

Delineation of Rural Urban Fringe of Indian Cities: A Case Study of Jammu City

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Abstract: *Fringe belt is a dynamic area which fluctuates in span of time. It continues shifting outward from the city with the diffusion of urban innovation in the surrounding localities. As its development is associated with growth of the city, it becomes more difficult to delineate the ever changing area on the periphery of a growing urban centre. The delimitation of such a geographical expansion of a city that binds the socio-economic influence is in fact a matter of interest. For delimitation of rural-urban fringe of Jammu city, two sets of indices or determinants have been selected based on the studies carried out by several researchers. The three sets of indices/determinants for delineating the rural urban fringe of the Jammu city are economic services, occupational structure and demographic determinants. It is found that the expansion of the city mainly towards the south and south east direction especially along bypass of national highway. Here some of the methods have been examined which were used in the delimitation of the rural-urban fringes of the different cities and towns of India and abroad.*

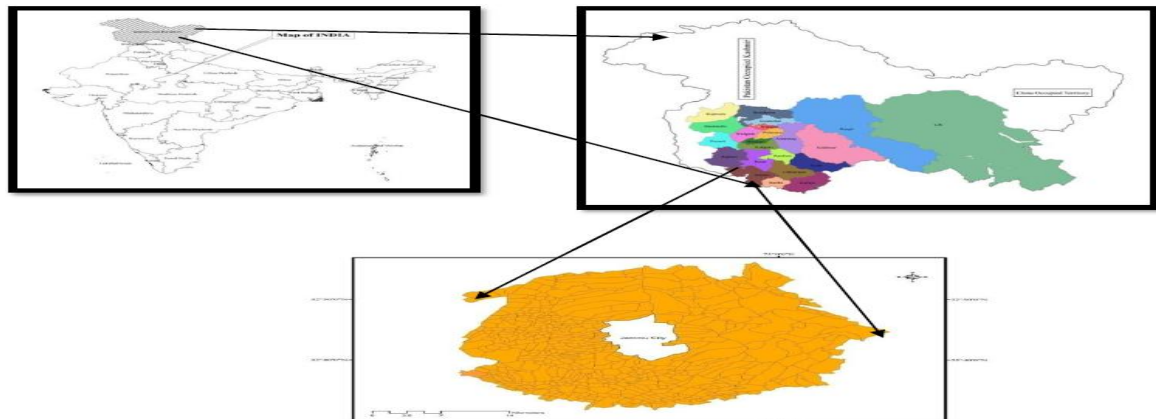
Keywords: *Fringe, delineation, commuters, literacy, occupational structure, demography.*

I. Introduction

The term rural-urban fringe was first used by T.L. Smith in 1837 to signify the discontinuous built-up area just outside the corporate limits of Louisiana City. Subsequently, the concept of 'rural-urban fringe' was developed by Robin J. Pryor in 1968. The word 'rural-urban fringe' is constituted by three words rural, urban and fringe. Rural is a common word denoting word village or country side. In the Oxford English Dictionary the word rural has been defined as "living in the country having the standing qualities or manner of peasants of country folk, engaged in country occupation agricultural or pastoral, or pertaining to, or characteristic of the country or country life as opposed to the town". Rural urban fringe is a complex zone on the periphery of a growing urban area. Rural-urban Fringe is a zone rather than a boundary. Hence, the rural-urban fringe cannot be precisely demarcated. In an attempt to understand and demarcate the rural-urban fringe it is imperative to measure the rural and urban interaction. Rural-urban differentiation can be examined in several aspects, for example, occupational difference, environmental differences, differences in the nature of housing and house holding, difference in the density of population, difference in social mobility and migration and the differences in social interaction and stratification.

II. Study Area

To set the agenda for research, the first effort has been set forth as the identification of the area. It is extended between 32°32' N to 32°54' N latitudes and between 74° 39' E to 75° 4' E longitudes. It is bounded by Akhnoor Tehsil in the north west, Samba district in the south east, R.S. Pura Tehsil in the south west and Bishnah Tehsil in the south. Western parts of the study area shares the international border with Pakistan. The area experiences sub-humid monsoon type of climate. The summer temperature fluctuates between 31°C-42°C. In winter the temperature range from 8°C-13°C. The annual rainfall is about 85-135 cm.



With the urban expansion, new location and other linear extension along the Jammu-Pathankot and Jammu-Akhnoor roads have extended the urban limits in the form of some stay colonies. The increase in population was too sudden for the city to accommodate and provide urban services like drinking water, sanitation, education, health, transportation, housing etc. Pull of Jammu was the major factor responsible for unprecedented growth of population. Migrants to Jammu city came from other parts of the state, thus beginning the story of transformation of Jammu city.

On the basis of above description of the study area it can be well justified that this area provides suitable grounds to study rural-urban fringe and the changes in it through time.

Objective

The main objective of the study is to delineate the rural urban fringe of jammu city.

