

**SPATIAL, DEMOGRAPHIC AND SOCIO-ECONOMIC
INTER RELATIONS OF LARGE SIZED VILLAGES AND
ALL URBAN CENTRES IN JAMMU & KASHMIR,
HIMACHAL PRADESH, PUNJAB AND DELHI, 1961.**

A DISSERTATION

SUBMITTED TO THE SCHOOL OF SOCIAL SCIENCES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Population Studies

Gurdarshan Singh


CENTRE FOR THE STUDY OF REGIONAL DEVELOPMENT
SCHOOL OF SOCIAL SCIENCES
JAWAHAR LAL NEHRU UNIVERSITY
NEW DELHI-110057

1976

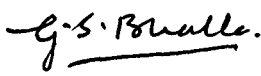
CENTRE FOR THE STUDY OF REGIONAL DEVELOPMENT
SCHOOL OF SOCIAL SCIENCES
JAWAHARLAL NEHRU UNIVERSITY

I Certify that the dissertation entitled
"Spatial, Demographic and Socio-Economic
Interrelations of Large Sized Villages
and all Urban Centres in Jammu & Kashmir,
Himachal Pradesh, Punjab and Delhi-1961"
submitted by Gurdarshan Singh, in fulfilment
of six credits out of the total requirements of
thirty credits for the degree of Master of Population
Studies(M.P.S.) of the University, is, to the best of
my knowledge, a bonafide work and may be placed before
the examiners for evaluation.

Dated: 4 Nov. 76


SUPERVISOR
(ASOKMITRA)

4 Nov 1976
Dated:


CHIEF
(G.S. BHALLA)

ACKNOWLEDGEMENTS

I avail of this opportunity in expressing my deep sense of gratitude and indebtedness to Professor Dr. Asok Mitra, Centre for the Study of Regional Development, School of Social Sciences, Jawahar Lal Nehru University, New Delhi, for his keen interest and valuable guidance given throughout the preparation of this work.

I am sincerely thankful to Associate Professor Dr.M.K. Premi, Centre for the Study of Regional Development, School of Social Sciences, Jawahar Lal Nehru University, New Delhi, for his continued encouragement and valuable guidance.

I am also thankful to Assistant Professor Dr.(Mrs.) Nagia for going through the manuscript and making many valuable suggestions.

I also offer my sincere thanks to Professor G.S.Bhalla, Chairman, Centre for the Study of Regional Development, School of Social Sciences, Jawahar Lal Nehru University, New Delhi, for his encouragement and for provision of all available facilities in completing this work.


(GURDARSHAN SINGH)

C-CONTENTS

	<u>Page</u>
ACKNOWLEDGEMENTS	1
TABLE OF CONTENT	11
LIST OF MAPS	111
LIST OF TABLES	iv
PREFACE	v

C H A P T E R S

Chapter I	Physical Setting	1
Chapter II	Spatial Distribution of Settlements	19
Chapter III	Demographic Profile	36
	1. Analysis of Demographic Characteristics.	
	2. Demographic Interrelations	
Chapter IV	Population Potentials	60
Chapter V	Economic Structure	69
	1. Analysis of Male Workers in Nine Industrial Categories	
	2. Functional Classification of Settlements	
Chapter VI	Social Amenities and Infrastructure Facilities	93
	1. Distribution of Social Amenities and Infrastructure Facilities	
	2. Settlement System and Hierarchy	
Procluce	Declassified Towns	105
Chapter VII	Conclusions	109

A P P E N D I C E S

Tables C.

Page

Table No.

III.17	Demographic Characteristics of Settlements (with location, code number of settlements)	114
IV.3	Population Potentials of each Settlement	130
V.4	Functional Classification of Settlements	135

LIST OF MAPS AND DIAGRAMS

- Fig. 1 Location of Study Area, 1961.
- Fig. 2 Drainage Pattern of Area.
- Fig. 3 Transport Network, 1961.
- Fig. 4 Distribution of Settlements, 1961.
- Fig. 5 Connectivity , 1961.
- Fig. 6 Population Potentials, 1961.
- Fig. 7 Percentage of Male Workers in Agriculture, 1961.
- Fig. 8 Percentage of Male Workers in Household
Industry and Manufacturing.
- Fig. 9 Percentage of Male Workers in Trade,
Transport and Communication.
- Fig.10 Percentage of Male Workers in Other Services
- Fig.11 Hierarchy of Rural Settlements, 1961.
- Fig.12 Distribution of Population in Villages(Lorenz Curve).

(iv)

LIST OF TABLES

<u>Table No.</u>		<u>Page</u>
II.1	Number of Settlements in 1951 and 1961	20
II.2	Density of Settlements 1961	22
II.3	Distribution of Settlements in Physiographic Regions	24
II.4	Distribution of Settlements on various Lines of Transport	29
II.5	Connectivity Index	30
II.6	Distribution of Settlements ('R' values) in Physiographic Regions	
III.1	Growth Rate of Settlements 1961	
III.2	Class-wise Growth Rate of Settlement 1961	41
III.3	Regionwise Growth Rate of Settlements 1961	42
III.4	Density of Population of Settlements 1961	44
III.5	Classwise Density of Population Settlements 1961	45
III.6	Regionwise Density of Population of Settlements 1961	46
III.7	Sex-Ratio of Settlements 1961	48
III.8	Classwise Sex-Ratio of Settlements 1961	49
III.9	Regionwise Sex Ratio of Settlements 1961	50
III.10	Literacy Rate of Settlements 1961	52
III.11	Classwise Literacy Rate of Settlements 1961	53

(v)

LIST OF TABLES

<u>Table No.</u>		<u>Page</u>
III.12	Regionwise Literacy of Settlements 1961	54
III.13	Cropping Pattern and Demographic Characteristics of Settlements 1961	55
III.14	Table of Two Variable Analysis	57
III.15	Soil Types and Demographic Characteristics of Population	58
III.16	Transport Network and Demographic Characteristics of Population	59
IV.1	Population Potentials	63
IV.2	Distribution of Settlements in Various Soil Types 1961	63
V.1	Dependency Ratio of Settlement 1961	78
V.2	Regionwise Dependency Ratio of Settlements 1961	79
V.3	Functional Classification of Settlements 1961	89
VI.1	Weightage Index	95
VI.2	Classification of Villages on the Basis of Size of Population 1961	100
VI.3	Orders of Rural Settlements	102

P R E F A C E

The last decade has witnessed a growing interest of scholars in the geography and demography of settlements both rural and urban with regard to socio-economic changes through time and space. But the systematic and scientific study of settlements has been started after the First World War, and now some important works have been published, particularly pertaining to urban settlements.

Our major aim of study is focussed on systemic or spatial distribution and demographic and socio-economic associations of large (villages having population 5000+) sized villages and all urban centres in the states of Jammu and Kashmir, Himachal Pradesh, Punjab and Delhi-1961.

Data Base:

There are generally two types of data being used in the spatial analysis of various phenomena : (a) Locational data - values observed at points (b) Area data- values observed for some geographical unit. In this study we have used both type of data i.e. point data as well as Area data.

The greatest limitation of our study is that we could not take 1971 as the base year - why because that the data for the year 1971 was not available in a published form for all the states of India. So we have taken '1961' as the base year for our study.

- -

Our study has been based on secondary source. All the data has been collected from the following sources.

1. Levels of Regional Development.

Information regarding the introduction to the Area has been collected from 'Levels of Regional Development'.

2. Other information has been collected from the District Census Hand Books of these states - 1961 and 1951. (Other information is total population, and male and female, Area of settlements as well a area of districts, literacy, distribution of workers in nine industrial categories; total workers and non workers).

