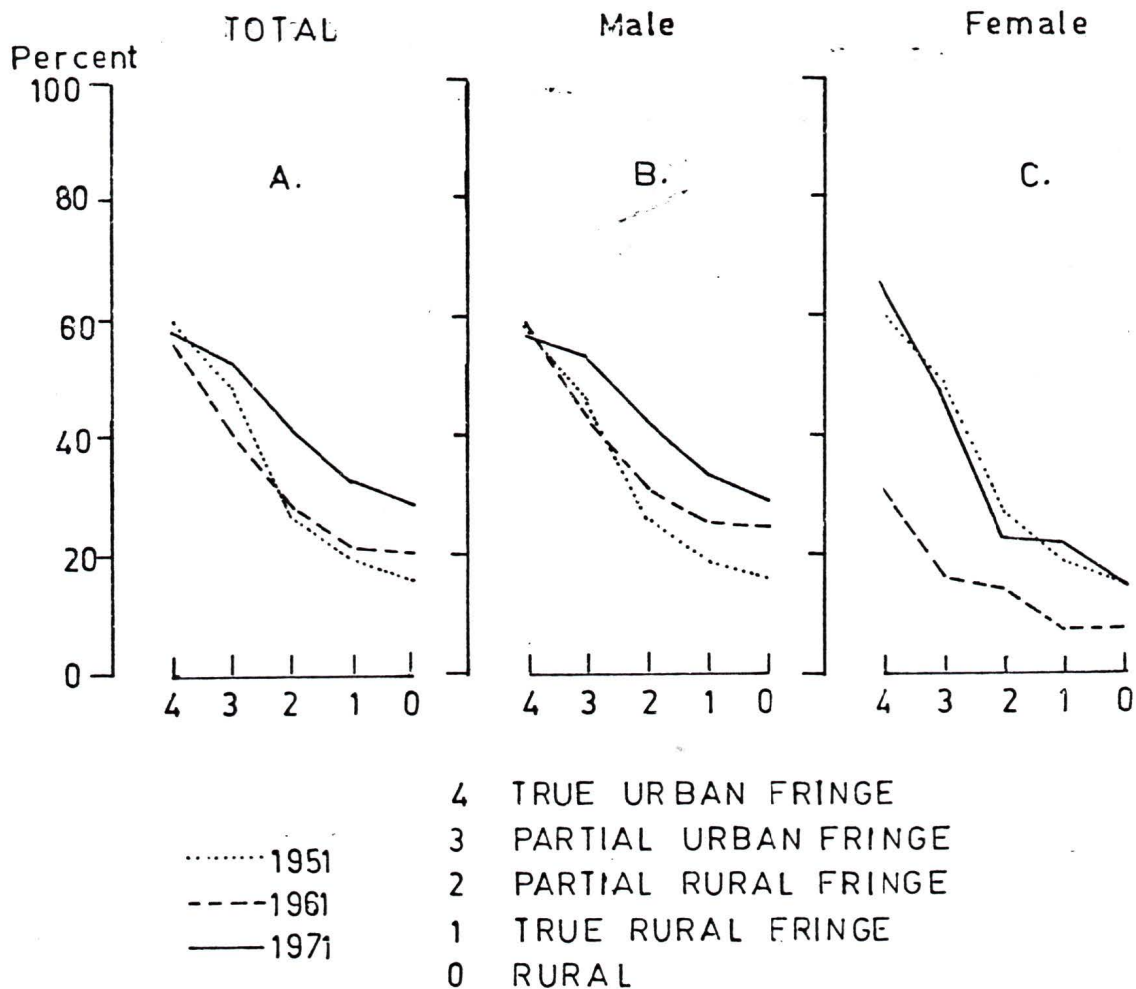


Fig. 29 A-C.

The distribution pattern of the female tertiary workers in the region was not much different from that of male. The most noteworthy feature of the female pattern was the great increase in ratios in all of the ecological regions. The 17 percent increase in 1961-71 for the whole metropolitan region is indicative of the high female participation in 'other services', as a result of the increase in the level of suburbanization. The largest increase during 1961-71 was in the urban fringe (32 percent) where female participation in the tertiary occupations had not only become a social need, but also a symbol of high social status. The major shift in the female occupational pattern is indicated by the fact that whereas in 1961, 54 percent of the females in the urban fringe were participating in primary occupations (22 percent in tertiary), in 1971, 53 percent were participating in the tertiary occupations (11 percent in primary).

#### Workers in Trade and Commerce

Trade and commerce are essentially urban phenomena. As such the majority of the people engaged in these activities live in the city, but percentages of such workers may be high in the rural settlements having strong interaction with the city. Therefore, a working hypothesis is that the ratio of workers in trade and commerce will be high in the highly suburbanized zones and will decrease away from the city with decrease in the level of suburbanization.

This hypothesis was confirmed and there was a relatively

sharp difference in the ratio of workers in trade and commerce between the urban fringe and rural fringe (Table 45 and Figure 30). During 1961-71 the ratio increased in all segments of the region, but the increase was more marked in the urban fringe than in the rural fringe. This increase was even higher than that in the city, indicating the intensity of the suburbanization process. The trends of male workers in trade and commerce were little different from those of total workers. The slight decrease in the ratio of male workers in the suburban towns in 1971 can be attributed to the substantial increase in manufacturing there. Although the ratio of female workers increased in all of the ecological regions between 1961 and 1971, in keeping with the advance of suburbanization, the increase was especially large in the urban fringe.

#### Workers in Transport, Storage and Communication

The ratios of workers in this category were higher in the urban fringe than in the city, both in 1961 and 1971 (Table 46 and Figure 31). This was mainly due to the fact that the functions of transport, storage and communication require large premises and ample space for their operation. Such space was more readily available in the fringe. It can be concluded, therefore, that the ratio of workers in transport, storage and communication is a function of the 'site factor', as well as the level of suburbanization in the region.

However, the ratio of female workers did not conform to this pattern, being highest in the city. Perhaps this was

TABLE 45: WORKERS IN TRADE AND COMMERCE  
(Figures in Percentages)

Ecological Regions	Total			Male			Female		
	181 1951	182 1961	182 1971	181 1951	182 1961	182 1971	181 1951	182 1961	182 1971
City	26.09	19.46	21.83	25.46	20.44	22.93	26.93	4.23	7.70
Suburbs	25.44	18.06	18.07	25.01	19.15	18.85	25.95	2.29	4.16
True Urban Fringe	13.09	10.16	14.13	12.97	11.14	14.39	13.24	1.31	6.69
Partial Urban Fringe	10.06	6.42	10.86	9.90	7.24	11.15	10.26	1.90	5.12
Partial Rural Fringe	5.26	4.27	7.01	5.11	5.11	7.29	5.45	1.03	2.09
True Rural Fringe	3.65	2.29	3.88	3.64	2.99	4.03	3.66	0.52	1.00
Rural	2.62	1.89	2.69	2.72	2.46	2.82	2.49	0.62	1.01
Total	6.48	3.79	6.71	6.54	4.78	6.96	6.37	0.74	2.32
Urban Fringe	11.60	7.80	12.28	11.49	8.73	12.57	11.76	1.73	5.66
Rural Fringe	4.21	2.96	5.05	4.16	3.76	5.25	4.27	0.65	1.43

181, 182: See footnotes

Table 46: WORKERS IN TRANSPORT, STORAGE AND COMMUNICATION  
(Figures in Percentages)

Ecological Region	Total			Male			Female		
	183 1951	184 1961	184 1971	183 1951	184 1961	184 1971	183 1951	184 1961	184 1971
City	6.17	6.38	9.51	6.28	6.66	10.00	6.02	1.96	3.27
Suburbs	8.21	8.44	9.77	8.51	8.99	10.18	7.86	0.50	2.41
True Urban Fringe	5.51	7.82	10.93	5.35	8.65	11.25	5.71	0.30	1.67
Partial Urban Fringe	3.69	6.45	10.44	3.65	7.61	10.89	3.74	0.10	1.64
Partial Rural Fringe	2.11	3.38	5.99	2.20	4.11	6.23	1.99	0.57	1.88
True Rural Fringe	0.99	2.22	4.98	1.02	3.12	5.22	0.95	0.00	0.31
Rural	1.01	1.75	4.53	1.16	2.50	4.87	0.85	0.07	0.23
Total	2.47	3.32	6.82	2.52	4.44	7.17	2.36	0.12	0.85
Urban Fringe	4.62	7.07	10.65	4.53	8.12	11.05	4.73	0.18	1.65
Rural Fringe	1.38	2.61	5.36	1.44	3.48	5.59	1.31	0.15	0.93

183, 184: See footnotes.

due to the particular skills required that were more available in the urban than in the rural females.

#### Workers in other Services

The 'other services' category of the tertiary sector includes various kinds of occupations not included in those studied above, such as those in various government, semi-government, private and institutional offices located in, or regulated from, the city. Because the diversity of the non-specific functions is much larger in the city than in the rural areas this category is mainly urban in character. Therefore, it can be hypothesized that the ratio of workers in this category will increase with increase in the level of suburbanization.

