Chapter III

Delimitation of Umland
CHAPTER – III
DELIMITATION OF UMLAND

Frequency and intensity of services depends on linkages in terms of distance of a city with its countryside and the available nature of transport and communication. The characteristics and socio-economic development of an Umland differ from that of another. People make their daily trips to perform their daily activities and jobs from the rear end of a city to its central part where their offices and institutions are generally located. The villagers also travel daily to cater their socio-economic needs to neighbouring towns and cities. Thus, city works as a centre of gravity for socio-economic, cultural and administrative activities which is truly representative of the countryside.

Aligarh city performs a variety of functions. It provides a number of services to its countryside i.e., health services, educational services, banking services and bus services and in turn of which it receives some services from its surrounding areas i.e., supply of agricultural products and daily labour. The information on the basis of which the Umland has been delimited, have been collected through surveys and records maintained by the colleges and schools, telephone offices, commuters’ assembling points, banks, mandis and milk collection points. Sampled areas have been marked in Figure 3.1. However, the collected data helps in understanding the hidden relationship of the city with its countryside. Not only distance but surplus production affects the extent of perishable commodities also. As a result, except the zones of perishable goods, the zones of telephone services, banking services, daily commuters, education and health have been divided into three distinct zones - the zone of high interaction (more than 75 per cent people are having connection with the city), the zone of medium interaction (50 per cent people move to the city for various services), the zone of low interaction (less than 25 per cent people are looking towards the city for fulfilling their demands). The zone of high interaction denotes the intense relationship of the city with its countryside whereas the zone of medium interaction delimits the areas from where the influence of the city starts dwindling down. The zone of low interaction points out the outer limit where connectivity between the city and its countryside becomes weak and least effective and the impact of other urban centres become influential. Therefore, this interrelationship between
ALIGARH CITY
SAMPLED AREAS FOR THE DELIMITATION OF UMLAND

INDEX
B Bank
B Bus Stand
C Commuters Assembling Point
D Degree College
D Dhanipur Mandi
H Hospital
I Industrial Training Institute
I Inter College
M Milk Collection Centre
S Sarsol Mandi
T Telephone Office
Aligarh City

Source: Based on Field Survey, 2007-08

Fig. 3.1
city and its countryside has been examined under two categories:

3.1 **Countryside Services**

   3.1.1 **Supply zone of agricultural products**
       3.1.1.1 Zone of vegetable supply
       3.1.1.2 Zone of foodgrains supply
   3.1.2 Zone of fruit supply
   3.1.3 Zone of milk supply
   3.1.4 Zone of daily commuters

3.2 **Cityside Services**

   3.2.1 Zone of banking services
   3.2.2 Zone of telephone services
   3.2.3 Zone of health services
   3.2.4 Zone of bus services
   3.2.5 Zone of education services

### 3.1 **Countryside Services**

#### 3.1.1 **Supply Zone of Agricultural Products**

Cities are dependent on their surroundings for their existence and growth. A city, having rapidly increasing population, needs a huge amount of agricultural products for its sustenance. It depends on countryside to a considerable extent for the supply of vegetables, milk, foodgrains, fruits and labour. These commodities are not only brought from immediate neighbourhood but also from hundreds of miles away. Thus, the city covers a huge area of surroundings for getting their agricultural products.

#### 3.1.1.1 Zone of Vegetable Supply

Aligarh provides a big vegetable and foodgrains market, thereby attracting a huge quantity of the agricultural products from its countryside – either directly from the village or through the big urban collection centres. The Umland of vegetable and foodgrains, having favourable location, is a great producer of agricultural products. As a result, a number of wholesale markets which are properly known as Mandi have sprung up in big urban centres such as Dhanipur Mandi in Aligarh city.

Dhanipur wholesale regulated market is the biggest market of Aligarh District.
This is the single wholesale market in Aligarh city, located on a distance of two kilometres from it. This mandi was established on 1st January, 1986. This is an ‘A’ Grade mandi situated on Grand Trunk Road, covering an area of 56 acres. It is well known for foodgrains and vegetables. The volume of agriculture products reaching here is much more than that of other regulated markets. The site of this mandi is free from water logging and threat of floods. The surrounding hinterland of this market is very fertile. This mandi remains full of agricultural products throughout the year.

The villages those lie within the radius of less than 40 km and easily linked with roads come within the vegetable supply zone. In this way, green vegetables such as cabbage, ladyfinger, brinjal, cauliflower, tomato, pumpkin, bottle gourd, cucumber are grown in the neighbourhood of the city. These are more perishable in nature and as the time passes, they loose their prices also. Only two settlements are 40 km away from the city. The other types of vegetables are those which are not perishable in nature such as potatoes, onions, bitter melon. Such vegetables are supplied here in larger quantity from longer distances such as Kanpur, Allahabad, Hapur and Bareilly also.

The vegetable supply zone has an area of 4,728 sq. km. It includes 1,176 total numbers of villages and 10 urban centres. The prominent bulges have been found in the north-eastern portion of this zone. Figure 3.2 demonstrates the greatest intensity in north-east and central part. The outer villages are situated within a radial distance of about 30-40 km. The four extremities are Rajghat and Ramghat in the north-east, Hathras in the south, Gangiri in the east and Surajpur in the west. About 13,053 hectares of land is under vegetable gardening in Aligarh district of which 1,081 hectare land is in urban area. Aligarh city, having a population of nearly 0.7 million, is the biggest consumer of vegetable among all the urban centers of Aligarh district. The total arrival of vegetables in Dhanipur mandi during the year 2007 has been 3.8 million quintals.

As the distance from the city increases, the influence of city market decreases. But in some areas, these conditions are not applicable. Narora and Ramghat are the biggest supplier of vegetables as they are located in high fertile land in the proximity of the Ganga River. Thus, these areas are situated at an advantageous position. They not only fulfill the demand of vegetables in Bulandshahr district but supply their surplus production to Aligarh city also. The sellers coming from these areas bring their vegetables in trucks, auto-rickshaws, max and tractors. Mostly, they prefer to
Fig. 3.2 (a)

ALIGARH CITY
ZONE OF VEGETABLE SUPPLY
(2007-08)

Frequency Pattern of Vegetable Sellers of Aligarh City

Frequency of Vegetable Sellers to the City
(In Numbers)

# > 800
# 600 - 800
# 400 - 600
# 200 - 400
# < 200

Source: Based on Field Survey, 2007-08

Fig. 3.2

110
travel through bullock carts and horse carts. Both the source areas are well connected with metalled roads.

There is also a bi-weekly market at Kwarasi, held on Thursday and Sunday. It is situated only 1 km from Aligarh Municipal Boundary. Here most of the sellers collect their product from the cold storage of Atrauli tahsil and some other from villages such as Kazimabad and Kishenpur. Most of the people buy vegetables and foodgrains from Dhanipur mandi and finally sell them here. Approximately 615 sellers of vegetable or foodgrains sell their commodities here. Livestock, cloths, spices and shoes are also sold here at much lower prices. Hand driving cart, auto-rickshaws, horse cart are the chief mode of transport. Less perishable types of vegetables such as potatoes and onions from distance sources are excluded.

Besides, these wholesale markets, some vegetable shops are generally found occupying the footpaths in different areas of the city such as Barahdwari, Dube Ka Padao, Dodhpur, Vishnupuri, Kishanpur, Janakpuri and Rasalganj. Here, all the vegetable sellers get their supplies from these bigger wholesale markets, except those few coming from nearby villages.

From Figure 3.2, it is observed that two settlements i.e. Narora and Ramghat along the Ganga have the highest frequency followed by Sonoth Gokulpur and Piplauth Gokulpur. Table 3.1 and Figure 3.2 (a) depict that frequency of vegetable sellers is high (33.97 per cent) within the distance category of 10-20 km. This distance category registered higher percentage of settlement accommodating total population of about 66 thousand. While, in contrast, at greater distance of 40 km, only two settlements namely Narora and Ramghat, because of their favourable locations, have comparatively higher frequency than the remaining two categories. These two settlements together constitute 3.51 per cent of the total settlement which is lowest. However, it is clear that 27.33 per cent vegetable sellers are coming from only two settlements. They are producing, collecting and supplying vegetables in greater quantum. Therefore, it is clear from the table that although higher number of settlements has accounted higher percentage of frequency, there is no relationship among population of the settlements, distance and frequency for the region of vegetable supply.
3.1.1.2. Zone of Foodgrains Supply

High productivity of vegetables and foodgrains has enabled this region to feed its growing population. Aligarh provides a ready market of foodgrains for the villagers of the immediate surroundings. Farmers from the surrounding villages not only sell their products in the market but make purchases from here also.

The zone of foodgrains supply encompasses an area of 9,179 sq. km and includes 2,107 villages. All the farmers of the surroundings do not produce wheat and other foodgrains in surplus. So they do not supply their products to the city. Only about 60 settlements play an active role in bringing their foodgrains to the mandi while rest of settlements purchases foodgrains from here for their livelihood. The main reason is that some have no surplus because of high density of population and some of them have low production of foodgrains themselves. So they sell their products within the local markets.
or haats of villages.

The total arrival of foodgrains in Dhanipur mandi during the year 2007 was 2.9 million quintals. Ramghat is the single biggest supplier of foodgrains due to its favourable physical settings. It is enjoying transportation facility as well. Wheat in greater quantity is mainly brought from Ikari, Kochchor, Khangarhi, Talaspur Khurd, Talaspur Kalan, Sikarna, Sukhrawali, Karthala, Shyamgarhi and Jatpura. All these settlements belong to Aligarh district. These settlements are easily accessible to Dhanipur mandi within the distance of 5-10 km. Jirol Dhoom Singh (Aligarh district) is far from the city, but it is located within the vicinity of very fertile plain of the Ganga River. All these settlements cater the demand of wheat of all the inhabitants of Aligarh city. Wheat does not arrive daily in the mandis but only during the harvest period and then only periodically through the rest of the year. A great quantum of foodgrains is also brought from Agsauli, Piplauth Gokulpur, Sumera Dariyapur, Hoshiyarpur and Siravli. All of these are spread in different portions of the Umland. They are well connected with Aligarh city by a wide dense network of roads ranging from cart tracts to metalled roads. Even some urban centres such as Sahpau, Shikarpur and Khurja also supply foodgrains to Aligarh city in a remarkable quantity. These centres collect surplus production from their surrounding territory. Since they are at greater distance from the city, their frequency of visiting Dhanipur mandi is comparatively very low. Narora, Ramghat and Rajghat come under exceptional cases having high frequency in spite of their far off locations because of their favorable physiographic conditions.