Approach to the study or Method of investigation:

In our analysis, the critical feature to be captured is that of 'Pattern' although its identification is put a first-step in the search for the 'processes' that have generated that pattern.¹ The simplest cases of the pattern analysis involve points in area. For example the nearest neighbour techniques is used to summarise such point patterns. There are however other ways to look at the 'Pattern', consider the case of surface. We have used ISO-lines maps to look at the 'pattern'. The approach is entirely quantitative based on various statistical and cartographic techniques.

1. A special Analysis :- A Reader in Statistical Geography Edited by Brian J.L. Berry and Owen F. Marble. 1968 by Prentice-Hall, GNC, Englewood Cliffs, New Jersey.

In this study we have pursued three type of studies.

- i) The pattern of spatial distribution of settlements.
- ii) The study of spatial associations - the co-variance of distribution.
- iii) We have tried to study the Areal variations under the heading of spatial associations. We have used two variance analysis in order to test the association between growth rate on one hand and crop regions and settlement size on the other hand.

Arrangement:

The present study is essentially a spatial analysis of the settlements. It, therefore, deals with the physical basis of area and how this affected demography of that area and economic development, which in turn influenced the growth and distribution pattern of settlements. It is thus arranged in six parts (or chapters). Part I deals with the nature and appearance of the land scape or the physical setting of the area. The physiography, climate, soil types, drainage pattern and transport net work. The brief outline of physical setting of the region has paramount importance in understanding the settlements of the region. Part II deals with the spatial distribution of settlements. In this part emphasis has been given on size, spacing and number of settlements, Density of settlements, Distribution of settlements in various physiographic regions and distribution of settlements according to Network of transportation. Apart from these factors of analysis, in this study there is outlined a new approach to the

problem of expressing the character of settlements pattern in mathematical terms.

Part IV deals with the 'Gravity Model'. This seeks to measure the interaction of various size classes of settlements. This model is based on the Zipf's formula.

Part III deals with the demographic profile of the population. The main characteristics of population are discussed such as growth rate, Density of populations, Sex ratio, literacy etc. Special associations are analysed between demographic characteristics on one hand and crop types, soil types and transport network on the other hand.

Part V deals with the Economic Structure. The first part of this chapter mainly concerned with male participation rate in the economic activities. ISO ploth lines are drawn and from these maps areal variations are recognised.

The second part of this chapter deals with functional classification of settlements. This functional classification is based on the method (Triangular co-ordination method) introduced by Dr. Ashok Mitra.²

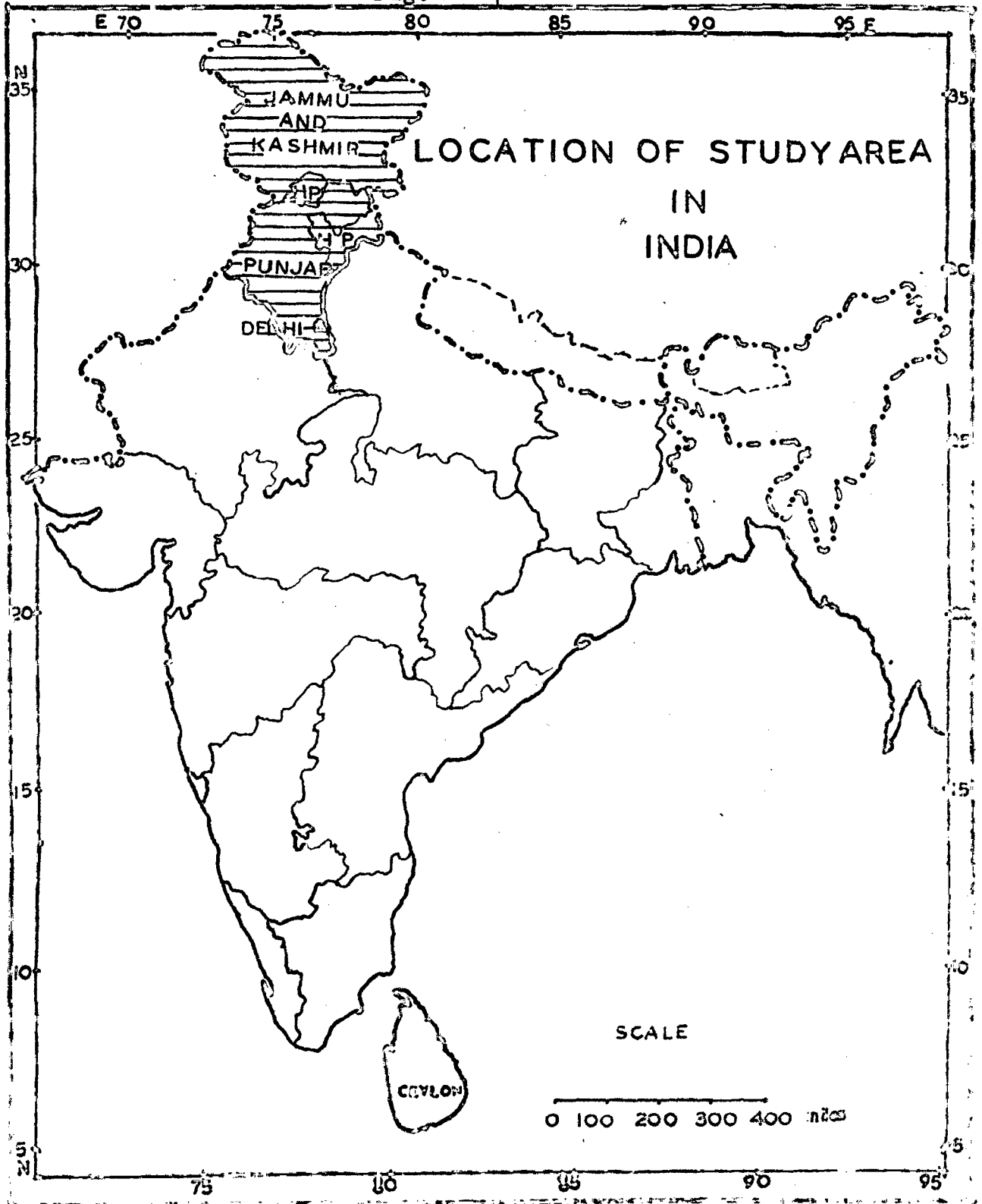
Part VI has analysed the social amenities and Infrastructure facilities. The main purpose of the first part is to do an analysis of these public utilities, facilities and necessities. The method used here is the centrality score. It is proposed that the level of the functional hierarchy should be given numerical values on the basis of their importance.

2. Internal Migration and Urbanisation in India Part I:
Text . Ashok Mitra , Registrar General India.

In the second part our main emphasis is on the analysis of settlement systems and hierarchy of settlements based on the operational characteristics of the central place theory.

Prelude :- Declassified towns. In this part towns declassified in 1951-61 and 1961-71 are mapped. Their growth pattern and functional character to be observed.

Fig. 1



I

PHYSICAL SETTING

The extreme north western states namely Jammu & Kashmir, Himachal Pradesh, Punjab and Delhi touch the boundaries of Afghanistan, K.A.A. and China in the north, Pakistan in the west, Tibet and Uttar Pradesh in the east and Rajasthan in the south. These states have been extended between latitudes of $26^{\circ} 57'$ north to 37° north and longitudes of $72^{\circ} 29'$ east to $78^{\circ} 58'$ east. This region covers an area of 112429 square miles (Jammu & Kashmir 53666, Himachal Pradesh 20190, Punjab 38000 and Delhi 573 square miles).