The study revealed that the ratio of workers in service was high in the urban fringe, low in the rural fringe and very low in the rural zones, thus confirming the hypothesis in general (Table 47 and Figure 32). However, there were a few exceptions. The ratio of workers in other services in the true urban fringe decreased by 5 percent during 1961-71, while the level of suburbanization increased. This was contrary to the hypothesis and due mainly to the shift of male workers into the higher paying trade, commerce, transportation, storage and communication occupations which were in demand. The same thing occurred in the city and suburbs during 1961-71. The gradients of the ratio figures were steeper away from the city in 1961 than in 1971, in the case of total and male

Table 47: WORKERS IN OTHER SERVICES  
(Figures in percentages)

Ecological Regions	Total			Male			Female		
	185 1951	186 1961	186 1971	185 1951	186 1961	186 1971	185 1951	186 1961	186 1971
City	49.35	46.41	38.30	49.38	44.71	35.65	49.30	73.02	72.35
Suburbs	46.84	30.95	28.38	46.65	29.63	26.22	47.03	49.84	66.83
-----									
True Urban Fringe	40.61	37.94	32.60	40.47	38.86	31.75	40.81	29.69	57.28
Partial Urban Fringe	33.80	27.04	30.91	32.77	29.24	30.44	35.09	15.10	40.31
-----									
Partial Rural Fringe	18.90	19.95	28.56	18.71	21.96	29.12	19.14	12.15	19.08
True Rural Fringe	14.11	16.39	24.48	14.31	19.98	24.70	13.89	7.45	20.37
-----									
Rural	11.87	15.65	21.42	11.82	19.50	22.01	11.94	7.01	14.09
-----									
Total	22.55	20.20	26.54	22.66	23.66	26.67	22.33	9.50	24.22
-----									
Urban Fringe	37.29	31.26	31.66	36.75	33.05	31.03	37.98	19.63	46.14
Rural Fringe	15.76	17.60	26.01	15.84	20.70	26.34	15.67	8.70	19.87

185, 186: See footnotes

WORKERS IN TERTIARY OCCUPATIONS IN DELHI METROPOLITAN REGION

WORKERS IN TRADE AND COMMERCE

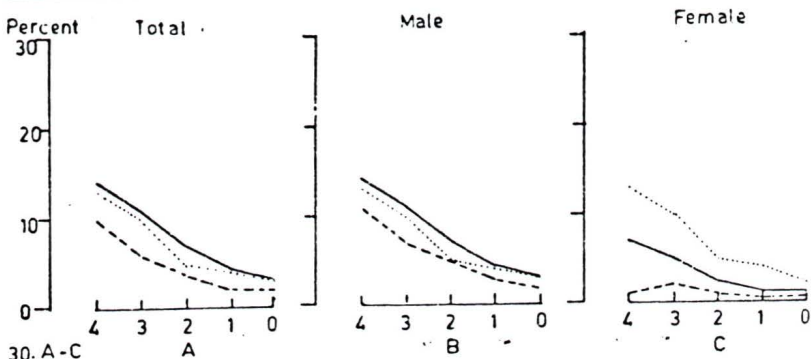


Fig 30. A-C

WORKERS IN TRANSPORT, STORAGE AND COMMUNICATION.

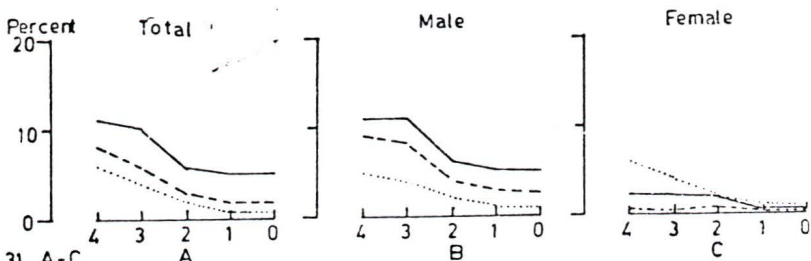


Fig 31. A-C

WORKERS IN OTHER SERVICES.

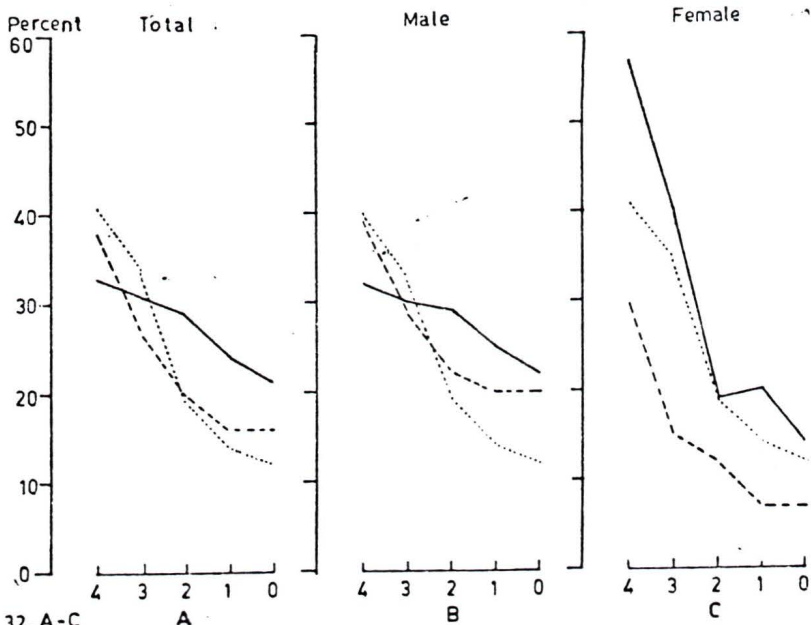


Fig 32. A-C

- 4 TRUE URBAN FRINGE
- 3 PARTIAL URBAN FRINGE
- 2 PARTIAL RURAL FRINGE
- 1 TRUE RURAL FRINGE
- 0 RURAL

..... 1951  
 --- 1961  
 — 1971

workers, an indication of the outward spread of suburbanization (Figure 32 A-B).

The increase in the ratio of female workers in service was very high in all segments of the fringe during 1961-71. However, the gradient was steeper in 1971 than in 1961 (Figure 32C) because as the level of suburbanization increased and farm-land decreased the females near the city withdrew from primary occupations and entered other services. While the females in the urban fringe shifted primarily to the service occupations (approximately 27 percent increase) during 1961-71, those of the rural fringe shifted primarily to the secondary occupations (approximately 28 percent increase.) This also reflects the differences in the social status and attitude of the urban and rural fringe females, the urban ones preferring service occupations.

#### COMPARISON OF OCCUPATIONAL SECTORS BY ECOLOGICAL REGIONS

The distribution of workers in the primary, secondary and tertiary section have been discussed in the previous sections independently. However, a comparative study of the various changes is useful to pinpoint the characteristics of each ecological region. The great limitations of the 1951 census data must be kept in mind when interpreting the following tables and graphs.

##### Workers in the City

The ratio of tertiary workers, although high throughout the period, was decreasing, while that of the secondary workers

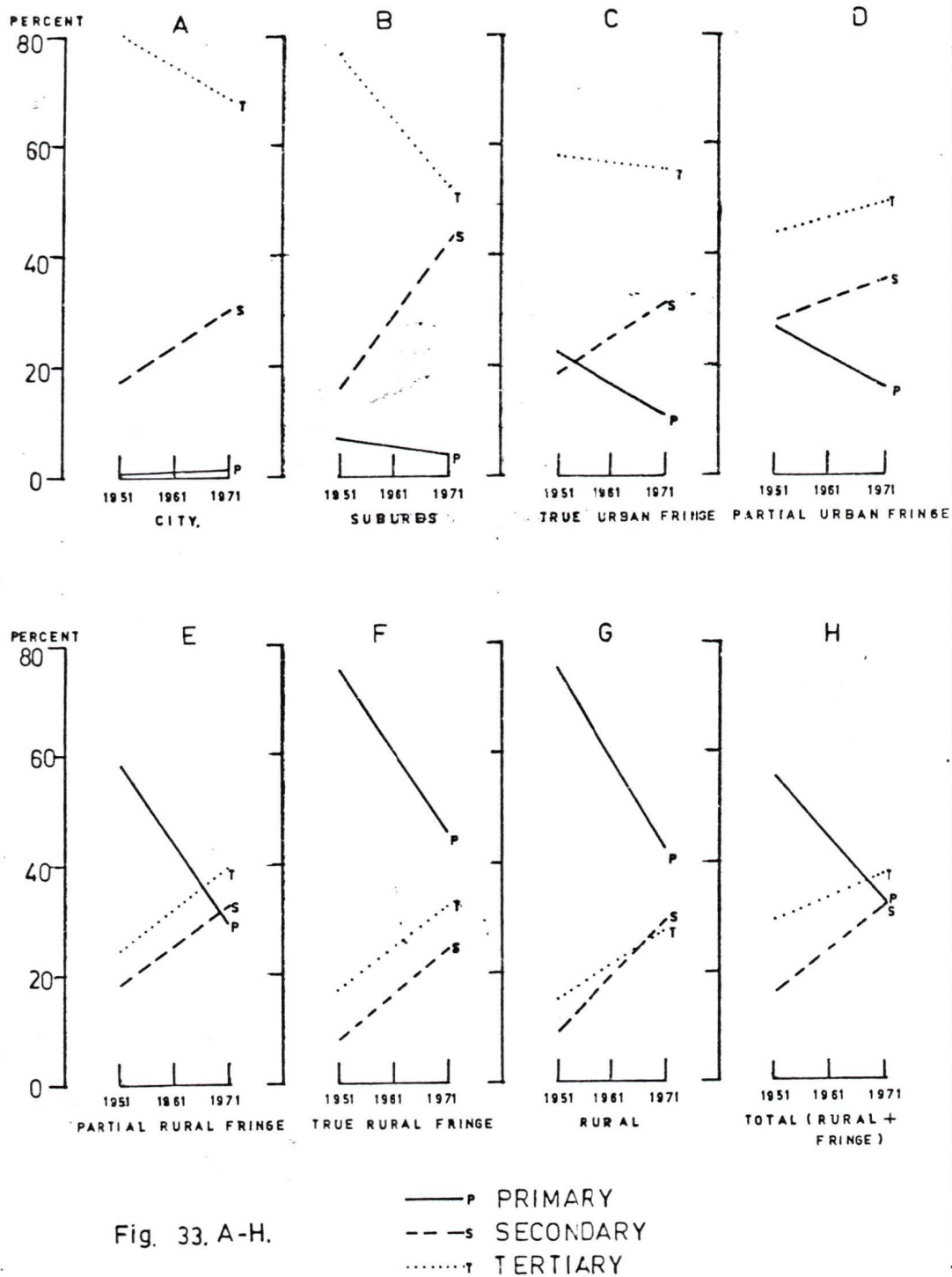
was increasing ( Table 48 and Figure 33 A ). This came about mainly because the city had become more industrialized. Household industries, particularly, developed within the city, while heavy manufacturing developed outside the city, especially in the industrial suburbs. The white collar workers of these heavy industries generally lived in the city, while the blue collar workers found it more convenient to live near industries.