III. Methodology

Methodology refers to a set of principles and processes by which aims and objectives are perceived. It is a technique which is followed to prove a hypothesis. To fulfill the objectives of present study a sound methodology has been devised to study demographical and occupational structures, land use variables, socio-economic transformations and accessibility variables of Jammu and adjacent districts (village level). In order to draw upon a comprehensive range of information, the study, make use of a variety of resources and methods. This study excepting its conceptual part is based on the data procured from the primary as well as secondary resources. The secondary data have been borrowed from various government and semi-government offices of district, tehsil and block level. The census data and other records are used to get a more general picture of the population profile and employment structure. Information on land use is taken from existing maps, remote sensing maps and field mapping as well as from agricultural land records; newspaper articles and reports giving details about the situation in the research area are also used and will be frequently cited in the text. On the other hand primary data is collected through personal field survey. A reconnaissance survey was conducted at the outset so as to identify the empirically and approximate limit of rural-urban fringe of Jammu city, viewing at various urban impacts on its peripheral area like:

- a. Extent of brick kiln zone.
- b. Extent of milk supply zone.
- c. Extent of mini-bus services both for public and school transport.
- d. Extent of vegetables supply zone.
- e. Extent of commuter zone.

The following techniques shall be applied to fulfil the objectives of present study-

Standard Deviation:

It is a method to measure dispersion. In this we first find out the sum of squares of deviations from the mean and then divide it by number of observations. The resultant is called as variance and its positive square root is defined as standard deviation .Here since we square up the values obtained by subtracting from each individual number so the presence of negative sign immediately gets converted into positive sign. The following formula is used to calculate standard deviation:-

$$S.D. = \sqrt{\frac{\sum (X - \bar{X})^2}{N}}$$

Where

$$\sum (X - \bar{X})^2 = \text{Sum of the squares of the deviation from the mean}$$

N = No. of variables

Average:

The averages were calculated to obtain the average of values in primary and secondary fringe area. The average was calculated by the following formula:-

$$\bar{X} = \Sigma X / N$$

Where \bar{X} = Mean or Average

ΣX = Sum of all values

N = No. of observations

The methodology stated above when applied on relevant data will provide a clear picture of the rural-urban fringe of the area under study, on the basis of which various policies and programmes will be proposed for the solution of the problems of the study area.

Fringe Delineation Of Jammu City

On the basis of aforesaid studies carried out at global and national levels from time to time, some common factors revealing fringe characteristics may be taken as the indicator of the urban influence on the periphery and outskirts of the urban centers. It would be rather a wise step to decide first those indicators or determinants. At the same time, it is not advisable to delimit the rural urban Fringes of Indian cities on the basis of the criterion suggested for fast growing urban centers of the West. India is a developing country and its urban centers show the same trend. Although some Indian scholars have tried to analyze different demographic aspects, land use and characteristics of rural urban fringe, yet a comprehensive methodology for delimitation of the rural urban fringe of a city is still lacking.

Jammu city located on the banks of river Tawi has been an important transit hub since the time immemorial. It being the only city in Jammu Division of the Jammu and Kashmir State, commands a sizeable tributary area of heterogeneous character. Its situation can be marked as ideal for being an inland capital. This is the reason it has been accorded the status of winter capital of the State. It has been a strategically located township and has enjoyed the urban primacy in the region throughout its existence. The city is the largest urban centre in terms of the areal coverage and population size and is experiencing the highest growth rates among other urban centers in the State. As a result of rapid growth of population, the Jammu city spills over the surrounding area and causes frequent changes in the rural-urban limits of the fringe. The rural-urban fringe belt of Jammu city fluctuates and continues shifting outward from the city on account of diffusion of urban activities in the surrounding villages. For delimitation of rural-urban fringe of Jammu city, two sets of indices or determinants have been selected based on the studies carried out by several researchers.

The three sets of indices/determinants for delineating the rural urban fringe of the Jammu city are as follows:

A. Economic Services:

- i) The milk supply zone
- ii) The vegetable supply zone
- iii) The mini bus service zone
- iv) The commuters zone
- v) The brick kilns zone

B. Demographic Determinants:

- i) Density of population
- ii) Sex ratio
- iii) Literacy rate

C. Occupational Structure:

- i) Ratio of non-agricultural workers

3.3 Economic Services

i) Milk Supply Zone:

Milk supply establishes one of the strong functional links between city and its peripheral area. Milk is by far the most important perishable commodity which is produced in fringe area for the city market. Jammu city has the large demand for milk and milk products and supply is adequate because the surrounding areas have a well developed livestock economy. Only 20 % of the milk requirement is met by the city itself and for about 80 % milk supply, the city looks for the surrounding countryside. The milk supply region of the city reveals the

supply of milk from the villages situated at a distance of 12-20 kms in its West, South, North -West and South-West. The northern and eastern side is much shorter. The milk is transported mainly by bicycles, buses, two wheelers etc. This zone has 57 villages. Kheri, Kotli Charkan, Deoli, Pandori, Rathana, seleshar, Sehora, Mamka, Makhanpur, Laswara, Chakra, Ratnal, Arnia, Kool, Chak Majra, Rehal, Bassi Kalan, Nagrota Sidhra, R.S. Pura, Batada, Marjali, etc. are some of the important milk producing centers. Small farmers and live stock breeders daily brought milk to the city early in the morning.