From Figure 3.3, it is clear that the boundary of foodgrains in western and eastern portion of the zone, to some extent, coincides the boundary of vegetable supply zone. But that covers a larger area in northern and southern portion of the zone. There is a slight bulge in north-west because of casual pull exerted by the principal road of the area. Due to Hoshiyarpur in Bulandshahr and Sahpau in Hathras district, there is a great bulge in the north and south directions respectively. While Siravli in the east and Fatehgarhi (Aligarh) in the west make the extremities of the zone. Ramghat (Bulandshahr), Sikandrarao (Hathras), Fatehgarhi, Shyamgarhi, Tikari and Kochchor (Aligarh) are those areas which make a remarkable supply of both foodgrains and vegetables to the ready market of Aligarh city. Highest intensity has been recorded in central and north- eastern portion of
Fig. 3.3

ALIGARH CITY
ZONE OF FOODGRAINS SUPPLY
(2007-08)

Frequency Pattern of Foodgrains Sellers of Aligarh City

Source: Based on Table 3.2

Frequency of Foodgrains Sellers to the City
(In Numbers)

> 400
300 - 400
200 - 300
100 - 200
< 100

Settlement
Foodgrains Supply Zone
Urban Centre

Source: Based on Field Survey, 2007-08

Fig. 3.3
the zone. While in the eastern part, the Ganga River makes the north-eastern boundary of vegetable and foodgrains supply zones. A few farmers or suppliers from Bisavali located near Raya (Mathura) sometimes sell their surplus here. It is well connected by Mathura road to Aligarh city. Since the surrounding of the city is a major producer of wheat, rice, maize and other foodgrains, the impact of these cereals from the distant wholesale has been considered unnecessary. Wheat can be preserved for a considerable longer duration in the cold storage which is brought here in offseason. Thus, city is mainly dependent on their immediate surroundings for agricultural products. In fact, the very existence of a city is possible when enough agricultural

Table 3.2: Pattern of Foodgrains Supply Zone

<table>
<thead>
<tr>
<th>Distance (km)</th>
<th>Name of Settlement and Location Code</th>
<th>Total Population</th>
<th>Total Settlement Number</th>
<th>Total Frequency Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>Keshopur Gadran (24), Kochchhor (25), Adaun (26), Khan Garhi (27), Ikari (28), Gara Sikharan (29), Juretha (42), Mehrawal (47), Talsapu Kalan (44), Ghasi pur (48), Mukundpur (49), Sukharavali (50), Talsapu Khurd (51), Badesh Mafi (52), Dhanipur (53)</td>
<td>49,211</td>
<td>15</td>
<td>26.79</td>
</tr>
<tr>
<td>10-20</td>
<td>Balipur (18), Jasarana (22), Sikarma (23), Balukhera (30), Jatpura (43), Sumera Dariyapur (45), Bhartri (46), Sonoth Gokulpur (54), Piplauth Gokulpur (55)</td>
<td>15,621</td>
<td>9</td>
<td>16.07</td>
</tr>
<tr>
<td>20-30</td>
<td>Fatehgarhi (2), Kiratpur (16), Mau (17), Balipur (20), Karthala (21), Kirtipur (31), Jiroli Heera Singh (32), Dariyapur (33), Manai (34), Gopi (35), Gudma Mishripur (36), Tikari (37), Gazipur (38), Bidhipur (40), Sikarma (41)</td>
<td>39,791</td>
<td>15</td>
<td>26.79</td>
</tr>
<tr>
<td>30-40</td>
<td>Shyamgarhi (3), Siravli (7), Bansvali (15), Matha Habibpur (19), Jiroli Dhoom Singh (39), Sikandrarao (56)</td>
<td>49,880</td>
<td>6</td>
<td>10.71</td>
</tr>
<tr>
<td>&gt;40</td>
<td>Lal Garhi (1), Bisavali (4), Sahpau (5), Agraui (6), Ramghat (8), Narora (9), Rajghat (10), Karnnas Banger (11), Hosiyapur (12), Shikarpur (13), Khurja (14)</td>
<td>1,83,789</td>
<td>11</td>
<td>19.61</td>
</tr>
<tr>
<td>Total</td>
<td>3,38,292</td>
<td>56</td>
<td>100.00</td>
<td>15,693</td>
</tr>
</tbody>
</table>

Source: Calculation is based on records maintained by Dhanipur Mandi. Population Data is obtained from Census of India, 2001. Note: Urban Centres are in bold letters.

products would be grown in the surrounding areas and be transported to the city to feed it.

Table 3.2 and Figure 3.3 (a) reveal that more than half of the persons (69.34 per cent) are coming for selling their foodgrains production by covering the distance of over 40 km. This is the only category which includes higher number of urban centres consisting almost half percentage of the total population. Most of the settlements are mainly from Bulandshahr district. A lot of fluctuations have been noticed in percentage frequency of foodgrains sellers. Likewise vegetable supply
zone, it is clear from the table that there is no relationship between distance and frequency of foodgrains’ sellers. It is showing decreasing trend up to the distance of 30-40 km but there is a sudden rise in frequency at greater distance, although the intensity of settlement is not registered as high as in 0-10 and 20-30 km distance categories.

3.1.2. Zone of Fruit Supply

Aligarh city has a very large wholesale fruit market, Sarsol Mandi, which serves not only its own population but its surrounding areas also. Sarsol mandi was established along Grand Trunk Road leading to Delhi (5 km from the city) in July 1989. It covers about 0.170 acres of area having 35 middlemen. Sarsol mandi works as the main hub for buying and selling of fruits in the city. As many farmers grow fruits on a small scale basis, they can not bring their produces directly to the retailers. Middlemen take the opportunity of such communication gap between the producers and retailers. Thus, middlemen are needed to transfer information of the quantities and prices of agricultural products. Consequently, a substantial price differential exists between wholesale and retail prices. As a result, these prices also play an important role in consumer preferences for individual fruits. Other reason is perishability of product and long distance between wholesale and retail markets. As fruits being relatively less perishable in comparison to vegetable and milk, its zone covers relatively larger area of 6,135 sq. km. It includes 1,748 villages and 23 urban centres having a great bulge in its south-western portion along the main metalled-Iglas Road. The zone also extends in north-eastern portion and to some extent, in extreme western portion. It may be because of favourable soil and climatic conditions coupled with the proximity of both great rivers the Ganga and the Yamuna in either sides of its zone.

Aligarh, likewise foodgrains and vegetable markets, gives big opportunities for fruit sellers to come here and get more profit. In the present study, only those fruit sellers have been considered who are bringing their products by rickshaws, bullock carts, horse carts, auto-rickshaws, tractors and max. It receives fruits directly from its surrounding settlements as well as from big urban centres. Some fruits which can easily be carried over long distances in unripe form are brought here for selling in large quantity with the help of trucks such as bananas from Mumbai; mangoes from Meerut; oranges from Nagpur; grapes from Pipalgaon; pineapples from Siliguri; and
Fig. 3.4

Source: Based on Field Survey, 2007-08
apples from Himachal Pradesh, Shimla, Chandigarh and Pahalgaon. The same fruits are also supplied in small quantity from the nearby areas of the city. The total primary and secondary arrival of fruits in Sarsol mandi was 1, 95,338 quintals and 4,829 quintals respectively in 2007 which witnessed 88,875 and 1,830 quintals respectively in the year 2003. Figure 3.4 shows the settlements of fruit supply to the city. It reveals greater intensity in the immediate doorstep of the city having very low frequency. The four extremities are Tappal (Aligarh) in extreme west, Raya (Mathura) in south-west, Sikanderpur (Aligarh) in extreme east and Khurja (Bulandshahr) in north. Dibai (140 fruit vendors per year) is the biggest supplier of fruits in Aligarh city, followed by Jatari, Atrauli and Vijaygarh with almost same number of fruit sellers (138 fruit sellers per year). It also depicts that fruit zone covers most of the urban centres of Aligarh such as Jatari, Atrauli, Vijaygarh, Khair, Pilakhana (Aligarh); Hathras, Sasni, Mendu and Mursan (Hathras); Dibai, Chhatari, Khurja, Pahasu and Narora (Bulandshahr). Likewise, vegetable and foodgrains zones, all such centres have recorded comparatively higher frequency of fruit vendors annually. Low frequency of fruit sellers have been registered in Mudhail (Aligarh, 25 km away from the city centre) with only 6 fruit sellers per year followed by Khempur (22 km), Raipur (21 km), Raipur (17 km) of Aligarh district with same value of 8 fruit sellers annually. Table 3.3 and Figure 3.4 (a) depicts the variations in frequency of fruit sellers and intensity of settlements within the fruit supply zone. It is revealed that highest proportion of fruit sellers are coming from only 13.27 per cent settlement covering distance of over 40 km. This is remarkably lowest percentage of settlement accommodating population of around two lakh fifty thousand total population. Pattern of frequency of fruit sellers is somewhat similar to that of vegetable and foodgrains supply zones. Highest frequency at greater distance is mainly because of the presence of higher number of urban centres including Ramghat which has already emerged as the biggest supplier of agricultural products for the city. It also indicates that it is agriculturally developed area of Dibai tahsil of Bulandshahr district. Two urban centres of Mathura i.e. Raya and Bajna are also included in this category. Lowest frequency has been observed within the immediate surroundings of the city up to a distance of 10 km. Although it is having comparatively higher percentage of settlements (22.12 per cent) comprising of 63,594 persons.

Besides, wholesale market, some fruit shops can be easily noticed near footpaths in few famous areas of the city such as Dodhpur, near Apsara Talkies, Near
Likewise vegetable sellers, fruit retailers also buy fruits from Sarsol wholesale market and finally resell it in these localities.

### Zone of Milk Supply

The supply area of milk is one of the most reflective indices of metropolitan influence. Dairy has not only provided gainful employment but provided assured and regular income also. It is a rural income generating activity. Since the demand in urban areas is rapidly increasing so is the surplus generated by milkmen. In Aligarh