Table 48: WORKERS IN THE CITY ( Figures in Percentages )

Occupational Sectors	Total			Male			Female		
	1951	1961	1971	1951	1961	1971	1951	1961	1971
Primary	0.60	1.01	1.07	0.60	0.88	1.11	0.60	2.95	0.55
Secondary	17.79	26.74	29.29	18.28	27.31	30.31	17.15	17.84	16.13
Tertiary	81.61	72.25	69.64	81.12	71.81	68.58	82.25	79.21	83.32

The ratio of male workers in the city increased in the primary and secondary sectors and decreased in the tertiary sector during 1961-71. The slight increase in the primary occupations may be attributed to the fact that after the farm land acquisition and village incorporation the farm workers were now living in the city and working in gardens, plantations and dairy farms within the city limits. The increase in the ratio of male secondary workers may be accounted for by the increase in number of industrial and construction jobs in the city. In the case of female workers the opposite occurred, with decreases in the primary and secondary and an increase in the tertiary, due mainly to the educational gains achieved by city women.

OCCUPATIONAL TRENDS IN DELHI METROPOLITAN REGION



### Workers in the Suburbs

In the suburban towns the ratios of workers in the tertiary and primary occupations have declined, while the ratio in the secondary sector has increased ( Table 49 ). The gradients for the suburbs in all cases are steeper than those in the city ( Figure 33 B ). The steep rise in the ratio of secondary workers is because of the development in industries in these towns, especially in Faridabad, Faridabad Township, Ballabhgarh and Ghaziabad. This is also a reason for the decline in the ratio of workers in tertiary occupations. The secondary sector growth opened up employment for large numbers of female workers, while female workers shifted to tertiary occupations.

Table 49: WORKERS IN SUBURBAN TOWNS ( Figures in Percentages )

Occupational Sectors	Total			Male			Female		
	1951	1961	1971	1951	1961	1971	1951	1961	1971
Primary	6.72	5.87	4.17	6.65	4.85	4.18	6.83	20.57	4.13
Secondary	12.79	36.68	39.61	13.18	37.38	40.57	12.33	26.80	22.47
Tertiary	80.49	57.45	56.22	80.17	57.77	55.25	80.84	52.63	73.40

### Workers in the True Urban Fringe

The rural settlements of this zone that were outside the city limits in 1951 were within the city in 1971. The majority are now urban villages and the level of suburbanization is high in most of them. The ratio of the primary workers declined and that of secondary

increased ( Table 50 and Figure 33 C ). The tertiary sector, however, showed very little increase except in the case of female workers. The decrease in the ratio of the primary workers was mainly due to the loss of farmland and the increase in the secondary may be attributed to the resultant increase in urban land uses, especially the development of industries. The female ratio increased both in the secondary and tertiary sector occupations. Females who were still unskilled took up jobs in the construction and industrial activities, while the semi-skilled and literate participated in the city oriented tertiary occupations.

Table 50: WORKERS IN THE TRUE URBAN FRINGE (Figures in Percentages)

Occupational Sectors	Total			Male			Female		
	1951	1961	1971	1951	1961	1971	1951	1961	1971
Primary	21.34	20.37	11.03	20.59	16.79	11.06	22.33	52.75	9.85
Secondary	19.45	23.71	31.31	20.62	24.56	31.55	17.91	15.95	24.51
Tertiary	59.21	55.92	57.66	58.79	58.65	57.39	59.76	31.30	65.64

#### Workers in the Partial Urban Fringe

The ratio of primary workers in this section of the fringe also decreased and the ratio of secondary and tertiary sector workers increased ( Table 51 and Figure 33 D ). Of course, the percentage level of the primary remained higher than in the true urban fringe, owing to the lower level of suburbanization there.

The increase in the ratio of male workers during 1961-71 was greater in the tertiary than in the secondary sector occupations, probably because the job opportunities in the secondary sector for males were very limited. Among female workers there was a wholesale switch out of the primary and into both the secondary and tertiary occupations. They were able to obtain employment in the secondary sector as unskilled labourers, especially in construction and manufacturing.

Table 51: WORKERS IN THE PARTIAL URBAN FRINGE (Figures in Percentages)

Occupational Sectors	Total			Male			Female		
	1951	1961	1971	1951	1961	1971	1951	1961	1971
Primary	24.34	27.93	12.96	22.94	22.87	13.05	26.10	55.61	10.98
Secondary	28.11	32.16	34.83	30.74	33.04	34.47	24.81	27.29	41.95
Tertiary	47.55	39.91	52.21	46.32	44.09	52.48	49.09	17.10	47.07

#### Workers in the Partial Rural Fringe

The gradients of decrease of primary workers are very steep in all of the rural zones, and are accompanied by rising percentages of secondary and tertiary ( Table 52 and Figure 33 E ). The major share of the increase in the ratio of workers was in the tertiary sector for male and in the secondary for females during 1961-71. The male workers had higher levels of education, facilitating their entry into tertiary jobs, and they were better able to travel long

distances to take up these jobs in or near the city. The female workers, on the other hand, sought employment in the nearby secondary sector industries.

Table 52: WORKERS IN THE PARTIAL RURAL FRINGE (Figures in Percentages)

Occupational Sectors	Total			Male			Female		
	1951	1961	1971	1951	1961	1971	1951	1961	1971
Primary	57.57	44.30	28.49	57.40	40.88	28.39	57.77	57.55	30.00
Secondary	16.16	28.10	29.95	16.68	27.94	28.97	15.65	28.70	46.95
Tertiary	26.27	27.60	41.56	26.02	31.18	42.64	26.58	13.75	23.05

#### Workers in the True Rural Fringe

Despite the rapid decline in the percentage of primary workers in the true rural fringe and rural areas, they were the only zones where the primary still exceeded the secondary and tertiary percentages ( Table 53 and Figure 33 F ). As in the partial rural fringe, the most important increase for males was in the tertiary sector and for females it was in the secondary sector.

Table 53: WORKERS IN THE TRUE RURAL FRINGE( Figures in Percentages)

Occupational Sectors	Total			Male			Female		
	1951	1961	1971	1951	1961	1971	1951	1961	1971
Primary	71.96	65.50	41.72	71.75	57.61	41.72	72.20	85.16	41.82
Secondary	9.29	13.60	24.94	9.28	16.30	24.33	9.30	6.87	36.50
Tertiary	18.75	20.90	33.34	18.97	26.09	33.95	18.50	7.97	21.68

### Workers in the Rural Areas

The pattern of change was similar in the rural areas, except that the shift of female workers from the primary to secondary occupations was more pronounced (Table 54 and Figure 33 G). This may be attributed to the attraction of the newly developed industrial suburbs that were situated near rural areas and provided unskilled jobs at higher than farm wages for many of the rural female workers.

Table 54: WORKERS IN THE RURAL AREAS (Figures in Percentages)

Occupational Sectors	Total			Male			Female		
	1951	1961	1971	1951	1961	1971	1951	1961	1971
Primary	75.78	60.01	42.54	75.26	52.69	43.15	76.36	76.40	34.64
Secondary	8.72	20.70	28.82	9.04	22.85	27.15	8.37	15.90	50.03
Tertiary	15.50	19.29	28.64	15.70	24.46	29.70	15.28	7.70	15.53

### CONCLUSION

The tertiary occupations are mainly city oriented, therefore, the working hypothesis was that the ratio of tertiary workers would be high in the zones having a high level of suburbanization. The study revealed a positive relationship with suburbanization, confirming the hypothesis. However, in the city and suburbs, the ratio of male workers in the tertiary sector declined during 1961-71, owing to the attraction of large number of workers to new secondary jobs. Contrary to this, the ratio of female workers in the tertiary sector increased in all of the ecological regions.

The ratio of workers in trade and commerce was high in the zones which were having high level of suburbanization and where the inter-

linkages with the commercial activities of the city were well developed. The increase in the ratio of female workers was especially large, reflecting the shift from secondary to tertiary occupations.

In transport, storage and communications the ratio of workers was higher in the urban fringe than in the city and suburbs. This was mainly due to the site factor, since these activities require large premises for their operation and are located in the outskirts of the city. Therefore, the gradient of the ratio of workers in transport, storage and communication is regulated not only by the level of suburbanization, but also by the site factor.

