POPULATION–SIZE, DISTRIBUTION, CHARACTERISTICS AND SPATIAL ORGANIZATION OF SERVICE CENTERS: A CASE STUDY OF ALWAR DISTRICT, RAJASTHAN

Dissertation submitted to Jawaharlal Nehru University
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DEDICATED TO MY TEACHER

FAMILY

AND

FRIENDS

ACKNOWLEDGEMENT

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DECLARATION

This is to certify that the dissertaion entitled **"POPULATION–SIZE, DISTRIBUTION, CHARACTERISTIC AND SPATIAL ORGANIZATION OF SERVICE CENTERS: A CASE STUDY OF ALWAR DISTRICT, RAJASTHAN",** is my bonafide work for the degree of **MASTER OF PHILOSOPHY** and may be placed before the examiners for evaluation.

Date :-   **BHAWANA VAISHNAV**

FORWARDED BY

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

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Chapter 1

SECTION- I
POPULATION –SIZE, DISTRIBUTION CHARACTERISTIC AND SPATIAL ORGANIZATION OF SERVICE CENTERS: A CASE STUDY OF ALWAR DISTRICT (RAJASTHAN)

Introduction

Human beings need shelter and easy access of necessary goods and services for their survival and development, for that they need to live in settlements which are an organised colony of human beings who have places to live. The different stages of settlement develop with time starting from hamlet, developing in to villages, towns and ultimately to the most complex and organised structure that is (city) urbanized settlement. Towns and cities provide more services in comparison to hamlet and village. Towns are the places that provide service centers. The more the function a town provides the more developed it is supposed to be, and act as the central place for the adjoining areas.

The concept of central place and centrality was taken from Walter Christaller's central place theory. Christaller[1] took a central place system to be a number of central places grouped around a central place (that is, the system-forming central place) according to given rules. And the producer will be providing the goods and services only if there is some minimum demand. The minimum demand can only be meet if there is threshold population size. This theory assumes certain assumption that consumer will go to nearest place to buy the goods that is to minimize the transportation cost, which is in the behavior of the consumer. The most heroic assumption of the theory is that there is homogenous distribution of settlement and purchasing power In central place theory, center place, central goods and complementary region are three important bases for analysis. According to all the above conditions the market area would be in the pattern of hexagonal pattern of settlement. And there will be hierarchical arrangement of central places. Which was afterward explained by A. Losch(1954)

The central place system will be functioning on three basic certain well defined principles: marketing principle (k=3), in which each settlement would serve

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[1] Christaller, W. (1966). "Central Places in Southern Germany". Translated by C. W. Baskin. Englewood Cliffs: Prentice Hall, .

it's hinterland in such a way that every settlement will serve 3 regions for marketing of the services.

Transportation services (k=4), in which one service center will serve 4 areas for transportation services. Like this for administrative purpose one central region would serve 7 regions of its hinterland.

Central place or service center is a region which provides services and functions to its own region and its surrounding settlement, development spreads in the region, with time its periphery developes. Hirschman has also said that development trickles down from its core (central place) to periphery. In this way central place concept is important not only for service centers but also for socioeconomic and infrastructural development.

Therefore there is need for further research in the field of service center. According to Berry and Garrison[2] in 1958, it is important to identify the sizes of a center. Larger centers are more complex in functions than smaller centers, and with the increasing size of the urban complementary region there is increase in functional complexity. It occurs because of different type of functions or services are provided by central region.

There is always some kind of interdependence exists between urban centers for the distribution of central goods and services. Preston's[3] study supports the validity of the principal behavioral assumption of Christaller in the central place theory. There are existence of interdependence between centers to provide the goods and services, and also hierarchical class-systems of central places. There are relative importance of settlements (central place system) as regional centers, because they

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[2] Berry, B. J. L., and W. L. Garrison. (1958) "The Functional Bases of the Central-Place Hierarchy," Economic Geography, 34 (April), pp. 145-54.

[3] Preston, Richard E. (1971), "The Structure of Central Place Systems", Economic Geography, Vol. 47, No. 2, Apr., pp. 136-155.

provides goods and services demanded by the center's own inhabitants and it's complimentary region.

Importance of centrality can be calculated by following formula:

C= N - L

Where, C = the surplus of importance, i.e., the relative importance of a place or centrality;

N = the importance of a place plus its complementary region, i.e., absolute importance or nodality.

L = the importance of a town as a unit consuming central goods and services, or local consumption.

Haggett[4] argued the importance of nodal region is a general system of human geography where some of objects like towns, villages, farms, etc. are related under circular flow of money, migrants, freight, etc. and other energy inputs come in the system by the biological and social demand of the people.

Preston (1971) said that hierarchical pattern are because of greater social, physical, and economic heterogeneity of larger areas, and other differences are found in individual subsystems. When all these subsystems are aggregated central place hierarchy is developed. With the changing technology and life style, Christaller's contributions is important in the investigation of settlements and structure, and operation of particular space economies.

By analyzing christaller's and losch's concept ,Bell[5] indicated the most critical locational and centrality factors and these are markets, transportation routes, and raw material. Losch argued that any alignment along transport axes, are more important rather than maximizing the coincidence of activities in center.

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[4] Haggett, P. (1966) . " Locational Analysis in Human Geography". New York: St. Martin's Press.

[5] Bell, Thomas L., & Stanley R. Lieber & Gerard Rushton(1974) "Clustering of Services in Central Places",Annals of the Association of American Geographers, Vol. 64, No. 2 (Jun.,), pp. 214-225.

Locational decisions of entrepreneurs and   complementary activities, agglomeration economies of alternate sites   having different tributary population affect central place system.

Agglomeration principles according to Christaller:

1) Occurrences of goods in centers are conditioned by the presence of goods which have lower threshold population requirements;

2) Alternative places not meeting this condition would be rejected even when they are more centrally located with respect to competing places; and

3) In an area of variable population densities some centers will have a hierarchical marginal good, a good which in other centers will have tributary population.

According to Smith [6] the economic system, population and transport affects the central place system which are interrelated factors. Distribution of settlement and demand also decides the centrality. There are certain causes which affects the central places which are following:

1. Economic Structure of a Central Place: The difference in the economy help in defining the type of industrial setup in the central place. On this basis the central place industries can be either labour intensive or capital intensive.

2.The Geographical Situation of the Central Place: The geographical outlook will be defining the communication structure, and can be described by the distribution   of   goods   and   passenger transport   over   the   means   of transportations like roadways, railways, inland waterways. In our study waterways is not of our importance.

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[6] Smith, Johannes(1965), "The Growth of Central Places as a Function of Regional Economy and Population", The Swedish Journal of Economics, Vol. 67, No. 4 Dec., pp. 279-307.

3.Distance between Population Agglomeration: Central place is inversely proportionate to the distance to larger agglomerations, and in direct proportion to the number of workplaces and the size of population in agglomerations.

4. Mutuality of Attraction between Industries: High concentrations of population and economic life, will lead to technical, economic and social advantage. There force of attraction between population and economic life, and among individual sectors of the economy. The labour forces coming to a central place are drawn away from regions with undiversified economy (agrarian setup). This is a classic example of dual economies, thus industries should be situated in such a way so that they can take the advantage of cost effectiveness with availability of labour forces. Geographically isolated areas will have difficulties in attracting qualified labours for industrial development.

5. Minimum Factors: The development of a central place is influenced by a number of minimum factors like capital, finance, disposable building-sites, building and traffic-restrictions. Minimum factor means population and workplaces are affected by unknown strength.

6.The Economic Base Approach : Central place or region can be divided into a primary and a secondary part. primary part depends on demand outside the area (central place or region) and is independent of the needs of the area's population for goods and services. The secondary part serves the needs of the local population.

According to Deller and Halstead[7] with the passage of time rural people migrate from the village in search employment and for entertainment, this pull down the travel cost with rising passengers and roads networks,(because of economies of scale) as people are more willing to go outside for employment, entertainment. In this way road network is efficient in the development of central place system.

[7] Deller, Steven C. and John M. Halstead (1994). "Efficiency in the Production of Rural Road Services: The Case of New England Towns" Land Economics, Vol. 70, No. 2 May, pp. 247-259.

1.1 <u>Study Area</u>

Present study examines to work on the service centers of Alwar District. Alwar district has only one class I town. It is a class I city in Rajasthan which is situated in northern part of the state. It is located between state capital of Rajasthan Jaipur and national capital Delhi. The distance of Alwar from Delhi is 160 K.M. in south west direction and Jaipur it is about 150K.M. Alwar is well connected by railways and roadways. The town is situated at the junction of three state roads, namely, state highway no. 13 from Delhi to Ahmadabad and highways no. 14 & 25 connecting important town of tourist attraction and industries. National highways no.8 also passes through Alwar. Alwar is easily accessible from Haryana as well as from Uttar Pradesh.

Because of its strategic location, Alwar was selected as a regional priority town in the national capital regional plan of the government of India. Alwar comes in the NCR region, however, despite its location which is conducive for emergency of many service centres only a few of them have been emerged. Therefore the problem of study is that why the development of centre has not been equal in the district. Why the fruits of development are not spreading in other region of Alwar. What are the regions for hierarchy of functions and services in Alwar districts? Is that hierarchy of services and function affects the quality of population in that region? Therefore it becomes important to study of central places in Alwar district.

The district is situated in the north-east of Rajasthan between 27°4' and 28°4' north Latitudes and 76°7' and 77°13' east Longitude. Its greatest length from south to north is about 137 K.M. and greatest breadth from east to west about 110 K.M. It is bounded on the north and north-east by Gurgaon (of Haryana) and Bharatpur district and on the north-west by Mahendragarh district of Haryana, on the south-west by Jaipur and on the south by Sawai- Madhopur and Jaipur districts. Its area is 8380 sq. k.m. it's density is 357 per s.q. k.m. its sex ratio is 887. Literacy among alwar region is 62.48%. Among male 78.91% are literate but among female 43.95 are literate. Its decadal growth rate remained 30.23. There are 12 sub-division and 12 tehsils and 14 panchayt samiti.

1.2 <u>Objectives</u>

1. To study the spatial distribution of human settlement in terms of population size ,social, demographic and economic characteristics,
2. To identify central places on the basis of centrality function like education health, communication, bank and their concentration in all the settlement.
3. To identify the relationship of central places with the population size, accessibility and centrality.

1.3 <u>Research questions</u>

1. Is there difference in population size & function performed among different order of service centers?

2. Is there any the relationship between population size and its characteristics, population density and it's characteristics with services and functions?

3. Does the good transport network affect the centrality?

1.4 <u>Database</u>

1. Data was obtained by village and town directory of Alwar and district census hand book of Alwar, census of India, 2001. Data for basic amenities like schooling, medical facilities, credit facilities, recreation facilities and other services for all the villages and urban settlement of Alwar was collected by related offices in the district headquarter (December 2011).

2. District and village wise map of study area were collected from district census hand book census of India, 2001, and administrative atlas of Rajasthan, census of India, 2001.

3. Census of India , 2001 primary census abstract of Rajasthan.

4. Other source of data and information is arc map, which is used for locating settlement.Arc map is ysed by creating personal geodatabase.

1.5 <u>Methodology</u>

1. To study the distribution pattern of rural and urban settlement, village wise map of Alwar district and location boundaries of all rural and urban settlements was identified with the help of arc map. After that by the geo-referencing geo database was created. By maps population density was presented so that settlement pattern can be known.

2. Centrality function was calculated by basic amenities like schooling, medical facilities, credit facilities, transport, and communication facilities and other services for all the villages and urban settlement. This was done by giving the weightage. These weights have been given by using population threshold for the functions. To calculate composite index threshold was multiplied with the total number of functions of each central place.

3. Then all the functions were divided by its average. Then composite index was calculated. Then centrality score is calculated for each settlement (Christaller, 1933, wanmali 1973[8] zutshi,1976 &1986).

4. Threshold =Total population /total number of functions.

5. Rank size rule will be used to show population distribution in the different hierarchies.

6. Then hierarchy of settlements would be mapped and cross classified with population size, number of functions, centrality score and accessibility.

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[8] Wanmali, Sudhir (1986) "Service center in rural India", B.R.Publishing Corporation, New Delhi.

7. To study the transport network of the Alwar, beta method, koning number was used by the help of map. Accessibility index of roads and railway station were also created with the help of Arc map. Finally centrality function map and accessibility maps are merge together to know the relationship between centrality and transport accessibility.

1.6 <u>**Research design**</u>

The research work would be done in five chapters.

Chapter- 1(section I) is introduction of research, which will include statement of problem study area, research questions, objectives, and methodology and research design & (section II) Literature survey.

Chapter- 2 this has covered population size and distribution of all the rural and urban settlement. It also covered social, economic, transport network and demographic characteristics of settlement.

Chapter- 3 this chapter has covered different services & function of central places, and their distribution in Alwar district.

Chapter- 4 this chapter finds out service centers and their hierarchy in Alwar district. The cross classification of population size, accessibility relationship with transport network is also done.

Chapter- 5 Conclusion.

SECTION - II (Literature Review)

The literature on human settlement and the function defining the pattern of human settlements goes back far in to the past. Early settlements were not more complex as human was not settled. With the rise of agriculture as the occupation the design and pattern of settlement started showing its structure and the proper study of these patterns of settlement was started during early 18th and 19th century by German geographers, and a few popular works are of Carl Ritter, and Schaefer. The more explicit version of settlement geography in the form of well-known Theory goes to Christaller's work (Central Place Theory). This revolutionized the study of settlement geography.

The broad definition of population geography includes settlement geography and thus central place theory. The history of the development and use of Christaller's theory provides and interesting case study of the rise and fall of a very particular form of theoretical frame-work. Classical central place theory is a normative- deductive theory based on a number of specific environmental and behavioral assumptions. Once the stage has been set and the cast selected the play unfolds in a highly ordered fashion. (Population Geography: Progress & Prospect Edited by Michael Pacione).

Christaller and Losch's versions of the theory were provoked in the 1950s and 1960s amongst geographers who sought to move beyond the description and classification of settlement types, which required for their purpose. The first inclination was to test the theory. That is to derive from central place theory hypotheses which could in turn yield empirically verifiable predictions.

Many of the tests revealed that there was rather more regularity in settlement patterns that one might have expected a priory and that certain aspects of urban functional hierarchies could be identified.(Berry, 1967; Berry and Horton, 1970). And central place theory became the most useful primitive tool as guiding stone for regional planners, to understand the rational for the size, number and

spatial distribution of places offering a range of services to dispersed population, under certain assumptions, which were questioned again and again by different geographers.(Berry, 1976)

In the country like ours (India) and others less developed countries where population are dispersed (low population density) and surrounded by agricultural land, Christaller's central place theory provides a techniques to slice off the functional relations, between division of space and settlement accordingly to understand and formulate the policy design for regional development. The central place theory (1933,Walter Christaller) was successful to explain the size, number, and distribution of central places (towns and cities providing goods and services to surrounding areas) in southern Germany, gives an insight to look and recognized the settlement pattern in any region and proved that there is always a definite pattern of the distribution of human settlements. The theory also visualizes landscape in which there are small centers but increasingly fewer large central places.

The salient feature of central place theory state that a central place is defined as the settlement which provide the availability of goods and services to its surrounding settlements which will in turn depends on the distance and cost at which facilities could be offered. (Berry 1976). Berry and Garrison have recently stated that whatever the distribution of purchasing power (and whether in open countryside or within a large metropolis) a hierarchical spatial structure of central places supplying central goods will emerge.

The same was explained by many economics geographers under the locational advantages of cost, and hence the centrality is recognized, the same is in consonance with the Hotelling's location theory in economics which tried to explain the location of markets place on linear and circular arrangements to minimize cost of transportation and capture the market by producers, (Harold Hotelling) in the article "Stability in Competition" in Economic Journal in 1929)

The assumption is that the consumer would buy the goods from the nearest market, and the concentration of market at the central place would depend upon the population size of that place. Homogeneous distribution of income and settlement was the strong assumption of this theory (Hagget.P). Under the given assumption the settlement pattern would be hexagonal (to avoid under lap and overlap problem of circular arrangement) and the system would be governed by the alternate principles like marketing, administration and transportation (Christaller, 1933).

This version was further improved by August Losch and used, based on the concept of hierarchies and combined it with the framework of economic art in which the he showed the flexibility between the number of central place and their functions. The attempt was to use this central place model as a tool for spatial development, to achieve economies of scale, avoiding the issue of economic growth he treated the agglomeration of human activities as spatial reflection of socioeconomic change which witnessed the emergence of extensive literature on central place theory and its impact on spatial distribution, socioeconomic change and in toto the regional development.

Central-place theory submits that differences in access to consumer markets affect the location of goods and services (Beavon 1977; Christaller [1933]1966; Losch 1954). According to this theory, there is a maximum range that a consumer is willing to travel for a specific good and a minimum market size (threshold) necessary to support suppliers. The interplay between range and threshold determines where the good or service is offered.

Preston's study supports the validity of the principal behavioral assumption of Christaller in the central place theory. There are existence of interdependence between centers to provide the goods and services, and also hierarchical class-systems of central places. There are relative importance of settlements (central place system) as regional centers, because they provides goods and services demanded by the center's own inhabitants and it's complimentary region.

Haggett, argued that nodal region is a general system in human geography in which some of objects like towns, villages, farms, etc. Are related under circular flow of money, migrants, freight, etc. and other energy inputs come in the system by the biological and social demand of the people.

Preston (1971) said that hierarchical pattern are because of greater social, physical, and economic heterogeneity of larger areas, and other differences are found in individual subsystems. When all these subsystems are aggregated central place hierarchy is developed. With the changing technology and life style, Christaller's contributions is important in the investigation of settlements and structure, and operation of particular space economies.

By analyzing Christaller's and Losch's concept, Bell indicated the most critical locational and centrality factors and these are markets, transportation routes, and raw material. Losch argued that alignment of centers along transport axis, are more important rather than maximizing the coincidence of activities in center. Locational decisions of entrepreneurs and complementary activities, agglomerating economies of alternate sites having different tributary population affect central place system.

Only cities maximizing access to all consumer markets offer a full range of goods and support a large constituent population and diverse economy. Cities with suboptimal access offer only goods with lower market thresholds and narrower ranges; such cities have correspondingly smaller populations and economies. The result of differential access to consumer markets is functionally differentiated among places and a flow of consumers from less central places to more central places for the provision of higher order goods. In the network of consumer flows, centrality is reflected in the number and volume of exchanges from other cities. The most central place draws more consumers from all other places while less central places draw fewer consumers from fewer places. Thus the concept of centrality is always implicit in any economics theorization and making of policies related to economic growth and development.

Geographical differences exist at different level but there are two ways to look in to the problems of regional imbalance through centrality concept as it is implicit in all studies related to human settlements, these ways are through central place distribution and decentralization and concentration of activities of particular nodal center and their diffusion from that center (Harris and Ullman; 1954). Functional effect on the settlement pattern in the adjoining areas of the central places keeps on expanding and is analyzed through the extent of diffusion.

The two main process of diffusion through which the wide variety of social changes takes place are contagion diffusion and hierarchical diffusion. First happens from direct local contacts between people, and the examples for these are spread of diseases , agricultural innovations, all these happens due to spatial homogeneity and progression of social segregation within a city as simulated for the Negro ghetto of Seattle(Richard Morrill). The hierarchical diffusion is more scattered in urban centers, where potential adopters are preferentially located this explains the spatial evolution and cultural innovations (Haggerstand, 1982).

But the diffusion process can be controlled through targeted government policies of redistribution and controlled production process and interregional trade, government policies intend to foster the development in the rural areas by providing the accessibility of required resource base in urban areas to increase the agriculture productivity and market for agricultural output in the nearby towns. This increases the level of social and economic gains in rural areas result in development of that region. (Wanmali, Sen, Ramesh 1971)

Regional economic development planning and spatial development planning are done by assimilating the concept of centrality theory and social diffusion processes, but this do not work exactly because of real constraints like irregularity of settlements, distribution of services,physiographic features, and differences in socioeconomic conditions.

This study about Alwar (Rajasthan) based on the centrality theory to find the distribution of settlement pattern and the functions influencing the

socioeconomic development, the study also tries to find that how the physiographic features, transport networks, population distributions and government efforts in redistribution of resources determine the development outlook of the region under study. The study will also try to validate the centrality theory and diffusion process. It also check the functional and hierarchal structure with the agglomerations of service center, and its distribution in the area under study.

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Chapter- 2

ALWAR REGIONAL STRUCTURE: SALIENT FEATURE AND SPATIAL ARRANGEMENT

2.1 Introduction

Regional structure of any place is the Physiography of that place with various species living in their particular habitats. The focus of this study is human being thus the stress is on their population distributions, characteristics of population and socio-economic structure. All these are the basic parameters in deciding and accessing the pace of economic and regional development of the area in this study.

In this chapter the focus of study is pattern of human settlement, in terms of its location, physical feature, and distribution of settlements in terms of its size and population density. The demographic characteristics discussed which are (a) distribution of population, (b) density of population, (c) population growth rate, and (d) sex ratio. Socioeconomic characteristic are (a) distribution of urban population, (b) schedule caste and schedule tribe population distribution, and (c) literacy rate. All these play a direct role in influencing and deciding the growth and development of any region. So the social, economic and demographic aspect becomes very important in our study.

2.2 Location and physical features

Alwar District is a part of National Capital Region (NCR), under the regional development plan formulated during the year 1985, to plan and promote a balanced and harmonious development around the national capital in order to check the unprecedented growth of Delhi. According to the plan, Alwar and Bhiwadi was identified as regional centers and are to be developed for siting of industries and other economic activities on priority basis.

The District is situated in north-east Rajasthan between 27°04' N and 28°04' N latitudes and 76°07' E and 77°13' E longitudes. It covers an area of 8,380 square kilometers. The District occupies about 2.45% of the total area of the State. The District is the 17th largest by area in the State. It is bounded in the north and north-east by Gurgaon District of Haryana and Bharatpur District respectively. In the north-west, Alwar is bounded by Rewari, District of Haryana. Jaipur District bounds Alwar in the south-west and south. Sawai Madhopur District surrounds Alwar in the south.

LOCATION MAP OF ALWAR 2001
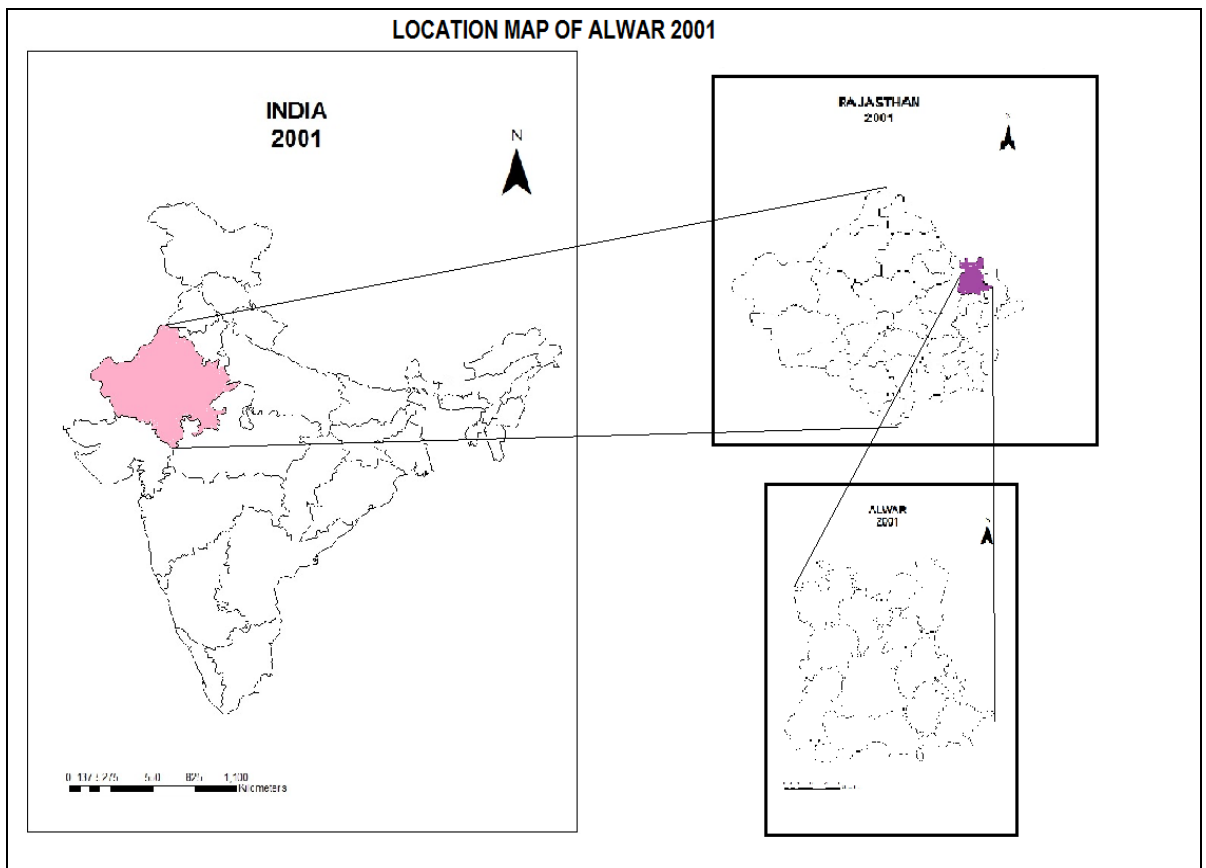
The central part of the district is covered by the Aravali hills, which run north to south ranging in height from 450 meters to 700 meters. The region has more or less flat topped hills, which is more prominent in south western part of the district. They enclose them with fertile valley that provides sanctuary to the wild life of the region in the forest of the sariska. Two seasonal rivers in district are Ruparel and Sabi. Ruparel rises from the hills of Thanagazi and finally terminates in Bharatpur district. River Sabi rises from Jaipur district enters Bansur Tehsil of the district, and then flows through the Behror, Mandawar, Kishangarh bas, and Tijara tehsil and then it enters Gurgaon district of Haryana state. The soil in western part of the district is brown, fine to loamy, sand, deep, non- calcareous. In eastern part soil is alluvial and thus of good quality.