Table 3.3: Pattern of Fruit Supply Zone

<table>
<thead>
<tr>
<th>Distance (km)</th>
<th>Name of Settlement and Location Code</th>
<th>Total Population</th>
<th>Total Settlement</th>
<th>Total Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
<td>Percentage</td>
<td>Number</td>
</tr>
<tr>
<td>&lt;10</td>
<td>Barola Haji (40), Madrak (41), Nauhati (42), Jirollidor (43), Digsi (44), Saharanpur (45), Mahrawal (46), Jahangirabad (47), Chandpura (48), Jatapur Chikawati (49), Mukundpur (50), Amapur Kondala (51), Elampur (52), Chikaura (53), Bhikampur (54), Alahadpur Nivry (55), Mullapara Bhujpura (56), Pantyavali (57), Rammagar (66), Paniuthi (70), Khangarhi (71), Alampur Subkara Mafi (89), Sikanerup Cherat (90), Ramgarh Panjoopur (91), Harduaganj (111)</td>
<td>63,594</td>
<td>25</td>
<td>662</td>
</tr>
<tr>
<td>10-20</td>
<td>Nagla Sabal Urf Gonda (7), Bhamraula (29), Ismailpur (30), Pipal Ka Gason (31), Anadala (32), Haivatpur (33), Nadroi (34), Karsua (35), Bhamraula (36), Bhartri (37), Semla (38), Nahra (39), Sahara Khurd (61), Sahara Kalan (62), Taharpur (63), Haivatpur (64), Rampur (65), Ukhalana (68), Bhakri Ahvasi (69), Barkakalan (78), Chhalesar (83), Jungle Garhi (84), Raipur (85), Kota Khas (86), Rampur (87), Amrauli (88), Hasnapur (98), Paurai (99), Pilakhana (107), Sasn (108), Jalali (109), Qasimpor Power House (110)</td>
<td>1,12,961</td>
<td>32</td>
<td>1,046</td>
</tr>
<tr>
<td>20-30</td>
<td>Talsara (6), Nagla Kalua Bailauth (8), Vijaygar (13), Rasulpur (28), Kandi (59), Rampur (60), Mudhial (74), Bara (75), Guniyavali (76), Sikanerup (77), Rammagar (79), Barauli (80), Raipur (81), Ismailpur (82), Rammagar (92), Sonna (93), Khempur (94), Karanpur (95), Rampur (96), Gabhana (97), Atrauli (103), Chhatarti (104), Khair (105), Iglas (106)</td>
<td>1,47,957</td>
<td>25</td>
<td>992</td>
</tr>
<tr>
<td>30-40</td>
<td>Karanpur (4), Bajna (5), Gorai (9), Mursan (11), Hathras (12), Hasnampur (14), Dhibo (20), Pahsu (21), Khera (27), Bahadarpur (58), Gangiri (72), Barauli (73), Beswan (101), Charr (102), Burhanpur Khurd (112), Aranyu (113)</td>
<td>2,47,348</td>
<td>16</td>
<td>977</td>
</tr>
<tr>
<td>&gt;40</td>
<td>Lappal (1), Taharpur (2), Jatari (3), Raya (10), Kasr (15), Rampat (16), Baghori (17), Gunnaur (18), Burhanpur Kalan(19), Khurja (22), Rasulpur (23), Sikanerup (24), Babrala (25), Rajghat (26), Naurora (100)</td>
<td>2,16,680</td>
<td>15</td>
<td>1,096</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7,88,540</strong></td>
<td><strong>113</strong></td>
<td><strong>100.00</strong></td>
<td><strong>4,773</strong></td>
</tr>
</tbody>
</table>

Source: Calculation is based on data collected from Sarsol Mandi. Population Data is obtained from Census of India, 2001.

Note: Urban Centres are in bold letters.

Gandhi Eye Hospital, Kishanpur, Gurudwara Road, Vishnupuri, Barahdware and Rasalgaanj. Likewise vegetable sellers, fruit retailers also buy fruits from Sarsol wholesale market and finally resell it in these localities.

### 3.1.3 Zone of Milk Supply

The supply area of milk is one of the most reflective indices of metropolitan influence. Dairy has not only provided gainful employment but provided assured and regular income also. It is a rural income generating activity. Since the demand in urban areas is rapidly increasing so is the surplus generated by milkmen. In Aligarh
city, milk and milk products are being supplied through milk co-operative societies, local private dairies and individual hawkers. There are three famous dairies; Heinz India Private Limited, Bhole Baba Dairy Industry and Rama Dairy Products Limited, located in the surroundings of the city. In 1960, Glaxo Laboratories, (U.K.) diversified into the field of food industry with the establishment of Aligarh Unit. In October, 1994, Heinz Group of Industry, USA, a market leader in food segment bought this unit and since then, this unit is known as Heinz India Private Limited, having its headquarters in Pittsburg. It is situated in Manzoorgarhi, 8 km away from Aligarh city. It collects milk about 4 lakh liters per day from cities like Bulandshahr, Mathura, Kasganj, Raya, Bayana, Hathras, Ratanpur, and other milk centres owned by the company and the contractors in rural areas of the district, from where milk is carried in tankers and milk carriers. Forty two different milk collection centres and chilling centres owned by company are located in a radius of 132 km around Aligarh city. Some of its village and block level societies are located in Narora, Jirollid or, Rati Ka Nagla, Gomat, Gonda, Gorai, Tappal, Jaithara, Jiroli and Sahara. Its main function is to collect milk from the rural areas and produce world fame dairy products such as Ghee (Trade name ‘Sampritii’), complan and Glucon-D. A total of 505 persons are engaged in the company. Bhole Baba Dairy Industry was established on Khair road in January, 2006. It initially started in Chatta (Mathura) in 1996. It receives milk of about 8-10 lakh liters per day from its different sub-collecting centres such as Kasganj, Raya and Agra. The organization markets its range of products under the brand name of ‘Krishna’. This organization supports approximately 500 employees. Rama Dairy Product Limited has its roots from 1956 when company Rama Dairy collected and distributed milk in the small area of western Uttar Pradesh. It was established in Panaithi in 1993, working as a unit of Rama Group of Companies, Bulandshahr. The unit processes 0.8 million liters of milk everyday which is sub processed into skinned milk powder, full cream milk powder, Ghee and milk powder. It is one of the premier manufactures and suppliers of milk and milk based products. The milk production in these organized units constitutes only a negligible fraction of milk. Here organized production and handling of milk is possible.

Besides, these private co-operative units, there are a number of individual hawkers, and milkman who bring milk and milk products to the city to cater its increasing demand. Some of them collect milk from surrounding small settlements and sell it here. In this work, only those milk vendors have been considered who carry
their milk by bicycle, motorcycle and automobiles. Figure 3.5 shows the settlements supplying milk to the city. Since it is perishable nature of commodity which needs its delivery at its destination within 2-3 hours, it covers an area of 30-35 km radius from the city centre. It includes total area of 3,088 sq. km. The zone includes 781 numbers of villages and 9 urban centres having a small bulge in its south-western portion. It includes only Aligarh district and Sasni tahsil of Hathras district. The milk collection centres in towns such as Atrauli (1,050 milk vendors/year), Vijaygarh (702 milk vendors/year), Iglas (600 milk vendors/year), Charra (366 milk vendors/year), Pilakhana (360 milk vendors/year), Kasimpur (305 milk vendors/year) and Sasni (177 milk vendors/year) lie within the distance of 15-32 km and supply milk to the city after collecting milk from its own surroundings. As a result, these areas even being situated comparatively at a greater distance have recorded higher frequency of milk vendors annually. Besides, Dhanipur (600 milk vendors/year) recorded higher frequency of milk vendors followed by Asna Ajitpur (468 milk vendors/year) and Ramgarh Punjoopur (390 milk vendors/year). These areas are only 2-6 km away from the city and very well connected to it. Low frequency of milk vendors have been accounted in Hasona Jagmohanpur (30 km) with 24 milk vendors/year followed by Resari (32 km) and Bhogpur (31 km) both with 30 milk vendors/year. Gorai, Bijauli and Nagla Padam being situated within a radius of 32 km have relatively low annual frequency with 87, 60, 41 milk vendors/year respectively. Therefore, it is clear that as the distance increases, except urban centres, the settlements have registered low frequency. Table 3.4 and Figure 3.5 (a) illustrate the difference in frequency of milk vendors and intensity of settlements within the milk supply zone. Thus, it is clear that trips of milk vendors and intensity of settlements (56.51 and 42.67 per cent respectively) have been relatively higher within the distance of less than 10 km from the city. But as the distance increases, both the percentage of milk vendors’ frequency and settlements starts decreasing. This may be mainly due to some adverse conditions found there. Some cultivators, whose principal occupation is agriculture, keep a few cows or buffaloes for milk production (2-4 animals on an average) as a supplementary source of income. This amount of milk is not properly distributed owing to the difficulties of transporting it to consumer markets over long distances. The producers try to dispose of their milk as quickly as possible since there are no facilities for cooling it. Therefore, either they use it for their own consumption or sell it within their own village and its surroundings at cheaper prices. Although the population is
higher within the distance of 20-30 km but frequency is not as high as within the distance category of 0-10 and 10-20 km. Greater distance and high demand due to large population particularly of urban centres i.e. Iglas, Atrauli and Vijaygarh, both play an active role in declining the percentage of frequency. Thus, milk supply zone establishes an inverse relationship between distance and frequency of the milk and positive relationship between total population of the settlements and frequency of persons. It has also been found through the survey that, to some extent, fluid milk

Table 3.4: Pattern of Milk Supply Zone

<table>
<thead>
<tr>
<th>Distance (km)</th>
<th>Name of Settlement and Location Code</th>
<th>Total Population</th>
<th>Total Settlement Number</th>
<th>Total Frequency Number</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>Harduaganj (73), Panaithi (32), Guru Sikharan (33), Rustampur Ailam (34), Musepur Jalal (35), Alinagar (37), Keshopur Gadrana (38), Alipur (39), Dhanspur (40), Bahmati (41), Jiloliddor (43), Mehrwal (45), Chandpura (47), Sarso (48), Madrak (49), Amarpur Nehra (50), Kochchor (51), Saharanpur (52), Kwarasi (53), Tajpoor Rasulpur (54), Deosaini (55), Sasamspur Kheerat (56), Keshopur Jafri (57), Wajipura Nada (58), Chamrauli (59), Kheria Khwaja Buddha (60), Sukhravali (61), Asna Ajitpur (62), Manzoorgarhi (67), Dhaurra Mafi (68), Ramgarh Punjoorpur (69)</td>
<td>1,09,446</td>
<td>32</td>
<td>42.67</td>
<td>7,181</td>
</tr>
<tr>
<td>10-20</td>
<td>Sasni (9), Andala (19), Bijaha (20), Chandfari (21), Bidarka (22), Baroth (23), Hastipur Khari (25), Pali Razapur (26), Nagla Barri (27), Kalai (28), Morthal (29), Akrobat (30), Nanau (31), Bhakri Ahvasi (36), Chuhawali (42), Pala Kiratpur Nimana (44), Danai (46), Kastari Vaishya (64), Sunamai (65), Majra Kalista Vaishya (66), Lohpooth (70), Lalpur (71), Jalali (72), Qasimpur Power House (74), Palkhana (75), Chaudauli Buzurg (76), Nagla Fateela (77)</td>
<td>1,09,396</td>
<td>27</td>
<td>36.00</td>
<td>2,683</td>
</tr>
<tr>
<td>20-30</td>
<td>Khera Sattu (3), Talesara (4), Iglas (8), Vijaygarh (10), Hasna Jagmohangpur (11) Tevathu (14), Atrauli (15), Khurd Khera (16), Gabhanna (18), Shahgarh (24)</td>
<td>1,66,210</td>
<td>10</td>
<td>13.33</td>
<td>2,229</td>
</tr>
<tr>
<td>&gt;30</td>
<td>Nagla Padam (1), Resari (2), Gorai (7), Charra (12), Bijauli (13), Bhogpur (17)</td>
<td>45,639</td>
<td>6</td>
<td>8.00</td>
<td>614</td>
</tr>
<tr>
<td>Total</td>
<td>4,30,691</td>
<td>75</td>
<td>100.00</td>
<td>12,707</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Calculation is based on data collected from milk collection centres of the city. Population Data is obtained from Census of India, 2001.

Note: Urban Centres are in bold letters.

requirements of the urban areas are also derived from cattle maintained within the municipal limit. Thus, in short, many reasons such as greater distance, connectivity problems with efficient transport, perishable nature of the commodity, relatively less number of cattle population in small size of settlements, have been responsible for covering smaller number of settlements having lower number of frequency.
3.1.4. Zone of Daily Commuters

A large section of population is migrating from rural to urban areas because there is less job opportunities in rural areas. Many do not get employment throughout the year and commute between rural and urban areas. Subsequently, the linkages between rural areas and cities get intensified. As a result, the amount of incoming commuters from rural settlement to urban one increases. Daily commuters are also agents of change who bring new ideas from urban centres back to their villages. A city or town may lose its status and function of being a regional centre if commuting practices cease to exist (Bansal, 1975). Commuting is usually on a daily basis but can occur weekly or any day of a week.