1. PHYSICAL FEATURES

1.a. The major part of the state Jammu & Kashmir extending from north-west to south-east is covered by Himalayan ranges varying from a height of 3,000 to 6,000 meters and above. Another oblique range which rises to the height of 20,000 feet and over of which Mount Godwin Austin (Gasherbrun) is of the loftiest peak of this region and has a height of 3,697 meters or 28266 feet. This range separates the Indus valley from those of Jhelum and Chenab and blocks the south-western monsoon. Other important peaks are Masherburn (26,676 feet), Dera Kangri (26,453 feet) and Golden Throne (24,508 feet). The valley of Kashmir is separated from province of Jammu by Pir Panjal range which has a height of 11,400 feet. In brief the state is almost entirely mountainous and it may be geographically divided into three areas - Tibetan and

semi Tibetan tracts in the north containing the districts of Ladakh and Gilgit , the middle region of Happy valley of Kashmir and the large level areas of Jammu in the South.

1.b. The territory of Himachal Pradesh can be divided into three zones - the outer Himalayas, Inner Himalayas and Alpine Pastures. The Inner Himalayan region has high mountains and narrow valleys with a height ranging between 6000 to 3000 meters. The Alpine pasture land (lands) remain under snow for about six months in the year. With the exception of broad valleys of Jammuna system in Paona Tehsil and Alsed Khad valley in Mandi and Bilaspur, most of the Himachal Pradesh is a mountainous tract with narrow valleys and high hills in lesser Himalayas and steep hills in the greater Himalayas. The highest peaks in Himachal are Purgad and Parasala in the Kinnaur district, estimated to be 6900 meters and 6400 meters in height. There is a Jaskar range of 6090 meters of height on average, in the Chamba District. In between these peaks are the summits of Rangl range in the Chamba districts and of the Dhaula Dhar Range in the districts of Mahasu, Mandi and Chamba. The mean elevation of these peaks is about 5000 meters. The Himalayan region in this part can be divided in to four parallel zones namely:

- i. Shiwalik Zone
- ii. The Lesser Himalayas
- iii. Greater Himalayas.

iv. Trans Himalayas or Terhyan Zone.

i.e. Compared to area, Punjab has a marked variety of land scape. The land north of an imaginary line from Kalka to Pathankot, comprising a fifth of the state is in the hills. To the immediate north of this line are low hills; the altitude of which varies (ranges) between 300 and 900 meters. The Kangra District (now in Himachal Pradesh) the North-East of the low hills is a zone of high hills with altitude ranging from 900 to 1800 meters. Further north are mountains where the altitude generally exceeds 1800 meters. The Kulu valley is a narrow and fairly level area bordered by high mountains. In Lahul and Spiti district, (now in Himachal Pradesh) which is separated from Kangra district by the high mountain ranges, the altitude is very high. In Lahaul and Spiti district there are sixteen peaks which have recorded elevation exceeding 4000 meters and the highest among them is Shilla which is 7026 meters (23070 Foot) above the sea level.

A major portion of Punjab is flat alluvial plain with an altitude less than 300 meters, and a gentle slope towards south-west. In the southern and western parts of Punjab plains there are extensive areas covered with sand dunes, but the monotony is broken by a low spur of Aravalli hill system in Mahendergarh and Gurgaon districts.

Along the major river there are low flood plains locally called Khaddar or bet. The flood plains are separated from the upland plains often by a steep slope of 5 feet to 10 feet, and are subjected to inundation during rainy seasons. In between the major rivers are extensive upland plains which are generally monotonously flat.

2. GEOLOGICAL FEATURES

2.a. Jammu and Kashmir: The geology of Kashmir is an interesting one on account of the large number of sedimentary rocks lying between the bifurcation of the main crystalline axis and a number of workable minerals and precious stones found in the region.

<u>LOCALITIES</u>	<u>AGE</u>
1. Recent and pleistocene deposits.	River terraces, valleys and Karwas etc.
2. Sivalik and Coastal tertiary deposits.	Foot hills.
3. Oligocene and lower miocene, Eocene.	Pir Panjal.
4. Cretaceous, Jurassic and upper Gondwana.	Ladakh, Banihal and Amarnath.
5. Triassic, Permian-carboniferous lower Gondwana.	Smith valley, Lidhar Valley, Pahalgam Northern slopes of Pir Panjal. Upper Sindh Janskar range etc.
6. Older Palaeozoic, Uindhyan Himalayan, Purana, suddapahs.	Ladakh, Bhandarwah, Kishtwar, Tangdara.
7. Purana Archaean Granites and Gneisses.	Doda, Zaskar, Gilgit.
8. Dharwarian, Khondalites	Parts of Baramula and Gilgit.
9. Charnokites and unclassified crystalline.	Gilgit, Himachal and Punjab.

2.d. HIMACHAL PRADESH:

<u>LOCALITIES</u>	<u>AGE</u>
1. Chamba	Slates lime stones, Schists, Phyllites.
2. Mandi	Sivalik Rocks.
3. Bilaspur	Lower Gondwana Rocks
4. Sirmur	Lime stone, Phyllites, Schists of Palaeozoic age.
5. Kinnaur	Hurree beds and triassic and permian rocks.
6. Mahasu	Limestone, Phyllites, Schists Palaeozoic age.

2.e. PUNJAB

<u>LOCALITIES</u>	<u>AGE</u>
(1) Gurdaspur, Amritsar, Kapurthala, Ferozpur, Jullundur, Ludhiana, Ambala, Patiala, Karnal Bhitinda, Sangrur, Rohtak Hissar, Mahendargarh.	Recent Alluvium (Riverine).

(11) HIMALAYAN PUNJAB

Lahaul and Spiti	Jurassic rocks (lime stone and shale).
Kangra	Shivalik rocks with oilaceous and cocono-Sedimentary rocks.
(111) Sirsa	Slate and Limestone of Purana age.
Heshiarpur (Bishat Doab) or (Beas Sutlej Doab)	Recent alluvium in the plains areas and coarse detritus at hill zone.

3. SOILS

3.a. Jammu and Kashmir:

Alluvial soils are mainly found in the districts of Kathua and Jammu. The soils are loamy with a little clay content. They contain small quantity of lime but the Magnesia content is high.

There are three parallel belts of Forest and hill soils widely apart - one stretching from chilas to the south eastern part of Ladakh range, another to the North-West of Jhelum valley and the third belt stretching from Poonch to Kathua. These soils are generally mixed with pebbles.

Brown soil under deciduous forest is found in Southern part of Doda and Udhampur district. They are dark brown in colour and vary from silt loams to dry loams with very small percentage of gravels.

The entire Karakoram range and small patches in Zaskar range and South-Eastern part of Ladakh are under Glaciers and Eternal Snow. In winter the entire landscape is frozen rigid and dead. In summer streams wake up only when weather is fine.

Podzolised soil occur over a long stretch extending from Gilgit to middle Ladakh range and two isolated patches one in Ladakh and another in Doda district.

Mountain Meadow soils are found in a large portion of the state, stretching from North-West to South-East direction. The soils are not deep but have a well developed profile.

Sub-mountain soils are mainly found in the districts of Poonch Udhampur and Anantnag. In its northern part the river Jhelum Meanders. There is also a narrow belt of this soil stretching from Baramulla to the middle of the Ladakh range. In the valley this soil is intensively cultivated.

There is only a small patch of Grey and Brown soils in the West of Baramulla district.

In the Northern and Northern-Eastern parts of Jammu and Kashmir no survey has yet been conducted.