Table 3.1: Zone Wise Milk Supply to Jammu City

Zones	Milk Supply (in litres/day)	Percentage
R.S. Pura	21,053	54.84
Jammu	8,780	22.87
Bishnah	6,431	16.75
Akhnoor	2,124	5.53
Total	38388	100

Source: Field Survey 2011

Table No. 3.1 shows that large bulk of milk is supplied by these suppliers. These milk suppliers lie adjoining to the Jammu city .Table No 3.1 shows that maximum quantity of milk is supplied to the Jammu city by R.S. Pura Tehsil i.e.54.84% comprising of villages Salehar, Kirpind, Deblehar, Nandpur, Makwal, Nihalpur Simbal, Chak Agara etc. Jammu Tehsil supply about 22.87% of milk to the city. Milk man from village Gagansu, Shaman Chak, Laliyal, Aquilpur, Kanachak, Gho- Manahasan etc. bring out approx. 8,780 litres of milk to Jammu city every day. Bishnah Tehsil and Akhnoor Tehsil pools about 16.75% and 5.53% of milk respectively out of the total milk supplied by individual suppliers to the city. Most of the milk suppliers are Gujjars, and some of them permanently settle down in some villages of study area viz. in Khojipur, Chak Agara, Salehar, Mishriwala etc. The outer most limit of milk supply zone has been taken to demarcate the fringe area of Jammu city

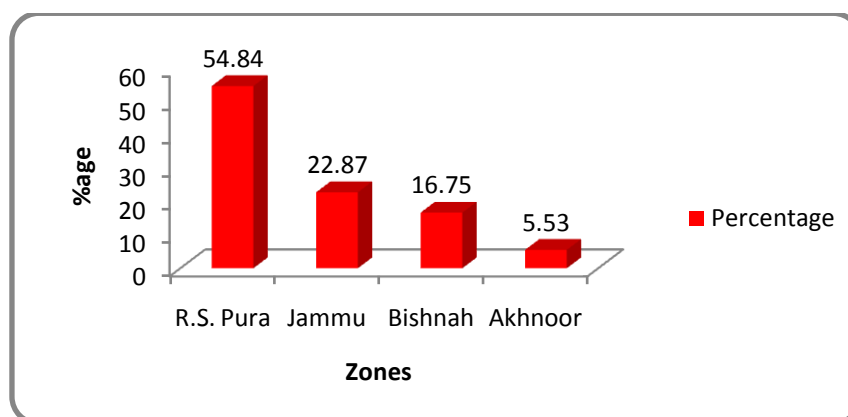


Fig. 3.1: Zone Wise Milk Supply to Jammu City

ii) Commuter's Zone:

The surrounding area of Jammu city is intimately associated with the city. Jammu provides the rural population the possibilities for earning their livelihood apart from medical, trade and educational facilities. A city may lose its status and function of being a regional centre, if commuting practices cease to exist. The workers from the surrounding villages come to the city in the morning to earn their livelihood and return to their homes in the evening. Several thousand persons come to Jammu from the surrounding rural areas to work in factories, small scale industries, to attend their different administrative services like Tehsil office, courts, block offices, schools, colleges and cinemas etc. and return to their homes the same day. Thousands of students come to their schools and colleges and go back to their origin places the same day mostly by mini buses. Hundred of persons come daily from Akhnoor, Bishnah, Bari Brahmana, Nagrota, Gajansu, R.S. Pura, Vijaypur, Kote Bhalwal, Arnia, Jagti, Shamachak, Kanachak, Mishriwalla, Laliyal etc. and return in the evening. The commuter's zone is extended to a distance of about 18-25 kms in all directions around the city more along the roads.

Table 3.2: Percentage of total Commuters Commuting to Jammu City

Categories	No. of commuters	% age of total commuters
Workers and labourers	8543	26.42
Students	17620	54.51
Milkmen	648	2
For medical treatment	2513	7.77
Other purposes	3000	9.28
Total	32324	

Source: Based on field survey 2011

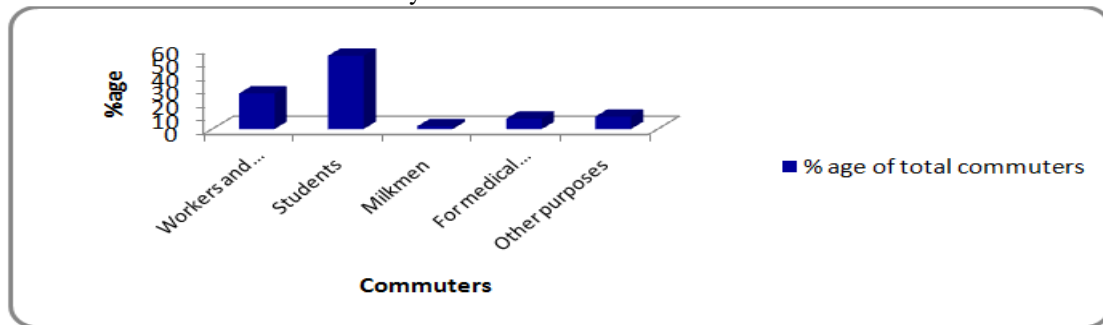
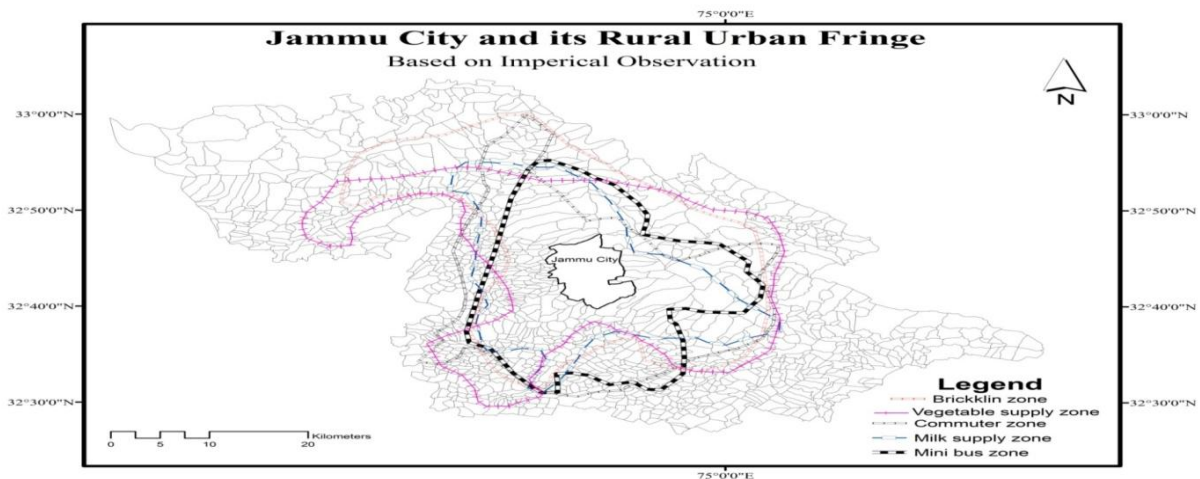