Workers who commute daily using horse cart, auto-rickshaws, buses, bicycle and as pedestrian for different purposes, have been surveyed for demarcating the zone of commuters of the city. Figure 3.6 reveals the spatial differences in commuting behaviour of daily workers with distance from the city. The entire commuting zone has been divided into three zones of varying distances. As only daily labour force has been considered, the commuter zone covers smaller area in comparison to other higher order services. It involves surrounding areas of two districts viz., Aligarh and Hathras. It demonstrates that the commuter’s zone encompasses an area of 3,043 square kilometres and includes 1,011 villages with 13 urban centres. The commuter zone of the city is extended to a distance of 45 km in all directions around the city. The greater intensity and frequency of commuters have been found in north-eastern direction. It can be noticed that the means of communication and transport are less developed in north-western and southern portion of the city in comparison to north-eastern areas. Other prime reason is the increasing influence of Haryana and Delhi in the north-west. It is revealed that greater frequency (from where more than 75 per cent commuters are coming to and from the city) has been recorded in the north-eastern portion of the zone comprising Atrauli and Koil tahsils within a distance of 8 to 22 km. Within this zone, highest frequency value has been accounted in Madrak situated at 9 km away from the city followed by Jawan Vajidpur (16 km) and Mehrawal (8 km). On the other hand, lower frequency zone of commuters (from where only 25 percent commuters commute to the city) is shown by outer boundary. There is a great bulge in its extreme western portion at Dharampur village (43 km) located in Gabhana tahsil. It represents the farthest point having comparatively lower
Fig. 3.6

ALIGARH CITY ZONE OF DAILY COMMUTERS (2007-08)

Frequency Pattern of Daily Commuters of Aligarh City

Settlements

Commuters

Fig. 3.6 (a)

Frequency of Daily Commuters to the City (In Numbers)

Source: Based on Table 3.5

Fig. 3.6
frequency. Within this zone, higher frequency of commuters has been recorded in Charra Rafatpur (30 km) leaving behind Bijauli (32 km). Medium frequency zone has been shown by a middle contiguous line.

Further, an investigation has been done to test the relationship between the commuter behaviour and distance within the demarcated zone. Table 3.5 and Figure 3.6 (a) show that higher frequency of commuters (74.89 per cent) has been figured out within the distance of 0-10 km which reveals the highest percentage value in all categories. This category includes only 18.18 per cent settlements having total population of 53,200. It indicates that commuters earn only a handful amount through daily works. Therefore, they generally prefer their nearby urban centres because of low purchasing power. Consequently, higher number of commuters for working purpose is coming from smaller number of settlements. Only two settlements have been registered at greater distance of more than 40 km having the lowest frequency of commuters and total population of the settlement. Furthermore, it is evident from the same table that there emerges inverse relationship between distance and number of commuters coming to the city. This relationship is sustained when all values of three zones are combined together. Intensity and frequency of commuters from its region also depend on linkages in terms of distance and the available nature of transport and

<table>
<thead>
<tr>
<th>Distance (km)</th>
<th>Name of Settlement and Location Code</th>
<th>Total Population</th>
<th>Total Settlement</th>
<th>Total Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>Madrak (28), Mehrawali (41), Jioilidoro (42), Deosaini (43), Chikaura (44), Kwarasi (45), Harthauganj (49), Darapur (50), Dhanipur (51), Dhauru Maфи (55)</td>
<td>53,200</td>
<td>10</td>
<td>53,1620</td>
</tr>
<tr>
<td>10-20</td>
<td>Kishtapur (5), Sahajpur (15), Sausi Dehat (16), Jawan Sikanderpur (24), Jamalpur Siya (25), Lodha (26), Basai (27), Akhabad (29), Jalal (30), Shekhupur (31), Daupur (32), Bhavigarh (33), Surajpur (34), Jiharka (35), Gopalpur (38), Raipur (39), Jwan Vajidpur (40), Kalai (46), Baroanta (47), Morthal (48), Narona Akapur (52), Daudgarhi (53), Ahmadpuri (54)</td>
<td>66,550</td>
<td>23</td>
<td>1,33,996</td>
</tr>
<tr>
<td>20-30</td>
<td>Ajahari (4), Mauhari (7), Shri Nagar (6), Bhabdamau (8), Charra Rafatpur (10), Sahnaul (13), Dhoraun Chandpur (14), Tikari (17), Goverdhanpur (18), Nagaria Patti Chahram (19), Barla (20), Noratha (21), Atrauli (22), Sikargarhi (23), Chapauta (36), Meergarhi (37)</td>
<td>76,103</td>
<td>16</td>
<td>36,646</td>
</tr>
<tr>
<td>30-40</td>
<td>Jalalpur (2), Madaunpur (3), Bijauli (11), Jamanpur (12)</td>
<td>11,282</td>
<td>4</td>
<td>4,730</td>
</tr>
<tr>
<td>&gt;40</td>
<td>Dharampur (1), Chandanpura (9)</td>
<td>2,591</td>
<td>2</td>
<td>2,912</td>
</tr>
<tr>
<td>Total</td>
<td>2,09,726</td>
<td>55</td>
<td>100</td>
<td>7,09,904</td>
</tr>
</tbody>
</table>

Source: Based on data collected from commuters' assembling points of the city. Population Data is obtained from Census of India, 2001.

Note: Urban Centres are in bold letters.
communication. The greater the distance between a city and dependent towns, the lesser will be the interaction and similarly the frequency of reaching in a city of people and commodities is also affected with the inter distance (Verma, 2006). Transportation used mainly depends on the distance covered by them. So in commuting activities, citizens have many choices in using public transport for their traveling (Tanim, 2005). Most of the commuters from within the distance of 6-7 km come as pedestrian for reaching at their working place for their daily earnings. Others who are covering distance of over 7 km use buses, bicycle, auto-rickshaw to reach their places of origin and destination. Travel distance is the single important factor that affects effectiveness of transport nodes and consequent commuter travel decision in urban areas (Maken, et al., 1997). As Aligarh city is a centre of urban functions, it has great demand of labour work force. The main employment attractions are factories, shops and constructional sites. One of the attentions is lock industry which has attracted thousand of workers. Therefore, there is a strong relationship between the city and its surroundings in this respect.

3.2.0 Cityside Services

Surroundings also depend on the city for some services such as education, bank, telephone, bus services and health services. For accessing these services, a stream of population moves generally towards the city. City meets all these demands of growing population of rural areas.

3.2.1 Zone of Banking Services

The exploitation of rural masses in the credit market is one of the most pervasive and persistent feature of rural life, in spite of major structural changes in credit institutions. Rural households need credit to meet short term requirements of working capital and for long term investment in agriculture and other income bearing institutions (Ramachandran and Swaminathan, 2004).

For delimiting the Umland of an area, bank services as a criterion, has been emphasized by Carter (Carter, 1955). The data regarding the name of settlements where people have their saving accounts for depositing and transacting other banking activities have been collected from the branches of Allahabad bank, Centre Point (4, total number of branches in the city), Gramin Bank, Ramghat Road (6), UCO Bank, Mathura Road (3) and State Bank of India, Delhi Gate (10) functioning in different
parts of the city. The emphasis has been given to only those branches of these banks which are situated at outskirts of Aligarh city. The analysis is based on the data and information gathered from records by the courtesy of managers of the respective branches.

The zone of banking service covers an area of 5,408 sq. km. and includes 1,409 villages and 23 urban centres. This zone is roughly extending about 45-55 km from north to south and about 40-45 km west to east. Figure 3.7 reveals that more than 75 per cent people up to the distance of 27 km from Aligarh city have opened their accounts in the banks of the city. High interaction zone covers an area of 1,022 sq km. There is a narrow bulge of a mile in width forming the north-western boundary of the zone. It is also clear from the figure that the highest density has been recorded in the south-western portion up to the distance of only 10 km. The eastern boundary has been formed by Anandpur in Atrauli, southern boundary by Nagla Fateela village of Sasni tahsil where high interaction for fulfilling their financial needs has been observed. It means that the bank services of Aligarh city cater the demand of almost all the immediate surroundings. There are some exceptional cases where the interaction is higher in spite of locating at greater distance. It is observed that higher frequency has been recorded in only two villages i.e. Kwarasi and Mullapara Bhujpura. Both these villages are situated within a distance of less than 5 km.

On the other hand, less than 25 per cent persons accessing bank services from the city have been shown by outer boundary. The four extremities of this zone are Kalyanpur village of Bulandshahr in the north, Jatari in the west and Shahjahanbad in the east of Aligarh and Kurawali of Hathras in the south. These villages are very well connected to Aligarh city with metalled roads. A great bulge is towards north-eastern portion of Bulandshahr district. It is because most of the students of these areas studying in the colleges of the city have opened their accounts in these banks for easy transactions. It is observed that mostly 3 persons from each village of Hathras and Bulandshahr come to Aligarh city annually for this purpose which is very low.

Therefore, it is evident that the influence of banks services in distant rural areas speedily decreases with increasing distance. The boundary of high frequency zone to some extent follows the boundary of medium frequency zone. Only one village of Etah comes under the influence of the banking services.

Furthermore, Table 3.6 demonstrates the overall variations in percentage of bank account holders and settlements with increasing distance from the city.
Likewise commuters’ zone, it also shows inverse relationship between distance and percentage of bank account holders and settlements. At lesser distance, more than half percentage of total persons (63.58 per cent) from 35.11 per cent settlement accommodating total population of 1,09,179 access bank services in the city which help them in saving for day to day hardships. In case of farmers, it would assist in improving productivity through investment in irrigation, production equipment, inputs or hired labour and also to invest in post harvest operations including processing and storage.