The ratio of workers in 'other services' was high in all segments of the metropolitan region, particularly in the city. However, the study showed that the ratio of the male workers in the city, suburbs and true urban fringe declined during 1961-71 because many workers had shifted to the other highly specialized, skilled and competitive occupations of the tertiary sector. On the other hand, the ratio of female workers in 'other services' increased during 1961-71. It is suggested that as the level of suburbanization increases the females, in the first stage, withdraw from primary and take up secondary occupations, as in the rural fringe. In the second stage, as they gain education and skill, they withdrew from the secondary occupations and enter the other services, as occurred in the urban fringe. But as the females become

'specialized' they begin to withdraw from 'other services' also, as occurred in the city in 1961-71. They enter specialized jobs in trade and commerce, as did the male workers on a large scale, in the city and suburbs.

Consideration of occupational trends within the ecological regions revealed the significant differences among them. Ratios of workers in the secondary sector increased in all regions, while those in the primary sector decreased, except in the city, owing to the annexation of farmland. Tertiary sector ratios declined in the most urbanized zones, owing to the effects of industrialization there, but increased in the areas most subject to suburbanization.

REFERENCES AND FOOTNOTES

179. Total/male/female workers getting livelihood from tertiary occupations =  $\frac{\text{Total/male/females in categories VI, VII and VIII}}{\text{Total/male/female population}} \times 100$
180. Total/male/female workers in the tertiary sector =  $\frac{\text{Total/males/females in categories VII, VIII and IX}}{\text{Total/males/females in categories I to IX}} \times 100$
181. Total/male/female workers getting livelihood from commerce =  $\frac{\text{Total/males/females in category VI}}{\text{Total/male/female population}} \times 100$
182. Total/male/female workers in trade and commerce =  $\frac{\text{Total/males/females in category VII}}{\text{Total/males/females in categories I to IX}} \times 100$
183. Total/male/female workers getting livelihood from transport =  $\frac{\text{Total/males/females in category VII}}{\text{Total/male/female population}} \times 100$
184. Total/male/female workers in transport storage and communication =  $\frac{\text{Total/males/females in category VIII}}{\text{Total/males/females in categories I to IX}} \times 100$
185. Total/male/female workers getting livelihood from other services =  $\frac{\text{Total/males/females in category IX}}{\text{Total/male/female population}} \times 100$
186. Total/male/female workers in other services =  $\frac{\text{Total/males/females in category IX}}{\text{Total/males/females in categories I to IX}} \times 100$

## Chapter 9 : CONCLUSION AND RECOMMENDATIONS

### INTRODUCTION AND METHODOLOGY

One of the most revolutionary phenomenon of the twentieth century is the expansion of the 'social city' outside its corporate limits. Just as urbanization has brought changes within the urban limits, suburbanization is the major force responsible for the transformation of the rural settlements outside the city limits. The intensity of the suburbanization process and hence the intensity of the transformation depends upon the level of urbanization within the city. Suburbanization denotes the extension of urban values, urban functions, urban land uses and urban demographic and social traits into the fringe settlements of a central city.

Various studies in urban geography, urban sociology, urban ecology and rural sociology were concerned with the dynamism at the edge of the city. The fringe was defined and conceptualized, and various criteria for its delineation were presented. The socio-economic and demographic characteristics of the fringe population compared with those of the central city and suburbs were addressed. These studies also drew attention to the 'leap-frog' and 'urban sprawl' forms of the suburbanization process; identified the various sections of the fringe based on the levels of urban impact and differentiated between the 'suburbs', 'fringe' and 'suburban zone'. The criteria used for the delineation of the fringe varied from the social, demographic and economic characteristics to the land conversion process and the interlinkages with the central city.

The fringe thus delineated has distinctive social, economic, demographic and land use characteristics which are neither rural nor urban. The characteristics of the fringe population depend upon their origin, whether the residents migrated from the rural areas or from the central city and how long they have been in the fringe. In Western cities most of the people in the fringe are from the central city, whereas in Indian cities they are of rural origin. The fringe development in the Delhi region is not 'voluntary' but 'involuntary' and suburbanism has been thrust upon them. The people living in the Western fringes have higher socio-economic and educational standards than those in the Indian fringes. The fringe development in India is extensive only around the large metropolitan areas. Since 'urbanism' in India largely ends at the city limits, the major impact on the fringe is visible in land use, agricultural practices and land values and somewhat less in the socio-economic transformation and in urban amenities.

The major questions addressed in this study were; what are the levels of suburbanization in the various segments of the fringe of Delhi as a result of urban impact and what are the socio-economic trends? It was hypothesized that the process of suburbanization is not homogeneous in the Delhi Metropolitan Region and that the socio-economic and demographic characteristics change both in space and time with increase in the level of suburbanization.

The Delhi Metropolitan Region was defined by the Delhi Development Authority, with the help of the Town and Country Planning Organization, in 1957, based on the 1951 census. It is a second order planning region and has strong daily interaction with the city. The Delhi Metropolitan Region includes 484 villages, 10 suburban town and one central city. The analysis included the various social, housing, economic and demographic characteristics for which figures were given in the 1951, 1961 and 1971 Indian censuses, with villages as the units.

The city, suburbs, true urban fringe, partial urban fringe, partial rural fringe, true fringe and rural zones have been identified within the 1951 space occupied by Delhi Metropolitan Region. They were called the 'ecological regions' because they have distinctive population features and social organizations. The identification of the Delhi fringe and its various segments was based on indices of suburbanization, comprising the density of population, sex ratio, percentage of farm workers and percentage of workers in the tertiary sector occupations.

#### SUBURBANIZATION - FACTORS AND PROCESS

The structural, functional and physical transformations of the fringe depend upon similar transformations within the city. Delhi has witnessed the rise and fall of sixteen historical cities located at various sites within the 1971 urban limits. The city of Delhi incorporated 146 villages during

the period 1880-1971. The number of inhabited villages in Delhi Union Territory decreased from 314 in 1921 to 243 in 1971. Likewise, the area of urban Delhi increased from 43 square kilometers in 1901 to 446 in 1971. A large rural population, approximately 119,000 in the city and 11,000 in the suburban towns, was incorporated into the urban areas during 1951-71. The population of the Delhi Union Territory increased from 51 percent urban in 1901 to 90 percent urban in 1971. The growth rate of the Delhi urban agglomeration was approximately 55 percent during 1961-71, which was higher than that of Calcutta or Bombay. The rate of immigration was also high in Delhi, especially after the 1947 partition of India. Displaced persons constituted 33 percent of the population of Delhi city, 42 percent of that in the suburbs and 19 percent of that in the urban fringe in 1951.

The physical and structural process of suburbanization was also reviewed in the present study. The zone of urban impact which extends up to a distance of 28.8 kilometers from the city centre was identified by locating breaks in the gradients of mean values of non-farm workers, the sex ratio and the land not available for cultivation. The process of suburbanization was studied in terms of extensions of the urban limits of Delhi, the extension of urban amenities in rural settlements, the non-farm land, the city bus service facilities, the density of population and the ratio of workers to total population. When the weightage of all these indices

for each concentric zone was ranked it was found that the outer limits of suburbanization extended up to 19.2 kilometers from the city centre. The validity of this is also indicated by the fact that the maximum number of rural settlements in the urban fringe is located within this zone.

The increase in the level of suburbanization has a direct bearing on the increase in the density of population in the city region. It was discovered that the number of villages in the low density category (less than 400 persons per square kilometer) decreased and the number in the high density category (above 800 persons per square kilometer) increased during 1951-71. This indicates that suburbanization in terms of the density of population has not only increased in time but also in space. The growth of the population and the density of the population have an inverse relationship. It is interesting to note that the majority of the villages located near the city (and incorporated during 1951-61) experienced population decrease during 1951-61, but achieved high growth during 1961-71. Thus, in the first stage of the process of suburbanization the villages were depopulated, but this was followed by a stage when suburbanization intensified.

The process of suburbanization is most clearly explained in terms of the ratio of farm workers in the villages. The increase in the number of villages having a low ratio of farm workers (less than 30 percent), and the decrease in the number having a high ratio (more than 60 percent) during 1951-71

clearly indicates the spatial, as well as temporal effect, of the process of suburbanization. It also explains the loss of the agricultural land and the increase in urban use of land.

The process of suburbanization can be studied both in time and space perspectives. Three types of regions were identified in the study as type I, the temporal analysis, type II, the tempo-spatial analysis and type III, the spatio-temporal analysis. The present study is based on type I where the space has been identified as that of 1951, according to the 1951 mean indices of suburbanization. The type II analysis has been termed tempo-spatial in the sense that the space changed with time. The number of villages in the 'fringe' increased during 1951-61, but decreased during 1961-71. The level of suburbanization in type II regions was less intensive during 1951-61 and more intensive during 1961-71 than in type I regions. In the type III analysis the time for the identification of the fringe is fixed in the sense that the 1951 indices of suburbanization were used to identify the fringes in 1951, 1961 and 1971. As such, the space was not fixed but changed with time. Since the number of villages in the fringe increased from 276 in 1951 to 400 in 1971, the level of suburbanization in terms of the socio-economic and demographic characteristics was not so.

#### DEMOGRAPHIC TRANSFORMATION

The demographic characteristics include the density and growth of the population and the sex ratio. The study showed

that the density gradients are very steep as one moves from the city to the peripheral rural areas, as a result of the high degree of compactness of the city. In general, the high density of population in the urban fringe and low density in the rural fringe was in accord with the process of suburbanization. However, a low density of population in the true urban fringe occurred in 1961 because of depopulation of the rural settlements after their incorporation into the city. There population change during 1951-61 showed a negative relationship with the level of suburbanization, but during 1961-71 there was a positive relationship.

The sex ratio showed a negative correlation with the level of suburbanization and, as a result, it was high in the rural fringe and low in the urban fringe. This was due to the high proportion of male in-migration to the urban fringe in search of work. The increase in the sex ratio in the city came about through the reunion of families, while the decline in the sex ratio in the suburbs was caused by the continuing concentration of migrants.