3.b. Himachal Pradesh:

Low hill soil is found in Paonta tehsil of Sirmur districts, Jogindernagar and Sundernagar tehsils of Mandi district Bhattiyat tehsil of Chamba district. The mid hill soil is found in Chamba and Chaurah Tehsils of Chamba district and a long strip extending from Mandi to western part of Sirmur district including lower part of Mahasu district.

High hill soil is found in parts of Chamba, Chaurah and Brahmaur Tehsils to Chamba district, Jogindernagar and Karcog tehsil of Mandi district, entire Mahasu district except in few pockets and Pachhad, Mahar and Rainka tehsil of Sirmur district.

Dry hill soil area with heavy snowfall but ideally suited to dry fruit cultivation characterises the Kinnaur district and Pangi sub-tehsil in Chamba.

Mountain soil, a zone not suitable for cultivate is found in part of Brahmaur and Chaurah tehsils of Chamba district and part of Theog tehsil of Mahasu district.

3.c. Punjab:

In the Southern and south-western Fringe of the state desert soil predominates parallel to this belt is a wide zone of black pedocal of fluvial origin. Its northern limit generally coincides with 500mm isohyet. On the north of this zone, there is another equally broad belt of pedocal brown colour soil, the northern boundary of which coincides roughly with 800mm isohyet. In the sub hilly, hilly and Mountainous areas of Ambala, Hoshiarpur, Gurdaspur, Simla and Kangra districts chestnut colour soils are predominant. They are generally associated with areas receiving about 100cms of rainfall annually. In the mountainous areas lithology and climate influence soil types.

4. DRAINAGE PATTERN

4.a. Jammu and Kashmir:

Important among the rivers which flow through the state are Indus, Jhelum, Chenab and Ravi. The area including the catchment basin of Ravi is 3100 square miles and only a portion of its tributary called Ujh passes through the state. River Indus takes off at Manasrover at a height of about 17000 feet in the Himalayas in the South east of the state and flows (longitudinally) diagonally towards the north west. Its principal tributaries are Zaskar, Shyok, Dras and Shigar rivers. The Shyok river which forms a valley of bleak and inaccessible region and its tributary Nubara are fed by the glaciers in the Karakoram

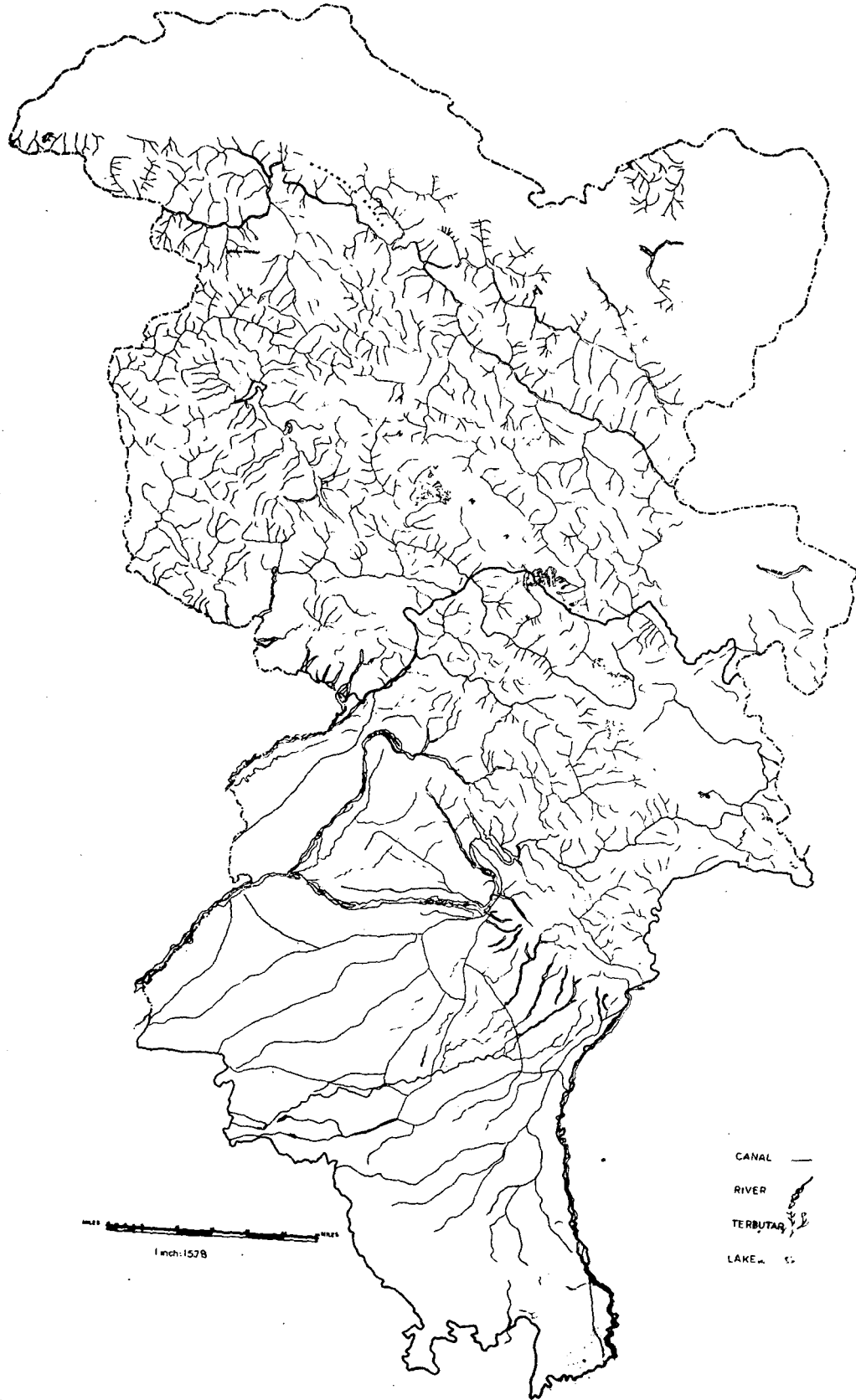
range . A Number of glaciers dams are found accross the path of the river and whenever these melt or break, river Indus gets flooded and causes enormous loss even in the most distant areas.

The other important river is Jehlum which is locally known as 'VATH'. The river takes off from a spring at Verinag in the north-east of Anantnag town. It is navigable from Anantnag to Baramulla, a distance of about 70 miles. The river flows through the cities of Shrinagar and the towns of Sumbal, Spore and Baramulla. It changes its course immediately after leaving Baramulla because of the deep gorge. From here onwards it has a ferocious flow up to Kohala - a distance of about 96 miles in which navigation is impossible. At Domel it takes the tribute of Kishanganga river.

The third important river of the state is Chenab which also takes off from the Himalayas - though its exact source has not been located. The river takes the name of Chenab from Tandi - a place near Kishtwar, which is the confluence of two small rivers , Chandra and Bhaga. The river is not negligible and is crossed either by bridges or by indigenous rope ways known as cradle bridges. It, however provides easy and cheap means of transport of forest timber available in large quantities in the forests of Bhandarwah and Kishtwar tehsils.

2 Fig.2

JAMMU & KASHMIR, PUNJAB, HIMACHAL PRADESH & DELHI
DRAINAGE SYSTEM



4.b. Himachal Pradesh

In all the district the Himachal Pradesh five big rivers - Ravi Chenab, Sutlej, Bias and Jamuna have their catchments in the state. These rivers rise from Himalayas and have perennial sources of water being fed by snow during winter and both by rain and snow during summer. Except Jamuna other rivers meet the Indus, falling in the Arabian Sea.

The Beas: The Beas rises on the southern face of the Rohtang pass in Kulu, 13226 feet above sea level. It enters the district of Mandi and the middle of its eastern border near village Largi and leaves it near the North-Western corner thus dividing it into two parts of which Northern is smaller.