2.3 Distribution of Settlements

Distributions of settlements imply the degree of dispersion or nucleation of the dwellings in terms of human population. This gives rise to settlement pattern refer

to geometrical shapes formed by the arrangement of dwellings. To identify such patterns in our study the, District has been taken as per the division by the government, for regional development. Map 2.2 gives picture of 12 sub-divisions also called 12 tehsils. (1) Laxmangarh (2) Behror (3) Mundawar (4) Kotkasim (5) Tijara (6) Bansur (7) Kishangarh Bas (8) Ramgarh (9) Thanagazi (10) Kathumar (11) Rajgarh (12) Alwar. The distribution of settlements and the percentage of population and its order according to population size in Alwar district are given below in table 2.1.

Map no. 2.2

ALWAR TEHSILS 2001
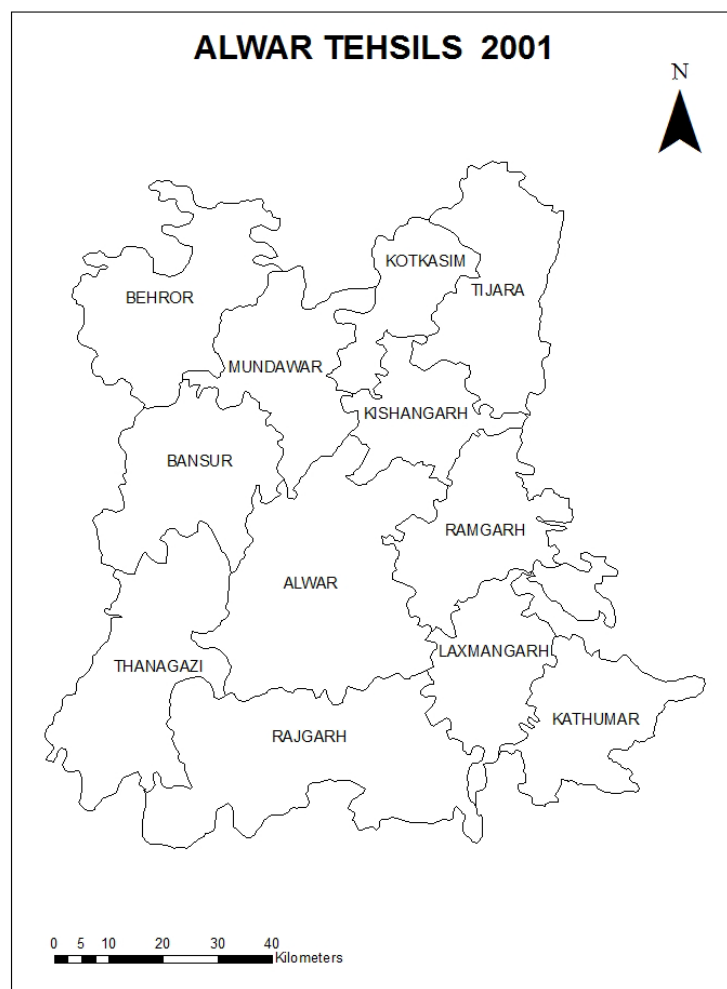
Table no. 2.1
Alwar district
Total number of Rural Settlement and Population in Each Size Class of
Population 2001

Sr. no.	Settlement Size	Settlement	Percent of Settlement	Population	Percent of Population
1	<200	151	7.6	11492	0.47
2	200-499	331	16.6	123157	5.04
3	500-999	584	29.3	435415	17.83
4	1000-1999	605	30.3	848180	34.74
5	2000-4999	273	13.7	666374	27.30
6	5000<	50	2.5	356306	14.59
	Total	1994	100.0	2440924	100

Source: District Census Handbook of Alwar,Census of India 2001

Table No 2.1 indicates that majority of rural settlements are of medium size (<500 persons). And a population size ranging from (2000-10000) are having less number of settlements in comparison to lower size settlements. A significant proportion of settlements (30%) have population size of (1000- 1999 person) with highest number of settlements (605). Small size settlements are having less concentration of population, and the majority of the populations are in high size (above 5000) of the settlements. Various causes can be accounted for the concentration of population; these are agricultural carrying capacity, the presence of service centers, and road connectivity.

2.4 Distribution of Size Classes of Settlements

Table No- 2.2 and graph No- 2.1, indicate that the small size settlements with higher concentration of population are in Thanagazi, Kotkasim, and Tijara. Mundawar, Bansur and Behror have less concentration of population under small size settlement. In medium size settlement higher concentration of population is in Behror, Mundawar and Bansur. Lower is in Rajgarh, Kotkasim and Tijara. In rest of the tehsil the concentration is of medium size. Under high sized settlement Alwar and

Kathumar has higher population concentration. The significance of this study will help in analyzing the distribution of service centers in coming chapters to conclude some results in explaining determinants for the development of Alwar, with the constraints explaining the backwardness.

Combining other functions the centrality will be identified. The centrality of a place is usually determined by three basic parameters one is range of service centers in terms of cost and location, other is the threshold which is the minimum number of population required to support some activity and third even spacing. It depends more or less on the geographical structure of the place. Final is the agglomeration principle which decide the clustering of the economic activities

Table no. 2.2
Alwar district
Percentage of Settlement in Each Size Class of Population 2001

Thesils	<200	200-499	500-999	1000-1999	2000-4999	5000-9999	10000<
BEHROR	6.21	9.60	19.21	37.29	25.99	1.13	0.56
MUNDAWAR	1.41	7.75	33.10	42.96	12.68	2.11	0.00
KOTKASIM	4.31	26.72	32.76	30.17	4.31	1.72	0.00
TIJARA	8.78	15.12	35.12	30.24	9.27	1.46	0.00
KISHANGARH	9.17	20.18	30.28	28.44	11.01	0.92	0.00
RAMGARH	3.64	21.82	29.09	32.73	10.30	1.82	0.61
ALWAR	9.22	12.14	29.13	24.76	20.39	4.37	0.00
BANSUR	3.03	9.85	25.00	39.39	18.94	3.03	0.76
THANAGAZI	20.75	17.61	20.13	26.42	12.58	1.26	1.26
RAJGARH	12.85	20.88	31.73	19.28	12.85	2.41	0.00
LAXMANGARH	3.08	20.51	32.82	31.79	9.74	2.05	0.00
KATHUMAR	3.60	17.99	31.65	29.50	12.95	4.32	0.00

Source: District Census Handbook of Alwar,Census of India 2001

Concentration of settlement has the relationship with the soil fertility, physiography and presence of water bodies like lake, ponds, rivers and canals, and road connectivity. Higher concentration of population is found in middle sized settlement and soil fertility being the main cause for this result. These tehsils are having the presence of older alluvial soil. And the tehsils are Tijara, Kishangarh and Behror. Mundawar has one extra cause for having more population that it is situated in plain region. For high sized concentration in Behror NH-8 is responsible which is because of the connectivity. In Rajgarh there is lower concentration, because this region is covered by hilly area with red gravelly and red sandy soil.

Small sized settlement has high concentration in Thanagazi and Rajgarh. These regions have hills which show the relationship with the physiography. Connectivity also play important role in settlement concentrations. Alwar and Behror have higher concentration because of high connectivity of roads and railways.

Through Behror lack in railways facilities but NH-8 gives adequate connectivity for having more concentration of settlements in the region.

2.5 Road network

Map 2.3 explains the graphic presentation that how the metal roads, national highways and state highways pass in Alwar district. State highway 29 passes through Rajgarh and Thanagazi. State highway 13 passes through Thanagazi, and Alwar. State highway 14 passes through Alwar, Rajmarh, Laxmangarh, Mandawar and Behror. State highway 35 passes through Ramgarh, Laxmangarh, Rajgarh and crosses SH -14 at Ramgarh. State highway 25 passes through Rajgarh, Alwar, Kishangarh and Tijara. State Highways 14, 25 & 13 cross each other in Alwar. State Highway 22 passes through Kathumar.National Highway 8 passes through Behror and it connects it to Delhi. And National highway 11-A passes through Thanagazi.

Map no. 2.3
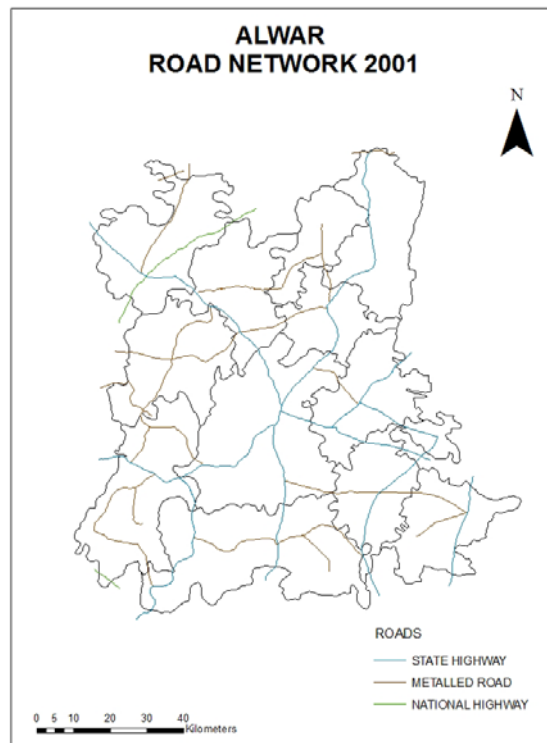
Kotkasim and Bansur, tehsils have neither National highway nor State highway passing through the region. But these tehsils are connected by important metalled road and insure its connectivity with Alwar. And Alwar city is nodal point where all roads meet. Maximum state highways pass through Alwar city proving it to be a candidate for central place.

2.6 Road Accessibility

Road accessibility is important indicator to show a place as a central place and decide the level of economic activities in the surrounding region. Because of road connectivity the area developed in urban center (towns) and it became supply center in terms of manufacturing goods consumers good and other, to its surrounding regions.

Map no. 2.4
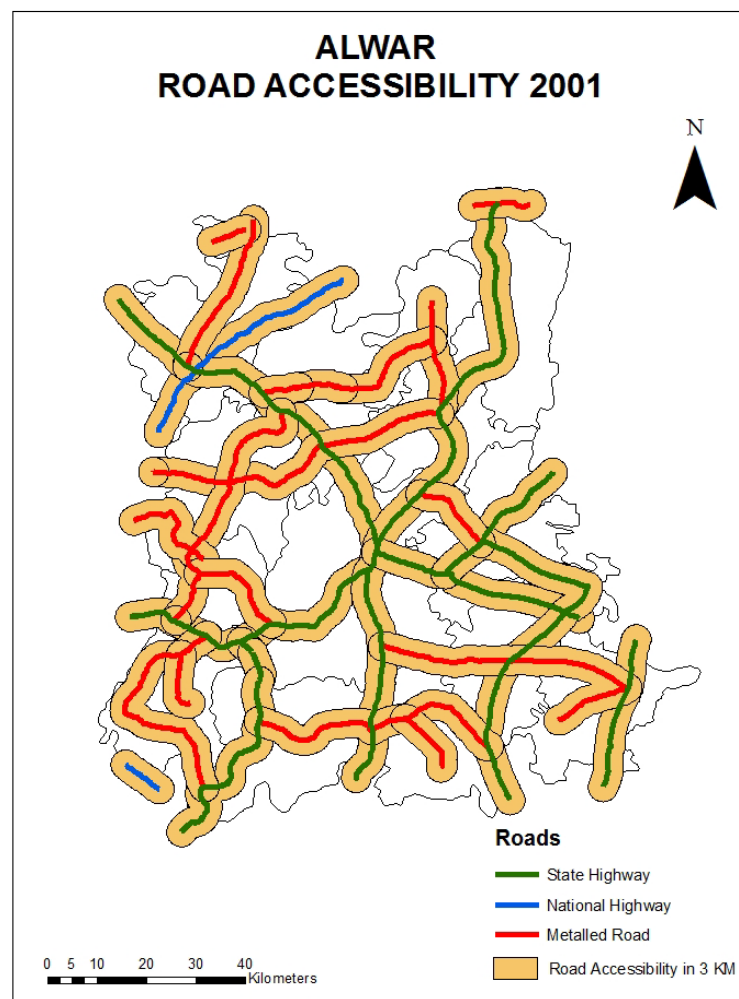
Map 2.4 explains the degree and pattern of road accessibility in Alwar district. All the tehsils are covered by road network. Road network is consisting of state highway, national highway and metalled road. Accessibility is created in the range of 3 KM of state highway, national highway and metalled road. Alwar is showing radial pattern of road network, as it is connected to all other small towns through road

network. This makes Alwar a central place in the district which is well developed with the provisions of other services.

2.7 Rail Accessibility

Map no. 2.5
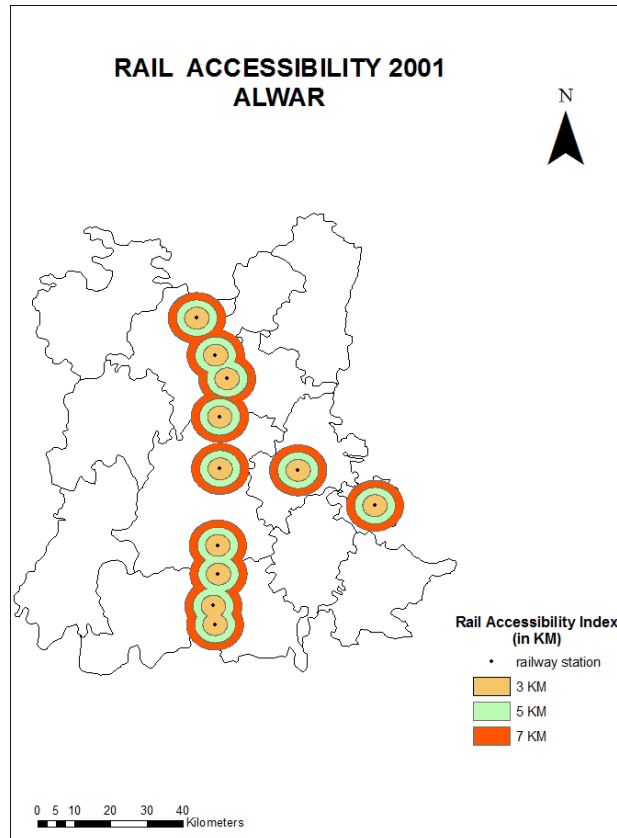
Map 2.5 explains the Railway network distribution in Alwar district. It is important for the bulk transportation of goods and passengers. This transport facility makes the surrounding area a candidate for the industrialization and urbanization. In Alwar railway Railway line is linearly distributed and passes through Rajgarh, Alwar, Kishangarh, Kotkasim and Mandawar. On this railway line, connecting Jaipur to Delhi, important stations are Rajgarh, Malkhera, Alwar, Khairthal, Harsoli, and Bawal.

Behror, Bansur, Thanagazi, Kathumar and Tijara tehsils are not covered by the railway line. On the Agra railway line important stations are Alwar, Ramgarh and Govindgarh. The map shows the accessibility in three ranges and is taken as 3km, 5km and 7km in width respectively.

2.8 Demographic characterstics

Alwar is situated between Aravali hills and plain area, due to this physiographic scene, population distribution is settled in scattered manner. And other vital cause of concentration of settlement is agricultural land. Crop distribution is concentrated in a few pockets. Main crop are Rabi and Kharif, Rabi crops are wheat gram, rape-seed, barley, pulses. Kharif crops are jowar, bajara, kharif pulses, maize, rice and arhar. In this part focus of study is demographic characteristics such as percentage of population in various class size, population density, population growth rate and urban population. Socio economic aspect of population is covered under sex ratio, literacy, and SC& ST population.

2.8(a) Distribution of population

The distribution of population in different size class is discussed. This distribution is studied here, to know the population pattern in different size of settlement.

Table no. 2.3
Alwar district
Percentage of Population in Each Size Class of Population 2001

Thesils	<200	200-499	500-999	1000-1999	2000-4999	5000<
BEHROR	0.4	3.9	14.9	56.2	7.6	17.0
MUNDAWAR	0.1	2.1	18.4	44.6	26.1	8.8
KOTKASIM	0.5	9.5	24.2	40.9	11.9	12.9
TIJARA	0.7	5.1	23.2	37.8	25.3	7.9
KISHANGARH	0.5	7.1	20.1	39.3	28.7	4.2
RAMGARH	0.3	6.7	17.5	38.1	22.1	15.4
ALWAR	0.4	2.8	14.9	23.3	40.2	18.3
BANSUR	0.2	2.1	11.9	34.1	34.8	16.8
THANAGAZI	1.1	5.4	12.3	30.8	29.8	20.7
RAJGARH	1.0	6.7	20.6	24.0	33.2	14.5
LAXMANGARH	0.2	6.6	20.7	36.1	22.9	13.4
KATHUMAR	0.1	5.3	17.6	28.8	27.7	20.4

Source: District Census Handbook of Alwar,Census of India 2001

Graph no. 2.2
Alwar district
Percentage of Population in Each Size Class of Population 2001
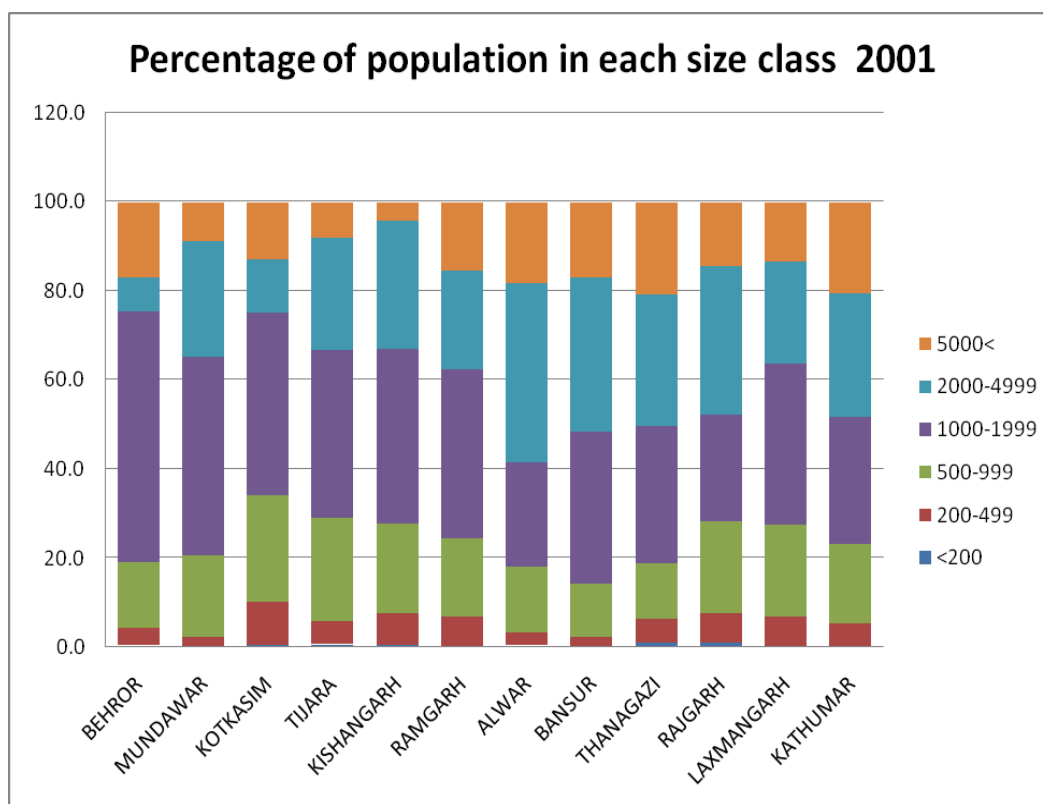
Table no.2.3 & graph no. 2.2. Indicate that most of the population is concentrated the medium class sized of (1000-1999). In this size class highest concentration is in Behror, Mundawar and Alwar. Reason for this is location of Behror, that is in North West near to Delhi a well-developed central place and presence of NH-8 connecting it from Delhi and Jaipur. Behror act as potential industrial store house and industrial hub for facilitating its central places Delhi and Jaipur.

Mundawar is located in plain area with double crop land, with better road connectivity from Behror and railways station near Mundawar. In other tehsil population is less concentrated such as Alwar and Kathumar. But under medium sized settlement (2000-4999) type Alwar has the highest population concentration because of Alwar is city and it is administrative headquarter of the district. Alwar is followed by Bansur which is near to the NH-8.

2.8(b) Distribution of Population Density

Population density plays an important role in the concentration of central function within central place. Population density is affected by topography, physical features, accessibility, and connectivity. Accessibility and connectivity are higher in urban center. Urban population densities decline in a negative exponential manner with increasing distance from the city center, (Clark 1961) [1]. But in some area there can be weakest correlation between density and distance from central places. (Winsborough 1961)[2].

The table No-2.4 shows that Alwar has highest population density, which is followed by Behror and Tijara because they come under plain area and there is abundance of service centers, with better transportation facilities(roadways and railways) and connectivity from adjoining areas. Thanagazi have lowest population

[1] **Clark, Colin** (1951). "Urban Population Densities", Journal Royal *Statistical Society*, Ser. A, Vol. 114, pp. 490-496.

[2] **Halliman H. Winsborough** (1961. ")*A Comparative Study of Urban Population Densities*" (unpublished Ph.D. dissertation, Department of Sociology, The University of Chicago.

density because it falls under Aravali hills and Sariska tiger reserve park. It is not well connected by

<div align="center">

Table no. 2.4
Alwar district
Population Density in Tehsils 2001

TEHSILS	POPULATION DENSITY (persons sq.km)
BEHROR	419
MUNDAWAR	345
KOTKASIM	343
TIJARA	419
KISHANGARH	400
RAMGARH	347
ALWAR	452
BANSUR	311
THANAGAZI	178
RAJGARH	233
LAXMANGARH	385
KATHUMAR	408

</div>

Source: District Census Handbook of Alwar,Census of India 2001

roadways and railways. Alwar city is the most populous city and it is class I city in this tehsil. This tehsil is well connected by roadways and railways and being an administrative headquarter and central in its position. It is influenced by various pull factors, which accrue to highest population density in Alwar.

Map 2.6 depicts distribution of population densityof Alwar district. There are four categories of population density. Higher population density above (400 persons per sq.km) is found in Alwar , Kishangarhbas, Tijara, Behror and Kathumar. In Thanagazi it is below 200 persons per sq.km, and in Rajgarh it is in the range of (200-300). Physiographic feature like hilly region and soil infertility accounts for such population density. Major parts of these areas (Rajgarh & Thanagazi) are covered by Aravali hills. In comparison to

**POPULATION DENSITY 2001
ALWAR**

N

POPULATION DENSITY
(persons/km sq.

- 400<
- 300 - 400
- 200 - 300
- < 200

0 5 10   20   30   40
Kilometers
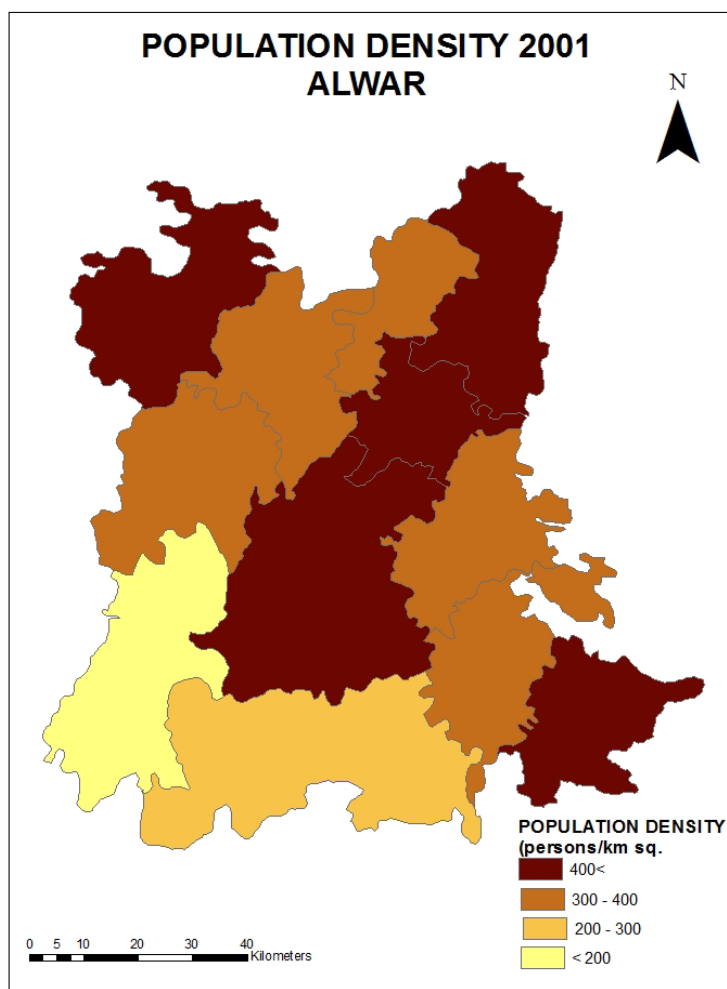
other tehsil, there is less area fall under of plains. While in Alwar, Kathumar, Kishangarh, Tijara and Behror population density is more than 400person per sq.km, and these tehsils are well connected through railway line or roadways or both. This area provides locational and connectivity advantages which accrue to the development of new industries. Because of this, work force is attracted towards these places and adds to the population density. Bhiwadi is a well-developed industrial hub so it facilitates other services to make it tend towards the centrality. In other tehsils population density is medium because of less connectivity and under developed economic activities.