#### SOCIAL TRANSFORMATION

The changes in social structure in relation to the levels of suburbanization were studied in terms of literacy, family size, housing facilities, displaced persons and scheduled castes, workers and non-workers, and dependency ratio. The study indicated that displaced persons constituted more than 19 percent of the population of the urban fringe, and only

2 percent of that of rural fringe. The population decrease in the urban fringe during 1951-61 suggests that these migrants shifted to the city as their economic status improved. A slight increase in the ratio of the scheduled caste population in the city and urban fringe occurred with the increase in job opportunities for the scheduled castes, because of the reserved positions for them in government and semi-government services.

The number of houses per rural settlement was high in the zones having a high level of suburbanization, but there was a lower ratio of persons per house in the urban fringe because of better housing facilities and smaller family sizes. It was found that as the level of suburbanization increased the ratio of households per house also increased. This was due mainly to the shift from the joint family to the single family system and to smaller numbers of children per family.

Literacy was found to be positively related with the level of suburbanization. The index of sex equality in literacy indicated that sex equality increased with increase in the level of suburbanization, both in space and time.

Contrary to the hypothesis, the ratio of workers to the total population was low in the urban fringe and high in the rural fringe. This was mainly because the urban functions were not yet well developed in the urban fringe. The farm workers retreated back to the rural areas or migrated to the city in search of work when their farmland was lost to urban

expansion. The female workers were also forced to withdraw from the work force, with the decrease in agricultural activities. The spatial distribution of workers was reversed in 1971, though the ratio of workers to the total population was lower than in 1961, mainly because of the definitional changes. This reversal was due chiefly to the large number of urban functions that developed in the urban fringe as a result of the high level of suburbanization that occurred. Directly related to the ratio of workers is the dependency ratio. The total dependency ratio in the urban fringe was higher than in the rural fringe in 1961, but the situation was reversed in 1971.

#### ECONOMIC TRANSFORMATION

The economic transformation of the fringe refers to the changes in the ratio of workers in primary, secondary and tertiary sector occupations occasioned by changes in the level of suburbanization. An hypothesis regarding primary occupations suggests that the ratio of primary workers to total workers will increase with a decrease in the level of suburbanization. The ratio of workers in the primary occupations tends to be low in the peripheral zones near the city, since with the advent of the urban invasion the farmland, the main basis of the primary occupations, is lost to the urban land uses. This hypothesis was confirmed in general by the fact that the level of suburbanization and the ratio of primary workers maintained a negative relationship. However, there were some deviations

from the general trend in the case of female primary workers due to the local factors. The low ratio of female workers in the primary sector in the 'rural' segment occurred because of the increased participation of the 'rural' females in the secondary occupations. Similarly, the increase in the ratio of female workers in the primary sector in the urban fringe during 1951-61 can be attributed partly to the changes in definition, but mainly to the changes in agricultural land use whereby the agricultural fields were turned into 'kitchen gardens'. In other primary occupations the only exception to the general situation was in mining and quarrying in which both male and female participation was high in the rural fringe and low in the urban fringe in 1971. This was due mainly to the fact that the mineral resources were found in the rural fringe. As the secondary occupations are mainly suburban activities, it was expected that the ratio of workers in the secondary sector would be high in the zones of high suburbanization and decline as the level of suburbanization decreased outward. Generally this was the case, however, the suburbs and rural areas were exceptions because of the 'site factor'. It was found that the ratio of workers was higher in the rural settlements than in the rural fringe. Also, the ratio was higher in the suburbs than in the city, both in 1961 and 1971. Another exception was in case of female workers in 1971 when female participation in the secondary sector was high in the rural fringe and low in the urban fringe. The relatively high

suburbanization of the urban fringe in 1971 attracted the females more towards the tertiary occupations.

In view of the fact that tertiary occupations are mainly city oriented, the hypothesis suggested that the ratio of tertiary sector workers would be high in the settlements having a high level of suburbanization. The ratios of tertiary workers were positively related with the level of suburbanization, confirming the hypothesis. However, the ratios of male tertiary workers in the city and suburbs decreased during 1961-71, while the female ratios increased. This was due to the increase in secondary activities in the city and suburbs which became highly technical and attracted only skilled male workers. The females who had attained the required educational standard, but were not able to obtain high technical skill, withdrew from the primary and secondary occupations and took up the tertiary occupations in the city and suburbs.

Table 55 summarizes the percentage changes in the three occupational groups during 1961-71. Changes were generally greater in the case of female workers than of male workers. The variations of male workers were at a maximum in the rural fringe, while those of female workers were at a maximum in the urban fringe.

#### THE INDIA-UNITED STATES COMPARISON

The process of suburbanization in India is quite different from that in the United States. The peripheral expansion of

Table 55: CHANGES IN MALE AND FEMALE PARTICIPATION IN PRIMARY, SECONDARY AND TERTIARY OCCUPATIONS BY MAJOR ECOLOGICAL REGIONS, 1961-71.

Major Ecological Regions	Levels of Urbanization/ Suburbanization	Sex	Percentage Difference		
			Primary	Secondary	Tertiary
City	High Urbanism	Male	0	+ 3	- 3
		Female	- 2	- 2	+ 4
Suburbs	Low Urbanism	Male	- 0	+ 3	- 3
		Female	-16	- 4	+21
Urban Fringe	High+Very High Suburbanization	Male	- 8	+ 3	+ 5
		Female	-44	+12	+32
Rural Fringe	Medium+Low Suburbanization	Male	-15	+ 6	+ 9
		Female	-41	+28	+13
Rural	Very Low Suburbanization	Male	- 9	+ 4	+ 5
		Female	-42	+34	+ 8

the Indian cities is limited and is found only around the large metropolitan areas. The gradients of 'urbanism' are very steep in India because the centrifugal force or urban sprawl is very weak. This is true in the case of Delhi. The city has no fringe as it is defined in the United States. It is a fringe only in the sense that it shows deviations from the rural mean, rather than from the urban mean, for various socio-economic and demographic characteristics.

The fringes of American cities often are products of the cities themselves in that they were colonized by the city populations. The Delhi fringe, as defined in the study, is not the product of the city in this sense. It came into existence as

a result of the transformation of the rural settlements by urban impact. Hence, this fringe is not a natural product of urbanization, but a reaction to it. Because of this difference in character Ellefsen (1962) was inclined to rule out the presence of urban fringes in Indian cities.

The suburban towns of many American cities are products of suburbanization and maintain a full range of urban amenities. The suburban towns of Delhi are not: they existed and had independent identities even before the process of suburbanization began in the region, and many of them were as old as Delhi itself. However, as the process of urbanization intensified and a high interaction between the city and suburbs developed, they became dependent suburbs of Delhi.

The Delhi fringe is inhabited by the indigenous rural people and the new rural migrants who were not able to get access to the city because of the high rent for accommodations. The socio-economic status of these people is low compared with the residents of the American city fringes. The American fringes are oriented toward private automobile transportation, whereas the Delhi fringe is characterized by the absence of these facilities and a high dependence on public transport. There is a wide cultural gap between the fringe and the city in Delhi. The socio-economic and demographic characteristics of the population in the fringe of Delhi are more rural than urban. In the United States these characteristics are more urban than rural. Though there are differences in the

identification of the fringes, it is possible to make some quantitative comparisons between the Delhi region and American cities.

The growth of population in the standard metropolitan areas (SMA'S) of the United States during 1950-60 was low in the central cities and high outside them, while in the Delhi metropolitan region the growth rate was higher in the city than outside it (Table 56). However, a limited similarity was observed during 1961-71 when population growth was higher in the urban fringe and suburbs of Delhi than in the city.

Table 56: GROWTH OF POPULATION: DELHI COMPARED WITH UNITED STATES CITIES (Figures in Percentages)

Growth in SMA's of U.S.A.* (SMA = 3 million population and over)	Growth in Delhi Metropolitan Region	
	1950-60	1951-61    1961-71
Central Cities	1.0	City                    59.8    50.7 Suburbs                56.8    73.7
Ring Areas outside Central Cities	71.3	Urban Fringe        -10.6    88.7 Rural Fringe         37.6    50.3 Rural                    44.0    50.3

\*Source: U.S. Bureau of Census, in Boskoff (1970) op.cit. p.44

The variation of sex ratios in the Delhi region was the reverse of that in American cities. Females constituted a higher proportion in the rural and fringe areas of Delhi than in the city, while in the United States the opposite was true (Table 57).

Table 57: SEX RATIOS: DELHI COMPARED WITH UNITED STATES CITIES (Males per 100 females)

Sex Ratio in U.S.A.- 1960*		Sex ratio in Delhi Metropolitan Region - 1961	
Central cities	92.9	City	128.9
Urban Fringe	96.2	Suburbs	120.8
Areas outside		Urban Fringe	126.2
Urban	93.8	Rural Fringe	118.6
Rural	104.3	Rural	115.8

\*Source: U.S. Bureau of Census, in Boscoff (1970) op.cit. p.49

The levels of literacy in the Delhi region were higher in the city than in the rural areas and the fringe (Table 58). On the other hand, in Washington, D.C. the average years of schooling for the population 25 years and over was lower in the city than in the ring outside it.

Table 58: PERCENTAGE OF LITERACY IN THE DELHI REGION AND THE AVERAGE YEARS OF SCHOOLING IN WASHINGTON, D.C.