Fig. 3.2: Percentage of total commuters commuting to Jammu City

Table 3.2 reveals that out of the total commuters commuting the city for various purposes about 54.54% belong to the category of students followed by the workers and laborer class i.e. 26.42%. About 7.77% comes from the rural area to the city for their medical treatment and 2% of the commuters belong to the category of milkman who come to the city for selling milk and milk products while 9.28% comes under the category of commuters who come to the city for various purposes like for shopping purposes, for cinemas etc. This zone thus includes Gajansu, Makwal, Gho Manhasan, in the West, Chawadi, Pargalta, Bajalta, Jagti, Nagrota in the East and North East Bishnah, R.S. Pura, Arnia, in the South, South West and Akhnoor, in North West, Mishriwalla, Gharota, Domi, Agore in the North. The outer most limit of this zone is considered to fix the rural urban fringe of Jammu city.

iii) Vegetable Supply Zone:

Vegetable gardening is widely prevalent in the surrounding area of Jammu city. The residents of the city get their vegetable and fruit through two wholesale vegetable markets i.e. Narwal and Parade bazaar. Jammu get perishable vegetables from 58 villages. These villages mark a zone around the city, this zone is more inclined towards South and South-West of the city. Some important villages for the supply of green vegetables are Gho-Manhasan, Gole Gujral, Kahna Chak, Chorpur, Aqalpur, Palniyal, Laliyal in the East and North-East and Kanhal, SArora, Badhyal Brahmana, Ratnal, Khojipur, R.S. Pura, Qadrechak, in the South and South east direction of the city. Some perishable vegetables like Cauliflower, Cabbage, Brinjal, Karela, Pumpkin, Chilly, Mangoes, etc. are abundantly supplied to Jammu city. Thus to demarcate the rural urban fringe of Jammu city the outer most limit of vegetable supply zone is taken into consideration.



iv) Bus Service Zone:

This service has been very widely used by the urban geographers in the delimitation of fringe area because there is a close interaction between the city and the flow of traffic on roads focused on it. The roads radiate in all directions. It is evident from the traffic flow and traffic volume that Jammu- Bishnah, Jammu-Sunjwan, Jammu-R.S. Pura, Jammu-Purmandal, Jammu-Nagrota, Jammu-Mishriwala etc. are prominent routes showing high intensity of bus traffic flow. The outer most limits of this mini bus service zone has been taken to demarcate the rural- urban fringe of the city.

Table 3.3: Number of Mini Buses Plying for different Routes.

S.No.	Routes	No. of Mini Buses Plying
1.	Janipur to Bari Brahmana 4 No. Factory	53
2.	Janipur to Bishnah	111
3.	Panjtirthi to Batra Hospital	11
4.	Panjtirthi to Kubar	4
5.	Panjtirthi to Bajalta-Surinsar	2
6.	Panjtirthi to Khana Chargol	6
7.	Panjtirthi to Bajalta Dhoon	1
8.	Jammu to Sunjwan	27
9.	Nagota to Jagti	31
10.	Jammu to Nagrota	21
11.	Jammu to Katal Batal	3
12.	Jammu to Aghore	6
13.	Jammu to Bhalwal-Seri	35

Source: Regional RTO Office Jammu, 2011.

The above table shows that the prominent routes followed by mini buses and number of buses plying on different routes of the study area. Maximum number of mini buses are plying on Jammu-Bishnah i.e.111 and Jammu-Bari Brahmana i.e. 53. About 27 mini buses are plying for Sunjwana, 21 for Nagrota. Only 3 buses are plying for Bajalta and 6 for Khana Chargol, 6 for Aghore and 35 Bhalwal-Seri and 3 for Katal Batal.