2.8(c) Population Growth Rate

Population growth is the outcome of natural increase as well as both in and out migration of population. Higher economic potential of a region leads to higher migration rate towards the center. Population growth rate in any region fulfill the threshold requirement for any place to be developed as a central place, so growth rate of population is an important determinant in this study. It helps to forecast the birth of center places. Its order in terms of service centers. It is of due importance for the economic and regional development planning.

The table No- 2.5 and map2.7 shows the population growth rate of different towns of Alwar district. Highest growth rate is in Bhiwadi, followed by Behror, and Khairthal. Bhiwadi has highest population growth rate because it is a progressing industrial hub. Because of industries, economic activities have increased in this region creating potential job market and a place of agglomeration of most of the economic activities. NH- 8 passes, through Behror connecting two major central places. This creates economic activities in the adjoining areas, and hence attracts the population to settled causing population growth rate. Kishangarh has no population growth rate because it is lower population base and less agglomeration of economic activities.

Table no. 2.5
Alwar district
Population Growth Rate in Towns 2001

Class	Urban Center	Growth Rate 1991-2001	Population 2001
III	Bhiwadi	121.64	33877
III	Behror	40.76	22856
III	Khairthal	40.74	32005
IV	Tijara	29.37	19921
I	Alwar	27.07	266203
IV	Kherli	26.45	15506
IV	Govindgarh	26.25	10089
III	Rajgarh	23.66	25009
V	Kishangarh	0.00	9473

Map no. 2.7
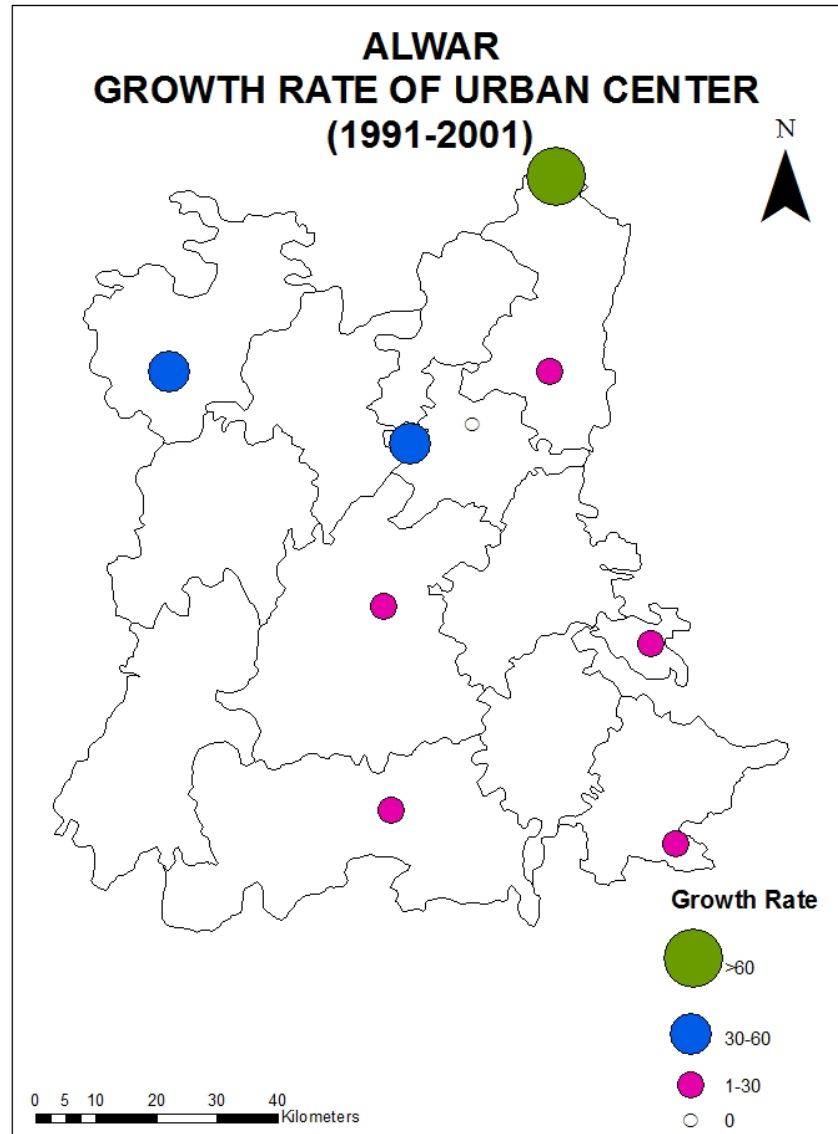
2.8(d) Distribution of Urban population

Urban center act as engine of growth in the adjoining areas thus importance of the study of urban distribution of center increases. Growth of urbanization brings development in its centers. It increases the potential of centers in bringing the different services and fostering economic activities in that region. There is close relationship between urban growth and changes in the structure of urban activities

37

(Berry & Garrision 1958)[3]. The increasing economic activities and agglomeration of services at a central place are likely to influence the sociocultural aspects of the surroundings and creating demands for the more advanced and improved services influenced the distribution of urban population.

Table no. 2.6
Alwar district
Urban Population in Tehsils 2001

NAME	Percentage of urban population to total urban population	Percentage of urban population to total population
Behror	5.3	7.5
Mandawar	0.0	0.0
Kotkasim	0.0	0.0
Tijara	12.4	19.2
Kishangarh Bas	9.5	25.7
Ramgarh	0.0	0.0
Alwar	61.2	46.8
Bansur	0.0	0.0
Thanagazi	0.0	0.0
Rajgarh	5.8	8.2
Lachhmangarh	2.3	4.2
Kathumar	3.6	7.5
Alwar DISTRICT	100.0	14.5

Source: District Census Handbook of Alwar,Census of India 2001

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[3] **Berry, Brian J. L. and William L. Garrison** (1958). "A Note on Central Place Theory and the Range of a Good", *Economic Geography*", Vol. 34, No. 4 Oct., pp. 304-311

PERCENTAGE OF TOTAL URBAN POPULATION 2001
ALWAR

N

percent to total urban

■	60 <
■	5 - 15
■	1 - 5
□	0

0 5 10   20   30   40
Kilometers
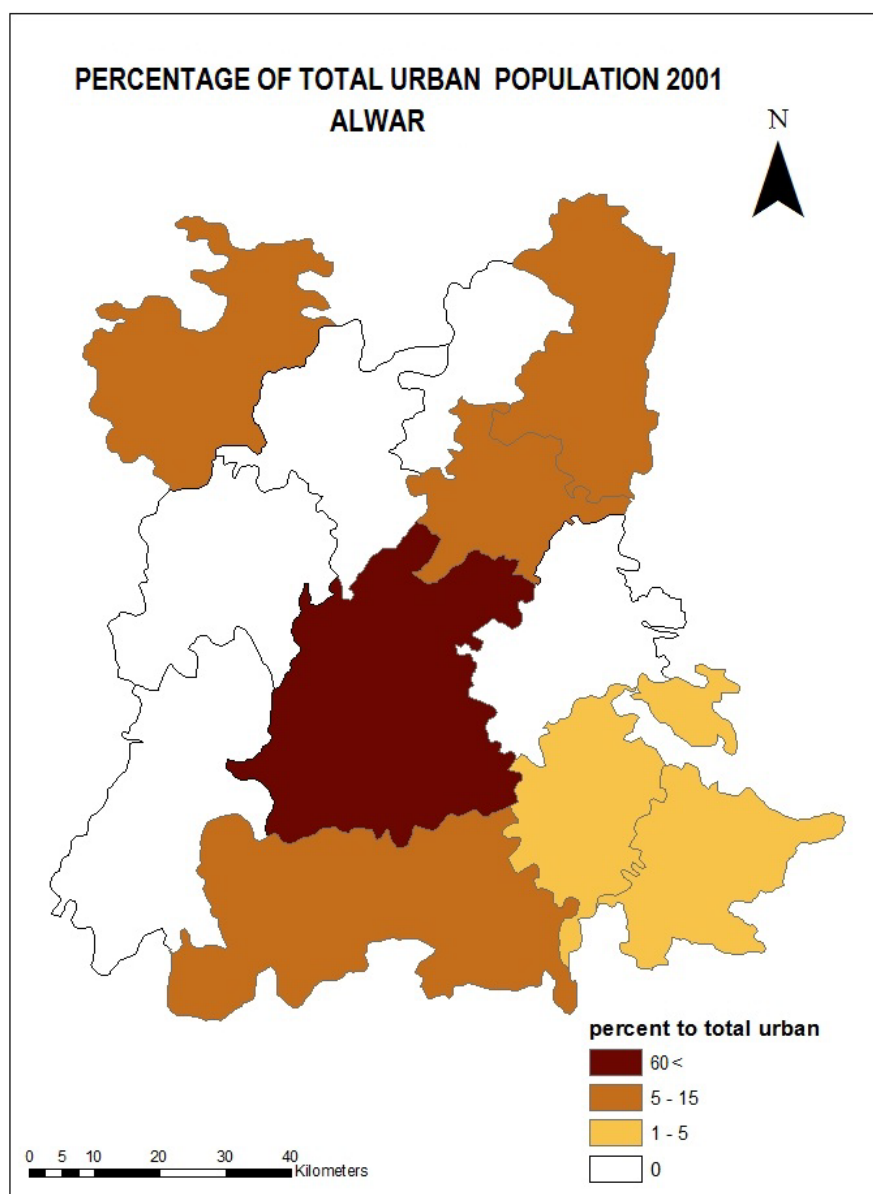
The table No- 2.6, map 2.8 & map 2.9 shows the percentage of total urban population tehsils wise. Alwar has higher concentration of urban population to total urban population. It is above 60% showing high disparities as other tehsils have below 15% urban to total urban population. It is because this tehsil is administrative Headquarter providing all the services to surrounding region. And it is highly connected through roadways and railways from other centers like Ajmer and Delhi. Alwar tehsil has Class I town. Location wise this tehsil is central where the all roads coming from various directions meets.
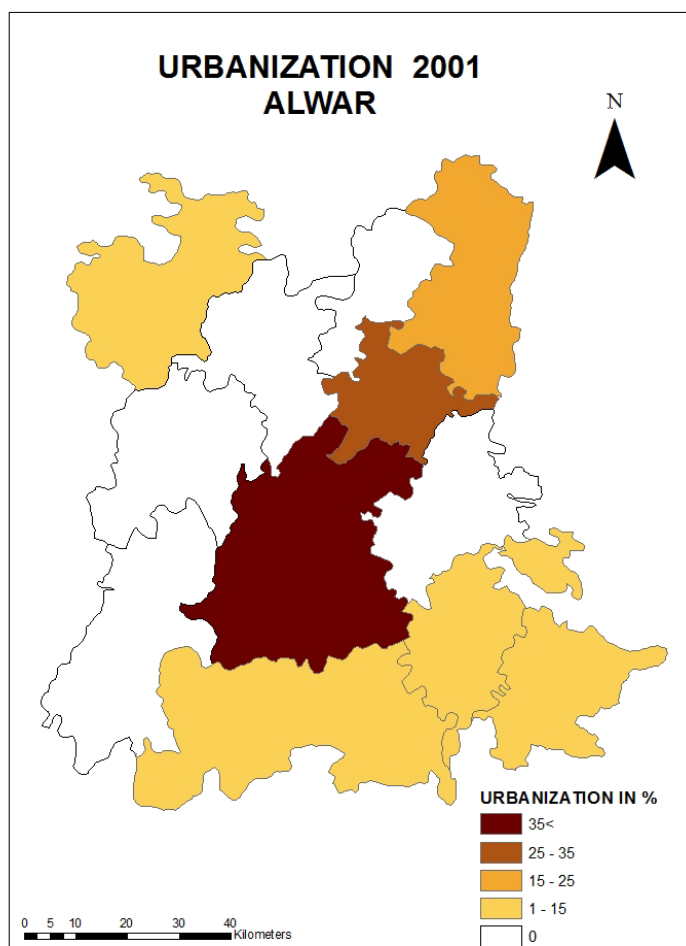
Rests of other tehsils are without urban centers, these are: Mundawar, Kotkasim, Ramgarh, Bansur, and Thanagazi.   In these tehsils concentration of urban population is low because of various factors. Kotkasim and Bansur have bad roadways connectivity can be one main cause. In Bansur and Thangazi urban population concentration is less because of its physiographic feature as these regions lie in hilly region and has less fertile land.

 Alwar tehsil is highly urbanized with 46.8% level of urbanization; it is followed by Kishangarhbas, and Tijara. Overall urbanization in Alwar district is 14.5%. From the above map it is observed that 5 tehsils are having no urbanization. And this can be accounted for various reasons among them the connectivity of the places from other central places limits the development of economic activities in the region. Southern tehsils have level of urbanization below 15%, these tehsils are

Rajgarh, Laxmangarh, Kathumar. Overall Alwar region is not well urbanized so we can conclude that the low level of development in the region.

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Table no. 2.7
Alwar district
Urban Population Percentage in Towns 2001

</div>

CLASS	TOWN_NAME	TOTAL POPULATION	PERCENTAGE OF URBAN POPULATION TO TOTAL URBAN POPULATION
I	Alwar	266203	61.2
III	Behror	22856	5.3
III	Bhiwadi	33877	7.8
IV	Govindgarh	10089	2.3
III	Khairthal	32005	7.4
IV	Kherli	15506	3.6
V	Kishangarh	9473	2.2
III	Rajgarh	25009	5.8
IV	Tijara	19921	4.6
	Total	434939	100

Source: Town directory,District Census Handbook of Alwar,Census of India 2001

Table 2.7 indicates that, 9 urban centers are there in all out of which three are class IV , four are class III (20000-50000 population), while only one town in Alwar district is of class I urban center(Alwar) with population of 266203 persons in 2001. There is huge concentration of population only in Alwar town, while rest of the towns has very less population. The district has three class IV towns with population ranging from 10089-1992 persons. In Alwar city service centers are concentrated, which has multiplier effect on the economic activities and creates demand pull effect in bringing more and more service center leading to agglomeration of economics activities which has a spillover effect in the adjoining areas causing expansion of central place. That's why in this city there is good connectivity by transports. Location of this city is also central. All these factors attract population from remote areas in order to get job and to leave as these places have better living condition. Among all urban centers of Alwar district. Alwar has the highest population percentage. Kishangarh and

Govindgarh have the lowest town wise population percentage it is far from the railways and roadways connectivity and other central places.

2.8 (e)Rank size rule and hierarchy

The rank-size rule (or rank-size distribution) of city populations, is a commonly observed statistical relationship between the population sizes and population ranks of a towns of a region under study. For many years, the reasoning behind the rank-size rule was unknown. In its most restrictive form (as devised by geographers), the rule is:

$$P_x = P_1/x$$

where:

x is the rank of the city's population i.e. 1 for the highest population, 2 for the second highest etc.

P_x Is the population size of the city ranked x

P_1 is the population size of the largest city.

On the basic of this method the rank size of different towns are calculated in this study with the following findings.

RANK SIZE RELATIONSHIP OF CITIES OF ALWAR 2001
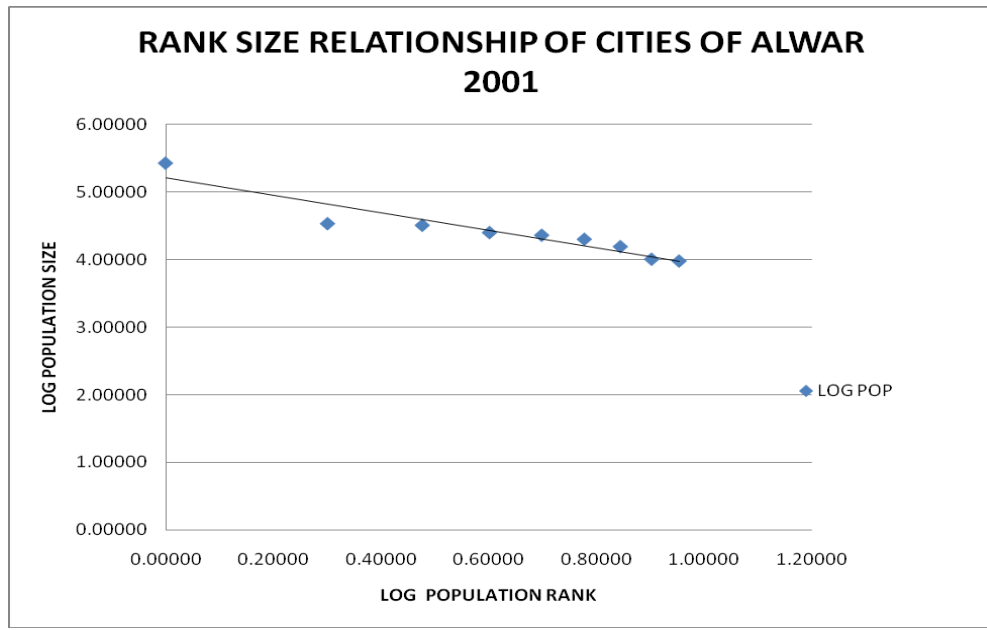
Graph 2.3 explains that Alwar is much higher than the trend line, only 2nd city is not on the trend line. This shows that Alwar has much higher population size. Second settlement is slight lower population size.and proves that trend line depends on population size.

2.8(f) SC & ST population

While capturing the demographic characteristics SC & ST has been taken because of the social factors, which have the significant influence in deciding the regional development. They usually, live in segregated settlements. Their population is vital in deciding the identification of central place. The majority of this population constitute unskilled workforce, which is important in the labour market from supply side. Labour forces mainly help in building the infrastructure facilities which is backbone of economic structure for the development. Thus their distribution needs to be included in our study.

Table No. 2.8 shows that highest percentage of SC population is in Kathumar followed by Kishangarh and for ST it is in Rajgarh. Lowest concentration of SC population is in Tijara and Thanagazi. For ST it is again Tijara and Kishangarh.

Table no. 2.8
Alwar district
Percentage of SC & ST Tehsil wise 2001

TEHSILS	PERCENTAGE of SC	PERCENTAGE of ST
BEHROR	15.6	1.4
MUNDAWAR	19.4	2.1
KOTKASIM	19.3	0.8
TIJARA	13.6	0.2
KISHANGARH	20.9	0.2
RAMGARH	17.4	2.2
ALWAR	19.6	4.8
BANSUR	15.4	4.3
THANAGAZI	14.5	19.1
RAJGARH	18.8	30.8
LAXMANGARH	18.5	12.1
KATHUMAR	22.7	11.9

Source: Primary Census Abstract of Alwar,Census of India 2001
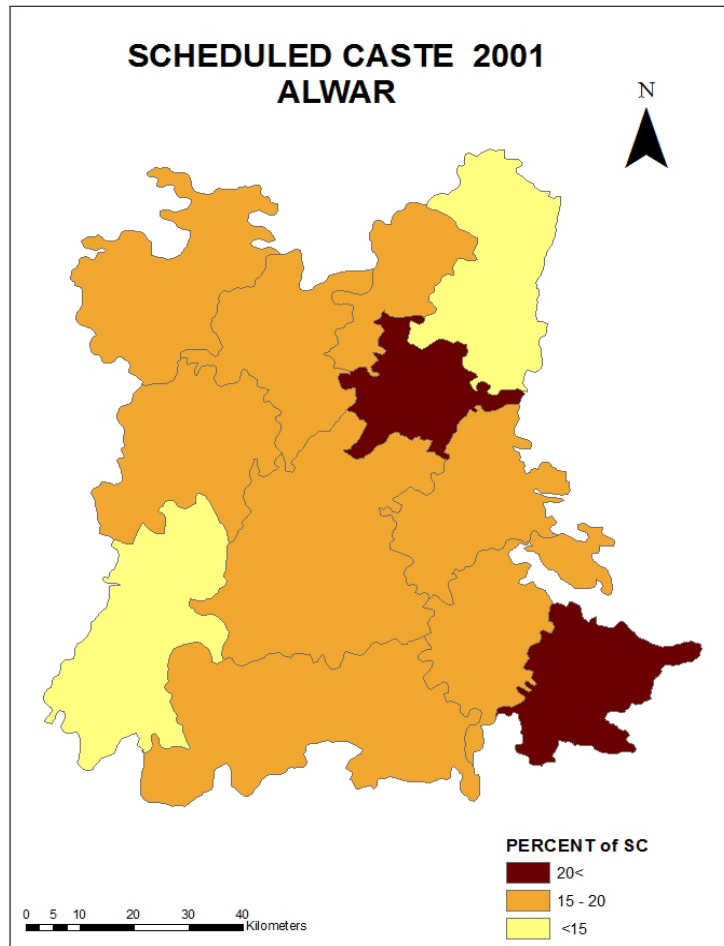
Map 2.10 depicts that more than 20 % of SC populations are distributed in Kishangarh and Kathumar, except Tijara and Thanagazi in rest of the tehsil SC population distribution varies between 15 to 20 percent. Lowest SC population is in Thanagazi
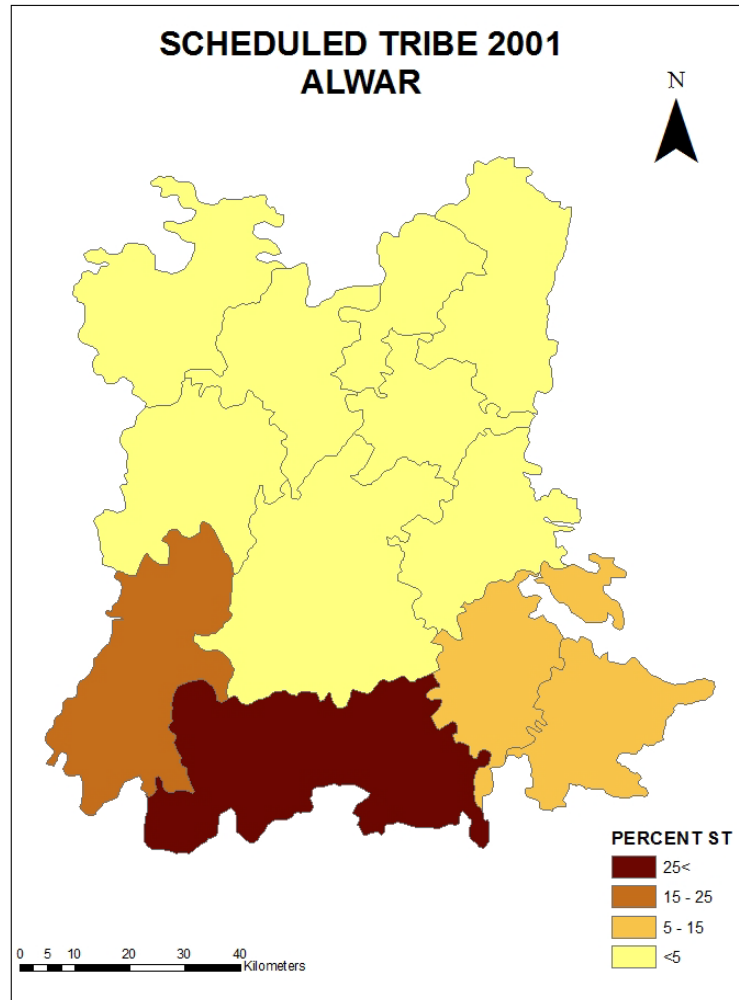
Map 2.11 depicts the population distribution of scheduled tribes. In case of ST Population higher distribution is only in Rajgarh that is above 25 %. In Thangazi, Laxmangarh and Kathumar the distribution is of medium percentage but in rest of the tehsil ST population distribution is below 5%.

2.8(g) Literacy

Literacy is one of the main factors in deciding the socioeconomic structure which is important for human development index and its good rate help in promoting the growth of any region by creating a pool of skilled workforce which better service in terms of health facilities, education, and better transportation. All these ultimately lead to rise in the income of the population. Table 2.9 depicts that Behror has the highest percentage of literacy, which is followed by Kotkasim, Mundawar and Alwar. Thanagazi tehsil has lowest literacy.