The Chenab: The Chenab or Chandrabhaga as its called in this part of the territory, rises near the top of the Bara Lacha Pass in Lahaul, by two heads the Chandra and Bhaga. These meet at tindi to form the river of great volume and size. It flows immediately to the north of the mid-Himalaya and parallel to it.

The Jamuna: The Jamuna is great river of the Northern India. It rises from the Jannotri glacier in Himalayas at a height of 26000 feet. It enters sirmur district for a distance of about 14 miles from Majri to Kaunch and then enters U.P.

The Ravi : The Ravi or Gravati, as it was called in ancient times, is the river of Chamba district. It drains

the whole of Chamba valley between the Dhaula-Dhar and Rangi Range. In its upper reaches, the river is generally called 'LAUTI' or 'GRAUTI' which has been derived from Irawati. It takes its rise from Mid-Himalayas and Bara Bansa Ranges. Flowing westward it touches Jammu territory at the point where the Siowa Stream forming the boundary falls into it from the north. It then turns to the south-west and skirting the terminal skirts of the Dhaula-Dhar, separates Chamba from Jammu and finally leaves the district at Keri to the plains at Shahpur.

4.c. Punjab:

Drainage System: There are four perennial streams or rivers bordering with or traversing through Punjab. From east to west these are the Jamuna, the Sutlej, the Ravi and the Beas. Jamuna and Ravi border the Punjab on the east and West respectively. The Sutlej and Beas traverse through the northern half of the state. Where as the net work of the drainage lines in the mountainous areas is very dense, a large part of the plain areas is without drainage lines. Apart from those perennial rivers there are some important seasonal streams such as Ghaghar, (Dangri and Markanda are feeders of Ghaghar) which flows from North-East to South-West into Beas and Black Boin. In the foot hills of Ambala, Hoshiarpur and Gurdaspur district there are very closely spaced rivulets flowing from the Shivalik hills. Some of them drain into the more important rivers but some terminate with joining any other stream. The hill torrents in

Hoshiarpur, known as Chos, have a very beneficial effect on land, since in their flow which is restricted to the rainy seasons, they bring down sand to deposit on their shifting course and lay waste fertile lands.

The Ghaggar river is an important inland drainage system. In the remote past it is said to have been a large independent drainage system with the Jamuna and Sutloj its tributaries. Because of the subsequent uplift of the Sutlej Jamna & vide, the Jamna drifted to the east and Sutlej to the west, leaving the Ghaggar as a mis-fit stream. It is said that the old Ghaggar river system used to flow through the old Hakra bed towards Rann of Kutch. Most of this old abandoned bed has been obliterated by the deposition of sand blown from the Indian desert.

The main rivers have been tapped from the development of Hydro-electric and canal irrigation. The Bhakra Nangal project of the Sutloj river is irrigating 6 million acres of land in dry and semidry areas of the central and south western Punjab. Among the streams which flow in south-westerly direction in Ambala and Karnal districts are Tagri, Markanda, Saraswati. The Pong Dam is already under construction to tap water from the Beas River.

5. CLIMATE

5.a. Jammu and Kashmir:

The state being situated between 32°17' to 36°58' North latitude at a high ranging from 1000 feet to 28250 feet; its climate varies from the arctic cold of Ladakh to the

tropical heat of Poonch and Jammu. The average rainfall in the whole state may be taken at 1064.01 mms (41.89") though it does not exceed 343.41 mms (13.52") in the Indus valley, 898.65 mms (35.38") in the Jhelum valley and 1073.40 mms (42.26") in the plains of Jammu. As we move from South to North the rainfall goes on decreasing till it is only 3" at Leh. The onset of the monsoon is expected on the 1 July and the withdrawal by the beginning of September. The monsoon, however, feed areas of Jammu province only and get weaker and weaker till they are exhausted among the low hills and valleys.

Good Rainfall divisions : Ranagar falls in this division where the rainfall varies between 2124 mms.

Mod-rate Rainfall Divisions: Rest of the areas of the state are included in this division where rainfall varies between 1000 to 15000 mms.

Poor Rainfall Divisions: Includes Ranbir Singhpura Baramulla and parts of Kishtwar and Anantnag tehsil.

The districts of Ladakh and part of the tehsils of Kishtwar, Bhaderwah, Doda, Anantnag and Poonch tehsils belong to the Desert and semi desert divisions.

5. D. Himachal Pradesh:

Rainfall in Himachal Pradesh is distributed twice a year once in summer and the other in winter. The summer rain is caused by the South-Western monsoon wind is distributed from July to mid September. The winter rainfall with the passage of western disturbances lasts from December to March.

The annual rainfall is high (above 150 cms) in the south-western part of Chamba-district, whole of Mandi district and along belt stretching from western part of Kinnaur district to eastern part of Sirmur district. The rainfall is high in the western side and as one goes from west to east it decreases. The Eastern part of Chamba and Mahasu districts and southern part of Bilaspur district experience rainfall below 150 cms while in Kinnaur district the rainfall is scanty (below 100 cms.).

The areas where annual rainfall is high, the maximum rainfall occurs during July and August. Areas where rainfall is moderate, it is distributed almost equally during winter and summer. In the areas of low rainfall (below 100 cms) it is recorded more in winter month than in summer months. For example in Kalpa of Kinnaur district, 40.41 of the annual rainfall is recorded during December to March while only 21.6% of the rainfall is recorded during July to September.

5.c. Punjabi

Proximity to hills and mountains located in the north of Punjab is the determining factor for amount of rainfall received in various parts of the state. The mountain regions of Kangra, Simla and Northern portions of Ambala and Gurdaspur receive more than 100 cms of rainfall in a year. The average for Dharmasala is 340 cms due to its particular location against a high mountain range in the direction inducing heavy precipitation. The Lahul and Spiti

districts despite its latitude, has phenomenally low rainfall of about 20 cms. Since it is located on the other side of Dhauladhar range obstructing the rains. Scarcity of rain in the district is, however, more than compensated by the heavy snow which covers the area for several months in the winter, and during the summer when the snow thaws innumerable small streams ooze through the cracks in the mountains. The sub-mountain region comprising Northern parts of Gurdaspur, Hoshiarpur and Ambala receive 100 to 125 cms of rain in a year. The districts south of the sub-mountain region (Amritsar, Kapurthala, Jullundur, Ludhiana) attracts about 175 cms of rain. Patiala and Karnal also fall in the same group. The South of the State comprising Ferozpur, Bhatinda, Sangrur, Hissar, Rohtak Mahendergarh and Gurgaon districts is dry receiving 40 to 50 cms of rainfall. A large part of the annual rainfall throughout Punjab occurs during July to September. In winter months from December to February some amount of rainfall occurs. April and May have little rain, June has occasional showers, in October it is negligible and November is almost dry.

The climate is marked by extremes of cold and heat and there is a wide diurnal range in temperature. Mid-December to Mid-January is the peak of winter when mercury often declines to 17°C below freezing point at Simla.

During the peak winter months the maximum temperature throughout Punjab is never more than 25°C. In June the temperature oscillates between 40°C and 22°C during the course of a day and the maximum temperature in some places may touch 45°C (113°F). Punjab is either hot or cold during most of the year, and it is temperate only for about a month in between the change of seasons. Punjab is equally known for its dry climate. Humidity ranges 35 and 45 percent all the year round except in August and September when it rises between 77 and 88 per cent in the plains and touching 90 per cent in Simla.