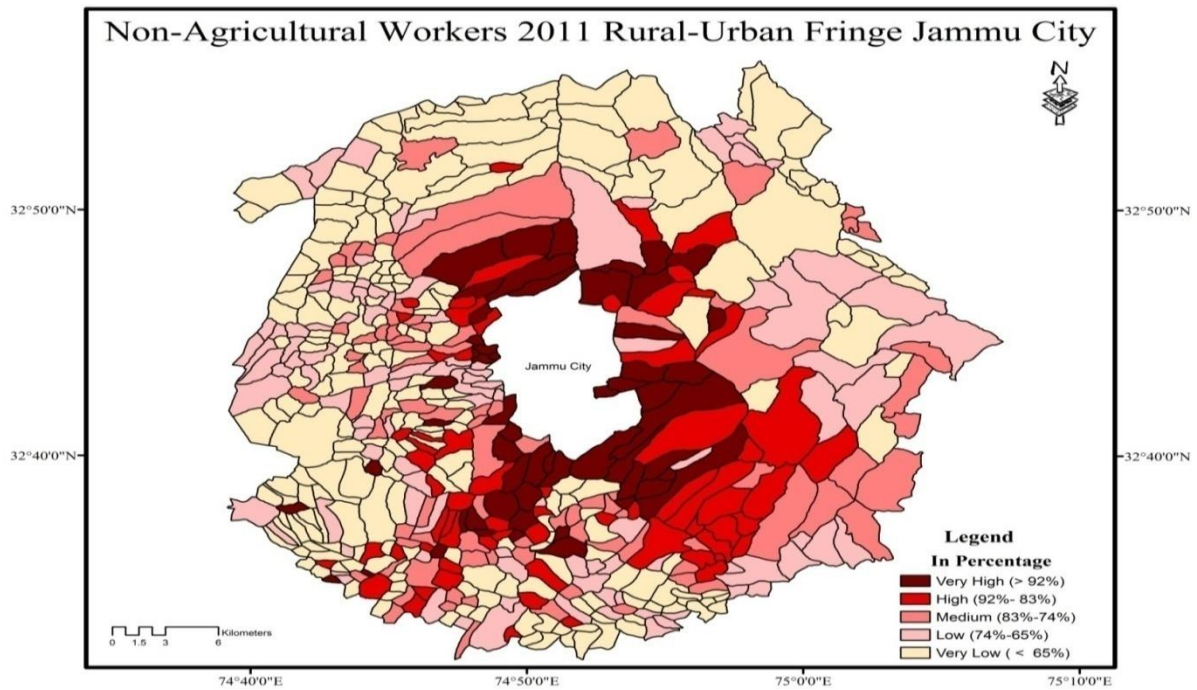
v) Brick kiln Zone:

Brick kilns usually seek peripheral location within the impact zone of the city. Constructional activity in Jammu has rapidly picked up. The demand is being met from 87 brick kilns spread in the study area. Brick kilns are spread over along Jammu- Akhnoor road around Bari Brahmana along National Highway. New residential developments cause the establishments of brick kilns in the primary fringe area also. They also help in identifying the fringe limit. These brick kilns consume fertile soil and grow at the cost of farming activity which is less gainful in primary fringes. Brick kilns are comparatively more beneficial and provide more economic returns than farming in the area. Number of brick kiln are set up on the fertile agriculture land of villages Patniyal, Aqilpur, Salehar, Chak Agara, Kanahal, Khojipur, Patoli Brahamana, Baba Talab, Dai Chak, Gajansu, Sangarampur, Domi, Pouni Chak, etc. Most of the villages are fall in the primary fringe area. This zone plays very important role for fringe delimitation.

3.4 Occupational Determinants

Ratio of Non-Agricultural workers:

One of the important attributes on which the impact of a city may be markedly discernible is the occupational structure of villages. The settlements in the vicinity of the cities seem to be changing their character more conspicuously than those situated away from it. In fact, a high percentage of non-agricultural workers in the working force of the rural areas, is an approximate measure of urban influence. This particular group is composed of the persons engaged in household and manufacturing industry, construction, trade and commerce, transport, storage and communications and in other services. These people live in areas with the orbit of cities which are classified as rural but they are not engaged in farming.



In case of Jammu the mean percentage of rural workers engaged in non agricultural occupation to the total workers comes near 65.31%. Therefore villages having greater share than this average, tends to show the increasing urban influence and hence they have been included in the rural urban fringe .For the grading of intensity of this determinant the standard deviation method has been adopted. Considering this, the mean percentage of non–agriculture workers has been taken as lower limit for delimiting the rural- urban fringe of Jammu city. Villages attaining less value than mean percentage have been taken as peripheral rural areas. Villages, showing value in between average 65.31% and average +1 S.D. ($65.31+8.81$) fall within the rural fringe of the city. With regard to delimitation of urban fringe, the villages having average +1S.D. to +3S.D. ($74.12-91.74$) values have considered in primary or urban fringe, as they show high degree of urban character

Table 3.4: Range of Values for Demarcating Ratio of Non- Agriculture Workers

S.No.	Categories	Range of values
1.	Primary/Inner Fringe	Mean +1 S.D to Mean +3 S.D (74.12% - 91.74%)
2.	Secondary/Outer Fringe	Mean to Mean +1 S.D (65.31% - 74.12%)