Table no. 2.9
Alwar district
Percentage of Literacy Tehsil wise 2001

TEHSILS	% Literacy
BEHROR	61.4
MUNDAWAR	56.1
KOTKASIM	56.5
TIJARA	45.3
KISHANGARH	48.7
RAMGARH	40.6
ALWAR	56.1
BANSUR	46.0
THANAGAZI	37.3
RAJGARH	45.9
LAXMANGARH	43.6
KATHUMAR	49.0

Source: Primary Census Abstract of Alwar,Census of India 2001

Alwar district
Percentage of Literacy Tehsil wise 2001
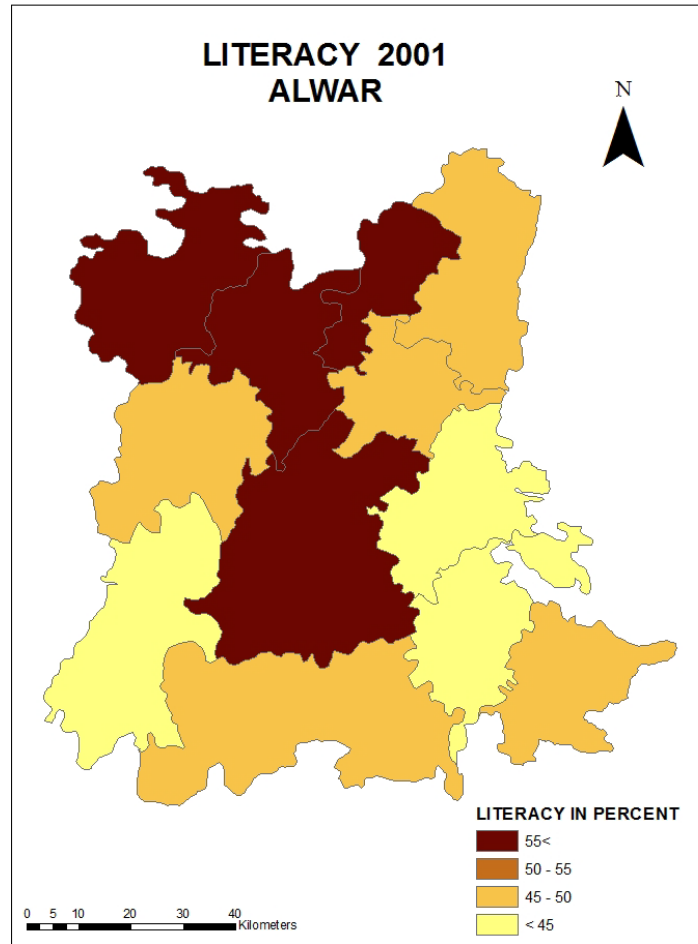
Map 2.12 indicates that the overall literacy in Alwar and northern tehsils like Behror, Mundawar, and Kotkasim is above 55%. Other tehsils have literacy below 50%. In Thanagazi, Laxmangarh and Ramgarh literacy is below 45%. Bansur, Tijara, Kishangarh, Rajgarh and Kathumar have literacy between 45 to 50 %.

2.8(h) Sex Ratio

Sex ratio is also important parameters in describing the demographic structure of any region, which fits into the explanation of the sociocultural structure and its influence on the development paradigm of the region under study.   Map 2.13 and table 2.9 gives the following picture of study area (Alwar). Mundawar have highest sex ratio which is followed by Behror, Kotkasim, Ramgarh. Tijara has lowest sex ratio and it is followed by Kathumar and Alwar. Among 0-6 age group sex ratio is highest in Thanagazi, and is followed by Ramgarh and Laxmangarh.   It is shown that in northern and western tehsil sex ratio is higher, which is above 900. In Tijara it is lowest which is below 860. Rajgarh and Laxmangarh come in the range of 880 to 900. In Alwar and Kathumar tehsil it is below 880.

SEX RATIO 2001
ALWAR

N

SEX RATIO
FEMALE/1000 MALE

900<
880 - 900
860 - 880
< 860

0 5 10   20   30   40
Kilometers

Table no. 2.10
Alwar district
Percentage of Sex Ratio Tehsil wise 2001

TEHSILS	Sex Ratio	Sex Ratio 0-6
BEHROR	917	846
MUNDAWAR	918	859
KOTKASIM	907	860
TIJARA	824	893
KISHANGARH	902	901
RAMGARH	904	904
ALWAR	870	881
BANSUR	904	899
THANAGAZI	902	916
RAJGARH	885	893
LAXMANGARH	888	903
KATHUMAR	868	886

Source: Primary Census Abstract of Alwar, Census of India 2001

2.8(i) Work Force

The work force composition of the study area is also taken in the consideration to identify its influence on the centrality in the region. This factor decides the basis for the level of industrialization and the distribution of economic activities. As this is the important factor of production. And its cheap source will attract the investor so the industrialization increases in the region leading to the development of new towns and cities. To capture the cost characteristic in centrality theory for industrial location, the regional distribution of labour need to be looked upon.

WORK FORCE PARTICIPATION RATE 2001
ALWAR

total workers in percemt

- 55<
- 50 - 55
- 45 - 50
- <45

0 5 10   20   30   40
Kilometers

TEHSILS	TOTAL WORKER	MAIN WORKER	MARGINAL WORKER
ALWAR	41.3	31.4	9.9
RAJGARH	41.8	31.7	10.2
KISHANGARH	43.2	26.8	16.4
RAMGARH	44.5	31.1	13.3
BANSUR	47.8	30.2	17.6
THANAGAZI	49.0	33.4	15.6
KOTKASIM	51.1	32.4	18.7
KATHUMAR	51.2	34.9	16.4
BEHROR	53.3	30.7	22.6
TIJARA	54.0	30.4	23.6
LAXMANGARH	57.4	37.3	20.1
MUNDAWAR	61.3	29.4	31.9

Source: Primary Census Abstract of Alwar, Census of India 2001

Graph no. 2.4
Alwar district
Work force Participation Rate Tehsil wise 2001
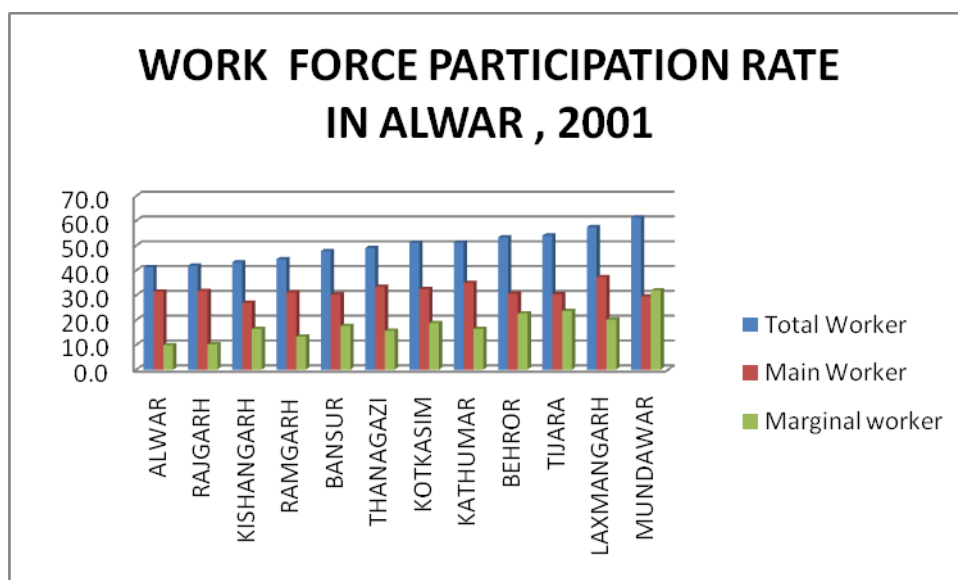
Map 2.14, table 2.11 and graph 2.4 depicts workforce participation and its distribution in the area(Alwar), it is observed that highest worker percentage is in Mundawar, followed by Laxmangarh, Tijara and Behror. Lowest is in Alwar and Rajgarh. Among main workers highest percentage is in Laxmangarh , followed by Kathumar.

 Lowest percentage of main worker is in Kishangarh and Mundawar. Among marginal worker highest percentage is in Mundawar followed by Tijara and Behror. Lowest percentage is in Alwar, followed by Rajgarh, and Ramgarh.

2.9 Conclusion

Distribution of settlements

➢ Largest number of rural settlement is in IV order of settlement followed by V order. In rural population higher population concentration is in 4th order category followed by 3rd order.

➢ In all the tehsils, in 4th order higher concentration is in Behror followed by Tijara, Laxmangarh, Mundawar and Ramgarh, which is above 30 percent.

Distribution of urban population

➢ Largest size of population is concentrated in 2 size classes: 4th order 1000-1999 and 5th order 2000-4999 in Alwar district.

➢ The percentage total urban population is highest in Alwar tehsil which is more than 60 percent. Lowest concentration is in Laxmangarh and Kathumar and absent in Bansur, Thanagazi, Ramgarh, Kotkasim and Mundawar.

➢ Total urbanization is highest again in Alwar tehsil, which is more than 45 percent and above that of state and national average. Lowest concentration is in Laxmangarh and absent in Bansur, Thanagazi, Ramgarh, Kotkasim and Mundawar.

➢ In Alwar district it is 14.5 percent which is below the state and national average.

➢ In cities of Alwar district Alwar city is highly urbanized with 61.2 %.

Distribution of SC & ST population

➢ Highest percentage of SC population is in Kathumar followed by Kishangarh . Lowest concentration is in Tijara and Thanagazi. Higheat percentage of ST population is in Rajgarh and lowest percentage is in Tijara and Kishangarh.

Distribution of Literacy

➢ In term of literacy Behror has the highest percentage of literacy, which is followed by Kotkasim, Mundawar and Alwar and lowest literacy is of Thanagazi tehsil.

Sex ratio

➤ Mundawar has highest sex ratio and it is followed by Behror, Kotkasim, Ramgarh. Tijara has lowest sex ratio and it is followed by Kathumar and Alwar. Among 0-6 sex ratio highest is in Thanagazi, which is followed by Ramgarh and Laxmangarh.

Worker distribution

➤ Mundawar has highest worker percentage and is followed by Laxmangarh, Tijara and Behror. Alwar and Rajgarh has lowest worker percentage. Among main workers group highest percentage is in Laxmangarh , followed by Kathumar. Lowest percentage of main worker is in Kishangarh and Mundawar. Among marginal worker highest percentage is in Mundawar followed by Tijara and Behror. Lowest percentage is in Alwar, followed by Rajgarh and Ramgarh.

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Chapter 3

CENTRAL FUNCTIONS AND THEIR DISTRIBUTION PATTERN

3.1 <u>Introduction</u>

Central functions are those which are available at a few places and its facilities are availed by a number of places. Central functions act as the supply outlet for different services and, close connections between mobility and the distribution of services that is a well-established geographical axiom. In the study various multivariate statistical procedures are used to mark the functions and have shown the distribution pattern of these services tehsil wise, rural and urban settlement wise.

The study related to Alwar intends to find and locate the concentration and distribution of the central functions in Alwar district. The central functions taken in this study are based on the following variables. (a) Education, (b) Health, (c) Credits Facilities, (d) Recreations and (e) Population Density. These variables are judged and their combined effects are calculated to show the place (town wise) or (tehsil wise) for its centrality. The developed or emerging central places accrue its benefits in its surroundings regions.

In Alwar, the functions of centrality throughout the district are identified, and its effect on the linkages with others functions are highlighted. The pattern in which functions are distributed and it agglomerate at a place to reinforce the centrality, give the spatial structure of any settlement. Population density at a place provide threshold, which means the minimum supporting population size for the establishment of any service center. And their ranges from the market places also have a great role in determining the nature and influence of the function taken in the study on the socioeconomic development.

As the geographical landscape and traditional social outlook act as the limiting factor for the diffusion of the benefits of core functional areas on the development of it's the periphery. This study also identify the limitation in the Alwar district which act as constraints in the development .Socio economic structure in case of India plays a significant role in development so it is also taken care of, as it can act like a self-explanatory variable in explaining cause constraining the regional and economic development.

3.2 <u>Integration of functions</u>

This section briefly explains the lay out to calculate the combined effect of the various parameters taken while studying the central function and their distributions. In calculating the hierarchic pattern of settlements, five sets of indicators are taken. In order to calculate the total effect of all these indicators, composite index are calculated. First of all, composite index of each indicator is calculated by the giving weight to each function. Weight was calculated by <u>scarcity value method</u>. Higher is the scarcity higher is the value of the function. On the basis of this weight has been assigned to each function. In this way composite index of each function is calculated. To remove the biasness of scale each function is divided by its mean and add all the composite index of all the functions. This calculated value is finally taken in this study <u>composite index calculated</u>.

<u>**Table3.1**</u>
<u>**Alwar district**</u>
<u>**Set of Indicators to calculate composite index 2011**</u>

Education Indicators	Health Indicators	Population Indicators	Credit Indicators	Recreation Indicators
Primary school	Hospitals	Population Density	Banks	Cinema Video Hall
Middle school	Health centers		Agriculture Credit Societies	Stadium
Secondary school	Dispensaries		Non- Agriculture Credit Societies	Auditorium
Senior secondary school				
College				

Table no- 3.1 explain the indicators such as Education, Health, Population, Credit and Recreation in Alwar district. The distribution pattern of these indicators is discussed in rural settlements, urban centers and in tehsils. It gives the picture of regional variation of different service centers in Alwar district.

3.3 Distribution of Educational Facilities Tehsilwise

Education has always played a vital role in economic development and social change, everywhere. Education is a process of training for better life in terms of civilizing individuals, and improving the methods production through innovation and invention, and building huge human resource base for an economy. It is also important for social development. If there is no good education facility anywhere then that place is doomed to falls under misery and destitution. Thus in this study education facility and its distribution is an important factor need to be analyzed. In Alwar district distribution of educational facilities are not equal. The educational facilities are more concentrated in urban center than in rural settlement.

Table3.2
Alwar district
Percentage of Settlements Covered under different groups of Educational facilities tehsilwise 2011

Thesils	Total numbers of Settlement	Percent of settlement having primary school	Percent of settlement having middle school	Percent of settlement having senior school	Percent of settlement having senior secondary school	Percent of settlement having College
BEHROR	178	93.8	64.0	26.4	18.5	0.6
MUNDAWAR	142	97.9	50.7	19.7	14.1	0.0
KOTKASIM	116	96.6	36.2	11.2	8.6	0.0
TIJARA	207	88.4	26.1	6.8	4.3	0.0
KISHANGARH	111	88.3	28.8	20.7	5.4	0.0
RAMGARH	165	92.7	27.3	19.4	3.6	0.0
ALWAR	207	86.0	35.7	11.6	6.3	0.5
BANSUR	132	98.5	47.0	10.6	8.3	0.0
THANAGAZI	159	76.1	31.4	25.8	5.7	0.0
RAJGARH	250	85.6	37.2	19.6	6.0	0.4
LAXMANGARH	196	97.4	34.2	23.0	5.1	0.5
KATHUMAR	140	97.1	41.4	27.1	5.0	0.7

Source: Collected data by District Education Office of Alwar District, on December, 2011 & Census of India,2001

Settlement covered under Educational Facilities Tehsilwise 2011

Table 3.2 and graph 3.1 explains the relationship between population size and availability of education facilities, that primary schools are more or less equally covers all the settlements. Most of the settlements in Bansur, Mundawar, Laxmangarh, Kathumar have primary schools, this is because of government universal education policy for lower age group population.

Most of the settlements of Behror and Mundawar have middle schools. Less percentage of settlements in Tijara, Ramgarh and Kishangarh have a middle school that is below 30%. Other tehsil 30%-50% settlements are covered between by middle school.

Highest percentage of settlements in Kathumar, Behror, Thanagazi, Laxmagarh and Kishangarh has senior schools. Lowest percentage of settlements in Tijara, Bansur, Kotksim and Alwar has senior school. By this table it is clear that senior schools covers less than 30 % of the settlements.

Settlements covered under senior secondary schooling system are less than 20%. Most of the settlements from Behror and Mundawar have senior secondary schools. In other tehsils less than 10% settlements have senior secondary schools and in a few settlements from Ramgarh and Tijara senior secondary schools. Settlements in five tehsils have college facilities, in other Tehsils there are no colleges. Highest coverage is in Kathumar and Behror and lowest coverage among these five tehsils is in Rajgarh. Thus, it can be said according to this table that as we go from low to higher order of educational facilities, less settlement are covered under educational facilities.

The cause accounts for this type of educational coverage in different settlements of the Alwar district can be many but the connectivity cause is most significant as in Behror and Mundawar most of the settlements have all types of educational facilities, as these tehsils are near to Delhi and having the access of NH-8. And it is also evident that the presence of industries is also a significant factor for having educational facilities. Alwar tehsil have also colleges and schools because of it being administrative center.

3.4 Distribution of educational facilities in Rural Settlement According to Population Size classes

Table3.3
Alwar district
Percent of rural settlement covered under educational facilities in 2011

Settlements pop. wise / Education Indicators	Population <200	200-499	500-999	1000-1999	2000-4999	5000<
Primary school	20.0	85.5	98.5	99.7	99.3	100.0
Middle school	2.0	4.5	18.0	55.4	90.5	98.0
Senior school	0.0	1.2	2.6	22.1	58.6	92.0
Senior secondary school	0.0	0.0	0.5	5.1	25.6	72.0
College	0.0	0.0	0.0	0.0	0.0	0.0

Source: Collected data by District Education Office of Alwar District, on December, 2011 & Census of India,2001

Settlement covered under Educational Facilities in Population size class 2011
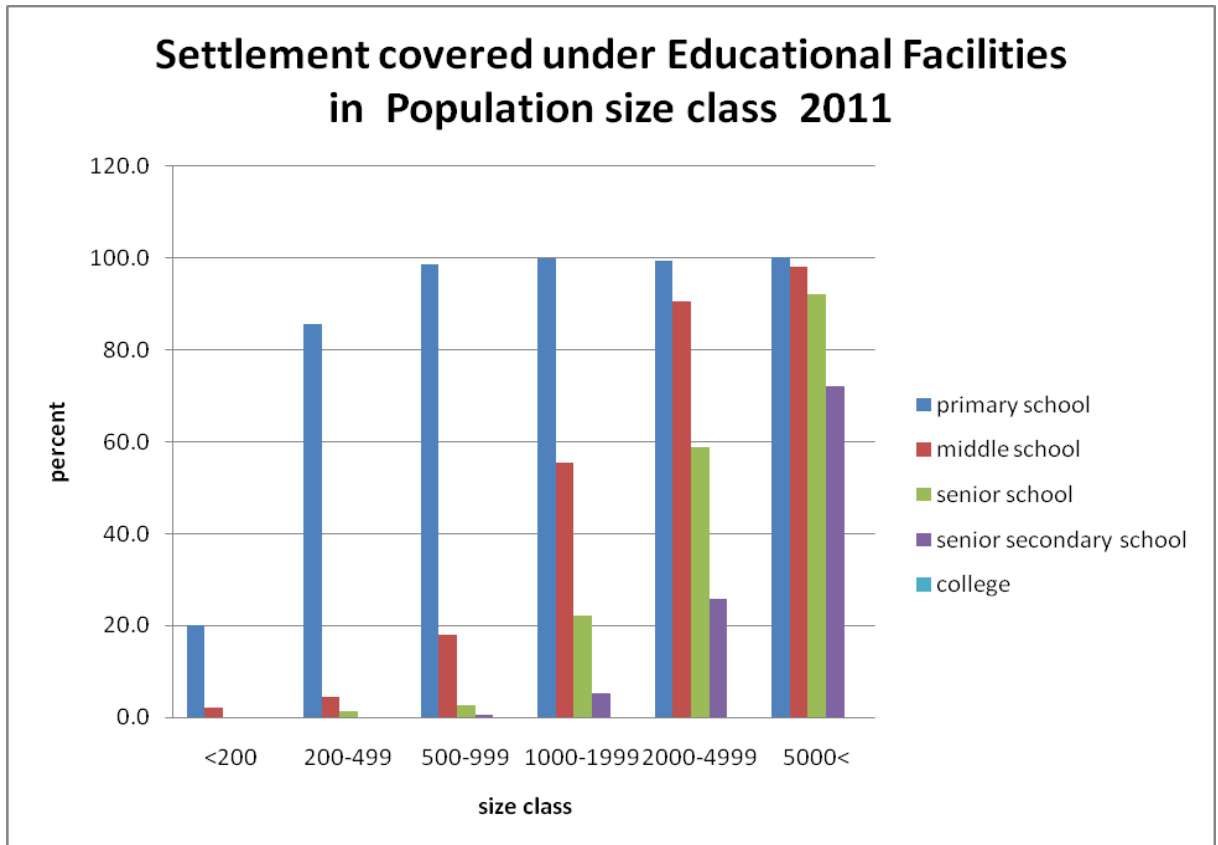
Table 3.3 and graph 3.2 indicates that settlement with less than 200 population size, have only primary schools and that covers 20% of the settlements and middle schools is in 2% of settlements. In the population sized of above 5000 persons, have all types of educational facilities except colleges. In the middle group population sized settlement. Almost every where there is good the coverage of primary schools and middle schools but no secondary schools and colleges. This disparites in educational facilities in the settlements with different population range of rurall areas of Alwar is because of bad connectivities to the major central places near by and the socioeconomic factors togather with low level of development in the region.

3.5 Educational Facilities at Urban Centers

Urban centers are usually a hub for providing all types of services or it tending towards providing such facilities, the urban centers usually satisfies the basic parameters for the development of it as the central place. It always has the thereshold population so there is always a demand pull in the region.This cause the

establishment and agglomeration of different kinds of services at the central place. This study intends to find educational facilities at urban centers in Alwar to access the growth of a central place.

Table 3.4
Alwar district
Percent of educational facilities at urban centers 2011

Urban Centers	Primary school	Middle school	Secondary school	Senior secondary school	College
Alwar	56.0	54.7	60.5	57.6	60.0
Behror	5.2	9.4	4.7	6.1	10.0
Bhiwadi	3.0	3.1	2.3	3.0	0.0
Govindgarh	3.7	1.6	2.3	6.1	10.0
Khairthal	9.7	7.8	2.3	3.0	0.0
Kherli	2.2	3.1	11.6	6.1	10.0
Kishangarh	3.7	1.6	4.7	6.1	0.0
Rajgarh	6.0	14.1	4.7	6.1	10.0
Tijara	10.4	4.7	7.0	6.1	0.0
Total	134	64	43	33	10

Source: Collected data by District Education Office of Alwar District, on December, 2011 &

Census of India,2001

Table 3.4 and map 3.3 depicts that only Alwar has the highest concentration of primary schools, secondary schools, middles schools and colleges. That is in percentage, which is about 56%. This shows that Alwar is a well-developed urban center among other urban centers in terms of educational facilities. Behror is not signifying the importance of NH – 8 thus this is proving that educational facilities do not depends only on connectivity but on some others factors like non-manufacturing services like good health facilities and population composition. Other urban places share the rest of the 50 % of schools and colleges.

3.6 Distribution of Health Facilities Tehsilwise

Table 3.5 and graph 3.4 explains that Laxmangarh has highest concentration of Health centers, which is followed by Mundawar, lowest concentration is in Kotkasim, in all the tehsil concentration of health centers are below 6%. Hospitals are   highly concentrate   in Kishangarh ,Behror and Tijara. In all the tehsil concentration of hospital is below 2%.

More dispensaries are in Mundawar followed by Behror , Bansur. Whereas Kishangarh has very few dispensaries. In all the tehsils concentration of dispensaries are below 20%. These results signifies the underdevelopment of the Alwar district in terms of health facilites. But same study is done on the basis of the population size wise to support the underdevelopment of the region in terms of health services.