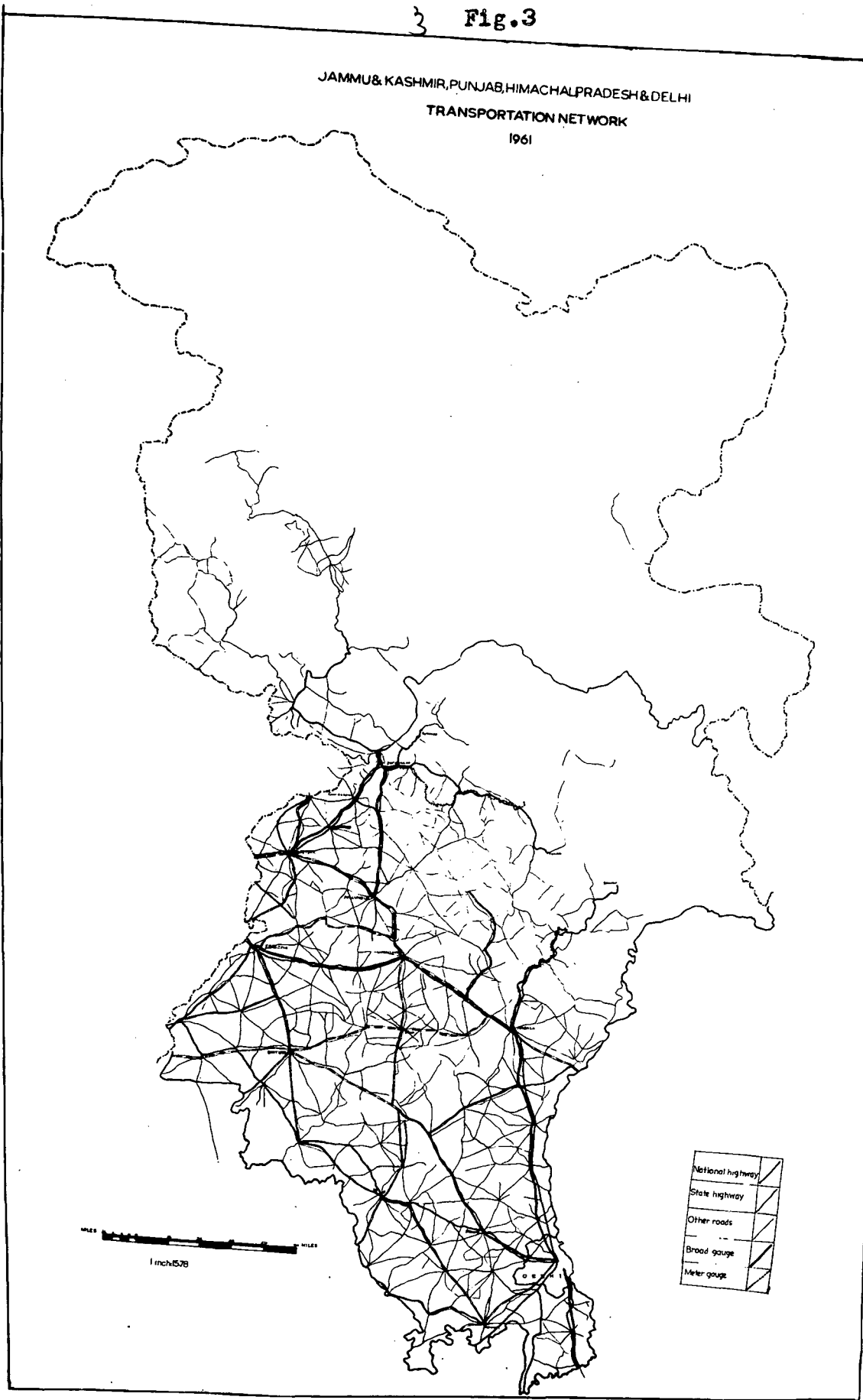
6. TRANSPORT NET WORKS

6.a. Jammu and Kashmir:

The length of surfaced roads in the State as a whole measures 1,12,806 Kilometers giving an average of 3.17 kilometres per 10,000 population. This average is exceeded by all the districts except Srinagar, Ladakh and Poonch. There are no surfaced roads in the districts of Ladakh and Poonch. In Srinagar the proportion per 10,000 of population is limited to 2.44 kilometres only. Kathua has the smallest length of surfaced roads among all districts except Ladakh and Poonch but the average per 10,000 of population stands at 4.58 K.Ms. This is because Kathua is least populous among all the districts of the state except Ladakh and the size of surfaced roads is proportionately large. It will be seen from the map that

3 Fig.3

JAMMU & KASHMIR, PUNJAB, HIMACHAL PRADESH & DELHI
TRANSPORTATION NETWORK
1961



the area from Anantnag to Srinagar claims the highest density of surfaced roads. The entire area is plain and is interwoven with anet work of roadsconnecting tehsil and district offices and leading to tourist and health resorts, such as Kukarnag, Pahalgan, etc. It is also apparent that except for parts of Jammu district and a small sector in the North of Srinagar, the density of surfaced roads in the all other areas is less than 150 per 1000 Sq K.M.s. In most of the districts the density from 0-50 per 1000 Sq. Kms. while in a few others such as Poonch, Kathua, parts of Udhampur and Baramulla, the densities are comparatively higher ranging from 50 to 150. The area to the north of Himachal Pradesh and contiguous with Ladakh is highly inaccessible. The territory to its left is also inaccessible but not to the same extent. The accessible and slightly inaccessible areas are dispersed all over the remaining parts of the state territory. The parts of Kashmir vley and areas bordered by the case- fire line in the west and the south area highly accessible.

6.b. Himachal Pradesh:

In the state as a whole, the length of surfaced roads for every 10,000 persons comes to 3.63 Kilometers. This ratio varies between 2.56 in Chamba and 5.35 in Balaapur district. Chamba and Mahasu district fall in the range below 4.00 Siraur and Mandi fall in the range 4.00-5.00. Data for Kinnaur district is not available.

The Western part of the state exhibit comparatively high density of surfaced roads per 1000 square kilometers. Most of the Chamba district, parts of Sirmur and Mahasu districts are the regions of comparatively low density of surfaced roads. For whole of eastern part of Himachal Pradesh data is not available. There is a thin central belt running from South to North is highly accessible. The extreme western part is also highly accessible. The interior part lying in the between these two highly accessible areas is moderately inaccessible.

6.c. Punjab:

The state is very well served with roads and railways. The road length in 1961 was reported to be 12458 miles more than half of which were metalled. The density of roads was 46 miles per 100 square miles of area and 108 miles of road length per lakh of population which gives the state a fairly high ranking in the country. In road transport the leading districts are Ambala, Jullunder, Amritsar and Patiala, all of which are in the Northern half of the state. The railway route length in state is 1985 miles.

-
1. Census Atlas Volume VI-Part IX J&K.
Census Atlas Volume XI-Part IX H.P.
Census Atlas Part IX Punjab.
 2. 1961 Himachal Pradesh was a union territory.
 3. Census of India 1961.
Volume XIII Punjab Part I-A (1). General Report.

II

SPATIAL DISTRIBUTION OF SETTLEMENTS

The spatial distribution of settlements is the outcome of various factors. The general pattern shows clearly the effects of physical relief, rainfall distribution, soil types, cropping pattern, drainage system and the network of transport lines. Our main purpose is to identify the distributional pattern of settlements according to physiographic regions, soil types, cropping pattern and net work of transport lines. Apart from these factors of analysis; in this study there is outlined a new approach to the problem of expressing the character of settlements pattern in mathematical terms. The approach is based on modern statistical theory and the notion of probability. This modern statistical theory is known as the 'Near Neighbour Analysis'.