### Table 3.6: Pattern of Zone of Banking Services

<table>
<thead>
<tr>
<th>Distance (km)</th>
<th>Name of Settlement and Location Code</th>
<th>Total Population</th>
<th>Total Settlement</th>
<th>Total Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
<td>Percentage</td>
<td>Number</td>
</tr>
<tr>
<td>&lt;10</td>
<td>Badwanimar (3), Hayatpur Hingotia (39), Panaiithi (49), Madar Khera (63), Jirollidor (67), Keshopur Jafri (68), Amanpur Kondal (69), Hayatpur Bajhera (70), Khera Khwaja Buddha (71), Daulr Nipal (72), Hasanpur Buzurg (73), Saharanpur (74), Hajipur Chauhatta (76), Chirauliya Daudkhan (77), Kochchor (83), Kamalpur (84), Aminagar (85), Dhampur (86), Mahua Khera (87), Guru Sikharan (88), Maheshpur (95), Bithana (106), Bhalmati (107), Amanpur Nehra (108), Pala Aisi (109), Jahan Girad (110), Singhapur (111), Mukundpur (112), Bhakrula (113), Asna Ajitpur (114), Barhaul Fateh Khan (115), Tajpur Rasooldpur (116), Baraula Jafirabad (117), Sarsol (118), Wajidpur Nada (119), Talaspur Khund (120), Mullapara Bhuwupa (121), Pariyavli (122), Deosaini (123), Talaspur Kalan (124), Chikaura (125), Sukhravali (126), Kwarasi (127), Kithara (128), Musupar Jalal (129), Hardauganj (131)</td>
<td>1,09,179</td>
<td>46</td>
<td>35.11</td>
</tr>
<tr>
<td>10-20</td>
<td>Mandala (2), Nagla Chandram (4), Banpur (31), Kiratpur Nirmana (32), Sasni Dehat (33), Basai (36), Pahera (37), D储ai (38), Baroath (40), Aliyaspur Bhanaura (41), Gursaina (42), Akrabad (48), Khrai (50), Rampur (55), Sunamai (56), Rampur (65), Kalai (75), Pali Razapur (78), Nagla Fateela (79), Nanai (81), Sonoth Gokulpur (82), Sindhula (89), Bisawampur Silla (90), Gwalra (93), Chuhawala (96), Kheda Buzurg (97), Rampur (98), Barautthaa (99), Basai (102), Nagla Sahab UrfGonda (103), Kishenpur (104), Bujahara (105), Chandauli Buzurg (130)</td>
<td>72,760</td>
<td>33</td>
<td>25.19</td>
</tr>
<tr>
<td>20-30</td>
<td>Razawal (5), Iglas (7), Rahna (12), Nagla Govindpur (13), Qasimpur (16), Duttavali (17), Sockhana (19), Chalakpur (22), Sot (28), Ghabana (29), Deopur (30), Salempur (43), Rampur (44), Bhura Ki Garhi (45), Kanakpur (46), Kamalpur (53), Pilkhuhi (54), Barauli (60), Songra (61), Rampur (62), Mohrana (66), Basai (64), Sidpur (80), Anandpur (91), Atrauli (92), Barautthaa (99)</td>
<td>1,05,545</td>
<td>26</td>
<td>19.85</td>
</tr>
<tr>
<td>30-40</td>
<td>Gorai (6), Nagla Heera Singh (10), Banupura (11), Sikandrarao (14), Shahjahanabad (18), Kanakpur (20), Khedia Rafatpur (21), Dhibi (24), Jalalpur (34), Kamalpur (35), Amamadapur (47), Barauli (51), Bujahari (52), Baraula (58), Pitampur (59)</td>
<td>38,444</td>
<td>15</td>
<td>11.45</td>
</tr>
<tr>
<td>40-50</td>
<td>Nagla Kalar (1), Kurawali (8), Bamauli (9), Nagla Pipal (15), Rampur (23)</td>
<td>8,353</td>
<td>5</td>
<td>3.82</td>
</tr>
<tr>
<td>&gt;50</td>
<td>Sikohi (25), Banwarpur (26), Kalvanpur (27), Rampur (57), Bullandshahr (100), Kakrauli (101)</td>
<td>1,83,122</td>
<td>6</td>
<td>4.58</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>5,17,403</strong></td>
<td><strong>131</strong></td>
<td><strong>1,211</strong></td>
</tr>
</tbody>
</table>

**Source:** Calculation is based on records maintained by different banks of the city. Population Data is obtained from Census of India, 2001.

**Note:** Urban centres are in bold letters.
marketing. But beyond 10 km, the percentage of bank account holders decline with increasing distance. At the distance of 40-50 km and more than 50 km, the percentage of bank account holders becomes stagnant (Figure 3.7 (a)). Although the variations have been found in the percentage of settlements and total population of the settlements. It may be due to active presence of another urban centre at greater distance i.e. Bulandshahr which is reflecting its influence and attracting the persons of its surroundings for accessing financial assistance. Thus, it makes clear that there is no relationship between total population of the settlements and percentage of bank account holders. Some of the important factors of low frequency are as follows:

- Ruralites frequently have to travel long distances and deposit savings or repay a loan. As they usually travel on foot, or slow moving vehicle, so they prefer to choose those areas which are much closer to them.
- Some rather poor persons living in remote rural areas have hardly any assets as security for taking loans. Ultimately, they are viewed as being ‘unprofitable’ by financial institutions.
- Some ruralites are not in good financial conditions to save for future. They are living in hand to mouth. Whatever they earn a small amount of money in one day, simultaneously they spent the same amount in a couple of days.
- As less educated people face an additional challenge in accessing financial services, they borrow money from their neighbours, relatives or private lenders in spite to take loans from registered banks.

From the above discussion, it points out that a considerable proportion of rural Indians lag behind in access to financial services such as banking and latest price information amongst the other disadvantage they face.

3.2.2 Zone of Telephone Services

Telephone services at affordable prices can increase the ability of the rural masses to participate in the market economy which will, in turn, improve their earnings. Connecting rural areas means inclusive growth and greater prosperity for the nation as a whole (Gulati, 2008). Being connectivity through telephone means access to information, markets and government services apart from financial services. This connectivity can thus improve rural productivity and reduce dependency on exploitative intermediaries. Delimitation of telephone zone has been worked out on
the basis of data obtained from the records maintained in Reliance Office (Mangalam Complex) at Centre Point and Bharat Sanchar Nigam Limited (BSNL) Office at Lal Diggi of Aligarh City.

Only landline connections which are being controlled and maintained from Aligarh city has been considered under the study. After delimiting the zone of telephone services, it is clear from Figure 3.8 that total area of 6,683 sq km comes under the zone which includes 1,874 villages and 29 urban centres. It encompasses the areas of Aligarh, Hathras and Etah districts. A great bulge has been found in eastern portion of the city because Reliance and Bharat Sanchar Nigam Limited Office located in city controls the billing and technical problems of landline holders of only these three districts. Although they have their franchise (Some rights have been granted to them by organization. They operate at limited capacity outside of a specific region) at small level in different parts of these districts. The same figure demonstrates that the people having telephone connections from the city within the boundary limit of high interaction zone covers the areas within the radius of 30 km. It comprises an area of 793 sq. km. The highest intensity of settlements has been recorded in the western portion of the zone but it has captured a great area in its eastern one. Higher number of persons having connectivity through telephone services have been accounted in Hajipur Chauhatta, 5 km away from the city followed by Daulra Nirpal, Pali Razapur, Karsua, Golara, Nagla Lala, Nagla Bari and Gursaina. All these lie within the radius of 5-19 km from the city. The zone of low interaction is narrow in northern and western portion while it becomes broader and broader in eastern and southern portion. The lowest number of persons who are using this facility is minimum (3 in number). This lowest proportion of connections have been found in many villages such as Sungarhi (Etah), Tappal, Bijna Ki Nagaliya, Jalalpur, Khedia Rafatpur, Kazimabad, Khurd Khera, Ganwari, Talepur, Tamkauli and Talesara (Aligarh). Except Sungarhi, All these villages are situated in between 22 and 60 km lying in north-western direction of the zone.

Table 3.7 and Figure 3.8 (a) explore the pattern of persons having telephone connectivity within the demarcated zone. As comparatively higher number of telephone connections from Etah, except surroundings of Aligarh city itself, are handled, maintained and controlled here within the city. Higher value of telephone holders (22.83 per cent) have been accounted within 50-60 km distance, with 4.38 percentage settlements consisting of total population of around 1,57,209. This
<table>
<thead>
<tr>
<th>Distance (km)</th>
<th>Name of Settlement and Location Code</th>
<th>Total Population</th>
<th>Total Settlement</th>
<th>Total Frequency</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1,13,921</td>
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<td>21.12</td>
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<td>Rodayan (11), Hasanpur (68), Kala Jat (180), Gadhawali (70), Kota Khas (71), Sikanderpur Kota (72), Tata Garhi (73), Bagarali (74), Tejpur (75), Jawan Sikanderpur (76), Jawan Vajidpur (77), Barakalian (104), Mamta Kahan (105), Sandalpur (107), Sighar (108), Haivatpur (109), Bijahara (110), Navalpur (111), Taharpur (112), Nagla Jhujur (115), Nagla Falseera (116), Nagla Madho (117), Dhand (118), Nagla Goverdhan Siktari (119), Basai (120), Pipal Ka Gona (121), Sumerpur (125), Bhamraula (126), Bhamamli (127), Haivatpur (128), Akrawat (129), Karsua (130), Sikkhar (131), Nara (132), Kahan (133), Mandala (134), Bhamrola (141), Bhairagorgar (143), Gursi (144), Pali Razapur (151), Dumhara (155), Bhatauli (156), Nagla Lala (157), Golara (158), Nagla Bani (159), Nagla Sartaj (160), Shahjananpur Tupur (167), Shekhpur (168), Meerpur (169), Daupur (170), Azambad Machhua (171), Sathia (176), Qasimpur House (177), Rampur (178), Amrooi (182), Madanpur Chhabla (183), Chahwali (184), Rustampur Dhola (185), Pala Dallu (186), Donai (187), Rampur (189), Jamalpur Siya (198), Nagla Sabal urf Gonda (204), Aliyaspur Bhanaura (205), Plakhnana (211), Akram Bad (212), Suhawali (213), Nanau (214), Chhatrali (215), Kathair (216), Khurrampur (217), Rohina Singharpur (218), Nadroi (221), Parsheera (222), Haranot (223), Semla (224)</td>
<td>1,56,240</td>
<td>76</td>
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<td>Digsari (3), Talesara (4), Nagla Kalua Baitaul (5), Kajroth (8), Khera Gurdev (9), Basai (10), Kusimbad (47), Mahwoodpur (48), Mujaffara (49), Chhatari (50), Talepur (51), Khur Khera (52), Soti (53), Pokhargarthi (54), Gara (55), Taumaili (56), Kinhua (57), Rannagar (58), Rampur Shahpur (67), Gaon Khera (78), Khalir (79), Shekhpur (80), Telath (81), Gopi (101), Kanakpur (102), Bisauli (113), Salempur (114), Bisauli (130), Baura (122), Kelanpur (161), Tuamail (162), Karhala (163), Bannoi (164), Chandpur Mirza (165), Hasana Jagmohanpur (166), Rasedpur Gorna (195), Rampur (196), Gabhaha (197), Nanapur Pala (200), Khair (201), Bhandpur (202), Rampur (203), Igla (207), Gobra (208), Jirroli Heera Singh (209), Vijaygarh (210), Attauli (250)</td>
<td>2,02,828</td>
<td>47</td>
<td>18.73</td>
</tr>
<tr>
<td>30-40</td>
<td>Sujanpur (2), Gorai (6), Beswan (7), Bad Nagla Atthwaria (12), Mitai (13), Gangoli (14), Rasulpur (15), Mandalpur (16), Raseni (41), Banupura (42), Salarpur (43), Kanakpur (44), Jadaupur (45), Khedia</td>
<td>82,276</td>
<td>24</td>
<td>9.56</td>
</tr>
</tbody>
</table>

Contd.....
distance comprises most of the settlements from Etah district except Tappal. This highest value is followed by 22.28 per cent telephone holders with slight variations which have been found within the distance value of 20-30 km. At this distance, 19.52 per cent settlements have the highest population of over two lakh accounting higher number of urban centres from Aligarh district. Thus, the table makes it clear that the percentage of telephone holders increases up to the distance of 30 km afterwards it experienced a sharp decline. Again a boost in the percentage has been figured out followed by a declining ratio. It unfolds the fact that urban centres and number of settlements particularly from Etah and Aligarh district are controlling the percentage of telephone holders. Still the percentage of telephone holders in the immediate surroundings is not as low as found at the distance of 60-70 km. But, no relationship between distance and number of telephone holders has been found. One of the prime reasons is that for having a telephone connection, it is not necessary to move to the other places daily and the people need not to bother about their purchasing power. Simultaneously, having telephone connection is not restricted to only one or two urban centres. Now a day, every person has telephone connectivity from anywhere. Most of the telephone users especially landline that do exist are highly concentrated in urban areas bearing rural areas out of the loop. The telephone connectivity has the ability to provide them with all the services cheaply at their doorsteps. One of the reasons for decreasing landline connectivity may be the increasing fashion of having
mobile phones at lower prices and poor landline services provided by BSNL. Consequently, most of the rural population, nowadays, goes more for mobile connectivity than landline.