Table 3.5
Alwar district
Percentage of Settlements Covered under different groups of health facilities tehsilwise
2011

Thesils	Settlement	Health center	Total hospital	Total dispensary
BEHROR	**178**	3.9	1.1	17.4
MUNDAWAR	**142**	4.2	0.0	19.0
KOTKASIM	**116**	0.9	0.0	5.2
TIJARA	**207**	1.9	1.0	10.1
KISHANGARH	**111**	2.7	1.8	3.6
RAMGARH	**165**	2.4	0.0	5.5
ALWAR	**207**	2.4	0.5	7.2
BANSUR	**132**	1.5	0.0	15.9
THANAGAZI	**159**	3.8	0.0	11.9
RAJGARH	**250**	2.8	0.4	10.8
LAXMANGARH	**196**	5.6	0.0	6.1
KATHUMAR	140	3.6	0.7	7.9

Source: Collected data by Chief Medical Health Office of Alwar District, on December, 2011

& Census of India 2001

Graph 3.4
Alwar district
Percentage of Settlements Covered under different groups of health facilities

tehsilwise2011
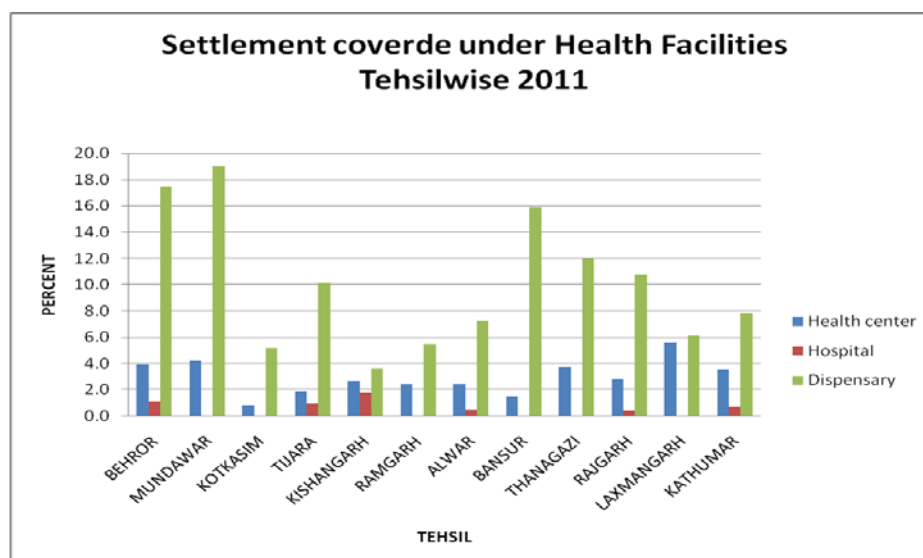
3.7 Distribution of Health facilities in Rural Settlement

Table3.6
Alwar district
Percent of rural settlement covered under health facilities 2011

Indicators	<200	200-499	500-999	1000-1999	2000-4999	5000<
Health center	0.0	0.0	0.9	2.1	8.1	34.0
Total hospital	0.0	0.0	0.0	0.0	0.0	4.0
Total dispensary	0.0	0.9	2.6	8.8	34.8	66.0

Source: Collected data by Chief Medical Health Office of Alwar District, on December, 2011

& Census of India 2001

Graph 3.5
Alwar district
**Percent of rural settlement covered under health facilities 2011**
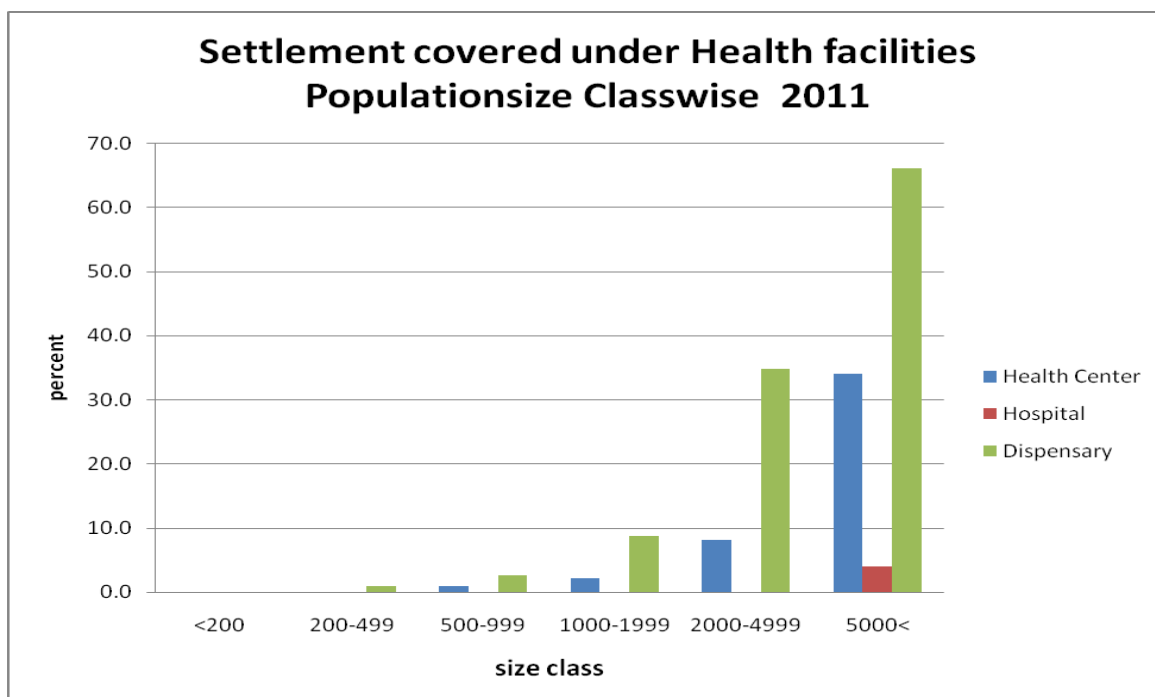
Table 3.6 and graph 3.5 explains the population size wise distribution of health services sattlements with population less than 500 settlements are covered under only dispensary. And settlements under population size type of (5000 & above) have most of the dispenseries and health centers with all the hospitals concentrated in these

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settlements. As the population size increases, health services are also increases.It shows the direct relationship of Health facilities with the population size.

3.8 Health facilities at Urban centers

Table3.7
Alwar district
Percent of health facilities available at urban centers 2011

Class of Towns	Urban Centers	Total hospitals	Dispensaries	Health center
I	Alwar	38.5	60.0	40.0
III	Behror	15.4	0.0	0.0
III	Bhiwadi	7.7	0.0	0.0
IV	Govindgarh	0.0	0.0	20.0
III	Khairthal	7.7	20.0	0.0
IV	Kherli	0.0	0.0	20.0
V	Kishangarh	7.7	0.0	0.0
III	Rajgarh	15.4	0.0	0.0
IV	Tijara	7.7	20.0	20.0
	Total	13	5	5

Source: Collected data by Chief Medical Health Office of Alwar District, on December, 2011

& Census of India 2001

Graph 3.6
Alwar district
Percent of health facilities available at urban centers 2011
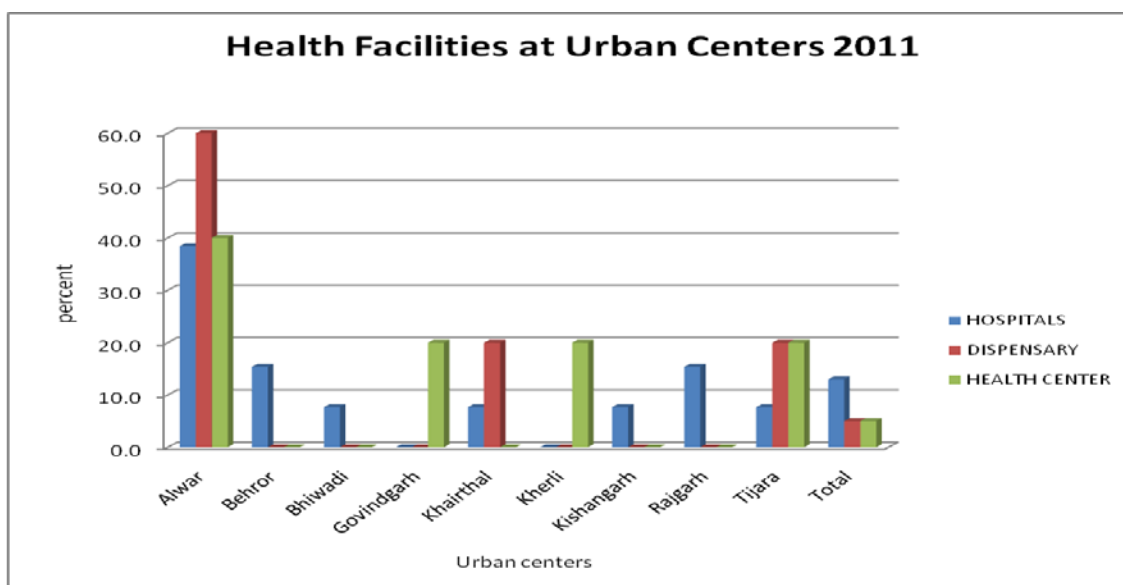
Table 3.7and graph 3.6 explains the concentration of hospitals, health centers and dispenseries and all these are more in Alwar itself no other towns have all the health centres facilities. Some city have either hospitals or health centers or both.

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Most of the towns falls under this categories. Only Tijara other than Alwar have all three types of health facilities. This results signifies that alwar is comparatively good in terms on health service in the categories of towns followed by Tijara. The cause for this distribution is self explainatory thatAlwar is well developed central place in Alwar district.

Distribution of Credit facilities tehsilwise

Table3.8
Alwar district
Percentage of Settlements Covered under different groups of credit facilities tehsilwise 2011

Thesils	Settlement	Bank	Credit
BEHROR	178	7.3	13.5
MUNDAWAR	142	6.3	19.0
KOTKASIM	116	4.3	15.5
TIJARA	207	3.9	7.7
KISHANGARH	111	3.6	10.8
RAMGARH	165	3.6	13.3
ALWAR	207	3.4	17.9
BANSUR	132	5.3	6.1
THANAGAZI	159	5.0	6.3
RAJGARH	250	3.6	10.8
LAXMANGARH	196	4.1	24.5
KATHUMAR	140	7.1	15.7

Source: Collected data by Head Office of Bank Alwar Distric on December, 2011
& Census of India,2001t,
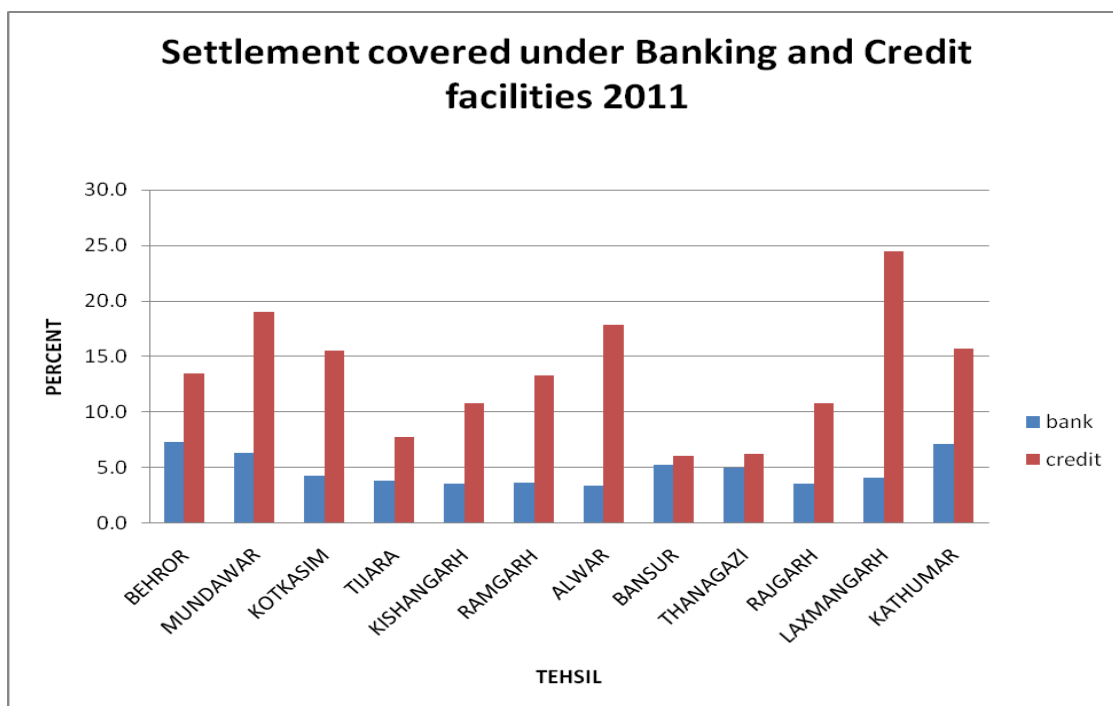
Table 3.8 and graph 3.7 is explaining the distribution of credit facilities in Alwar tehsil wise. Credit facilities are usually given to those who aim to establish business or for those who are farmers. This is done through the banking and non-banking financial outlets of government undertakings. Private credit facilitators are not taken in to consideration even though they constitute a significant role in the areas with huge agricultural base. For private credit providers the data is not available.

Behror and Kathumar have high concentration of banking facilities (cooperative and commercial banking) and Alwar has the lowest at (3.4%) followed by Kishangarh, Ramgarh and Rajgarh. In all the tehsil concentration of banking facilities are below 8%.

Looking at the concentration of credit facilities (agriculture society, non agricultural society and other) highest is in Laxmangarh which is 24.5%. And lowest concentration is in Bansur 6.1% followed by Thanagazi and Tijara. In all the tehsil concentration of credit facilities are below 8%.

3.9 Distribution of Credit facilities in rural settlement

Table3.9
Alwar district
Percent of rural settlement covered under Credit facilities 2011

Indicators	Population <200	200-499	500-999	1000-1999	2000-4999	5000<
Cooperative bank	0.0	0.3	0.3	1.0	7.0	30.0
Commercial banks	0.0	0.3	0.3	2.1	14.3	58.0
Agricultural credit societies	0.0	4.5	4.8	14.4	30.0	74.0
Non - Agricultural credit societies	0.0	0.0	0.3	0.3	0.7	10.0
Other societies	0.0	0.0	0.3	0.2	1.5	8.0

Source: Collected data by Head Office of Bank Alwar Distric on December, 2011

& Census of India,2001t

Table 3.9 and graph 3.8 explains the distribution of credit facilities in settlements, under different population size class. There is no banking and credit services in the settlements with population less than 200 population size. Medium sized settlements (200-499) are not covered by nonagricultural and other credit facilities. But these settlements are covered under the cooperative banks, commercial banks and agricultural credit societies which is 0.3%, 0.3% and 4.5%. respectively.

Settlements with high population size(5000 & above) are covered by all types of the credit facilities. Under these population size settlements agricultural credit facilitie is more significant. And this is because these settlements are mostly depndent on agricultural.as population size increses credit facility also increases, which shows the direct relationship of credit service with population size.

3.10 Credit facilities at Urban Center

Table3.10
Alwar district
Percent of credit facilities available at urban centers 2011

Class of Towns	Urban Centers	Bank	Credit facilities
I	Alwar	44.0	0.0
III	Behror	10.3	9.1
III	Bhiwadi	14.7	9.1
IV	Govindgarh	0.9	9.1
III	Khairthal	9.5	27.3
IV	Kherli	4.3	9.1
V	Kishangarh	2.6	9.1
III	Rajgarh	6.0	18.2
IV	Tijara	7.8	9.1
	Total	116	11

Source: Collected data by Head Office of Bank Alwar Distric on December, 2011

& Census of India,2001t
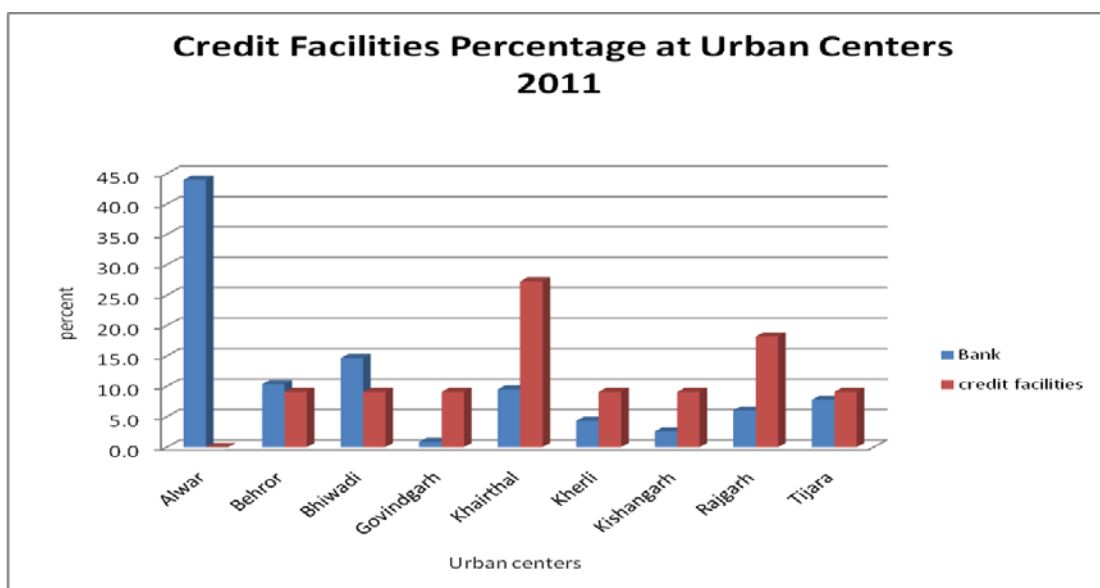
Table 3.10 and graph 3.9 explains the concentrations of credit facilities centres and banks in urban settlements. And it is found Alwar has highest concentration of banks with no credit facilities and lowest is in Govindgarh with 0.9% of total banks and 9% of the other credit centers. Khairtahal and Rajgarh have good percentage of credit centers. Rest of the urban centers have in significant persence of banking and credit centres. The main cause of such distribution is the presence of populations in the region. The availability of industries and agriculture as a main occupation.

3.12 Distribution of Recreation facilities tehsilwise

Tehsils	Settlement	Cinema video hall	Stadium auditorium facility
BEHROR	**178**	2.2	0.0
MUNDAWAR	**142**	0.0	0.0
KOTKASIM	**116**	1.7	0.0
TIJARA	**207**	1.9	0.0
KISHANGARH	**111**	3.6	0.0
RAMGARH	**165**	3.0	0.0
ALWAR	**207**	1.0	0.5
BANSUR	**132**	0.8	0.0
THANAGAZI	**159**	0.0	0.0
RAJGARH	**250**	0.4	0.4
LAXMANGARH	**196**	1.0	0.0
KATHUMAR	140	1.4	0.0

Source: Collected data by Office of District Collector, Alwar Distric on December, 2011 &

Census of India,2001

Graph 3.10
Alwar district
Percentage of Settlements Covered under recreational facilities tehsilwise 2011
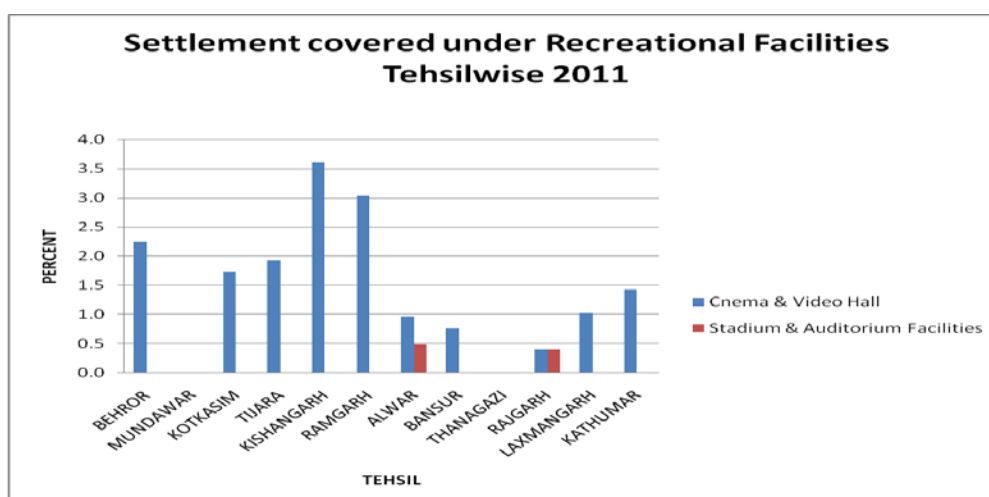
Table 3.11and graph 3.10 explains the settlement wise distribution of recreational facilities in percentage and it is clear that in most of the tehsils there is cinema halls. Kishangarh have the highest percentage of settlements covered under cinama halls. No settlements in Tanagazi & Mundawar have cinema video halls. One

peculiar results is that Alwar being a central tehsil having only 1% of the settlements are covered under the cinema halls. The concentration of stadium and auditorium facilities is only in Alwar and Rajgarh. Which is in very low percentages of settlements, that signifies the population living in these urban centers falls under the middle class income group.In other tehsil, there is no concentration of this facilities.

3.13 Distribution of Recreation facilities in rural settlement

Table3.12
Alwar district
Percentage of Rural Settlements Covered under recreation facilities 2011

Indicators	Population <200	200-499	500-999	1000-1999	2000-4999	5000<
Cinema video hall	0.0	0.3	0.2	0.5	1.5	0.0
Stadium auditorium facilities	0.0	0.0	0.0	0.0	1.5	22.0

Source: Collected data by Office of District Collector, Alwar Distric on December, 2011 &

Census of India,2001

Graph3.11
Alwar district
Percentage of Rural Settlements Covered under recreation facilities 2011
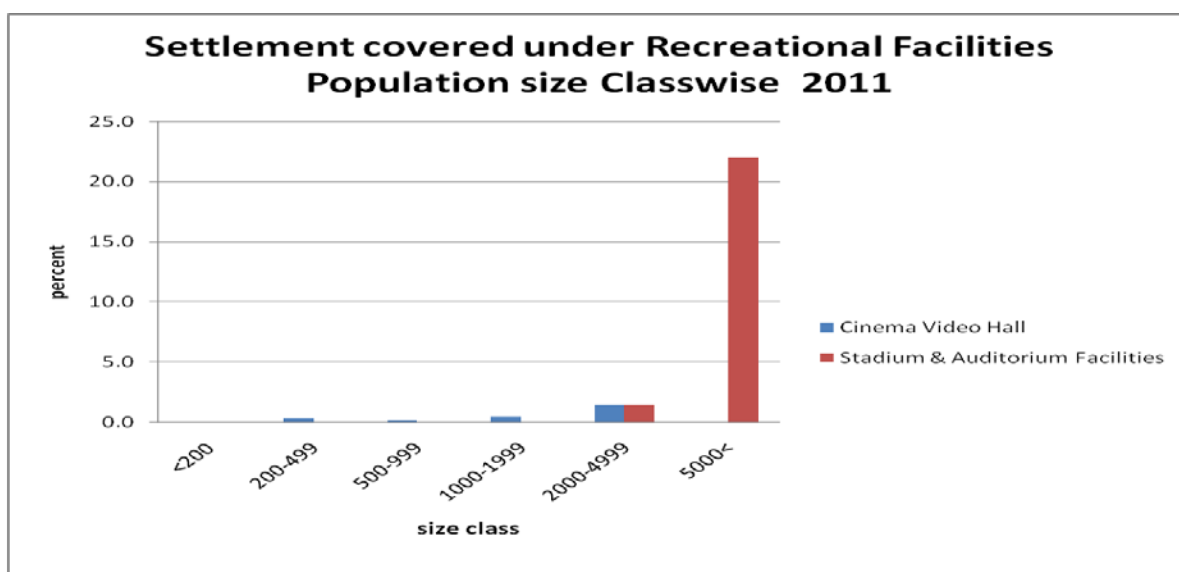
Table 3.12 and graph 3.11 explains the settlements with the cinema halls and stadium facilities in rural area falling under different population size. Rural settlements with population less than 200 have not any types of recreational

facilities.middle population sized settlements have a few number of cinema hall and no stadiums. Rual settlements with high population sized (5000 & above) have no cinema hall. But there is a good percentage covered under stadium facilities. The occupational structure of the population and middle income bands can be the suitable cause for this distributions.

3.14 Recreation facilities at urban center

Table3.13
Alwar district
Percent of recreation facilities available at urban centers 2011

Class of Towns	Urban Centers	Stadium facilities	Cinema and video hall	Auditorium
I	Alwar	50.0	30.8	33.3
III	Behror	0.0	7.7	0.0
III	Bhiwadi	0.0	30.8	0.0
IV	Govindgarh	0.0	0.0	0.0
III	Khairthal	0.0	7.7	0.0
IV	Kherli	0.0	7.7	0.0
V	Kishangarh	0.0	7.7	0.0
III	Rajgarh	50.0	7.7	33.3
IV	Tijara	0.0	0.0	33.3
	Total	2	13	3

Source: Collected data by Office of District Collector, Alwar Distric on December, 2011 &
Census of India,2001

Recreation Facilities Percentage at Urban Centers 2011

Table 3.13 and graph 3.12 explains the recreational facilities in urban centers. Alwar has all types of recreational facilities and it is highly concentrated in this city as it is class I city. It has significant percentage of cinema halls, stadiums and auditoriums, this city is followed by Rajgarh with very less percentage of cinema halls. Govindgarh have zero percentage of recreational facilities in terms of all the types of it. There can be a number of factors contributiing this distribution from which income distribution pattern of the population is one cause which play a major role in creating demand for these facilities. Occupational structure of the adjoining area are mainly agriculture.

3.15 Conclusion

Distribution of educational facilities

- All the settlements are more or less equally covered by primary schools. High coverage of primary schools is in Bansur, Mundawar, Laxmangarh, Kathumar. Lowest coverage is in Thanagazi followed by Rajgarh, Tijara and Kishangarh. In these settlements coverage is below 90%. Middle school coverage is highest in Behror and Mundawar, which is above 50%. Lowest coverage is in Tijara followed by Ramgarh and kishangarh. Secondary school coverage is highest in Kathumar followed by Behror, Thanagazi, Laxmagarh and Kishangarh. Lowest coverage is in Tijara followed by Bansur, Kotksim and Alwar. Highest coverage of senior secondary schools is in Behror and Mundawar. Lowest coverage is in Ramgarh followed by Tijara. Only 5 tehsils has college facilities .Highest coverage is in Kathumar and Behror with lowest coverage in Rajgarh.

- In population size classes' educational facilities are concentrated at higher population size structure. In lower population size structure there is very less concentration.

- At urban centers overall Alwar nad Rajgarh are at the top position in education facilities, whereas Kherli, Khairthal, Bhiwadi, Govindgarh and Kishangarh has not good situation in educational facilities.