	Average years of schooling for the population 25 years and over in Washington, D.C.*		Literacy as a percentage of the total population in Delhi Metropolitan Region	
	1960	1970	1961	1971
City	10.8	11.4	City	57.0 60.0
			Suburbs	49.0 53.8
Ring	12.3	12.8	Urban Fringe	34.6 43.2
			Rural Fringe	23.8 34.1
			Rural	23.5 33.4

\*Source: U.S. Bureau of Census, R. Farley in Barry Schwartz (Ed.) op.cit., 1976, p.21.

The scheduled castes of India and the non-whites of the United States have some similarities of social position in their respective societies. The displaced persons of India can also be compared with the non-whites of United States in the sense that both have been migrants to the city. The displaced persons are socially more acceptable in Indian society than the scheduled castes. The ratio of the scheduled castes was higher in the fringe and rural areas than in the city and suburbs, while in the United States the non-whites were mainly concentrated in the central cities (Table 59). The distribution of displaced persons was generally similar with that of non-whites in America.

Table 59: DISTRIBUTION OF SOCIAL GROUPS BY CASTE, COLOUR AND MIGRATION IN THE CITY REGIONS OF DELHI AND UNITED STATES

Delhi Region-1971	Delhi Region-1951	U.S.A. City Region-1950*			
Scheduled Castes	Displaced Persons	Non-Whites Whites			
City	14.1	32.8	Central Cities	13.0	87.0
Suburbs	12.6	41.6	Suburbs and Urban Fringes	4.7	95.3
Urban Fringe	22.9	19.1			
Rural Fr.	20.7	2.0			
Rural	25.7	1.2			

\*Source: Duncan and Reiss, 1956. op.cit. p.122.

There are other characteristics of the fringe residents of American cities which reveal that they enjoy a better quality of life and social environment and have a higher socio-economic status than the residents of Delhi fringe. Unfortunately, the lack of data on such things as composition, marital status and housing amenities for the rural settlements in the Indian census makes it difficult to carry out a more complete comparative study of the fringe residents in India and United States.

#### PROBLEMS AND PLANNING RECOMMENDATIONS

The Delhi fringe is a transitional zone that has lost its rural economic base, social harmony and stability. It has developed many of the problems of a transitional zone. The city impact on the fringe is visible in land uses, agricultural practices and land values. The fringe has lost a major share of its farmland and agricultural productivity is low. The size of holding has been reduced to the minimum, making extensive agriculture uneconomic. As a result, a large amount of the agricultural land is abandoned long before the land is used for urban functions. The allotments and barren fields with agricultural pockets between them are a common sight as one moves outside the city limits. Much of the productive farmland has been acquired by the colonizers, industrialists and land speculators well in advance of its use for urban development. Delhi Development Authority, of course, is the prime

defaulter in allowing such large areas of unused land to exist.

While suburbanization led to a decline of extensive agriculture in the urban fringe, it also led to the growth of an intensive form of agriculture. Grain production declined, but vegetables, horticulture and fodder crops increased, as did the practice of dairy farming. The subsistence farming has changed into commercial farming, as the products of the fields now are being raised for cash. Nevertheless, agriculture is no longer as profitable as it used to be. As agriculture dwindled the cultivators and farm labourers left the fields to work in the city and industrial suburbs. But female participation in agriculture increased, since the fields were virtually turned into 'kitchen gardens'. This separation of male and female work places divided the family and brought instability and loss of social harmony.

On the one hand, suburbanization caused a major land use transformation, but on the other hand, it brought very little improvement in the social and economic status of the population living in the fringe. The fringe society is urban in that its people are working in urban functions. Also, the fringe of Delhi has all of the vices and problems of urban society, but not the urban amenities. The density of population in the fringe is increasing, but not because work opportunities and living facilities are increasing, rather,

because it provides cheap and unauthorized, slum-type accommodation to the migrants who wish to be near their work in the city. An interesting phenomenon of the unauthorized colonies is that they develop primarily on the outskirts of the city and move outward as part of the suburbanization process. In many cases the unauthorized colonies located in the peripheral rural areas were incorporated in the city, as a result of the expansion of the city limits. Though the social and demographic characteristics of these incorporated settlements are becoming more like those of the city, their socio-economic status, attitudes and standard of living are far behind those of the city. Their total environment is far below that found in the nearby planned colonies.

Although literacy is higher in the fringe than in the rural areas, the educational standard is still far below that in the city. The ratio of households per house in the fringe is lower than in the city, yet the amenities in the houses are lacking. Compared with the rural areas family sizes are smaller, but family harmony is lacking. The people living in the fringe have a socio-economic status between that of the city and that of the rural areas, but the quality of life and social well-being are inferior to those of both the city and rural areas. The moral, spiritual and social values are being eroded in the fringe. It is a breeding ground for social vices and urban criminals.

The major problem in the metropolitan region derives from the unequal distribution of the population in relation to the amenities available. The problem requires planning at city, suburb, fringe and rural levels and an integrated plan at the metropolitan level. The integrated planning should have three main thrusts: population planning, land use planning and economic planning.

The population planning should be aimed at regulating the city-ward migration. The growth of the population is rapid in the urban fringe and the density is constantly increasing, mainly because of migration from the rural tracts. It is, therefore, essential to divert this population towards the suburbs which can maintain close economic contact with the central city. A basic planning goal should be to develop the means of transportation first, rather than after development. The outer ring road and rail links must be well developed to link all the suburban towns and the city with other regional towns of the National Capital Region.

The land use planning must be aimed at regulating the urban services and the residential density of the population. Residential areas should be developed in the urban fringe with better civic amenities, along with zonal city centres. A green belt extending to four kilometres beyond the urban fringe could also be developed to restrict suburban expansion. Beyond the green belt the rural fringe and rural areas should

be maintained as an agricultural zone. Several major rural service centres could also be established in this rural zone.

The economic planning is concerned with administrative functions and economic activities in the metropolitan region. The major administrative functions are already located in the city. However, some of the future administrative functions could be developed in the suburbs and some of the existing ones transferred there. The existing industrial suburbs should be retained exclusively for heavy industries, with additional residential facilities developed. Narela in the north, located between the major road and railway routes, could be developed into a new heavy industrial town. Recreational and residential facilities could be developed in Mehrauli and household and the cottage industries in the major rural service centres beyond the green belt. The main features of a proposed integrated planning model may be summarized by major zones as follows:

- (1) City- The central city extends up to 8 kilometre from the city centre. The density of population should be maintained at about 8,000 persons per square kilometre as at present. It should continue to have administrative functions. New residential facilities for low, medium and high income groups could be provided through redevelopment plans, along with new city parks and recreational centres. Special efforts must be made to save the Delhi ridge as an urban forest or city lung.

- (2) Suburban Zone- The region should be planned to extend from 8 to 14 kilometre from the city centre. It should include all of the residential colonies developed beyond the 1951 urban limits of Delhi and also the urban fringe. The average density can be maintained at about 5,000 persons per square kilometre. The two suburban towns of Mehrauli and Shahdara are located in this zone. Mehrauli is suitable for development as a recreational and residential centre catering to a population of up to 15,000. Shahdara should be developed purely as a residential and whole-sale market centre.
- (3) Green Belt- This buffer zone of about 4 kilometre in width, extending from 14 to 18 kilometre from the centre of the city, could be developed in the form of a green belt between the urban and rural fringes.
- (4) Rural Tract- Beyond the green belt the rural fringe and the rural areas of the metropolitan region forms the rural tract. This region should be maintained as predominantly agricultural in land use. The main crops should be a variety of fruits and vegetables for urban markets, along with fodder crops. This zone could also have some major rural service centres catering to the needs of the rural population. These centres may have household, cottage and dairy industries based on the local agricultural products.

(5) Suburban Towns- The suburbs should be residential, commercial and industrial, having all the functions of rural service centres and additional functions of higher order centres. The major functions of these towns may be suggested as follows:

- (a) Faridabad Township - Heavy industries and recreational.
- (b) Faridabad - Residential.
- (c) Ghaziabad - Heavy industries, administration and residential.
- (d) Gurgaon - Household industries, residential and administration.
- (e) Narela - Heavy industries and residential.
- (f) Bahadurgarh - Residential.
- (g) Ballabgarh - Household industries and residential.
- (h) Shahdara - Residential, wholesaling and transportation.
- (i) Mehrauli - Residential and recreational.
- (j) Nazafgarh - Residential, small scale industries and rural service centre.

Planning must start in the urban fringe because suburbanization and the resultant transformation of the area is at a peak in this zone. As such, it requires immediate attention. The provisions of urban amenities and the improvement of the social environment are of utmost importance in order to save the urban fringe from turning into a metropolitan slum.

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APPENDIX IDEFINITIONS OF THE TERMS USED IN THE STUDY

1. Fringe or the Fringe Villages:  
The rural settlements satisfying one or more of four indices of suburbanization.
2. Rural:  
The villages which did not satisfy any of the four indices of suburbanization.
3. Metropolitan Rural:  
All villages of Delhi Metropolitan Region including both rural and fringe villages.
4. Urbanism:  
The urban way of life expressed in terms of the socio-economic and demographic characteristics found in the city of Delhi.
5. Ruralism:  
The rural way of life expressed in terms of the socio-economic and demographic characteristics found in the metropolitan rural areas of Delhi.
6. Suburbanism:  
A way of life expressed in terms of socio-economic and demographic characteristics in the fringe of Delhi.
7. Suburban Zone:  
A zone outside the city including the fringe and the suburban towns.
8. Suburbs:  
The towns outside the city of Delhi having interlinkages with it, but being outside the continuous built-up area at the time of identification.
9. Ecological Regions or Units:  
A group of settlements having distinctive economic, cultural and demographic characteristics and social organization.

10. Central City:

The city of Delhi or urban Delhi or Delhi city.