3.2.3 Zone of Health Services

Health facility is a vital social infrastructure for any society as it directly affects the well being of its people. The health infrastructure continues to remain inadequate in terms of coverage of the population especially in rural areas. Generally, health facilities offer very reliable criteria for marking out urban affiliations. A good part of the movement to the town is necessitated by them because health facilities are scarce in the rural areas. For this, data have been collected from four leading government hospitals located in different parts of Aligarh city - Jawaharlal Nehru Medical College (JNMC) at Medical Road, Gandhi Eye Hospital at Ramghat Road, Malkhan Singh Hospital at Rasalganj and Deen Dayal Hospital at Kwarasi. JNMC is situated in the premises of Aligarh Muslim University, Aligarh. It is a Central Government Hospital run by the faculty of Medicine, Aligarh Muslim University. It is well equipped with all the modern facilities. The Out Patient Department (OPD) is managed by 23 different specialized clinics. The Gandhi Eye Hospital was founded in 1928 with the sole objective of combating eye diseases and offering rely to all suffering from eye troubles. The Umland of hospital facilities covers a much larger area in comparison to other services. Figure 3.9 demonstrates that hospital zone has an area of 13,100 sq. km comprising 3,164 villages coupled with 45 urban centres. It extends in parts of Mathura, Hathras, Budaun, Bulandshahr and Etah including Aligarh district covering a distance of about 90 kms in all directions. It encompasses a larger area towards the east and smaller area towards the west. Only one tahsil of Mathura district comes under its influence zone because of the gravity of Mathura city itself. It is clear from the figure that the frequency is much higher (more than 1500 patients) in the vicinity of Aligarh city up to the distance of 35-40 km. Besides Aligarh, it includes the areas of Hathras district also. Table 3.8 shows that high frequency of patients for medical treatment come from most of the areas of Aligarh district up to the distance ranging between 10 and 32 km. Higher frequency has been recorded in its central portion of Aligarh district. Higher frequency has also been recorded in Bairamgarhi (25 km) and Kasimpur Power House (14 km) having 6,550 patients/year lagging behind Jawan (5,789 patients/year), Tilothi (5,184 patients/year)
ALIGARH CITY
ZONE OF HEALTH SERVICES
(2007-08)

Fig. 3.9 (a)

Frequency of Patients for accessing Health Services in the City
(In Numbers)

- >1500
- 1200 - 1500
- 900 - 1200
- 600 - 900
- 300 - 600
- < 300

- Settlement
- High Interaction Zone
- Medium Interaction Zone
- Low Interaction Zone
- Urban Centre

Fig. 3.9

Source: Based on Field Survey, 2007-08
located at 18 km and 21 km respectively from Aligarh city. Lower frequency within this zone has been found in Mai (1,456 patients/year) followed by Bharatpur (1,469 patients/year) and Barauli Bhikam (1,529 patients/year). These villages lie within a distance of 11-13 km from the city. On the other hand, zone of low interaction starts including the areas beyond the distance of 40-45 km from the city. A great bulge in its

Table 3.8: Pattern of Zone of Health Services

<table>
<thead>
<tr>
<th>Distance (km)</th>
<th>Name of Settlement and Location Code</th>
<th>Total Population</th>
<th>Total Settlement</th>
<th>Total Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>Barola Haji (73), Bithana (77), Rathgawan (107), Kithara (108), Haivatpur Siya (109), Ramgarh Pansooopur (110), Shahpur (116), Bhupur (117), Hardaunaj (118), Panarihi (119), Alipur (120), Guru Sikaran (121), Dhanpur (122), Madrak (123), Mahrawal (124), Manoharpur Kayalatha (125), Iyyasrpur Mahrawal (126), Deosaini (127), Barauli Fate Khan (128), Chakaura (129), Sarsol (130), Hajipur Chauhatta (131), Kwarsi (132), Mullapara Bhaipura (133), Roravar (134)</td>
<td>94,737</td>
<td>25</td>
<td>49.23</td>
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<tr>
<td>10-20</td>
<td>Nagla Sabal Urf Gonda (38), Lodha (71), Bharatpur (72), Karhala Wargi (74), Bhamraula (75), Barauli Bhikam (76), Baroth (78), Haspur Chandfari (79), Susni (81), Phillkuna (85), Dumhira (86), Bhawan Khera (87), Mai (88), Ismailpur (90), Padaka Sultanpur (92), Qasimpur Power House (93), Rampur (94), Jawan (95), Jungle Garhi (96), Piplauth Gokulpur (97), Lehtoi (101), Chuharpur (102), Hajipur Chauhatta (131), Kwarsi (132), Mullapara Bhaipura (133), Roravar (134)</td>
<td>96,180</td>
<td>30</td>
<td>34.71</td>
</tr>
<tr>
<td>20-30</td>
<td>Vajipur (7), Gomat (36), Rampur (39), Lask (40), Bharatpur (41), Mendo (44), Gangai (68), Lakshmanagari (69), Khair (70), Bairamgarhi (80), Chandpur Mirza (83), Vijaygarh (82), Atrauli (89), Ismailpur (90), Mahmoopur (91), Ghabbana (98), Rampur (99), Bhamraula (100), Tilo (102)</td>
<td>1,34,657</td>
<td>20</td>
<td>9.27</td>
</tr>
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<td>30-40</td>
<td>Pisawa (3), Mursan (10), Besan (42), Hathras (43), Hasaya (45), Sikander Rao (46), Haspuru (51), Gangiri (52), Kakran (53), Pali Mukeempur (57), Chakathal (58), Pahasa (61), Sadehpur (63), Chandaus (64), Umari (65), Diba (67), Jalalpur (66), Bhadroi (84)</td>
<td>2,98,567</td>
<td>20</td>
<td>3.14</td>
</tr>
<tr>
<td>40-50</td>
<td>Shahpur (2), Nagla Heera (8), Nune (9), Siamal (11), Sahpat (12), Begampur (13), Alipur (25), Naroru (26), Gannaur (27), Jatra (35), Rampur Chandiya (39), Samaspur (48), Marhara (49), Dhonia (50), Dado (54), Hamdipur (56), Khurja (62)</td>
<td>2,98,149</td>
<td>17</td>
<td>1.64</td>
</tr>
<tr>
<td>50-60</td>
<td>Hamdipur (4), Tappal (5), Girdharpur (6), Lahra (14), Nudaill Kalan (15), Nagla Thana (28), Rajpura (29), Anupshahr (30), Jahanagirabad (31), Badarkha (32), Bulandshahr (33), Chunnungi (34), Piliha (47)</td>
<td>2,89,342</td>
<td>13</td>
<td>1.14</td>
</tr>
<tr>
<td>60-70</td>
<td>Sikandnabad (1), Etah (16), Sadgaon (22), Soron (23), Sahaswan (24)</td>
<td>2,85,319</td>
<td>5</td>
<td>0.49</td>
</tr>
<tr>
<td>&gt;70</td>
<td>Sidhpura (17), Dharapur (18), Gunjandwara (19), Samaspur (20), Sahawar (21)</td>
<td>75,984</td>
<td>5</td>
<td>0.38</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,479,783</strong></td>
<td><strong>135</strong></td>
<td><strong>100.00</strong></td>
<td><strong>5,55,346</strong></td>
</tr>
</tbody>
</table>

Source: Based on records maintained by different hospitals of the city. Population Data is obtained from Census of India, 2001. Note: Urban centres are in bold letters.
northern portion has been found at Bulandshahr (605 patients/year) and another bulge in eastern portion at Samaspur (112 patients/year). These areas represent the lower frequency of patients within the zone. The value of frequency ranges between 605-112 patients/year within the same zone. Higher value (605 patients/year) has been found in almost all urban centres such as Gunjduandwara, Sidhpura, Sikandrabad, Etah, Sahaswan, Soron, Bulandshahr, Nidhaueli Kalan, Anupshahr, Gunnaur, Narora and Mursan. There are few villages recording the same high value, namely Nagla Thane and Rajpura (Budaun), Hamidpur (Aligarh), Lehra (Etah) and Siamal (Hathras) located within a distance of 39-59 km from the city. It is apparent that due to lack of advanced medical facilities in these areas, the patients for specialized treatment come here.

Furthermore, a study has been done to test the relationship between the patients coming to the city and distance within the demarcated zone. It has been found out from Table 3.8 and Figure 3.9 (a) that as the distance increases the frequency of the patients’ decreases. As most of the urban centres up to the distance of 80-90 km are not as advanced in providing medical treatment as Aligarh city, higher number of urban centres come under its influence for getting health services despite of situated at greater distances. Moreover, it is interesting to note that those categories which have high number of urban centres in spite of having larger volume of population have low frequency to the city for treatment. It may be due to deteriorating quality of facilities provided to the patients in the government hospitals. Consequently, they are moving towards the private hospitals and clinics. On the other end of the scale, the poor people are compelled for taking treatment from government hospitals due to low purchasing power. In addition, only 0.38 per cent patients from only 8.33 per cent settlements accommodating total population of around 75,984 visits the city by covering distance of over 70 km.

3.2.4 Zone of Bus Services

Bus services have been widely used by the urban geographers in the delimitation of Umland of town and cities (Green, 1950; Singh, 1956). The use of buses is very popular for all the classes of the society. Aligarh city is well served by efficient road network. It plays an important role for the flow of goods and passengers for small distances and is not far apart from development. Aligarh city has a radial road pattern and major national, state and district roads which led out of Aligarh city
in different directions look very much like the spokes of wheel.