Distribution of Health facilities

- Laxmangarh tehsil has highest concentration of Health centers, which is followed by Mundawar, lowest concentration is in Kotkasim which is 0.9%. Concentration of hospitals is high in Kishangarh ,Behror and Tijara. There is no concentration of hospital in Mundawar, Kotkasim, Ramgarh, Bansur, Thanagazi and L axmangarh . In terms of dispensaries highest concentration is in Mundawar followed by Behror and Bansur, lowest concentration is in Kishangarh.

- In terms of population size health facility concentration is negligible in lower population size classes. In higher population size class there is good concentration of health facilities.

- Hospital concentration is highest in Alwar city. In Govindgarh , Kherli, there is no concentration of hospitals. The concentration of dispensaries is again

highest in Alwar with 60%. In other towns ther is no concentration of Dispensaries except Khairthal and Tijara. Highest concentration is again in Alwar with 40% . In other towns there is no concentration of health centers except Govindgarh, Kherliand Tijara.

Distribution of Credit facilities

- Highest concentration of banking facilities is in Behror and Kathumar. Lowest concentration is in Alwar which is 3.4%   followed by kishangarh ,Ramgarh and Rajgarh. If seen the concentration of credit facilities is highest in Laxmangarh which is 24.5%, and lowest is in Bansur 6.1% followed by Thanagazi and Tijara.

- As per the population size class increases credit facility coverage also increases. In more than 5000 population size class credit facility concentration is higher in lower population size class it is negligible.

- Bank concentration is highest in Alwar and lowest in Govindgarh with 0.9% . Highest concentration of credit facilities is in Khairthal with 27.3%. There is no concentration of credit societies In Alwar.

Distribution of Recreation facilities

- Kishangarh has highest concentration of cinema video hall, which is followed by Ramgarh. Mundawar. And Thanagazi has no concentration of cinema video hall. The concentration of stadium and auditorium facilities it is only in Alwar and Rajgarh . In other tehsil there is no concentration of this facilities.

- Only 2000-4999 population size class is covered by the cinema video halls, while stadium & auditorium facilities are more in numbers only in 5000 & above population size class.

- Stadium concentration is highest in Alwar & Rajgarh. In other town there is no concentration of stadium. Highest concentration of cinema is again in Alwar & Bhiwadi . In Govindgarh and Tijara there is no concentration of cinema, there is 33.3% concentration of auditorium in Rajgarh , Alwar and Tijara sepratley. In other towns there are no concentration of auditorium.

Chapter - 4

IDENTIFICATION OF SERVICE CENTERS AND THEIR SPATIAL ORGANIZATION

4.1 <u>Introduction</u>

Identification of central place is of due importance in the study of centrality and its effect on the regional and economic development. This chapter is for identification of central places in Alwar district. Before identifying the central places overall centre points are identified according to different function providing a range of services. By this a hierarchy of different services is decided.

According to Walter Christtaler , the implication of hierarchical class-system is an integral part of the spatial model of central places. The model states that central places belong to different class. Each class possesses specific groups of central functions and is characterized by a distinct population level of its centers[1]. Since the central places of each class possess discrete groups of activities they also tend to have discrete population levels. The notion of classes of central places is defined with respect to the notion of functions[2].

One important element in central place theory is the notion of the range of a good[3]. This range marks out the zone or tributary area around a central place (urban center) from which persons travel to the center to purchase the good.

The population of the serving urban center is here termed the threshold population for the good[4]. There is two major features of his work, as Beckmann has stressed[5]. One is the theoretical account of the hierarchical spatial structure, the network of hexagons, a scheme well known to geographers through the work of W. Christaller. Another feature of Losch's work is his

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[1] Walther Christaller: Central place in southern Germany, Jena, 1933, translated by C. Baskin at the Bureau of Population and Urban Research, University of Virginia, 1954

[2] Brian J. L. Berry and William L. Garrison , The Functional Bases of the Central Place Hierarchy Economic Geography, Vol. 34, No. 2 (Apr., 1958), pp. 145-154

[3] Walther Christaller: Central place in southern Germany, Jena, 1933, translated by C. Baskin at the Bureau of Population and Urban Research, University of Virginia, 1954.

[4] Losch: Die Kumliche Ordnung der Wirtschaft, Jena, 1944, translated by W. H. Woglom and W. F. Stolper as The Economics of Location, New Haven, 1954.

[5] Martin Beckmann: "Some Reflections on Losch's Theory of Location," Regional Science Association, Papers and Proceedings I, 1955, pp. N-1 to N-8.

account of location equilibrium or his identification of the balance of spatial and other forces as a result of which the spatial structure takes on explicit patterns.

Location equilibrium conditions are an integral part of the hexagonal system of markets help in identification of centrality.

4.2 <u>Identification of service centers</u>

To identify the centrality of service center and hierarchy structure of centrality, there is not any direct formula. In this study selection of variables are done according to which it provide centrality to Alwar region. In calculating centrality of settlement all population sizes are taken in the consideration. (Zutshi, 1976), because the population size is significant, as its threshold level is important in deciding the demand level for services.

And it increases the pull of the places to attract them (Zutshi,1986). If level of scarcity is high, its importance in terms of centrality will increase and weight of that service will also increase. In this study the weight is calculated according to the given formula.

<u>Weightage = Total settlement /Total number of services</u>

In this way we calculate weights first; higher the scarcity higher will be the value for that service. In the second step, composite index will be calculated for each service. For each service sub services or function will be calculated by assigning weight to services, for example education service index will be created by adding all the sub education functions. Thus in this study composite index for population density, education, health, credit services and recreation services is obtained. After that to remove the biasness of scale each composite index is divided by its mean. And all functions are arranged on same scale. Then all indexes of different functions are added and finally a composite index of centrality or service centers is calculated (Wanmali, Sudhir).

4.3 Distribution of Education Service center2011

Education is necessary for development of each individual as an elementary unit in economic activity as an equipped factor of production and as a well-informed consumer. It is now fundamental right for every child and is important from the viewpoints of socioeconomic development. In earlier chapter distribution of educational facilities are already discussed. Which is important in expressing the cause for centrality?

Table no. 4.1
Alwar district
Order of Education service center 2011

Settlements	Education composite index	order
Alwar	329.6363	I
Rajgarh	50.87402	II
Kherli	50.33153	II
Behror	49.58811	III
Govindgarh	46.45369	III
Narayanpur	11.89472	IV
Bardod	10.18686	IV
Tijara	10.12658	IV
Thanagazi	10.04621	IV

Source: Collected data by District Education Office of Alwar District, on December, 2011 & Census of India,2001

Table 4.1 explains the composite index of the education and thus the hierarchy of education in different tehsils of Alwar is decided. Alwar falls under first order categories with highest value of composite index. Rajgarh and Kherli are in second order. Third orders in terms of education are, Behror, Govindgarh. And Narayanpur Bardod, Tijara, Thanagazi are in fourth order of centrality. The causes for such distribution of education are its population density and connectivity with other central place like Delhi and Jaipur through railways and roadways with the availability of all

other services. And Alwar is class I town as identified in previous chapter so it act as main central place of the district.

Table no. 4.2
Alwar district
Hierarchy of Education service center 2011

Order	Educational service center
1 order	1
II order	2
III order	2
IV order	4
V order	36
VI order	1958

Table 4.2 explains that among hierarchy of educations service centers, there is only one first order service center that is Alwar while two second order and four third order service center in order of their centrality. This is because of clustering (agglomerations) of all other services in towns which gives rise to the population density.

Table no. 4.3
Alwar district
Distribution of Education service center 2011

TEHSILS	1 order	II order	III order	IV order	V	VI
BEHROR	0	0	1	1	6	170
MUNDAWAR	0	0	0	0	4	138
KOTKASIM	0	0	0	0	2	114
TIJARA	0	0	0	1	1	205
KISHANGARH	0	0	0	0	3	108
RAMGARH	0	0	0	0	2	163
ALWAR	1	0	0	0	3	203
BANSUR	0	0	0	0	4	128
THANAGAZI	0	0	0	2	1	156
RAJGARH	0	1	0	0	5	244
LAXMANGARH	0	0	1	0	3	192
KATHUMAR	0	1	0	0	2	137

Source: Collected data by District Education Office of Alwar District, on December, 2011 & Census of India,2001

Table 4.3 and map 4.1 explains the tehsil wise distribution of order of centrality for all tehsils in Alwar. And found that Alwar is in first order of central place for education. Second order educational service centers are in Rajgarh and Kathumar . In Behror and Laxmangarh there are one 3rd order educational central place. Fourth order service center are 4 which are in Behror, Tijara and Thanagazi. Education service center is highest in Thanagazi and Behror. The order changes as the distance and connectivity from main regional center place change. Population density in different towns is also a main factor deciding its order. The other factors are density of population and level of urbanization in the central towns are accounting for this result. All the towns are not well developed in terms of education facilities.

Map no. 4.1
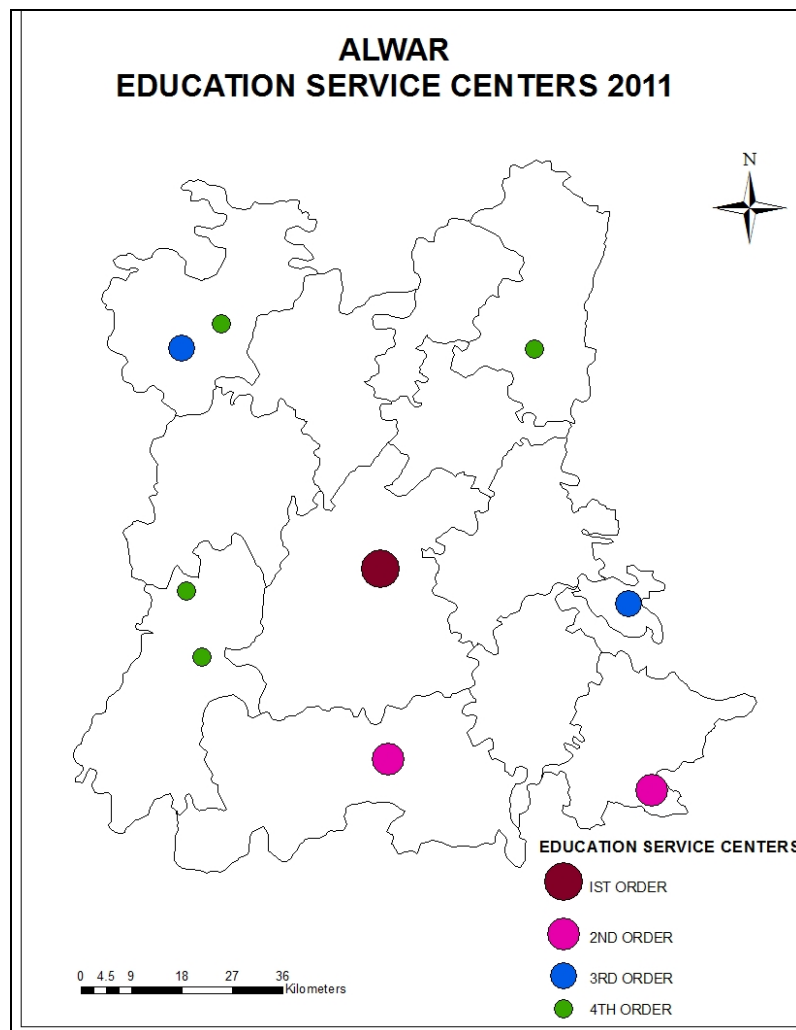
Map 4.1 explains the cross analysis of education centers with population growth rate of towns, it is found that towns having higher population growth rate such as

Bhiwadi, Behror ,and Khairthal don't have good concentration of education facilities. But the region with medium population growth rate like Alwar, Govindgarh, Kherli, Rajgarh and Tijara having the good concentration of education facilities. Thus connectivity is the main factor.

In terms of population density the tehsils with higher population density such as Alwar, Behror, Tijara and Kathumar have higher order of education facilities. So this proves that population density has the relationship with the order of education service center. Thanagazi and Rajgarh have lowest population density but in these tehsil education centers are available. In Behror, Mundawar, Kotkasim and Alwar literacy is higher, but Mundawar and Kotkasim are not having higher order education service center.

In terms of urbanization Alwar tehsil is highly urbanized and have first order of education centers. In terms of total urban population it has highest population. And it is followed by Kishangarh and Tijara, among which Kishangarh has no education service center.

In terms of SC & ST population Kathumar, Kishangarh, Mundawar, Kotkasim having higher percent of SC population except Kathumar, all these tehsils have no good concentration of higher service center. In term of ST population, Rajgarh, have high ST population followed by Thanagazi. These tehsils have medium order service centers. It means in region of higher concentration of SC there is lower order of education service center but it is not true with the ST.

4.4 Distribution of health service center2011

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Table no. 4.4
Alwar district
Order of Health service center2011

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SETTLEMENT	Health composite index	Order
Alwar	114.4	I
Lachhmangarh	96	II
Kherli Rel (Rural)	72.32	III
Tijara	42.08	III
Amarpur	32	IV
Bahadurpur Patti Meeran	32	IV

Bahala		32	IV
Baldeogarh		32	IV
Baroli		32	IV
Baseth		32	IV
Behror Jat		32	IV
Bhuleri		32	IV
Bichgaon		32	IV
Burhi Bawal		32	IV
Churani		32	IV
Dahar Ka Bas		32	IV
Gothra		32	IV
Govindgarh		32	IV
Gurha		32	IV
Guwalda		32	IV
Hajipur		32	IV
Ismalpur		32	IV
Jamdoli		32	IV
Jatwara		32	IV
Jeevan Singhpura		32	IV
Kasba Dahra		32	IV
Kathoomar		32	IV
Khera Mangal Singh		32	IV
Kherli		32	IV
Khoha		32	IV
Khudiyana		32	IV
Kishori		32	IV
Kishorpura		32	IV
Kohrana		32	IV
Kolgaon		32	IV
Kuteena		32	IV
Machari		32	IV
Mala Khera		32	IV
Mundawar		32	IV
Nangal Bani		32	IV
Narayanpur		32	IV
Naugawan		32	IV
Nithari		32	IV
Pakhar		32	IV
Peepli		32	IV
Pehal		32	IV
Pratapgarh		32	IV
Ram Nagar		32	IV
Ramgarh		32	IV
Rampura		32	IV
Ratanpura		32	IV

Reni	32	IV
Riwali	32	IV
Salarpur	32	IV
Saloli	32	IV
Sare Khurd	32	IV
Shahjahanpur	32	IV
Tapookra	32	IV
Taseeng	32	IV
Tatarpur	32	IV
Untoli	32	IV

Source: Collected data by Chief Medical Health Office of Alwar District, on December, 2011 & Census of India,2001

Table 4.4 depicts that 1st order settlement is in Alwar. 2nd order settlement is Laxmangarh.3rd order is Kherli Rel & Tijara.

Table no. 4.5
Alwar district
Hierarchy of Health service center 2011

Order	health service center
1 order	1
II order	1
III order	2
IV order	56
V order	60
VI order	1883

Table 4.5 in health service center overall, in Alwar district has one first order health service center. And one second order health service center. Under third order there are 2, and of 4th order there are 56 health service centers. 5th and 6th orders are 60 and 1883 repectively.

Table no. 4.6
Alwar district
Distribution of Health service center 2011

TEHSILS	1 order	II order	III order	IV order	V order	VI order
BEHROR	0	0	0	7	7	164
MUNDAWAR	0	0	0	6	6	130
KOTKASIM	0	0	0	1	1	114
TIJARA	0	0	1	3	4	199
KISHANGARH	0	0	0	3	3	105
RAMGARH	0	0	0	4	4	157
ALWAR	1	0	0	4	5	197
BANSUR	0	0	0	2	2	128
THANAGAZI	0	0	0	6	6	147
RAJGARH	0	0	0	7	7	236
LAXMANGARH	0	1	0	10	11	174
KATHUMAR	0	0	1	3	4	132

Source: Collected data by Chief Medical Health Office of Alwar District, on December, 2011 & Census of India,2001

Table 4.4 explains the order and distribution of health service centers. One first order health service center is in Alwar. Second order health service center is in Laxmangarh. Third order is in Kathumar and Tijara. Fourth order service center is distributed in all the tehsils. There is only one fourth order health service center is in Kotkasim whereas maximum 4th order service center is in Laxmangarh.

ALWAR
DISTRIBUTION OF HEALTH SERVICE CENTERS
2011

N

HEALTH SERVICE CENTER

⬤ IST ORDER

⬤ 2ND ORDER

⬤ 3RD ORDER

⬤ 4TH ORDER

0 4.5 9   18   27   36
Kilometers
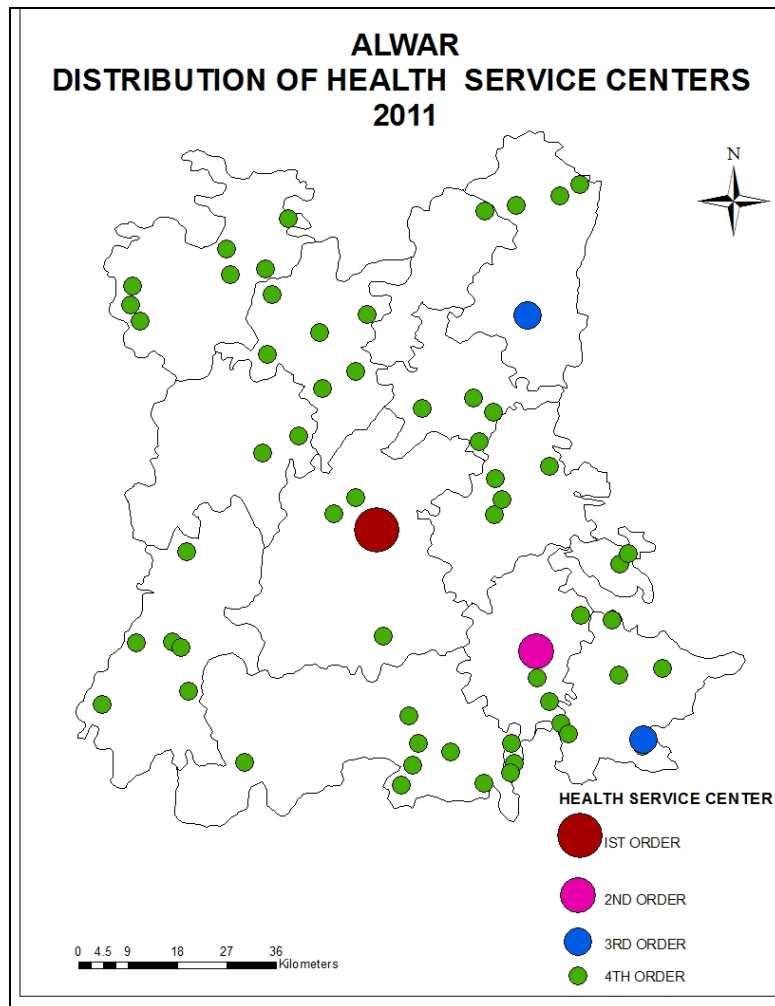
Map 4.2 express the distribution of Health service center identified in terms of number. Cross analyzing this number with population growth rate of towns, it is found that towns having higher population growth rate such as Bhiwadi, Behror, and Khairthal have concentration of health center facilities. But they have not higher order of service center. Only Behror have 3rd order health facilities. Region with medium population growth rate such as Alwar, Govindgarh, Kherli, Rajgarh and Tijara among them only Kherli and Tijara have higher order of health facilities.

Population density wise, tehsils which have higher density such as Alwar, Behror, Tijara, Kathumar are having health facilities. But only in Alwar, Laxmangarh, Kathumar and Tijara have higher order of health service center. So here population density has positive relationship with the order of health service center. Thanagazi and Rajgarh have low population density and in these tehsil order of health facility is also of lower order. Highest concentration of health service center is in Laxmangarh.

Alwar tehsil is highly urbanized in terms of percentage of total urban region. It is followed by Kishangarh and Tijara, among which Kishangarh has lower order health service center.

In terms of SC & ST population Kathumar, Kishangarh, Mundawar, Kotkasim having higher percent of SC population, except Kathumar, all these tehsils have less concentration of higher order health service center. Lower order health service center concentration is good in these tehsils. In terms of ST population, Rajgarh have highest ST population followed by Thanagazi and in these tehsils lower order health center concentration. It means, in region with high concentration of SC population, there is low concentration of health service center but it is not true with the ST.

It is clear from this study that how the demand influences the health market. Health service in Alwar is highly demand sensitive. The level of connectivity with population growth rate and density and the social factors has its effect on the distribution of health facilities in Alwar.

4.5 Distribution of service center based on population density 2011

Reilly[6] indicated that a relationships exist between the population density of a central place and the number of units of any function which that place possesses and this is, of course, clear from common knowledge. Christaller[7] suggested that through the working of the income mechanism the population density of a center is a function of the number and types of central goods and services that the central place provides. The population density of a center is a function of the number of stores of each type[8]. Thus population density in our study comes out to be an important variable to identify the central place.

[6]W. J. Reilly: "Methods of the Study of Retail Relationships, " University of Texas Bulletin 2944, 1929; idem: The Law of Retail Gravitation, New York, 1931.

[7] Walther Christaller: Die zentralen Orte in Siiddeutschland, Jena, 1933, translated by C. Baskin at the Bureau of Population and Urban Research, University of Virginia, 1954.

[8] Brian J. L. Berry and William L. Garrison , The Functional Bases of the Central Place Hierarchy
Economic Geography, Vol. 34, No. 2 (Apr., 1958), pp. 145-154

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Table no. 4.7
Alwar district
Order of service center based on population density 2001

SETTLEMENT	population density	
Alwar (Rural)	20.84161	I
Alwar	14.26455	II
Kherli	8.216188	III
Patti Beena	8.119502	III
Ramgarh	6.650942	III
Diwakari	6.454286	III
Kishangarh	6.212219	III
Santhalka	6.149866	III
Ganj	6.100091	III
Govindgarh	5.345874	III
Tijara	5.277785	III
Shahpur	5.226962	III
Belaka	4.977318	IV
Udaipur	4.976667	IV
Sitapura	4.823389	IV
Harchandpur	4.498885	IV
Bhiwadi	4.487614	IV
Guwara Leswa	4.437674	IV
Guwara Lala Bhaiya	4.259352	IV
Kootooki	4.215158	IV
Gola Ka Bas	4.129881	IV
Beela Heri	4.10249	IV
Tapookra	4.082094	IV
Khairthal	4.020516	IV
Behror	4.004875	IV

Source: Census of India,2001

</div>

Table 4.7 explains the order of service centers based on the population density. And found that 1st order settlement is Alwar. In (rural) Alwar is placed in 2nd order. In 3rd order Kishangarh ,Tijara , Ramgarh, Kherli, Patti Beena, Diwakari, Santhalka, Ganj, Shahpur and Govindgarh are placed. Thus density of population is playing a main role deciding the order distribution. Other is connectivity and occupation of population and the roadways connectivity.

Table no. 4.8
Alwar district
Hierarchy of service center based on population density

Order	population service center
1 order	1
II order	1
III order	10
IV order	13
V order	25
VI order	1953

Table 4.8 explains the hierarchy of service centers based on population density wise. In first and second order there are only one service centers. So any pyramid of hierarchy is not seen so in case of Alwar the population density fails to show the hierarchy.