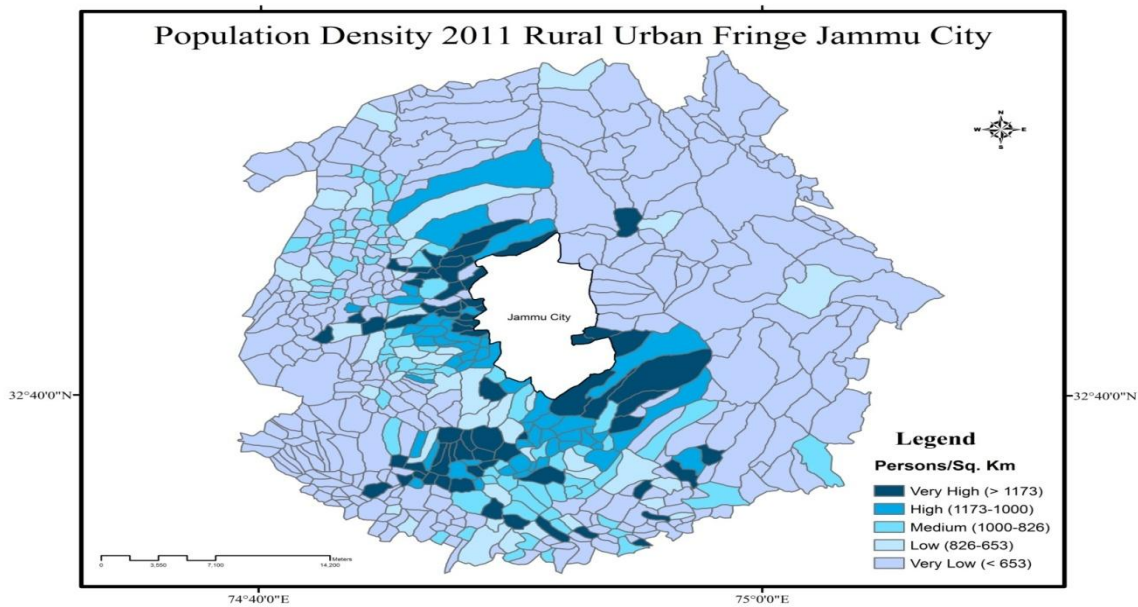
3.5 Demographic Determinants

The following some demographic determinants of population like growth, density, literacy, sex ratio etc. were selected to set the limits of the (pre-urban) rural – urban fringe of Jammu city.

i) Density of Population:

The density of population is the most significant factor to evaluate the city influence on its fringe area. Wehrwein (1942) has delineated the fringe of Indian polis city, based on population density variable, for example not exceeding 388 inhabitants per sq. km. The rural population both skilled and unskilled is pushed into the city for employment, education and other utility services but cannot afford to pay for high rent and is supposed to reside in the periphery at a commutable distance.

The population density, therefore, in the surrounding villages of the city gets increased. The mean rural density of the region is 653 persons per sq. km. (Census of India 2011). This average density has been taken as the lower mark for fixing the outer limit of the rural-urban fringe. Further, villages under study are showing heterogeneity so far as their population density is concerned due to which the standard deviation is as high as 173.41.



The villages with average + 1 S.D are taken as peripheral area of rural-urban fringe. Further, villages having mean + 1 S.D to + 3 S.D are taken as inner or urban fringe, as they show high degree of urban character.

Table 3.5: Range of Values for Demarcating Population Density Zone

S.No.	Categories	Range of values (persons per sq.kms)
1.	Primary/Inner Fringe	Mean +1 S.D to Mean +3 S.D (826 – 1173)
2.	Secondary/Outer Fringe	Mean to Mean +1 S.D (653 – 826)

ii) Literacy:

It is a general observation that people living in the villages near the city will be more literate than the far away villages. The highly educated society of the city affecting and transforming the traditional and old living style of the villages. The surrounding area is gradually changing in literacy pattern of all age groups. The total rural literacy average for Jammu is 68.61%. The average literacy has been taken as the lower mark for fixing the outer limit of rural- urban fringe. For further grading of the intensity of this factor standard Deviation (S.D) methods seems to be helpful. Considering this villages with average + 1 S.D (68.61+2.11) i.e. 70.6% of literacy are taken as peripheral areas of rural – urban fringe. Further, the villages having mean + 1 S.D (68.61+2.11) to +