The bus system in Aligarh comprises both public (District Transport Corporation) and private sectors. Delux Buses are less significant for measuring regional influence as they ply over long distances and record very low frequency. Keeping in mind all these points only data of public and private sectors have been considered for measuring the frequency of bus services to and from Aligarh city. The data of one week has been collected from the records maintained by the respective bus terminals. After the analysis of the frequency of buses from the city the area on the map drawn and then Umland of bus services has been delimited. The passenger services through their higher frequencies and more frequent halts are more reflective of the city region relationship (Manzoor, 1972). There are five bus terminals in the city. They are:

a) Gandhi Park Bus Terminal (Old Bus Station), Agra Road
b) Masoodabad Bus Terminal (New Bus Station), Grand Trunk Road
c) Charra Bus Terminal, Charra Road
d) Khair Bus Terminal, Khair Road
e) Atrauli Bus Terminal, Ramghat Road

Gandhi Park and Masoodabad Bus terminals are handled by District Government from where Uttar Pradesh State Transport Corporation buses serve cities all over the state of Uttar Pradesh while buses plying from Charra, Atrauli and Khair Bus terminals are being maintained by private companies. These cover the areas of Atrauli, Khair, Gonda, Iglas, Tappal, Bijauni and Gangiri which meets the increasing local traffic pressure on these routes. It reveals the importance of the city as traffic centre. It is apparent from Figure 3.10 that Aligarh city is directly connected with Bulandshahr and Khurja in the north, Dibai and Narora in the north-east, Agra and Mathura in the south and south-west, Etah and Kasganj in the east. All the urban centers and some relatively bigger rural areas are easily approachable from Aligarh city through bus services. Moreover, it shows that prominent routes from Aligarh-Narora via Atrauli, Aligarh-Sambhal via Babrala, Aligarh-Anupshahr via Dibai and Aligarh-Jewar via Khair have high intensity of traffic flow. The highest volume of traffic flow is found on Ramghat Road running 133 buses to Narora via Atrauli and 199 buses to Sambhal through Atrauli. This route connects Atrauli, Narora, Gunnaur and Babrala with Aligarh city. It is due to the gravity of the city centre for occupational and educational services. So most of the people from these areas prefer
Fig. 3.10

Source: Based on Field Survey, 2007-08
to commute for getting better life opportunities either daily, monthly or annually. The Narora has also religious importance as well. Another reason may be that private as well as government buses both are running up to Atrauli. This is followed by Anupshahr Road running 22 buses to Anupshahr via Dibai. The minimum flow of buses is found on Kasganj Road and Etah Road as adequate railway service is available here which is more efficient, comfortable and economical over long distances. Jalesar is quite far from Aligarh city. It takes 4 hours to reach there. So frequency of buses has been recorded very low on this route. 73 and 71 buses are running respectively on Aligarh-Agra Route via Hathras and Aligarh-Mathura Route via Iglas. So relatively close connectivity between these two cities have been found. As both of these cities (*Krishna Nagri and Taj City*) are industrially developed and also famous as tourists and religious places at local, national and international level, the time taken by bus for reaching at these two destination cities is 2-3 hours.

It takes two and half hours to reach in the northern and north-eastern portion. The southern and south-eastern portions are reachable within 2 and 3 hours respectively. Bus services have brought all these areas closer to Aligarh city. Thus, bus service plays a vital role in promoting the extension of the boundaries of the city region (Bansal, 1975). This zone covers the whole Umland of Aligarh. Of course, it forms much larger zone than the other services except the zone of telephone services.

### 3.2.5 Zone of Educational Services

Basic education is a fundamental human right in itself and essential for reducing poverty and improving the living conditions of rural population. Rural people commonly suffer from unequal access to education, healthcare, infrastructure, technology, institutional support and markets. So they are moving towards urban areas to access all these facilities (Gasperini, 2003). The data for delineating the zone of education services have been collected from three post graduate colleges i.e., Dharam Samaj Degree College, Sri Varshney College and Tika Ram Kanya Mahavidhalaya; three inter colleges, namely, Maheshwari Inter College, Chiranjilal Lal Inter College and Naurangi Lal Inter College; and Industrial Training Institute, all of them located at different locations of Aligarh city. There are only three post graduate government colleges which serve the Umland of Aligarh city. In Industrial Training Institute, it has been found that most of the students belong to rural areas because it provides training in some professional courses at affordable fees. All of these
educational institutions are maintained by state government. Graduate, inter and high school level data have been considered for research purpose because primary level education is easily available in their own villages and children move only for getting higher education in urban centres.

The zone of education service has an area of 8,293 square kilometres consisting of 2,205 villages and 33 urban centres. Figure 3.11 shows the settlements from where students prefer to come here for getting education. There is a great bulge towards the northern and north-western portion forming the north-western boundary of this zone. It makes clear that more than 75 per cent students are coming only from Aligarh district itself. The highest frequency of settlements has been recognized in the doorstep of Aligarh city while the frequency is high in the central part of the zone. It also indicates that only three villages including one urban centre of Etah district, one village of Budaun district, almost whole Bulandshahr, Hathras and Aligarh District come under the influence zone of education services. The highest enrolment from surrounding settlement has been recorded in Barauli, Alahdadpur, Mahmoudpur, Narona Akapur, Lakshmanpur, Nagla Mati, Bhawan Garhi (Aligarh) and Jalalpur (Hathras), covering the distance of 16-25 km radius from the city. On the other hand, within high intensity zone (from where more than 75 per cent enrolment recorded) low frequency have been noticed in Nagla Assoo, Bankner, Lahtoi, Sunana, Shekhupur, Kiratpur Nimana, Bhakri Ahivasi and Bhatauli (Aligarh) covering the distance up to 30 km radius from Aligarh city. Within the zone of medium intensity, students enrollment, Atrauli and Iglas have recorded higher students enrollment lagging behind Sasni. All of which are urban centres lying within the periphery of 15-26 km radius. Low enrolment within this zone has been registered in many settlements located comparatively at greater distances ranging between 25 and 41 km. The zone of low interaction for education service shows highest frequency in Narora, Sadabad and Hathras where students have enough potential to access much greater distance varying between 36 and 64 km i.e. in Barikhera, Bhadaura, Farana (Bulandshahr), Rasulpur, Lalgarhi, Jirauli Kalan, Alipur (Aligarh), Jainpura (Jalesar), Bajna and Neemgaon (Mathura). Influence of other competing urban centers itself such as Mathura and Bulandshahr may be responsible for such lower value of students’ enrollment in Aligarh city. These centres also attract students from their own service zone.
Source: Based on Table 3.9

Frequency Pattern of Students For Accessing Education Facilities from Aligarh City

Frequency of Students for accessing Educational Facilities in the City (In Numbers)
- >100
- 80 - 100
- 60 - 80
- 40 - 60
- 20 - 40
- < 20
- Settlement

High Interaction Zone
Medium Interaction Zone
Low Interaction Zone
Urban Centre

Fig. 3.11 (a)
<table>
<thead>
<tr>
<th>Distance (km)</th>
<th>Name of Settlement and Location Code</th>
<th>Total Population</th>
<th>Total Settlement Number</th>
<th>Total Frequency Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>Haivatpur Siya (224), Alampur Subkara (225), Sikanderpur Cheraat (226), Manzoorgarhi (227), Dhaurra Mafi (228), Akbarpur (229), Barola Haqi (230), Bhagwanpur (231), Noorpur (232), Dhanpur (233), Jhilpur Waku (234), Dhaurra (235), Khira Shamsul (236), Ajabpura (237), Barola Haji (238), Bhagwanpur (239), Noorpur (240), Digsi (241), Jhirudor (242), Khira Bakhtawar (243), Hailpur (244), Khera Khus Khabar (245), Samastpur Keerat (246), Mehrawal (247), Govindpur Fagoi (248), Talaspur Kalan (249), Mainath (250), Keshopur Jafri (251), Singhpur (252), Elampur (253), Asna Ajitpur (254), Mukundpur (255), Jatanpur Chkrawati (256), Barhaulal Fateh Khan (257), Daulra Nirpal (258), Tajpoor Rasulpur (259), Saras Jaffar (260), Baraula Jaffar (261), Karwasi (262), Shahpur Kutub (263), Alapur (264), Alahdadpur Nivry (265), Wajidpur Nada (266), Kheria Khwaja Buddha (267), Mullapara Bhujpura (268), Gorara (269), Bhadeshi Mafi (270), Parayvali (271), Ramanj Pur (272), Panthi (273), Hardhauganj (274), Ahadpur (275), Guru Sikharan (276), Murespur Jalal (277), Kochchhor (278), Ghaspur (279), Chauriuli Daudkhan (280), Puneetpur (281), Ghasipur (282), Chirauliya Daudkhan (283), Kamalpur (284), Alinagar (285), Dhanpur (286), Khan Garhi (287)</td>
<td>1,38,802</td>
<td>53</td>
<td>18.47</td>
<td>4,733</td>
</tr>
<tr>
<td>10-20</td>
<td>Nagla Sabal Urf Gonda (85), Nagla Jagdev (86), Kairthal (87), Nagla Mohan (95), Alipur (96), Sasni (97), Bijhari (98), Pipal Ka Gaon (148), Andala (149), Kiratpur Nimana (150), Nagla Mati (151), Pinjri Nagar (152), Jaitoli (153), Haivatpur (154), Bijhara (155), Jasrana (156), Susayat Khud (157), Tatarpur Mauharia (158), Sialk Akbarpur (159), Jalalpur (160), Malipur (161), Bhakhi Ahvasi (162), Khandwar (163), Bhatali (164), Nagla Bar (165), Lakshmanpur (166), Chirauli (167), Suhawali (168), Akbar (169), Jalali (170), Shekhpura (171), Shahjahanpur Taipur (172), Jihaob (173), Surajpur (174), Kalai (175), Baswan Garhi (176), Chandauli Buzurg (177), Narona Akapur (178), Chhalesar (186), Kheda Buzurg (179), Padka Sultanpur (180), Sunamari (181), Qasimpur Power House (190), Satha (191), Rampur (192), Chandauli Buzurg (193), Pila (194), Bhalolpur (195), Dabthala (196), Sumera Dariaypur (199), Lehtoi (200), Sunana (201), Madho Garhi (202), Pothi (203), Khera Haivat (204), Chauriuli (205), Khira (206), Azadpur (213), Nidhula (214), Talibnagar (215), Rampur (216), Jhan Sikanderpur (217), Sahri (219), Sujagar (220), Haivatpur (221), Akbar (222), Amrauli (223), Nadro (229), Karsia (230), Parshera (231), Heyatpur Bajhera (232), Rajmau (233), Nahra (234), Chihawali (235), Bharatpur (236), Khera Khur (273), Jasathpur (274), Baratha (275)</td>
<td>2,20,256</td>
<td>78</td>
<td>27.14</td>
<td>3,881</td>
</tr>
<tr>
<td>20-30</td>
<td>Khera Sattu (5), Nagla Birku (6), Memu (13), Nagola (79), Gomai (80), Badami (81), Bhogpur (82), Usram (83), Talesara (84), Khagana (88), Rampur (89), Manjipur (90), Iglas (91), Bharatpur (92), Kajroth (93), Tochigar (94), Lalpur (95), Dariaypur (100), Khedia (101), Chandwaiya (102), Shekhpura Ajit (103), Nagla Kesia (104), Rampur (105), Ristan (106), Dhanoila Chiana (107), Hasana Jogmohanpur (108), Naugan (114), Singhpur Himmatur (120), Tevath (121), Kamalpur (122), Airavali (123), Shekhpura (124), Kaka (128), Suratgarh (129), Sahabu (127), Pandrawal (128), Teyor Buzurg (129), Dhaurau</td>
<td>2,26,469</td>
<td>61</td>
<td>21.21</td>
<td>1,937</td>
</tr>
</tbody>
</table>

Contd....
Table 3.9 unfolds the fact that two distance categories (30-40 and 50-60 km) despite of having highest population recorded comparatively lower students’ enrolment (8.68 and 1.12 per cent respectively) owing to the division of strain by the presence of Bulandshahr and Hathras district. Hence, students have choice of another urban centre besides Aligarh. It also supports the inverse relationship between distance and students enrolment. Higher percent of students’ enrolment have been noticed from only 18.47 per cent of settlement of the immediate countryside of the city. Unlike students’ enrolment, percentage of settlements has experienced slight fluctuations at 10-20 km radius, afterwards it starts declining.