Before discussing this modern statistical theory let us discuss some of the earlier methods of analysing the distribution pattern of settlements.

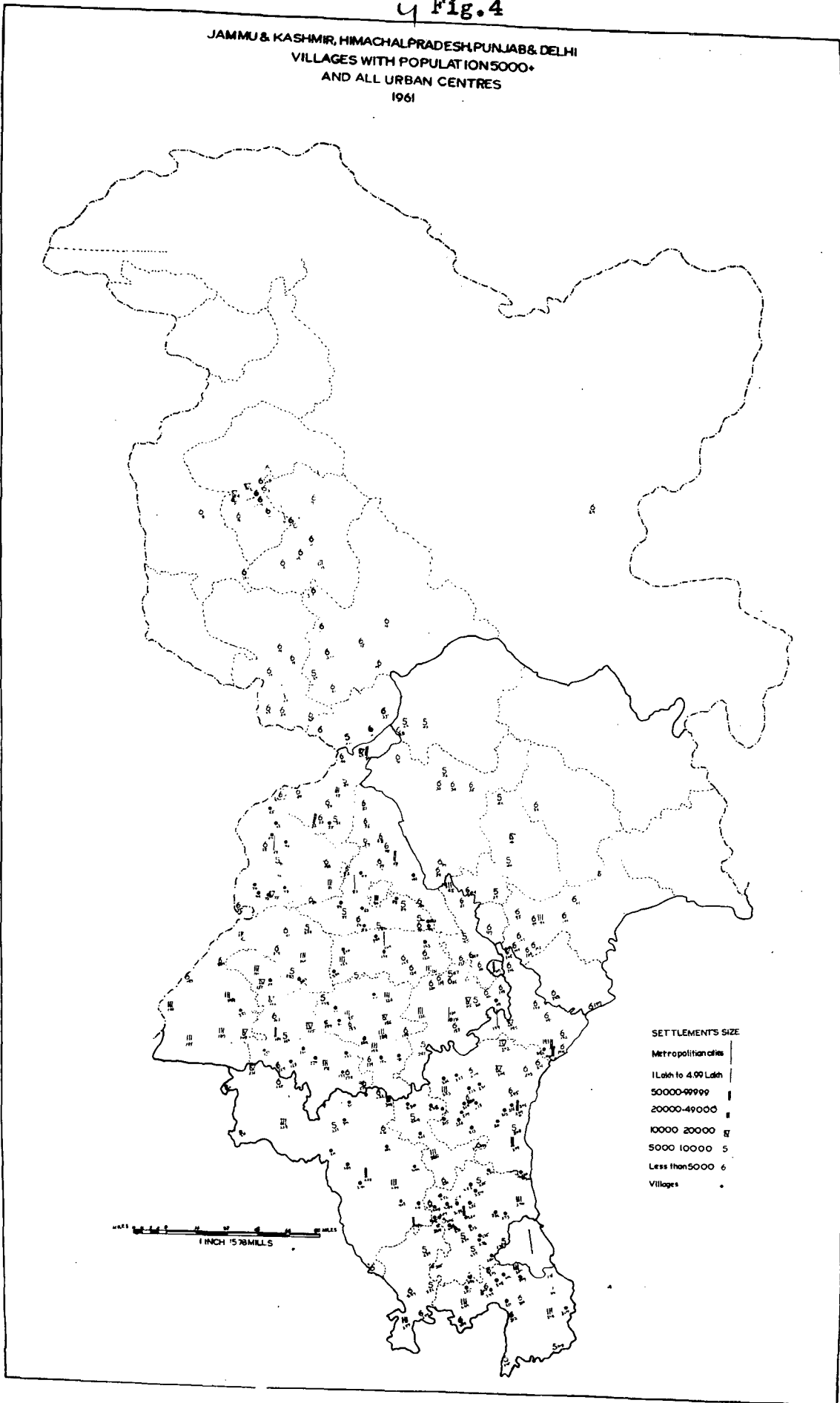
Size, Number and Spacing of Settlements

On the basis of population the settlements are classified into seven categories. This criterion of population size has been used in the census in order to categorise the urban settlements in various classes.¹

<u>Class</u>	<u>Population size</u>
I	One Lakh and above
II	50,000-99,999
III	20,000-49,999
IV	10,000-19,999
V	5,000- 9,999
VI	Less than 5,000
VII	Villages 5,000 and above (the last VII category has been added by us).

4 Fig.4

JAMMU & KASHMIR, HIMACHAL PRADESH, PUNJAB & DELHI
VILLAGES WITH POPULATION 5000+
AND ALL URBAN CENTRES
1961



The following table gives the distribution of settlements in various classes.

TABLE: I - Number of Settlements

Classes of settlement	1961 No. of Settlement	1951 No. of Settlement
I	7	5
II	11	4
III	37	28
IV	43	30
V	57	67
VI	69	55
VII(Villages)	113	61

(One Metropolitan city of Delhi is also included in our study).

Among the factors which are responsible for the growth of settlements in terms of number as well as size; the growing economy on the basis of agriculture, industry, spread of roads and rail network, the impact of population growth and influx of population.

The spacing of settlements has become more closer in 1961 than in 1901 and regional disparities with respect to the proximity to urban centres have greatly reduced. Still the northern areas of the region continued to be more urbanised than their southern counter part. In the northern part of the region, areas which are at a distance of more than ten miles from towns are fewer than in 1951. Many areas are within 5 miles from the nearest town. In the Southern part of the region as well as in the extreme northern part fairly large areas are having a very few towns, than less. Around the Union territory of Delhi there has been considerable urban



development as a result of which spacing of settlements have become closer. In Jammu and Kashmir all the urban centres are located in valley of Kashmir and Jammu region. Only two settlements named Kargil and Leh are located outside the Kashmir valley. Except one class VI town, there is no town in more than two third of the state territory extending from South east to North East. On the other hand a sizeable conglomeration of classes V and VI towns like in the South westorly sector. The Northern region of the state is also marked by a number of contiguous towns which are of class V and VI and also a few are of class IV also. Other towns are irregularly scattered in various parts of the state. In Himachal Pradesh and Himalayan Punjab the settlements are spaced at a quite large distant.

Density of settlements:

An attempt has been made to analyse the number of settlements within a unit of area. Here the density of settlements is defined as the number of settlements per 100 square miles similarly as the density of population.

The following table indicates the density of settlements per 100 square miles of area for each inhabited (inhabited means the districts which have large sized villages and towns) district.

Y3337:7.44N7

DISS
LSI

G- 39358



TABLE. II. - Density of settlements-1961

District	Density Per 100 Sq. Miles.	No. of Settlements	Natural Regions	Density of settlement in these regions
Rohtak	1.24	27	South Western Punjab Plain	0.87
Mahindargarh	0.46	6		
Gurgaon	0.80	19		
Hissar	0.50	25		
Jind	1.65	5		
Bhatinda	0.73	19		
Sagrur	0.72	21		
Karnal	0.94	24	Eastern Punjab Plain	0.81
Ambala	0.76	17		
Patiala	0.72	14		
Ludhiana	0.75	10	Bias-Sutloj Doabor Bist Doab.	0.85
Jullundur	1.27	17		
Hoshiarpur	0.54	12		
Amritsar	0.85	17	Northorn Punjab Plains	1.00
Gurdaspur	1.02	14		
Kapurthala	0.58	4		
Ferozepur	0.56	21		
Simla	1.872	5	Himalayan Punjab and Himachal Pradesh.	0.58
Sirmaur	0.18	2		
Bilaspur	0.44	2		
Handi	0.99	3		
Nahasu	0.23	5		
Kangra	0.24	6		
Kathua	0.47	3	Jammu	0.31
Jammu	0.48	6		
Udhampur	0.23	4		
Doda	0.06	6		
Anantnag	0.28	6	Kashmir Valley	0.34
Srinagar	0.33	4		
Baramula	0.43	11		
Ladakh	0.00	1	Ladakh	0.00

2000000

Density of settlements is highest in Rohtak, Jullundur Gurdaspur and Simla districts i.e. 1.24, 1.27, 1.02 and 1.87 settlements per 100 sq. miles of area respectively. There is a positive correlation between the density of population and density of settlements. For example in Jullundur district the

density of settlements is 1.27 settlements for 100 sq. miles and the density of population is also 568 persons per sq. mile in 1961. On the other hand in the district of Hissar the density of settlements is .50 per 100 sq. miles corresponding to 176 persons per sq. mile. Taking all these into consideration the above two examples of Jullundur and Hissar districts we find that density of settlements is decreasing in accordance with the fall in the agriculture productivity of the soil. The same holds true for other districts also.