11. Suburbanization:

A process of developing fringe characteristics.

12. Levels of Suburbanization:

Levels of suburbanization may be expressed on a scale, such as low, medium and high, over a time period or from very low in rural areas to very high in the true urban fringe.

## APPENDIX II

## OCCUPATIONAL CATEGORIES\*

1951	1961	1971
1. PRIMARY LIVELIHOOD CLASSES.	1. PRIMARY SECTOR	1. PRIMARY SECTOR
I. Cultivators of land wholly or mainly owned and their dependents	I. Cultivators	I. Cultivators
II. Cultivators of land wholly or mainly unowned and their dependents	II. Agricultural labourers	II. Agricultural labourers
III. Cultivating labourers and their dependents	III. Mining, quarrying, livestock, forestry, fishing, hunting, Plantation orchards and allied activities	III. Livestock, forest, fishing, hunting, plantation, orchards and allied activities
IV. Non-cultivating owners of land, agricultural rent receivers and their dependents		IV. Mining and quarrying
2. SECONDARY LIVELIHOOD CLASSES	2. SECONDARY SECTOR	2. SECONDARY SECTOR
Persons, including dependents who derive their principal means of livelihood from:	IV. Household Industry	V. Manufacturing
V. Production other than cultivation	V. Manufacturing	(a) Household
	VI. Construction	(b) Other than Household
		VI. Construction
3. TERTIARY LIVELIHOOD CLASSES	3. TERTIARY SECTOR	3. TERTIARY SECTOR
VI. Commerce	VII. Trade and commerce	VII. Trade and commerce
VII. Transport	VIII. Transport, storage and communication	VIII. Transport, storage and communication
VIII. Other services and miscellaneous sources	IX. Other services	IX. Other services
	X. Non-workers	X. Non-workers

\* The Census of India 1961 grouped nine industrial categories into three sectors: Primary, Secondary and Tertiary sector occupations. See Census Atlas Delhi, Volume XIX, Part IX, Census of India 1961

LIST OF THE VILLAGES AND THEIR CODE NUMBERS

S.NO.	CODE NO.	NAME OF THE VILLAGES
I. <u>Villages of Union of Territory of</u> <u>Delhi/Delhi Tehsil</u>		
1	001	Chilla Saroda Khadar
2	002	Chilla Saroda Bangar
3	003	Dallo Pura
4	004	Kondli
5	005	Gharoli
6	006	Kotla
7	007	Gharoda Neemka Bangar alias Patparganj
8	008	Gharoda Neemka Khadar
9	009	Shamaspur
10	010	Shakarpur Baramad
11	011	Mandauli
12	012	Gokalpur
13	013	Babarpur
14	014	Jafarbad
15	015	Ziauddin Pur
16	016	Khampur Dhani
17	017	Qarawal Nagar
18	018	Dayalpur
19	019	Jiwan Pur alias Johri Pur
20	020	Mustafabad
21	021	Mirpur Turk
22	022	Tukmir Pur
23	023	Khajoori Khas
24	024	Gari Mendu
25	025	Saadat Pur Gujran
26	026	Sher Pur
27	027	Behari Pur
28	028	Baqiabad
29	029	Saadat Pur Musalmanan
30	030	Wazirabad
31	031	Gopal Pur
32	032	Jharoda Mazra Burari
33	033	Saba Pur
34	034	Pur
35	035	Badar Pur
36	036	Salem Pur Mazra Burari
37	037	Jagat Pur
38	038	Burari
39	039	Kamal Pur
40	040	Mukand Pur
41	041	Shanjar Pur
42	042	Bhalwa Jahangir Pur
43	043	Haidar Pur
44	044	Sahi Pur
45	045	Yakut Pur

46	046	Pitam Pura
47	047	Nahar Pur
48	048	Badli
49	049	Shama Pur
50	050	Libas Pur
51	051	Qadi Pur
52	052	Ibrahim Pur
53	053	Garhi Khasru
54	054	Hiranki
55	055	Tehri Daulat Pur
56	056	Mohd. Pur Ramzanpur
57	057	Fatehpur Jat
58	058	Tigi Pur
59	059	Sunger Pur
60	060	Jhangola
61	061	Akbar Pur Mazra
62	062	Qallak Pur
63	063	Palla
64	064	Taj Pur Kalan
65	065	Bkhtawar Pur
66	066	Zind Pur
67	067	Mukhmel Pur
68	068	Nangli Poona
69	069	Siras Pur
70	070	Khera Kalan
71	071	Bodh Pur Bija Pur
72	072	Alipur
73	073	Bankauli
74	074	Hamidpur
75	075	Singhu
76	076	Singhola
77	077	Kham Pur
78	078	Shahpur Garhi
79	079	Tikri Khurd
80	080	Kureni
81	081	Bhor Garh
82	082	Bankner
83	083	Lampur
84	084	Ghoga
85	085	Sanoth
86	086	Razapur Kalan
87	087	Holambi Kalan
88	088	Holambi Khurd
89	089	Iradat Nagar alias Naya Bans
90	090	Khera Khurd
91	091	Pehlad Pur Bangar
92	092	Sahibabad Daulatpur
93	093	Kankar Khera
94	094	Pansali
95	095	Barwala
96	096	Pooth Khurd
97	097	Bawana

98	098	Darya Pur Kalan
99	099	Hareoli
100	100	Ochandi
101	101	Mungesh Pur
102	102	Qutab Garh
103	103	Katewra
104	104	Bazidpur Thakran
105	105	Nangal Thakran
106	106	Sultanpur Dabas
107	107	Chandpur
108	108	Budhan Pur
109	109	Salahpur Mazra
110	110	Khor Jat
111	111	Khor Punjab
112	112	Chatesar
113	113	Jonti
114	114	Garhi Rindhala
115	115	Nizampur Rashidpur
116	116	Lad Pur
117	117	Kanjhawala
118	118	Karala
119	119	Mohd. Pur Majri
120	120	Gheora
121	121	Saoda
122	122	Tikri Kalan
123	123	Neelwal
124	124	Jafarpur alias Hiran Kudna
125	125	Bakarwala
126	126	Bapraula
127	127	Nangli Sakrawati
128	128	Dichaon Kalan
129	129	Jharoda Kalan
130	130	Surakpur
131	131	Kair
132	132	Mitraon
133	133	Roshan Pura alias Dichaon Khurd
134	134	Dindar Pur
135	135	Khera
136	136	Kharkhari Nahar
137	137	Surera
138	138	Mundhela Khurd
139	139	Mundhela Kalan
140	140	Jafar Pur Kalan
141	141	Khera Dabar
142	142	Sher Pur Deri
143	143	Ujwa
144	144	Shamas Pur Khalsa
145	145	Baqur Garh
146	146	Isa Pur
147	147	Qazi Pur
148	148	Malik Pur Zer Najafgarh
149	149	Darya Pur Khurd
150	150	Jhujhuli

151	151	Sarang Pur
152	152	Dhansa
153	153	Ghalib Pur
154	154	Deorala
155	155	Raota
156	156	Goman Hera

II. Villages of Union Territory of Delhi/Mehrauli Tehsil

157	157	Mundka
158	158	Rani Khera
159	159	Rasool Pur
160	160	Madan Pur Debas
161	161	Mubarak Pur Debas
162	162	Kirari Suleman Nagar
163	163	Nithari
164	164	Begum Pur
165	165	Pooth Kalan
166	166	Rithala
167	167	Manghol Pur Kalan
168	168	Manghol Pur Khurd
169	169	Sultan Pur Majra
170	170	Nangloi Jat
171	171	Garhi Piran
172	172	Jawala Heri
173	173	Nangloi Sayed
174	174	Qamruddin Nagar
175	175	Nilothi
176	176	Ranhola Shafi Pur
177	177	Tilang Pur Kotla
178	178	Raja Pur Khurd
179	179	Nawada Mazra Hastal
180	180	Hastal
181	181	Binda Pur
182	182	Mirza Pur
183	183	Dabri
184	184	Sagar Pur
185	185	Nasir Pur
186	186	Palam
187	187	Matola
188	188	Lohar Heri
189	189	Kakrola
190	190	Goela Khurd
191	191	Taj Pur Khurd
192	192	Chhawla
193	193	Rewla Khan Pur
194	194	Paprawat
195	195	Pindwala Khurd

196	196	Pindwala Kalan
197	197	Khar Khari Jatmal
198	198	Khar Khari Rond
199	199	Hasan Pur
200	200	Daulat Pur
201	201	Asalat Put Khawad
202	202	Zin Pur
203	203	Shikar Pur
204	204	Jhatikra
205	205	Nanak Heri
206	206	Raghupur
207	207	Badhosra
208	208	Kangan Heri
209	209	Bamonoli
210	210	Dhulsiras
211	211	Pochan Pur
212	212	Qutabpur
213	213	Ambar Hai
214	214	Togan Pur
215	215	Bagrola
216	216	Sahu Pur
217	217	Shahabad Modh. Pur
218	218	Bhartal
219	219	Bijwasan
220	220	Salah Pur
221	221	Kapas Hera
222	222	Sambhalka
223	223	Nangal Devat
224	224	Mahipal Pur
225	225	Kusum Pur
226	226	Moradabad Pahari
227	227	Masud Pur
228	228	Malikpur Kohi alias Rangpuri
229	229	Rajokri
230	230	Ghatorni
231	231	Yahya Nagar
232	232	Gadaipur
233	233	Sultan Pur
234	234	Lado Sarai
235	235	Saidul Ajaib
236	236	Neb Sarai
237	237	Maidan Garhi
238	238	Chattar Pur
239	239	Satberi
240	240	Chandan Hola
241	241	Fateh Pur Beri
242	242	Jona Pur
243	243	Dera
244	244	Mandi
245	245	Bhati
246	246	Asola