Besides, Aligarh is best known for Aligarh Muslim University. This is one of Contd…..

<table>
<thead>
<tr>
<th>Distance Range</th>
<th>Urban Centres</th>
<th>Students’ Enrolment</th>
<th>Settlements</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-40</td>
<td>Keelpur (3), Bajna (4), Gorai (7), Shyamgarhi (8), Neemgaon (9), Lalgarhi (10), Manipur (11), Hathras (12), Bhogao Nagla Jayas (14), Parsara (15), Andoli (24), Hasayan (25), Bastoi (26), Sikandrarao (27), Purlidinagar (28), Hardoli (38), Duttacholi Khurd (39), Gehitl Nirmal (41), Janipur (42), Pokharapur (43), Kharikwar (44), Vijay Nagaliya (45), Asadpur Gher (49), Umra (50), Dibai (51), Banpur (54), Dolutpur Khurd (55), Khudadiya (56), Pisa (66), Kamalpur (74), Resari (76), Khera (77), Sujanpur (78), Baratpur (109), Sujawalpur (110), Badankhurd (111), Hasanpur (112), Gangiri (113), Shahjahanbad (115), Dado (116), Bijnori (117), Pipli (118), Saipur (119), Narayanpur (131), Keratpur (132), Surjwal (133), Pahasu (134), Bhogpur (139), Tajpur (141), Sarapur (142), Chandaura (143), Nagla Padam (144), Chhara (197)</td>
<td>4,22,911</td>
<td>54</td>
<td>18.82</td>
</tr>
<tr>
<td>40-50</td>
<td>Hetalpur (2), Arjunpur (16), Salempur (17), Sahpau (19), Nagla Salem (20), Khera (21), Mirzapur (22), Jaimpur (23), Jarauli Kalan (29), Ganthai Shahpur (30), Saraspur (31), Kaserpur (34), Jiravali (35), Mohkampur Ta Dado (36), Lehra Salempur (37), Alipur (40), Narora (47), Chothera (48), Kamrau (52), Talwar (53), Satwara (57), Dharaun (62), Shahpur (65), Lal Garhi (67), Rasulpur (68), Bani (69), Talpur (70), Dhibai (71)</td>
<td>86,752</td>
<td>28</td>
<td>9.76</td>
</tr>
<tr>
<td>50-60</td>
<td>Malav (1), Sadabad (18), Kasganj (32), Faridpur (33), Hargovindpur (46), Surjwal (60), Bulandshahr (61), Bhadaura (64), Bani (69), Tappal (70)</td>
<td>3,29,357</td>
<td>10</td>
<td>3.49</td>
</tr>
<tr>
<td>&gt;60</td>
<td>Unchagaon (58), Bhadaura (59), Barikhera (71)</td>
<td>10,434</td>
<td>3</td>
<td>1.05</td>
</tr>
</tbody>
</table>

| Total          | 1,418,981 | 287 | 100.00 | 12,023 | 100.00 |

Source: Based on records maintained by educational institutions of the city. Population Data is obtained from Census of India, 2001.
Note: Urban Centres are in bold letters.

Table 3.9 unfolds the fact that two distance categories (30-40 and 50-60 km) despite of having highest population recorded comparatively lower students’ enrolment (8.68 and 1.12 per cent respectively) owing to the division of strain by the presence of Bulandshahr and Hathras district. Hence, students have choice of another urban centre besides Aligarh. It also supports the inverse relationship between distance and students enrolment. Higher percent of students’ enrolment have been noticed from only 18.47 per cent of settlement of the immediate countryside of the city. Unlike students’ enrolment, percentage of settlements has experienced slight fluctuations at 10-20 km radius, afterwards it starts declining.

Besides, Aligarh is best known for Aligarh Muslim University. This is one of
the prime Central University of India, with several faculties and maintained institutions and draws students from all corners of the country as well as from other countries of West Asia and Africa. Thus, it supports the fact that the distance, ideas and socio-economic conditions of the residents, influence of other nearest competing urban centres, efficient road and transport facilities, good reputation and superior quality of education system of the institution are some other factors which determine the service area of education facilities.

3.3 Composite Umland of Aligarh City (2007-08)

The above going discussion gives a clear cut idea how and to what extent, Aligarh city exerts its influence and is functionally linked with its surroundings. The superimposition of all the ten functional zones together provides the composite Umland of the city (Figure 3.12). The outer boundary of these zones is traced to find out extreme limit of the Umland.

It stretches over an area of 12,150 sq. km. It encloses 3,334 numbers of villages and 44 urban centres accommodating total population of 7,968,653. It includes 942 villages and 10 urban centres from seven tahsils of Bulandshahr district, 767 villages and 16 urban centres from four tahsils of Etah district, 240 villages and 3 urban centres from two tahsils of Budaun district and 180 villages and 2 urban centres from Mat tahsil of Mathura district including 1,205 villages and 13 urban centres of Aligarh district itself. In this way, it crosses the administrative boundaries of Mathura, Bulandshahr, Hathras, Etah and Budaun district (Figure 3.13). Among all the districts, Hathras was carved out from Aligarh district in 1997. Only one tahsil of Mathura district comes under its Umland due to gravity of Mathura city itself.

The northern and southern boundaries extend up to the distance of about 68 km and 50 km. In addition, the city exerts its influence up to the distance of about 55 km and 50 km in the western and eastern directions respectively. The western area along the Yamuna River has less functional relationship with the city in comparison to those settlements located in the vicinity of the Ganga River. Gautam Buddha Nagar in the north-west, Agra in the south and the state boundary of Haryana in the extreme west restrict the boundaries in these directions. The city has not recorded any frequency from Gautam Buddha Nagar as it is near to Delhi.

Since Aligarh has no competitor in providing education and health services within the radius of 80 km, the settlements over such distance are connected with the
Fig. 3.12
Fig. 3.13

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city for higher order of goods and services which are not provided by their immediate respective urban centres. Thus, Figure 3.12 clearly indicates high spread of urban impact in eastern portion from the city centre. All the urban centres and some relatively bigger rural settlements in the surroundings are easily approachable from Aligarh city through bus services. Transport facilities have encouraged the extent of urban influence of the city and increase the possibility of its further extension in the future. These services have played dominant role in bringing distant areas closer to the city. As well as, it is not possible to maintain health, education, bank, telephone and bus services with well equipped and modern facilities at the level of villages and small towns. Consequently, most of the residents of these areas depend on such urban centres which are blessed with all these facilities.

3.4 Degree of Urban Influence

Degree of influence can be determined by the number of functions or linkages that a particular settlement has with the city. The composite picture of all the settlement will provide the clear cut zone of high, medium and low intensity. It has been found from Figure 3.14 that it is not necessary of having the same functional linkage of the two settlement located at the same distance. There are some settlements having higher functional linkages, despite of its far off location, in comparison to those settlements which are located in the vicinity of the city. This unequal functional linkage is mainly due to availability of transport facilities, size of the settlement, influence of other urban centres, state boundary of Haryana, physical barrier of rivers, surplus production of agriculture and other products and availability of infrastructure facilities within the settlement. But such exceptional cases are excluded to avoid the biasness. It is clearly visible in the figure that functional linkage is comparatively higher near the city and as the distance increases, the functional linkage starts decreasing but in a very slow and meshed manner. Therefore, keeping in mind the above facts, settlements have been divided into three categories-settlement with less than two functional linkages (zone of low functional influence), settlements with 2-4 functional linkages (zone of moderate functional influence), and settlements with more than 4 functional linkages (zone of high functional influence). To avoid the biasness and to find out the well identified zones, the outer settlements of each category are linked together.
Fig. 3.14

UMLAND OF ALIGARH CITY
DEGREE OF URBAN INFLUENCE

INDEX

Settlement Functional Linkages Degree of Urban Influence
- High > 4
- Medium 2 - 4
- Low < 2

Source: Based on Field Survey, 2007-08

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3.4.1 Zone of High Functional Influence

Under this influence zone, the areas which are connected with the Aligarh city for all the functions used for the delimitation of the Umland are included. These areas are mainly concentrated in the immediate surroundings of the city, up to the distance of 30 km in the south-western portion. But this zone has a linear but narrow extension in the north-eastern portion goes up to the distance of 43 km. This extension is mainly due to influence zone of vegetable and foodgrains supply (Figure 3.14). Therefore, the vegetable and foodgrains supply zones determine the outer limit of high degree of influence zone of the city.

3.4.2 Zone of Moderate Functional Influence

The zone of moderate influence contains those settlements which are maintaining the functional linkages with the city for 2-4 services. Since, the areas which are related to Aligarh city include Hathras and Etah district along with Aligarh district itself. As a result, this zone experiences wide extension in the eastern direction. This extension forms linear pattern due to its influence along the road leading towards Aliganj tahsil passing through Kasganj tahsil. Small bulges along the roads such as Grand Trunk Road, Khair Road and Hathras Road have also been found within the zone. Its outer limit is extended to a distance of about 50 km to 76 km.

3.4.3 Zone of Low Functional Influence

This zone has low connection with the city having less than one functional linkage. The zone follows more or less the boundary of the zone of moderate influence covering comparatively greater area in extent. It provides only education, telephone and bus services. These services cumulatively link this zone to Aligarh city. Like other zones, it has also some small extensions along the main roads connecting all the surrounding districts together with the city. The Yamuna River in the western portion has restricted the eastern boundary of this zone while in the north-western direction, it covers a comparatively wider area beyond the Ganga River covering the tahsils of Gunnaur and Sahaswan. It is due to high influence of Mathura, Agra and Bulandshahr in western, northern and southern directions respectively. These urban centres start playing active role beyond this boundary while the urban centres of Budaun district are still lagging behind in the sufficiency of infrastructural facilities or development. As this is the outer zone, it covers the areas located up to the distance of
Therefore, it has been observed from the analysis that the degree of urban influence starts decreasing with increasing distance. The urban influence is intense in the immediate doorstep of the city and therefore, goes on decreasing with a very slow rate and in a meshed manner due to improved network of transport facilities. As well, the functional linkages of the city with its surroundings is mainly influenced by distance, availability of transport facilities, gravity of other urban centres, size of the settlement, and of course, choice of the people for getting maximum profits.
Reference


Bundery Metropolitan Area (Indonesia), Proceedings of the Eastern Asian Society for Transportation Studies, 5, 1281-1300.