3 S.D (68.61+6.33) are taken as inner or urban fringe, as they show a high degree of urban character.

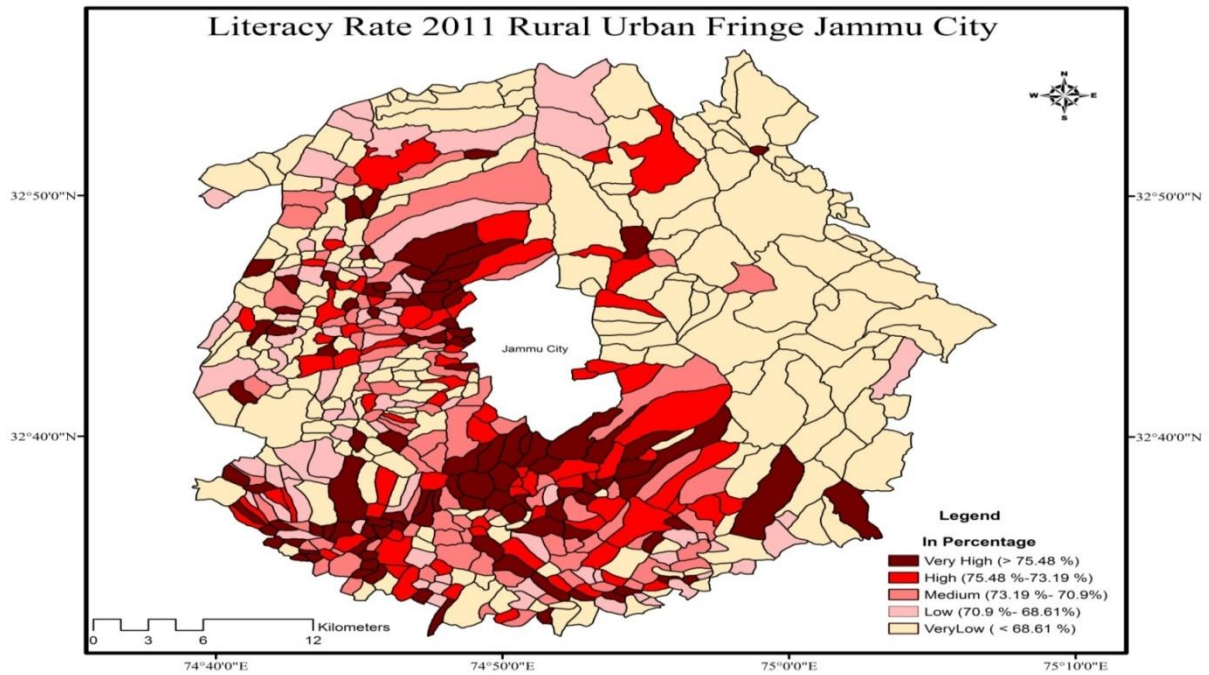
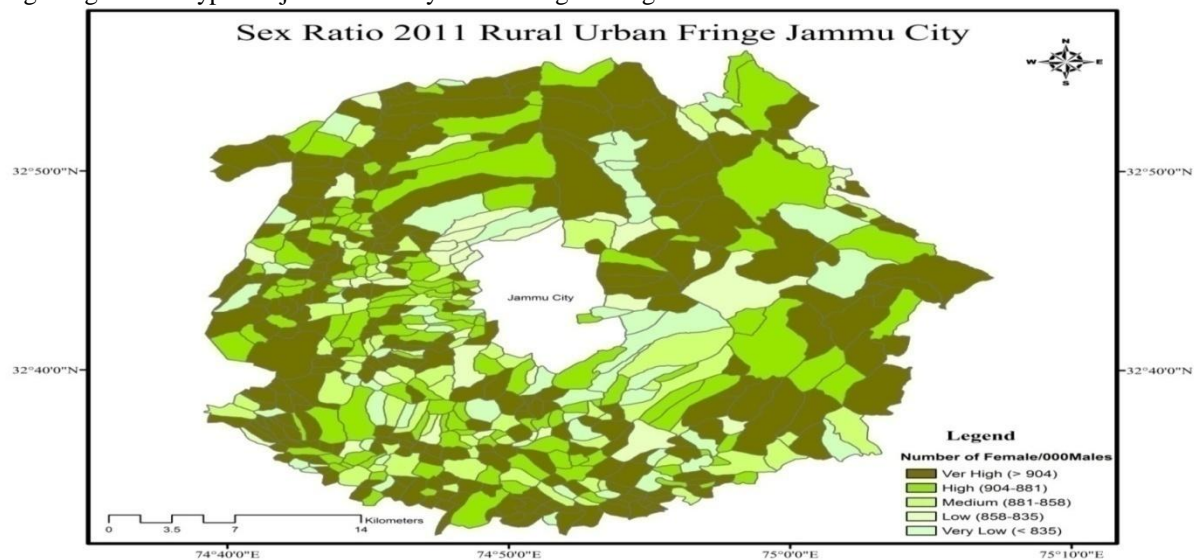


Table 3.6: Range of Values for Demarcating Literacy Zone

S.No.	Categories	Range of values
1.	Primary/Inner Fringe	Mean +1 S.D to Mean +3 S.D (70.6% - 74.94%)
2.	Secondary/Outer Fringe	Mean to Mean +1 S.D (68.61% - 70.60%)

iii) Sex Composition:

The sex ratio (female / 1000 males), another effective demographic variable, presents the population composition and socio-economic disparities prevailing therein large number of male migrants to city in search of jobs leaving their families in rural areas is main reason of this composition. This type of the ratio decreases towards the city side, and vice versa. Most of the poor, uneducated and labor class prefers to live in the peri-urban areas due to cheap residential and other facilities, in addition with proximity of their job areas in the city.¹⁹ Presently, a number of poor people are living in this situation with their families because their wives are also getting various types of jobs in the city. This living status generates difference in sex ratio.



At rural urban zonal level the sex ratio indicates continuous increase as one goes far from the city. Keeping this view in mind, villages having value of mean (904) to mean -1 S.D (904-22.61) are taken as outer or secondary fringe. Further the villages with mean -1S.D to mean -3 S.D (904-67.83) females per thousand of males reveal primary or urban fringe character.

Table 3.7: Range of Values for Demarcating Sex Ratio Zone

S.No.	Categories	Range of values (females per thousand of males)
1.	Primary/Inner Fringe	Mean -1 S.D to Mean -3 S.D (871 - 836)
2.	Secondary/Outer Fringe	Mean to Mean -1 S.D (904 - 871)