Table no. 4.9
Alwar district
Order of service center based on population density 2001

TEHSILS	1 order	II order	III order	IV order	V order	VI order
BEHROR	0	0	0	1	1	176
MUNDAWAR	0	0	0	0	0	142
KOTKASIM	0	0	1	0	1	114
TIJARA	0	0	2	5	7	193
KISHANGARH	0	0	2	1	3	105
RAMGARH	0	0	1	0	1	163
ALWAR	1	1	1	1	4	199
BANSUR	0	0	0	0	0	132
THANAGAZI	0	0	0	2	2	155
RAJGARH	0	0	1	3	4	242
LAXMANGARH	0	0	1	0	1	194
KATHUMAR	0	0	1	0	1	138

Source: Census of India,2001

Table 4.9 explains the study of central place based on population density. Population density wise 1st order and 2nd order services are in Alwar. 3rd order service centers are in Kotkasim, Tijara, Kishangarh, Ramgarh, Alwar , Rajgarh ,Laxmangarh and Kathumar. 4th order services based on population density are in Behror, Tijara, Kishangarh, Alwar, Thanagazi and Ramgarh. Maximum 4th order service centers are in Tijara. Fourth order is more because of population density is not more in the towns of lower orders.
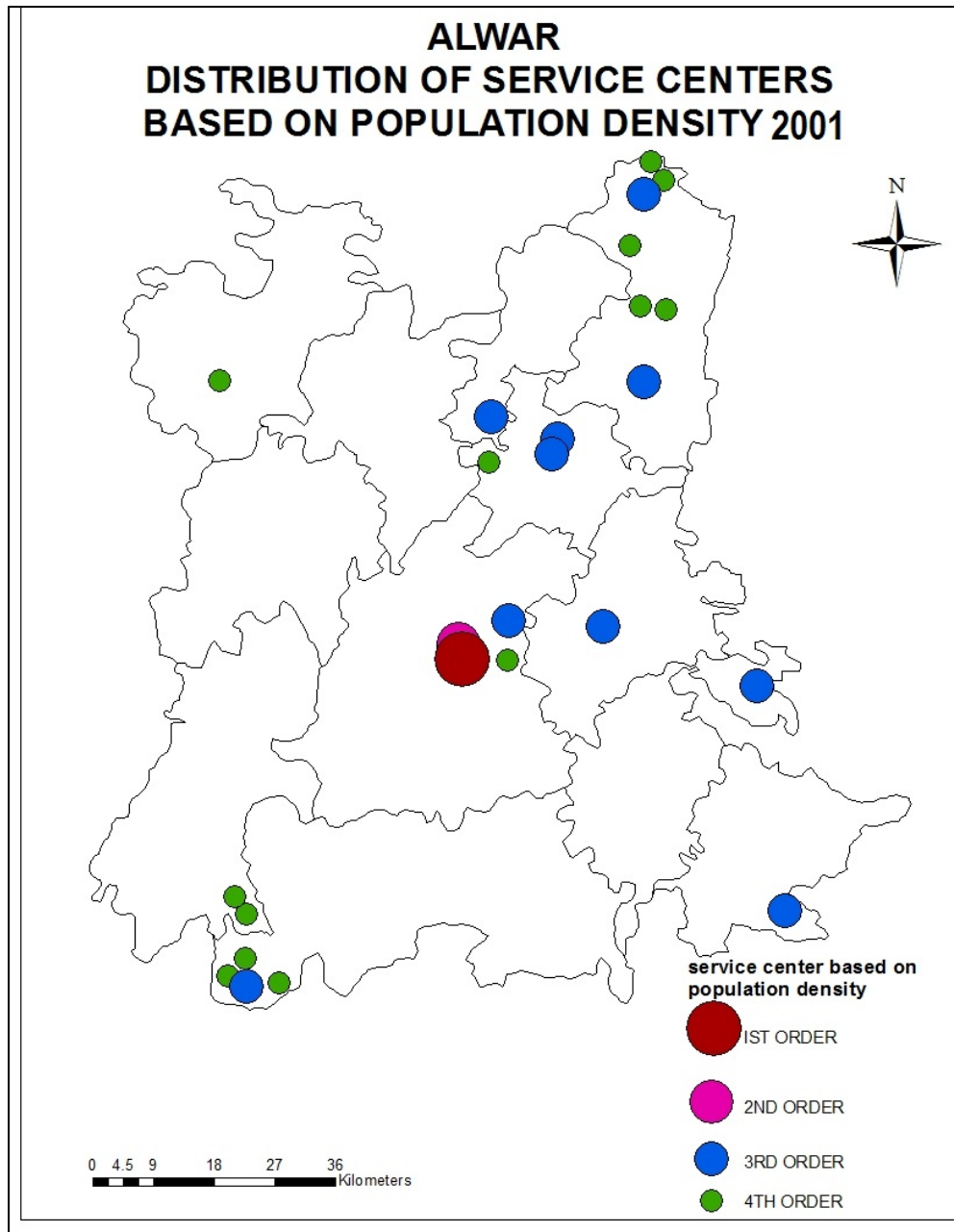
Map 4.3 explains the cross analysis for order of services with population growth rate of towns. Towns having higher population growth rate such as Bhiwadi, Behror ,and Khairthal don't have good concentration of higher order population service center therse are less urbanized and not having better health service and main occupation of these places is agriculture so the fertility rate high and hence population

growth rate. But the region having medium population growth rate such as Alwar, Govindgarh, Kherli, Rajgarh and Tijara having the higher order of population service center except Rajgarh. Population growth rate and order of service is not directly linked. Central place where services are more and urbanization level is high will not show the population growth because at such place the rate of use of contraceptive is high and non-agricultural occupation do not support the rising population.

In terms of urbanization Alwar tehsil is highest which has 1st order of population service center. In terms of total urban area it is highest. But it is followed by Kishangarh and Tijara, has higher order population service center.

In terms of SC & ST population Kathumar, Kishangarh, Mundawar, Kotkasim having higher percent of SC population , except Kathumar , all these tehsils are not having good concentration of service center. Kathumar, Kotkasim and kishangarh having 3rd order service center. In terms of ST population, Rajgarh is having higher ST population followed by Thanagazi , in these tehsils 3rd order and 2 fourth order population service center are available respectively.

4.6 Distribution of credit service center2011

Table no. 4.10
Alwar district
Order of credit service center

Service Center	Credit Index	Order
Alwar	174.1463	1
Bhiwadi	61.70732	2
Neemrana	54.87805	2
Khairthal	48.53659	3
Behror	44.63415	3
Thanagazi	35.12195	4
Lachhmangarh	35.12195	4
Tijara	34.39024	4
Kasba Bansur	31.46341	4
Rajgarh	31.21951	4

Source: Head Office of Bank in Alwar District and Census of India,2001

Table 4.10 explains credit facility in their order. It is very important service for farming community and small business men to insure their income and thus their sustenance. First order credit center is in Alwar and 2nd order credit center are in Bhiwadi and Neemrana. 3rd order credit service center are in Khairthal and Behror. 4th order service center are in Thnagazi, Laxmangarh, Tijara, Bansur and Rajgarh.

Most of the fouth order are in rural sector as the agriculture is the main occupation. This study shows that major population of Alwar comes under agricultural sector. This is a potential for the existence of dual economy and problems related to them.

Table no. 4.11
Alwar district
Hierarchy of credit service center

Order	Credit service center
1 order	1
II order	2
III order	2
IV order	5
V order	10
VI order	1983

Table 4.11 explains the hierarchy .1st order service center is one. 2nd and 3rd order service centers are two.4th order service centers are five. This pattern did not support for hierarchy.

Table no. 4.12
Alwar district
Distribution of credit service center2011

TEHSILS	1 order	II order	III order	IV order	V order	VI order
BEHROR	0	1	1	0	2	174
MUNDAWAR	0	0	0	0	0	142
KOTKASIM	0	0	0	0	0	116
TIJARA	0	1	0	1	2	203
KISHANGARH	0	0	1	0	1	109
RAMGARH	0	0	0	0	0	165
ALWAR	1	0	0	0	1	205
BANSUR	0	0	0	1	1	130
THANAGAZI	0	0	0	1	1	157
RAJGARH	0	0	0	1	1	248
LAXMANGARH	0	0	0	1	1	194
KATHUMAR	0	0	0	0	0	140

Source: Head Office of Bank in Alwar District and Census of India,2001

Table 4.12 explains the order distribution of credit services in different tehsils of Alwar. According to the credit wise observation 1st order service center is in Alwar. 2nd orders are in Behror and Tijara, 3rd order service center is in Kishangarh and Behror. And 4th order service center are in Tijara, Bansur, Thanagazi, Rajgarh and Laxmangarh.

ALWAR
CREDIT SERVICE CENTERS 2011

CREDIT SERVICE CENTERS

● 1ST ORDER
● 2ND ORDER
● 3RD ORDER
● 4TH ORDER

0 4.5 9   18   27   36
                   Kilometers
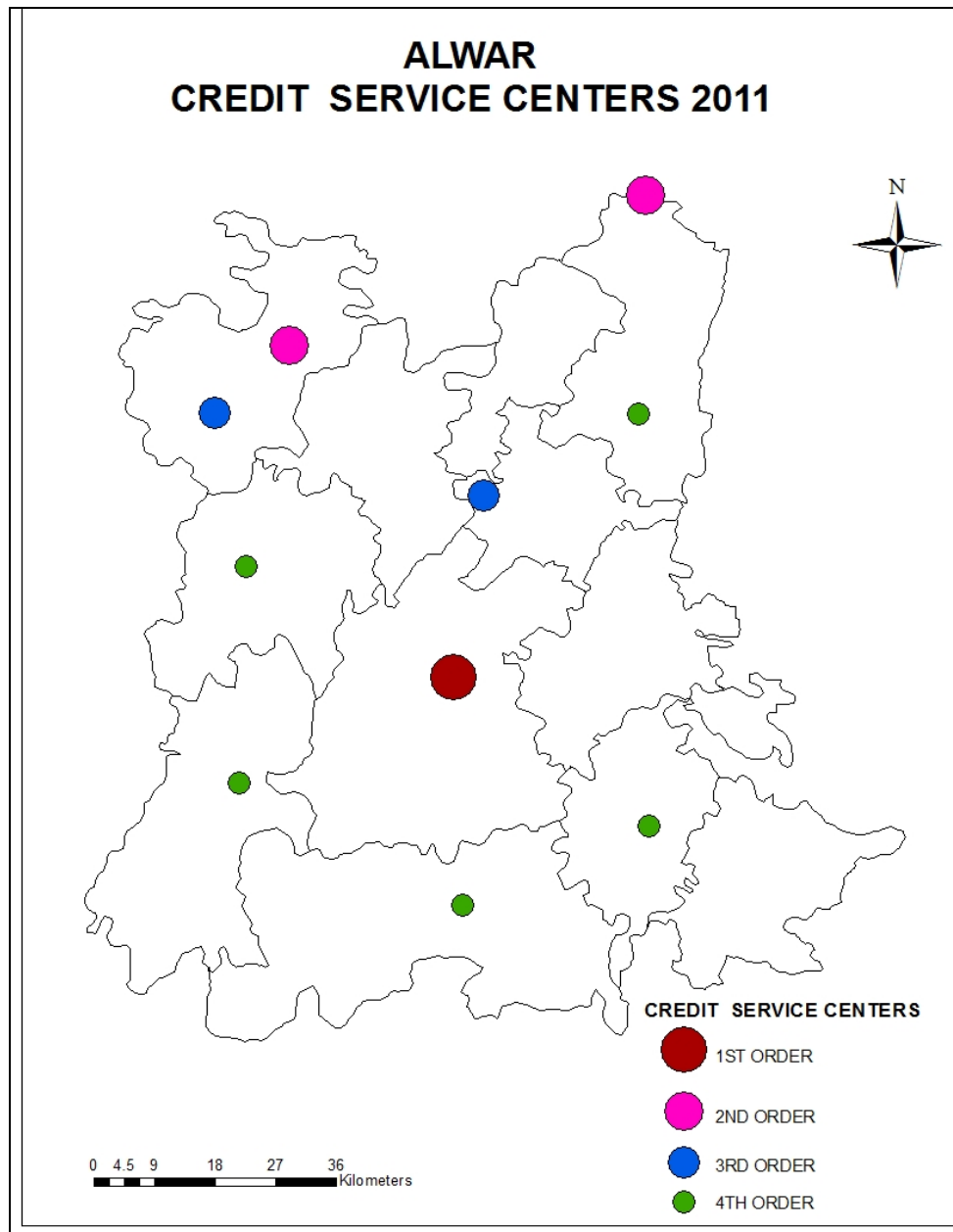
Map 4.4 explains credit service centers and its distribution in Alwar based on the population growth rate. It is found that towns having higher population growth rate such as Bhiwadi, Behror, and Khairthal are having higher order of credit facilities and these are not well developed towns and creates the demand surrounding agricultural output. But the region have medium population growth rate such as Alwar, Govindgarh, Kherli, Rajgarh and Tijara are not having the concentration of credit facilities except Alwar and Tijara and are class I &II towns.

In terms of population density, the tehsils having higher density such as Alwar, Behror, Tijara and Kathumar are having good concentration credit facilities in terms of banking facilities except Kathumar. So here population density has the relationship with the order of credit service center. Thanagazi and Rajgarh have low population density with lower order credit facility.

In terms of urbanization Alwar tehsil is highly urbanized which has 1st order of credit facilities. In terms of total urban population it has is largest concentration. It is followed by Kishangarh and Tijara, and they have lower order credit service center.

In terms of SC & ST population Kathumar, Kishangarh, Mundawar and Kotkasim are having higher percent of SC population. Except Kishangarh, all these tehsils are not having concentration of credit service center. In terms of ST population, Rajgarh, have higher ST population followed by Thanagazi, in these entire tehsils fourth order credit service center is observed. It means in region with higher concentration of SC, there is low concentration of credit service center but it is not true with the ST. this pattern comes because from these community the demand for credit is low and they are socially and culturally backward.

4.7 Distribution of Recreation service center2011

Table no. 4.13
Alwar district
Order of recreation service center 2011

Service Center	Recreation	order
Alwar	272.7273	I
Bhiwadi	181.8182	II
Tapookra	136.3636	III
Ramgarh	136.3636	III
Rajgarh	136.3636	III
Neemrana	90.90909	IV
Kotkasim	90.90909	IV
Ismalpur	90.90909	IV

Source: Collected data by District collector Office of Alwar District, on December, 2011 &
Census of India,2001

Table 4.13 explains the distribution of recreation facilities in Alwar. It depends on the income structure, occupation of the population in the region, level of urbanization and connectivity. So Alwar has got 1st order. Bhiwadi got 2nd order in recreation facility. Rajgarh , Tapookra, and Ramgarh has got 3rd order in recreation facility. Neemrana, Kotkasim, Ismalpur are 4th order service center.

Table no. 4.14
Alwar district
Hierarchy of recreation service center

Order	recreation service center
1 order	1
II order	1
III order	3
IV order	3
V order	8
VI order	1987

Table 4.14 explains the hierarchy of the recreational facility in Alwar. In recreation service center 1st order and 2nd order service center are only one. 3rd order service center and 4th order service centers are only three.

Table no. 4.15
Alwar district
Distribution of recreation service center

TEHSILS	1 order	II order	III order	IV order	V order	VI order
BEHROR	0	0	0	1	1	176
MUNDAWAR	0	0	0	0	0	142
KOTKASIM	0	0	0	1	1	114
TIJARA	0	1	1	0	2	203
KISHANGARH	0	0	0	1	1	109
RAMGARH	0	0	1	0	1	163
ALWAR	1	0	0	0	1	205
BANSUR	0	0	0	0	0	132
THANAGAZI	0	0	0	0	0	159
RAJGARH	0	0	1	0	1	248
LAXMANGARH	0	0	0	0	0	196
KATHUMAR	0	0	0	0	0	140

Source: Collected data by District collector Office of Alwar District, on December, 2011 & Census of India,2001

Table 4.15 explains the distribution of recreation facilities in Alwar district. First order service centers are in Alwar. 2nd order are in Tijara . 3rd order service centers are in Tijara, Ramgarh and Rajgarh . And 4th order service centers are distributed in Behror, Kotkasim, Kishangarh.
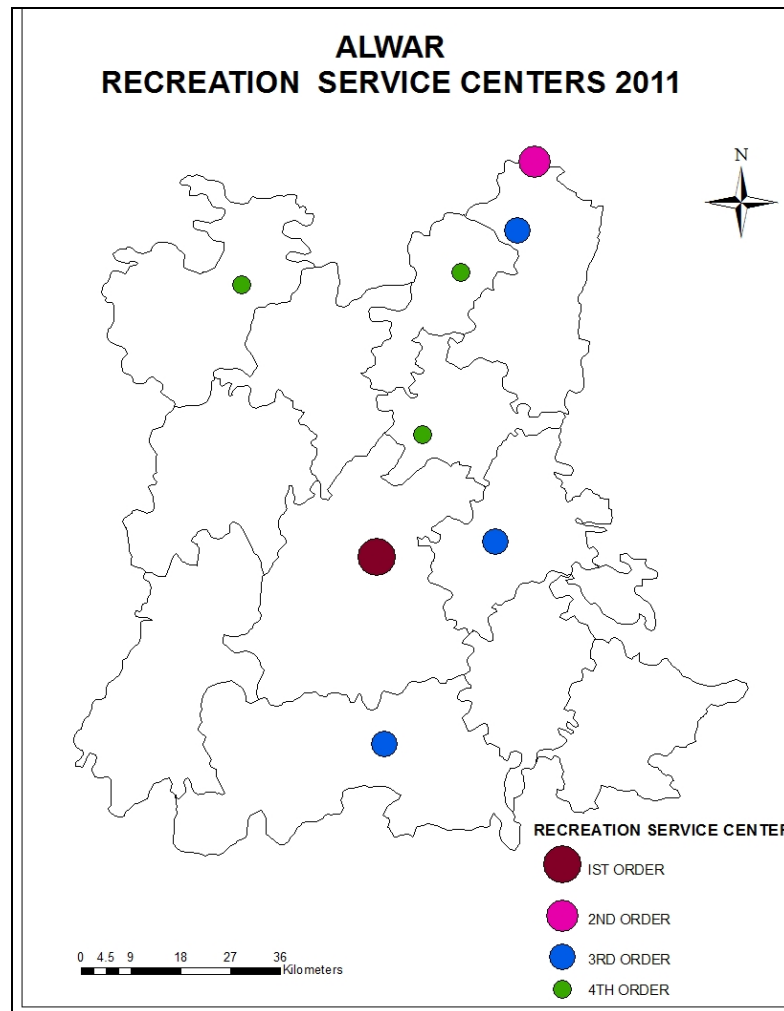
Map 4.5 explains the relation between the population growth rate of towns and the distribution of recreation facilities and it is found that there is no relation in recreation facility and population growth rate of towns as recreation facility directly depends on the income level and level of urbanization. And so in Alwar it is found that towns having higher population growth rate such as Bhiwadi, Behror ,and Khairthal do not have concentration of recreation facilities except Bhiwadi.

In terms of population density, the tehsils which have   higher density such as Alwar, Behror, Tijara and Kathumar have good concentration of recreation facilities. So here population density has the relationship with the concentration of recreation service center. Thanagazi and Rajgarh have lowest density but in these tehsil only Rajgarh has recreation facility.

In terms of urbanization Alwar tehsil is highest which has 1st order of recreation facilities. In terms of total urban population it is highest. It is followed by Kishangarh and Tijara and all have recreation service center.

In terms of SC population Kathumar, Kishangarh, Mundawar, Kotkasim have higher percent of SC population. Except Kathumar and Mundawar, all these tehsils are having concentration of recreation service center. In terms of ST population, Rajgarh, have higher ST population followed by Thanagazi, in these tehsils Thanagazi does not have recreation service center.

4.8 Distribution of service center

Table 4.16 explains the combined order of service centers in Alwar district. The first order service center is in Alwar because of its most central in the districe with almost all the service centers. 2nd order are in Bhiwadi, Rajgarh, Ramgarh . 3rd order service center are in Tapookra, Behror, Kherli and Neemrana. 4th order are in Laxmangarh, Kherli Rel, Tijara, Ismalpur, Kotkasim and Khairthal.

Table no. 4.16
Alwar district
Order of combined service center

Service center	composite index	order
Alwar	905.1745	1
Bhiwadi	262.4532	2
Rajgarh	241.2675	2
Ramgarh	207.5997	2
Tapookra	198.3412	3
Behror	163.8417	3
Kherli	156.734	3
Neemrana	154.8628	3
Lachhmangarh	141.7334	4
Kherli Rel (Rural)	140.8651	4
Tijara	137.3292	4
Ismalpur	130.4803	4
Kotkasim	117.8407	4
Khairthal	114.8628	4

Table no. 4.17
Alwar district
Hierarchy of combined service center

Order	combined service center
1 order	1
II order	3
III order	4
IV order	6
V order	16
VI order	1970

Table 4.17 explains the combined service centers for their hierarchy. In which 1st order service centers are only one. 2nd order service centers are three. 3rd order service center are six. 4th order service centers are nine. There is a hierarchy in combined service center.

Table no. 4.18
Alwar district
Distribution of combined service center

TEHSILS	1 order	II order	III order	IV order	V order	VI order
BEHROR	0	0	2	0	2	174
MUNDAWAR	0	0	0	0	0	142
KOTKASIM	0	0	0	1	1	114
TIJARA	0	1	1	1	3	201
KISHANGARH	0	0	0	2	2	107
RAMGARH	0	1	0	0	1	163
ALWAR	1	0	0	0	1	205
BANSUR	0	0	0	0	0	132
THANAGAZI	0	0	0	0	0	159
RAJGARH	0	1	0	0	1	248
LAXMANGARH	0	0	0	1	1	194
KATHUMAR	0	0	1	4	7	126

Finally it is conclude that 1st order service center is in Alwar. 2nd order is in Tijara, Ramgarh and Rajgarh. 3rd order service centerare in Behror Tijara, Kathumar . 4th order population service center are distributed in Tijara, Kotkasim, Laxmagarh, Kathumar and Kishangarh.
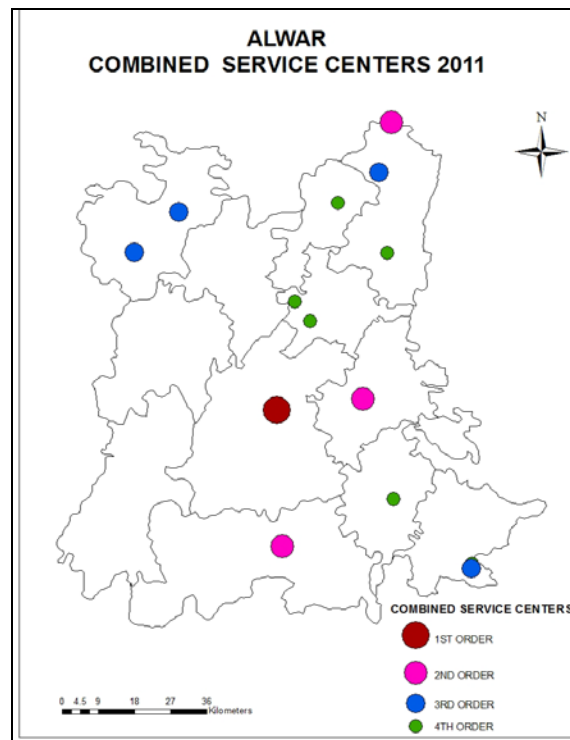
By the cross analysis with population growth rate of towns , it is found that towns having higher population growth rate such as Bhiwadi, Behror ,and Khairthal have concentration of combined service center. In this way there is relationship of service centers with the population growth of town.

In terms of population density, the tehsils which have higher density such as Alwar, Behror, Tijara and Kathumar having good concentration of service center. So here population density has the relationship with the combined service center. Thanagazi and Rajgarh have lowest density and in these tehsil only Rajgarh has service center.

In terms of urbanization Alwar tehsil is highest which has 1st order of education facilities. In terms of total urban population it is highest, it is followed by Kishangarh and Tijara such tehsils have concentration of service center.

In terms of SC population Kathumar, Kishangarh, Mundawar and Kotkasim have higher percent of SC population, except Mundawar, all these tehsils are having concentration of service center. In terms of ST population, Rajgarh, having higher ST

population followed by Thanagazi among these tehsils Thanagazi do not have service center.

4.9 Population size and service center

Table no. 4.19
Alwar district
Cross classification of service center with population size class

Population size		100000<	50000-99999	20000-49999	10000-19999	5000-9999	<5000
Service Center		I	II	III	IV	V	VI
I	1	1					
II	3			2	1		
III	4			1	1	1	1
IV	6			1	1	4	
V	16				3	9	4
VI	1973				2	32	1939

Source: calculated service center and Census of India,2001

Central place theory provided the original hypothesis that there should be an observable relationship between the number of activities in a center and its population[9].

Table 4.19 explains that the center according to population size does not exactly match according to service center. 1st order service center match to the class I town according to the population size. 2nd order service center are three in number among which 2 are class III town and one is class IV town. 3rd order service center are four in number among which are class III, IV, V and VI town. 4th order service center are 6 in number among which one is class III , other is class IV and four are class V service center.5th order service center are 16 which are distributed in class IV,V and IV. 6th order service center are distributed in class IV, V and IV.

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[9] R. M. Lillibridge: "Shopping Centers in Urban Re- development," Land Econs., Vol. 24, 1948, pp. 137-160

4.10 <u>Konning number</u>

<u>Table no. 4.20</u>
<u>Alwar district</u>
<u>Konning number for service center</u>

service center	konning number	Order of service center
Alwar	3	1
Behror	7	3
Ismalpur	7	4
Khairthal	7	4
Ramgarh	8	2
Tapookra	8	3
Neemrana	8	3
Tijara	8	4
thanagazi	8	6
bansur	8	5
Bhiwadi	9	2
Rajgarh	9	2
Lachhmangarh	9	4
Kotkasim	9	4
Kherli	11	3
Kherli Rel (Rural)	11	4

Source: Calculated by Road map of Alwar District 2001

Table 4.20 explains the calculated konning number for different tehsils in Alwar. It is known as the value of konning number rise the place goes away from the centrality, less is value of konning number, and more is centrality. Alwar has least konning number, which means it is more central. Behror, Ismalpur and Khairthal are having 2nd least value of konning number, and are second to the central place. Highest value of konning number is in Kherli, followed by Kotkasim, Laxmangarh, Rajgarh, Bhiwadi.it means Kherli is least central, it is followed by Kotkasim, Laxmangarh, Rajgarh, Bhiwadi.