247	247	Shahur Pur
248	248	Rajpur Khurd
249	249	Deoli
250	250	Tigri
251	251	Pul Pehlad
252	252	Tajpur
253	253	Mithe Pur
254	254	Molar Band
255	255	Kotla Mahigiran
256	256	Daidabad
257	257	Aali
258	258	Jaitpur

III. Villages of Union Territory of Delhi/Urbanized  
After 1961

259	259	Neemri
260	260	Sadhora Kalan
261	261	Sadhora Khurd
262	262	Chaukri Mubarkabad
263	263	Salem Pur Mazra/Madi Pur
264	264	Masuda Bad
265	265	Haibut Pur
266	266	Ladha Sarai
267	267	Khichri Pur
268	268	Shakar Pur Khas
269	269	Mandoli Fazal Pur
270	270	Gazi Pur
271	271	Hasan Pur
272	272	Ghonda Chauhan Bangar
273	273	Ghonda Chauhan Khadar
274	274	Ghonda Gujran Bangar
275	275	Ghonda Gurjan Khadar
276	276	Ganwari Ghonda
277	277	Usman Pur
278	278	Naya Gaon
279	279	Manj Pur
280	280	Saboli
281	281	Jhilmil Tahar Pur
282	282	Chirgah Shimali (Kaitwara)
283	283	Dhir Pur
284	284	Wazir Pur
285	285	Pipal Thala
286	286	Bharola
287	287	Budhela
288	288	Bair Sarai
289	289	Katwaria Sarai
290	290	Kishan Garh alias Chhan

291	291	Hauz Rani
292	292	Khan Pur
293	293	Madan Gir
294	294	Tughlakabad
295	295	Tikhand
296	296	Jasola
297	297	Madan Pur Khadar
298	298	Badar Pur

IV. Villages of Union Territory of Delhi/Urbanized  
After 1951

299	299	Oldanpur
300	300	Khureji Khas
301	301	Saqdarpur
302	302	Silampur
303	303	Kharkar Dooman
304	304	Azadpur
305	305	Ghondli
306	306	Shakurpur
307	307	Basti Darapur
308	308	Shadipur
309	309	Khampur
310	310	Hauz Khas
311	311	Humayunpur
312	312	Mubarakpur Kotla
313	313	Masjid Moth
314	314	Sarai Kale Khan
315	315	Zamrudpur
316	316	Chirag Delhi
317	317	Garhi Jharia Maria
318	318	Khirki
319	319	Toot Sarai
320	320	Seikh Sarai
321	321	Kalu Sarai
322	322	Shahpur Jat
323	323	Kharera
324	324	Begumpur
325	325	Jai Sarai
326	326	Adhchini
327	327	Nangli Razapur
328	328	Basant Nagar
329	329	Joga Bai
330	330	Mohd. Pur Munirka
331	331	Khizarabad
332	332	Okhla
333	333	Chack Chilla
334	334	Kilokri
335	335	Keshapur

336	336	Chaukhandi
337	337	Madipur
338	338	Khyala
339	339	Nangli Jalab
340	340	Tihar
341	341	Tatarpur
342	342	Yaqutpur
343	343	Bahapur
344	344	Sarai Shahji
345	345	Asalatpur
346	346	Posangipur
	347	Narela Rural

V. Villages of District Rohtak, Tehsil Bahadurgarh

347	351	Bahadurgarh Rural
348	352	Balaur
349	353	Bamnoli
350	354	Kasar
351	355	Parnala
352	356	Sankhaul
353	357	Sarai Aurnagabad
354	358	Hasanpur

VI. Villages of District Gurgaon, Tehsil Gurgaon

355	401	Adampur
356	402	Alawadi Sarai
357	403	Behrampur
358	404	Bajghera
359	405	Bindapur
360	406	Chakarpur
361	407	Chaumuha
362	408	Daulat Nasirabad
363	409	Bunda Heri
364	410	Fatehpur
365	411	Ghasanla
366	412	Gurgaon Rural
367	413	Hindayatpur
368	414	Inayatpur Khera
369	415	Islampur
370	416	Jharsa
371	417	Kadipur
372	418	Kanhai
373	419	Khandsa
374	420	Mulla Hera

375	421	Naharpur Rupra
376	422	Nathupur
377	423	Solokhra
378	424	Shahpur
379	425	Shamaspur
380	426	Sikandarpur
381	427	Sarhaul
382	428	Sukhrate
383	429	Tikri

VII. Villages of District Gurgaon, Tehsil Ballabhgarh

384	451	Aitmadpur
385	452	Ajraunda
386	453	Ankhir
387	454	Arangpur
388	455	Badkhal
389	456	Ballabhgarh Rural
390	457	Barauli
391	458	Baselwah
392	459	Bhankri
393	460	Budena
394	461	Dabwa
395	462	Daulatabad
396	463	Faridabad Rural
397	464	Fatehpur Chandila
398	465	Gaunchhi
399	466	Ghazipur
400	467	Ghosipur
401	468	Khari Gujran
402	469	Lakarpur
403	470	Majegar
404	471	Mawai
405	472	Manaru
406	473	Meola Maharajpur
407	474	Nangla Gujran
408	475	Nagwada Kohn
409	476	Palla
410	477	Ranhera
411	478	Saran
412	479	Shatpur
413	480	Sihi
414	481	Tilpat
415	482	Uncha Gaon
416	483	Sarai Khwja
417	484	Pahladpur Barsuli

VIII. Villages of District Meerut, Tehsil Ghaziabad  
and Villages of District Bulandsher, Tehsil  
Sikandrabad

418	501	Afzalpur
419	502	Ahmadpur Nagar Nawada
420	503	Arthala
421	504	Asalatpur
422	505	Banthala
423	506	Bayana
424	507	Behrampur
425	508	Behta Hajipur
426	509	Bhaunja
427	510	Bhopura Bairampur
428	511	Bhua Pur
429	512	Chhajarsi
430	513	Chhaparaula (Tehsil Sikandrabad)
431	514	Chikamaber Pur
432	515	Chipyiana (Tehsil Sikandrabad)
433	516	Dariyai (Tehsil Sikandrabad)
434	517	Dehroti Khurd
435	518	Dunda Heri
436	519	Ghokana
437	520	Girdharpur Sunarsi (Tehsil Sikandrabad)
438	521	Guldhar
439	522	Harsaon
440	523	Bazidpur
441	524	Jagola
442	525	Jalalpur/Roza Jalalpur
443	526	Jatwara
444	527	Jhandapur
445	528	Kaila
446	529	Karela
447	530	Karkan Mandan
448	531	Khora
449	532	Kimauni/Kinauni/Mohd. Pur Kimauni
450	533	Lalpur
451	534	Loni
452	535	Maharajpur
453	536	Maina
454	537	Maharuli
455	538	Makanpur
456	539	Makarmatpur
457	540	Mawi
458	541	Meota
459	542	Mehman Sarai
460	543	Mirzapur
461	544	Morti
462	545	Mukarramatpur

463	546	Rampur
464	547	Nasirpur
465	548	Nastauli
466	549	Pehlad Garhi
467	550	Pasaunda
468	551	Raispur
469	552	Rasulpur Nawada
470	553	Roza Yaqubpur (Tehsil Sikandrabad)
471	554	Razapur
472	555	Sadik Nagar
473	556	Sadik Pur
474	557	Saddullahabad
475	558	Sahibabad
476	559	Sakrali
477	560	Noor Nagar
478	561	Shah Behari/Shah Beri (Tehsil Sikandrabad)
479	562	Shahpur Bamheta
480	563	Sehani Kalan
481	564	Sikandar Pur
482	565	Tela Shaabazpur
483	566	Hasanpur Bhuwapur
484	567	Meolagri

## VITA

Surname: PACHAURI

Given Names: MAHESH KUMAR

Place of Birth: ALIGARH, U.P., INDIA. Date of Birth: September 2, 1940

Educational Institutions Attended, with Dates of Entering and Leaving:

D.S.College Aligarh (Agra University Agra, India) 1959-1961

D.S.College Aligarh (Agra University Agra, India) 1963-1965

University of Victoria, B.C., Canada 1976-1977

Jawaharlal Nehru University, New Delhi, India 1978-1982

Degree, Diplomas, Etc., Awarded, with Dates and Names of Institutions:

B.A. 1961 Agra University Agra, India.

M.A. 1965 Agra University Agra, India.

Honors and Awards:

1. Three Gold Medals in M.A. (Geography) 1964-65
2. Agra University Bursary 1965
3. Teaching Assistantship, University of Victoria 1976-77
4. Teacher Fellowship, University Grants Commission (Govt. of India) New Delhi 1978-82

Publications:

1. 'Intra-Urban Interaction Pattern: An Analytical Review', Indian Geographic Review, Vol.IV, 1979
2. 'Delineation of the Fringe and the Gradients of the Socio-economic and Demographic Characteristics in the Rural Metropolitan Community with Special Reference to Delhi', National Association of Geographers, India, Abstract of Papers, Chandigarh, 1980
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4. 'Identification of Space in Delhi Metropolitan Region: An Attempt to Trace Methodology for the Study of Sub-urbanization in Spatial and Temporal Perspectives', National Association of Geographers, Fourth Annual Congress, Abstracts, Bombay, 1982.
5. 'Conceptualization, Classification and Management of Resources: A Discussion', in Singh L.R. et.al. 'Environmental Management, Allahabad, 1983.

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Name

MAHESH KUMAR PACHAURI

Date

September 9, 1983