3.6 Extent And Shape Of Rural-Urban Fringe Of Jammu City

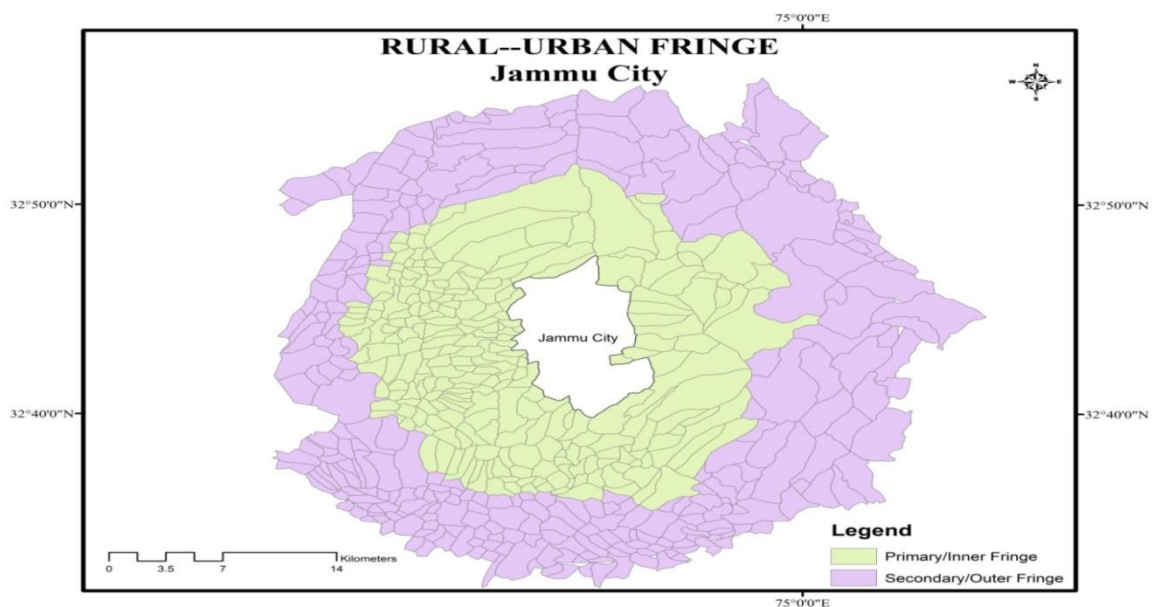
The rural-urban fringe is the area where the cultural development takes place outside the boundaries of central cities and extends to the areas of the predominantly agricultural activities.²⁰ All the determinants of delimitation of rural urban fringe of Jammu city are plotted on the city map of Jammu superimposed over each other to give a clear implication of the city. The area immediately next to the city where most of these variables/indicators resemble and at the same time, there is also a zone in which very few variables are conspicuous by their presence. In fringe area the villages, which have attained at least any three of the indicators and lie adjoining to the city, have been considered to determine the rural urban fringe of Jammu city. Thus, the extension of rural-urban fringe begins from the Municipal corporation boundary and reaches up to the rural tangential areas.

On the basis of this process the rural-urban fringe zone of Jammu city may be classified into two groups.

- (1) Inner or Primary fringe
- (2) Outer or Secondary fringe

Inner or Primary Fringe:

The primary fringe exist just beyond the municipal boundary of the city and is highly urbanized. This zone has the maximum intensity of interaction with the city, economically and culturally. This zone is characterized by the land in an advanced stage of transition from rural to urban land use and area new construction is taking place at faster pace. This zone is more urban and less rural in character and the major occupation of this zone is the production of goods which are in demand for the city such as vegetables, fruits, dairy products and eggs etc. This zone is undergoing a transformation process in terms of their physical, occupational and demographic structure at a much more rapid rate than the villages beyond this zone. This zone is also characterized by unplanned growth of the built up area associated with lack of sewage and other urban amenities which ultimately give rise to various problems at the margin of city.



Outer or Secondary Fringe:

The secondary or outer fringe starts beyond the outer boundary of the primary fringe. The built up area in this outer zone is discontinuous, percentage of agricultural land is relatively high, marketing facilities are partially available. There is no physically clear cut boundary between these two zones, but both are interrelated and interconnected.

Table 3.8: Villages, Area and Population under Rural–Urban Fringe of Jammu City

Type of fringe	No. of Villages	Area in Sq. Kms.	Population 2011
Primary/Inner fringe	157	438.2677	4,09,526
Secondary/Outer fringe	370	758.8973	2,10,492
Total	527	1197.165	6,20,018

Source: District Census Handbook, Jammu, Samba District 2011

On the basis of spatial, occupational and demographic determinants the rural-urban fringe of Jammu city consists of 527 villages, (Appendix-I) with an area of 1197.165 Sq. Kms. The Primary Fringe includes 157 villages with 438.2677 Sq. Kms area, Secondary Fringe includes 370 villages with 758.8973 Sq. Kms area. The fringe area is not extended in concentric zones around the city but a star shaped and it extends between 5 Kms to 20 Kms from the city centre. It will be unscientific and laborious too to consider a village as a basic unit for fringe delineation. Therefore eight buffers (distant zones Appendix-II) of 2 km each in radius were generated and different land use, demographic, occupational and socio-economic parameters of the said zones are evaluated. All these above discussed indicators have resulted in the expansion of the city mainly towards the south and south east direction especially along bypass of national highway. In the north –west side of the city the fringe extends to village Ranjan and Chhuha, lying at 20 kms distance from the city centre on Akhnour road. While in the south it is noticeable upto village Salehar in Tehsil R.S. Pura. The western side fringe area is bounded by international border in which village Chanore form western limit. Toward the eastern side the fringe area is extended upto the village Purmandal.

The extension of the fringe is generally more along the transport network particularly along the axial routes, while in intersectional spaces, the fringe tends to shrink.

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