4.11 Road accessibility and service center

Map no. 4.7
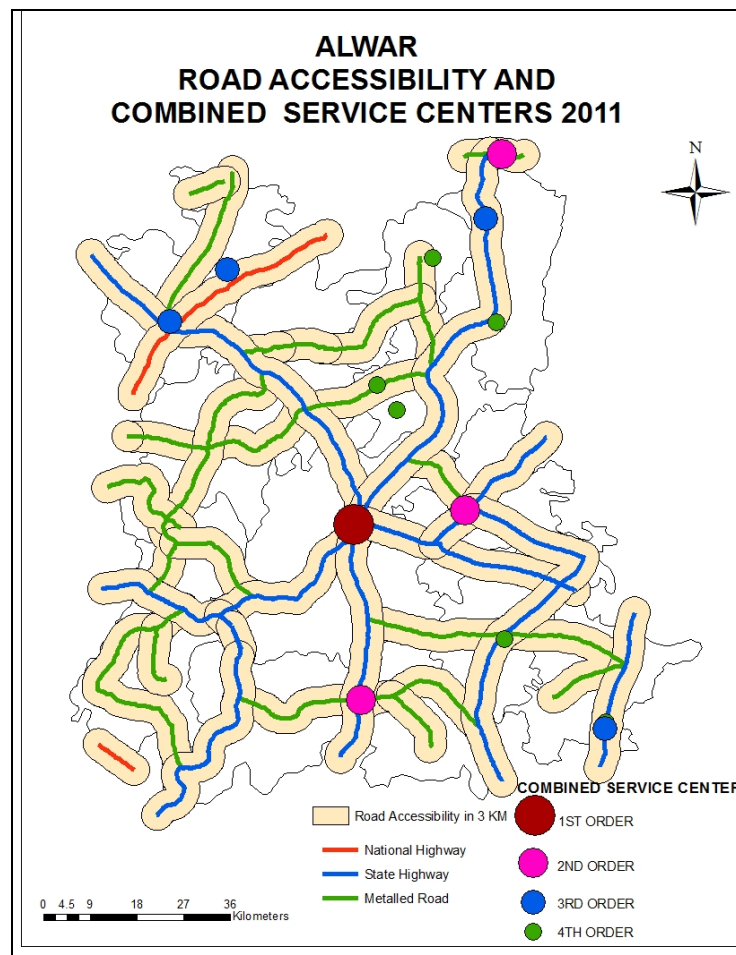
Map 4.7 explains the connectivity and its effect in deciding the order of service centers. The 1st order service center is Alwar city, which is located on meeting point of all state highways. It is highly accessible center because of nodal point of all state highways. Because of highest accessibility, it has come up as a 1st order service center. 2nd order of service center is Bhiwadi, it is industrial hub. This is the reason for its progress. Almost all the service center is located on the road network except Ismalpur. But Ismalpur is also in accessible region of road network.

4.12 Rail accessibility and service center

Map 4.8

**ALWAR
RAIL ACCESSIBILITY
COMBINED SERVICE CENTERS 2011**
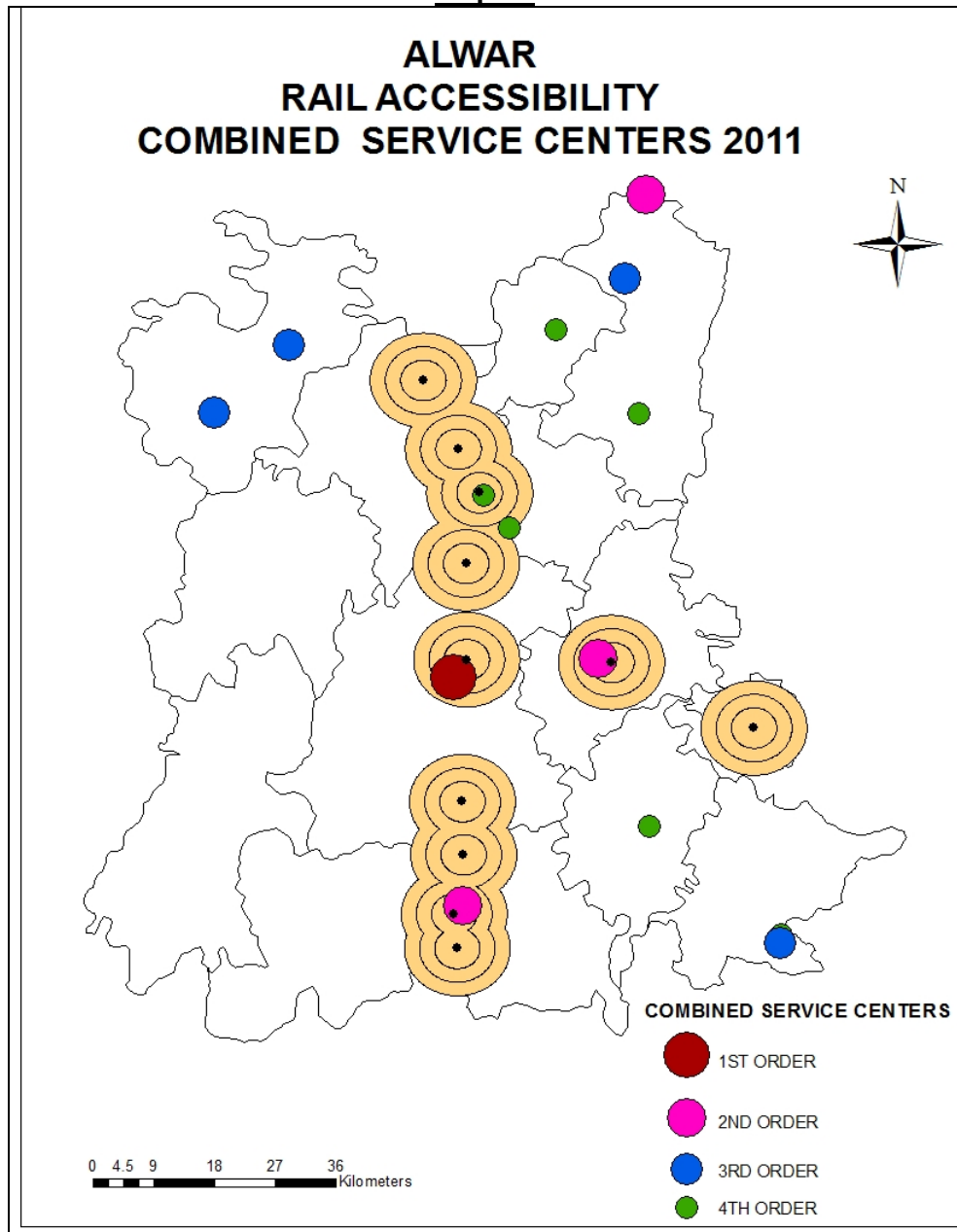
Map 4.8 explains the role of railways connectivity and its effect in deciding the distribution of service centres. Most of the service centers are in the accessible region except some service centers which are Behror, Neemrana, Tapookra, Kotkasim, Tijara, Laxmangarh and Kherli rel. But these centers are well connected through roadways. Higher order service center 1st and 2nd order center Alwar, Rajgarh and Ramgarh are in the range of railways accessibility region in the map, except Bhiwadi. 3rd order service center are not in railway accessibility range. Only three

service center of 4th order does not come in railway accessibility range, which is Kotkasim, Tijara and Laxmangarh.

4.13 Network analysis

Network is important aspect for settlement. It comprises of Roadways, Railways, Airways, Waterways and Telephone links. Waterways are not significant in this study. By the help of connectivity matrix and topological characteristics derived from the graph theory it can be analyzed easily and efficiency can be measured by which network is connected.

Table no. 4.21
Alwar district
Network analysis by alpha beta gama index

TEHSILS	ALPHA	BETA	GAMA	CYLOMETRIC NUMBER
BEHROR	0.0045	1.0526	0.0569	3
MUNDAWAR	0.0089	1.1143	0.0655	6
KOTKASIM	0.0049	1.0333	0.0713	2
TIJARA	0.0038	1.0294	0.0624	2
KISHANGARH	0.0040	1.0303	0.0644	2
RAMGARH	0.0071	1.0857	0.0639	5
ALWAR	0.0063	1.1912	0.0356	14
BANSUR	0.0028	1.0256	0.0540	2
THANAGAZI	0.0067	1.0385	0.0831	2
RAJGARH	0.0094	1.2000	0.0490	11
LAXMANGARH	0.0058	1.0000	0.1053	1
KATHUMAR	0.0444	1.0909	0.2182	2
ALWAR DIST.	0.0101	1.1957	0.0531	10

Source : Calculated from Road Map of Alwar, 2001

4.13(a)Cyclometric number

This is a simple index and indicates the number of circuits. If Cyclometric number increases it indicates the completeness of the connection and complexity of network. In this case there will be more number of edges less number of vertices. According to Garrision[10] cyclometric number would bear direct relationship with the levels of development of a region. Cyclometric number is highest for Alwar. It is

_____
[10] Garrision W.L. and DF Marble (1974) "graph thoratic concepts" in Eliot Hurst and E.Michel(ed) transportation geography-conmments and readings New York McGraw Hill p. 64.

because Alwar is district headquarter and nodal point. It is followed by Rajgarh. In these tehsils completeness of connection and complexity of the networks are found. In Laxmangarh, this is lowest it means there is less connectivity. The regions with more connectivity are more developed with less connectivity is les developed. In Kotkasim, Tijara, Kishangarh, Bansur, Thanagazia and Kathumar, are with less cyclometric number. It means there is less connectivity because there is direct relationship of cyclometric number to connectivity, thus there is less development. Overall cyclometric number of district also indicates that connectivity is good in district.

4.13(b)Alpha index

Alpha index is ratio of actual number of circuits and the maximum number of possible circuits. The value of α varies from 0 to 1. The value of α=1 indicate that network is completely interconnected because the number of edges decrease the connectivity value also decrease. Another advantage of this index is that two network of unequal graphs can be compared. Alpha index is highest in Kathumar and lowest in Bansur followed by Tijara. In Bansur neither state highway nor does national highway pass. Topography does not suit to road service in this area, because of hilly region.

4.13(c)Beta index

Those network which form structures like a trees with several branches and no connected graphs with no circuits will have β value less than 1. Value of β=1 will indicate only one circuit. Value of β more than 1 will indicate more complex network with an increasing number of edges in relation to vertices. In the above table it is shown that Laxmangarh has only one circuit, in Alwar and Mundawar, value of β index is highest, showing that more complex networks are in these tehsils. Overall scenario of network in Alwar district is also more complex.

4.13(d)Gama index

Gama index is the ratio of actual number of edges or route connections to the maximum possible number of edges. Value of Gama index varies within (0 to 1).

When $\gamma =0$, it indicates there is no connections in network. When value of $\gamma =1$, it indicates maximum number of connection in network. In above table highest indexed is Kathumar followed by Laxmangarh. It means in these tehsils there are more connections in network in comparison to other tehsils. In Alwar and Rajgarh there is lowest connection in network in comparison to others tehsils.

Table no. 4.22
Alwar district
Network analysis by indices 2001

TYPE OF INDICES	FORMULA	VALUE OF INDICES
ALPHA	(E-V+1)/1/2 (sq of V-V)-(V-1)	0.01010101
BETA	E/V	1.195652174
GAMA	E/1/2 (sq of V-V)	0.053140097
CYLOMETRIC NUMBER	E-V+ p(row)	10

Source : Calculated from Road Map of Alwar, 2001

Table no. 4.23
Alwar district
Network analysis by composite index of rank

TEHSILS	CI OF RANK
KATHUMAR	12
MUNDAWAR	14
RAJGARH	16
RAMGARH	20
ALWAR	21
THANAGAZI	22
KOTKASIM	28
BEHROR	29
LAXMANGARH	33
KISHANGARH	34
TIJARA	39
BANSUR	44

Source: Calculated from Road Map of Alwar, 2001

Table 4.3 explains the intensity of network connectivity analyzed with composite index calculation of different measures as ranking of Alpha, Beta, Gama indexes and Cyclometric number. After ranking, all the ranks are added and then composite index of transport is calculated according to the ranking method used by Kendall[11]. From this table if there is higher composite index then, lower the transport value of that region. And the higher value is for Kathumar, Mundawar, Rajgarh and Ramgarh .It means in these tehsils transport connection is good, from these tehsils state highway passes, which are SH-22, SH14, SH25 and SH-35. In Laxmangarh, Kishangarh, Tijara and Bansur transport network is not efficient, because of hilly region there is no good connectivity. No state highway passes through Bansur. It is connected by only metaled road. From Tijara only one road SH- 25 passes.

4.14 Population Distribution in Identified Service Center

Map 4.9 explains population concentration in identified service centers. Alwar city has highest concentration of population. And other centers do not show scuh high concentration the connectivity an income structure together with the agrarian economic setup is held responsible for this picture. Some lower order towns with population are spread in eastern part of extreme north is because of its connectivity factors. And similarly there are some in extreme south.

Through out Alwar district the population distributionis not even and this result is reinforcing the cause and effect.

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[11] Kendall, M.G. "A course in multivariate analysis" ,charles giffin co. London,1968p.35.

ALWAR
POPULATION DISTRIBUTION OF
ALL IDENTIFIED SERVICE CENTERS
UP TO FOURTH ORDER 2001

POPULATION SIZE

250000<

10000-15000

1000-5000

<1000

5000-10000

0 4 8   16   24   32
Kilometers
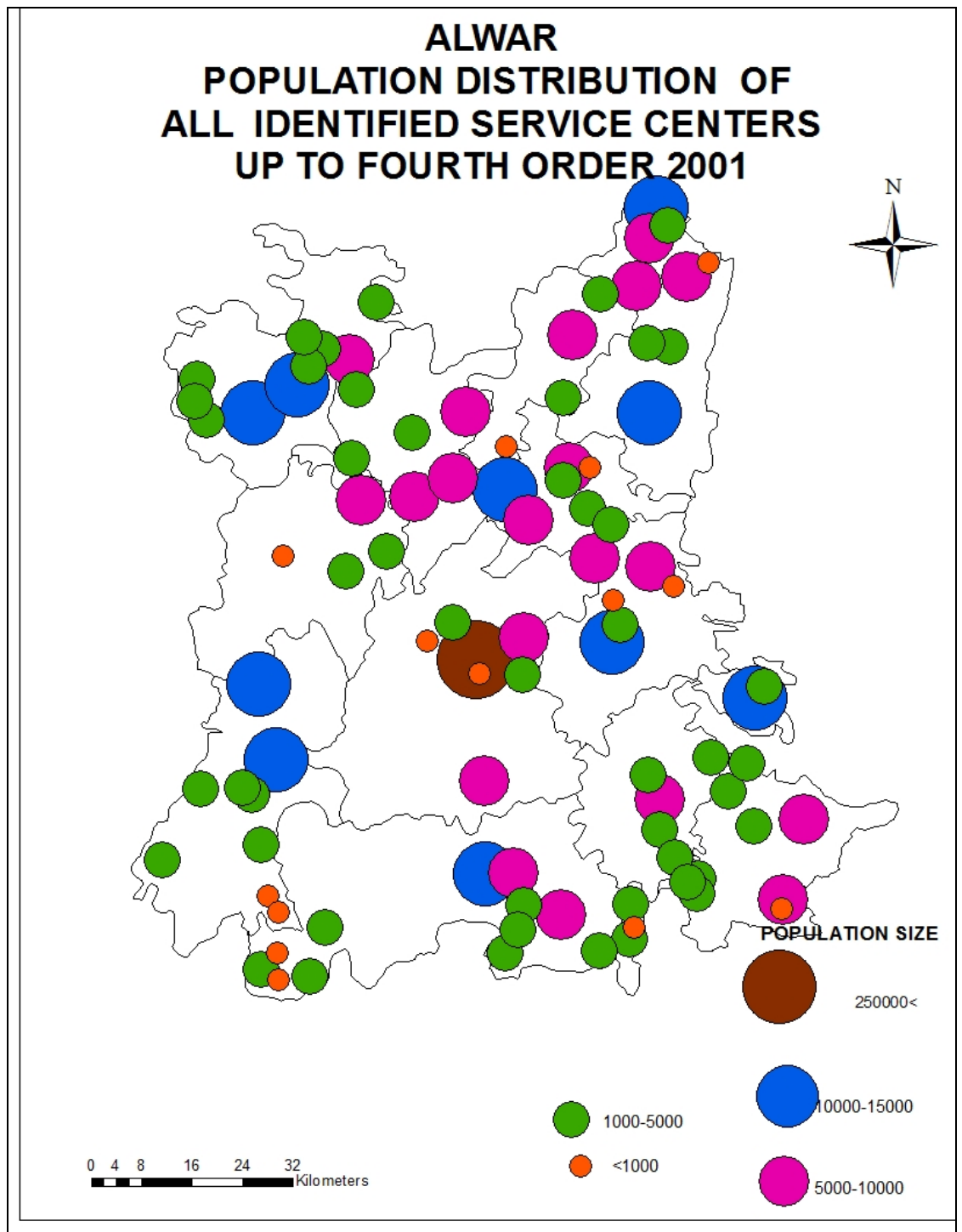
4.15 Conclusion

Education service center

- 1st order service center is Alwar city. In education facility 2nd order settlements are Rajgarh, Kherli,. 3rd order settlements are, Behror, Govindgarh. 4th order settlements are Narayanpur, Bardod, Tijara Thanagazi.

- In Alwar there is only 1st order educational central place. 2nd order educational service center are in Rajgarh and Kathumar .In Behror and Laxmangarh there is one 3rd order educational central place. And 4th order service center are 4 which are in Behror, Tijara and Thanagazi(2).

Health service center

- 1st order health service centers are in Alwar tehsil. 2nd order health service centers are in Laxmangarh tehsil. 3rd orders are in Kathumar and Tijara tehsil . 4th order service centers are distributed in all the tehsils. There are only 4th order service centers in Kotkasim whereas maximum 4th order service centers are in Laxmangarh.

- 1st order settlements in terms of health services are in Alwar. 2nd order settlements are in Laxmangarh.3rd order settlements are in Kherli Rel.

Population wise service center

- Population wise 1st order services are in Alwar tehsil. 2nd order services are also in Alwar. 3rd order service centers are in Kotkasim, Tijara, Kishangarh, Ramgarh, Alwar , Rajgarh ,Laxmangarh and Kathumar tehsil. 4th order service centers are in Behror, Tijara, Kishangarh, Alwar, Thanagazi and Ramgarh. Maximum 4th order service centers are in Tijara.

- 1st order settlements are in Alwar (rural). In 2nd order settlements are in Alwar. In 3rd order Kishangarh, Tijara, Ramgarh, Kherli, Patti Beena, Diwakari, Santhalka, Ganj, Shahpur and Govindgarh are placed.

Credit service center

- 1st order credit service centers are in Alwar . 2nd order credit service centers are in Bhiwadi, and Neemrana. 3rd order credit service centers are in Khairthal & Behror. 4th order credit service centers are in Thnagazi, Laxmangarh, Tijara, Bansur and Rajgarh.

- Credit wise 1st order service center is in Alwar tehsil. 2nd orders are in Behror and Tijara tehsils. 3rd order service centers are in Kishangarh and Behror. 4th order service centers are in Tijara, Bansur, Thanagazi, Rajgarh and Laxmangarh tehsils.

Recreation service center

- 1st order recreation service centers are in Alwar tehsil. 2nd order services are in Tijara tehsil. 3rd order service centers are in Tijara, Ramgarh and Rajgarh tehsils. 4th order service centers are distributed in Behror, Kotkasim, Kishangarh tehsils.

- Alwar has got 1st order. Bhiwadi got 2nd order in recreation facility. Rajgarh , Tapookra, and Ramgarh got 3rd order in recreation facility. Neemrana, Kotkasim, Ismalpur got 4th order.

Combined service center

- 1st order combined service centers are in Alwar. 2nd combined service centers are in Bhiwadi, Rajgarh, and Ramgarh. 3rd combined service centers are in Tapookra, Behror, Kherli Neemrana . 4th combined service centers are in Laxmangarh, Kherli Rel, Tijara, Ismalpur, Kotkasim and Khairthal.

- 1st order service center is in Alwar tehsil. 2nd order is in Tijara, Ramgarh and Rajgarh tehsils. 3rd order service centers are in Behror, Tijara, Kathumar tehsils . 4th order population service centers are distributed in Tijara, Kotkasim, Laxmagarh, Kathumar and Kishangarh tehsils.

Population size and service center

Order of Population size of towns and service centers does not match except 1st order a service center that is only Alwar. It means pattern of distribution of population size and service center does not follow the central place theory.

According the konning number Alwar is most central and Bansur is least central point.

Railways and roadways accessibility show positive relationship with development of a place and degree of transport network. But in this case railway stations are linearly distributed and roadways are not well connecting all the places of the region. This looks a visible constraint in the development of Alwar.

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Chapter 5

CONCLUSIONS

In this study, pertinency of central place theory is checked in Alwar district. And it is found that Central place theory is not fully applicable in Alwar district because only 1st order of central place matches according to population size. Secondly according to the central place theory hierarchy of service center should introduce a definite pattern, but in Alwar district this not so in most of the services. The findings of this study are highlighting the skewed pattern of hierarchical structure in Alwar.

Distribution of the functions of centrality which are taken in this study like education, health, credit service center, recreational facilities and transportation are well discussed according to the data collected from various government agencies. And it is found that in some parts of the district concentration of the functions of centrality is high but in some part it is dispersed. All the findings regarding different functions of services from this study are compared to the centrality theorem. Alwar district is showing different degrees of dispersion for different services. This is enough to make a case that the major parts of the region are still not developed, and are economically backward.

Service of all types is equally important for the growth and development of a place, in well-functioning central places. And if there are so many central places in a region are distributed in a definite pattern then there is nothing which can stop the market forces to do miracles in changing its face in to a developed region. But in case of Alwar there is not any pattern among the distribution of central place. The different orders of the central towns are not even in a circular order there is only one first order town in Alwar district is Alwar town. And there is three of second order, four of third order and sixteen are of fourth order. This explains that most of the region falls under the loop side of services and hence under developed.

Usually the most static factor of hindrance for such picture of order and pattern of towns could be the geographical factors. But in this study geographical constraint is not significant. So looking at the other main forces of development and distribution of services that is the veins of supply chains for the services is network connectivity (Roadways, Railways, and other connectivity) roadways is not evenly connecting all the places and railways is showing its linear influence in the region. This is the important cause in explaining the underdevelopment of the region.

Inadequate transport connectivity is negatively impacting all types of the service throughout Alwar district. Education service centers are not distributed everywhere, the cause can be population density but the occupational structure that is rural setup of the major part of the regional economy is also adds to the problem together with the literacy rate and lack of regional demand base for the skilled labour.

Health service centers are also not evenly distributed everywhere the connectivity and population density is the significant cause for such a bad health service. Recreation service foster mainly in urban centers with the concentration of population of higher income group, and is more in Alwar town. Credit facilities such as banking and cooperative service are also showing uneven distribution, most of the banks are in Alwar and other credits facilities are in small towns which feed rural population.

Services centers usually have the potential to generate employment opportunities for the labour pool of different strata of population. Availability of employment opportunities is the potential for growth in terms of income of the populace, and in our case Alwar has only one center of first order of centrality that is Alwar city itself, which is having most of service centers.

In accordance with the total population of Alwar the employment opportunities is not adequate, so that the whole purpose of growth of the region in terms of income is defeated. This can be one valid reason for the existence of dualism in the economic structure of the area which account for the growth of informal sector. (William Arthur Lewis). According to socioeconomic and educational factors the region under study is not well developed with the centrality axioms to provide a spectrum of employment which can stop migration. In some tehsils like Behror and Kathumar overall education facilities are good, but the other functions like health facilities are not fully dispersed, whereas the number of dispensaries are good everywhere and the numbers of hospitals are mostly concentrated in the regions tending towards the centrality. This is only due to lack of the roadways facilities in most part of Alwar, and the physical constraints also having the positive cause. In this study service center is affected by many factors like physiography, transport network, NCR region, and roads and railways network.

Alwar being a 1ˢᵗ order suggested in the result can be reasoned easily. As it is central point of district, where different state highway meets and this is the nodal point for road networks. Railway line also passes through Alwar district. So it is highly accessible to the other parts of the districts and national and state capital because of good transport networks connectivity through roadways and railways. Railway is providing limited growth and range of accessibility as it is linearly distributed in Alwar. Alwar come out to be a nodal point of this study so the services agglomerate here.

2ⁿᵈ order service centers are Bhiwadi, Rajgarh and Ramgarh. Bhiwadi is progressing as industrial hub and near to Delhi. This is located on Delhi Jaipur road so the development of services is high in this region. Rajgarh and Ramgarh are connected by railway and roads. Rajgarh has the settlement in old pattern in comparison to Bhiwadi.

Tapookra, Behror, Kherli, Neemrana are of 3ʳᵈ order service center. In these centers Behror, Tapookra and Neemrana are also progressing as industrial center and well connected through the transport services. That's why region is developed as service center which is a good sign for the potential for development in near future.

By all the finding it has come to know that connectivity and education plays important role for the development of a service center. But all parts of Alwar lack in schooling facilities and health facilities and these are important factors of human development measures of the region. According to the physiography of the Alwar district there is inadequate transportation in some part but overall connectivity is average. This can be a good candidate to advocate Alwar not being developed and the other evidence is of the population distribution and facilities distributions in the region are not according to the proportion.

Socio economic conditions and connectivity are interrelated which affect each other and the distribution of central place as Christaller suggest, provide job opportunities to the population for growth and development and thus the central place theory work. But the study of Alwar under the static set of political and social condition it is found that the region is not well developed according to the centrality elements.

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