On the basis of the analysis of the data it would be worth to say that largest population concentration will either stimulate the size of settlements or the number of settlements. The districts which have highest density of settlements. The districts which have highest density of settlements have large sized settlements (class I, Class II, Class III etc). On the other hand the districts which have lowest density of settlements are deprived of large sized settlements.

The districts having highest settlement density as well as high population density are agriculturally and industrial well developed. The means of transportation are also well developed.

The hilly tracts of the region have lowest density of settlements. This lowest density corresponds to the rough topography of the area which hinders the development of means of transportation and as well as there is each lack of orable land for agriculture.

Distribution of Settlements in Physiographic Regions.

The state of Jammu and Kashmir, Himachal Pradesh, Punjab and Delhi has been divided into 8 physiographic regions. The following table gives the distribution of settlements in these physiographic regions.

TABLE.III - Distribution of Settlements
Physiographic Regions.

Name of the Region	Number of settlements per 100 Sq. miles.	Density of settlements Per 100 Sq Miles	'R' Value
1. Southwestern Punjab Plains	122	0.87	0.960 R
2. Eastern Punjab Plains	58	0.81	1.290 R
3. Beas-Satlej Doab	36	0.85	0.836 R
4. Northern Punjab Plains	54	1.00	1.510
5. Punjab, Himalayan Himachal Pradesh	24	0.58	1.29 R
6. Jammu	19	0.31	1.443 R
7. Valley of Kashmir	21	0.34	.459 C
8. Ladakh	2	0.00	---

1. South Western Punjab:

This region is a flat gently sloping plain. Geologically it comprises recent Alluvium (Riverine). Gaggar, Saraswati, Jamuna and Dehan are the main rivers of this region. The amount of rainfall varies between 458 mm to 375 mm (1960) annually. Depending upon these physical and climate conditions this is mainly grain producing area. It has got 122 settlements out of 336 settlements. The density of settlements is 0.87 per 100 sq. miles. The pattern of distribution of settlement is random ('R' 0.960).

2. Eastern Punjab Plain:

Northern most district (Ambala) of this region is a piedmont plain flanked by the Siwalik in the north and north eastern parts. Rest of region is slopping flat plain in South western direction. Sutlej and Gaggar are the main rivers of region. The amount of rainfall is varying between 900 mm to 569 mm annually. The soils of this region are very fertile and it is mainly a wheat producing area. This region consists of 58 settlements and the density of settlements is varying between 0.70 to .81 per 100 Sq. miles. Settlements are randomly distributed.

3. Beas Sutlej Doab:

The Hoshiarpur district of this region is a gently undulating plain bounded on the NE by the Siwalik; gradually merging to a flat plain in the West. Rest of two districts are flat plains gently sloping in South Western and Western direction. In the Northern part Beas is the main river and in South Sutlej is the main river of this area. Average rainfall is the main character of the area and it is mainly wheat producing area. The density of settlements 0.85 per 100 sq. miles. The settlements in this region are also randomly distributed. But the number of settlements is only 36, that means it is a quite small region as compared to other regions.

4. Northern Punjab Plains:

Geologically it contains recent alluvium.

This plain is bounded by on the North and East by the Sivaliks and on the south by river Sutlej. Beas, Ravi and Sutlej are the main rivers of this region. This region is quite fertile and the climatic conditions are also favourable. It is mainly a wheat producing area. The amount of rainfall varies between 944 mm to 225mm annually (1960). The settlements are 'evenly' distributed in this region; and on the other hand density of settlement is highest in this region i.e. 1.00 per 100 sq. miles of area. It has 54 settlements.

5. Himalayan Punjab and Himachal Pradesh:

This region has a very complex geological structure (Sivalik rocks, limestone, lower Gondwana rocks, Phyllites, Schists of Palaeozoic age, Murre beds and Triassic and Permian rocks). It has hilly, rugged and mountainous topography. Sutlej, Beas, Yamuna, Markanda etc. are main rivers of this region. The amount of rainfall varies between 1037 mm to 6474 mm annually. It is mainly maize and wheat producing area. Terrace cultivation is being done due to the mountainous topography. The density of settlements is quite low i.e. 0.58 per 100 sq. miles. The distributional pattern follows the random distribution of settlements.

6. Jammu Region:

A narrow strip of alluvial plain brings the Jammu hills. It is broadest around Jammu and Mirpur and is crossed by many hills torrents. This plain and adjoining low hills are called the Kandi. Wheat is raised in alluvial soil region. In the upland areas, maize is the dominant Pehrif crop and is mainly raised in Udhampur, Poonch and Doda districts. The density of settlements is very low and settlements are randomly distributed in this region. It consists only 19 settlements (for geological structure see chapter I).

7. Valley of Kashmir:

This valley is only large stretch of flat country in the state. With its fertile alluvial soil, cool temperature - climate and irrigation facilities, the valley supports fairly a dense population. Mainly the flood plains of Jhelum river are very fertile. The plateau-like (older alluvium flood plain) blocks of older alluvium are called Karowac. Rainfall is enough for successful cultivation supplemental irrigation is essential. Rice and maize are the main crops of the region. Although density of settlements is very low (.31 per 100 sq. miles) yet the distribution of settlements follows the clustered pattern. It consists of only 21 settlements, among which one class I city is located.

8. Ladakh:

Extremely rugged mountainous areas north

of the great Himalayas are mostly negative lands. These are only two settlements found named Kargil and Leh in this region.

In conclusion we can say that distributional pattern of settlements (clustered, random and even) is influenced through the variations in physiography of the region. As one moves from rugged topography to flat leveled topography; the number and density of settlements goes on increasing.

Apart from these physical factors; the economic base and transport facilities have also great impact on the distribution of settlements.

Transport Network

In this part an attempt has been made to assess the distributional pattern of settlements with respect to transport network. Secondly the aim of study is to assess the regional disparities in the network developments. The second aim of study is based on the connectivity index.

Methodology:

In our analysis we have taken six types of network of transport. To each type of network weightage has been given according to the importance of the system. The weightage allotment is based on the generalisation. The weightages allotted to each type are 8,4,2,6,1 and 5 to National Highway (N.H), State Highway (S.H.), other roads, broad gauge railway line, metre gauge and junction or terminance point respectively. For example if the settlement

'a' is on the all the transport line, it would get all the weights. The following equation has been used to calculate the C.I.

Connection of Settlement A. CI refer to connectivity Index.

$$CI = \frac{W_1 + W_2 + W_3}{W_4} \quad W = \text{Weight.}$$

Similarly for all the settlements - C.I. has been calculated. In the next step weighted values has been plotted on the map and joined by isopleth lines.

TABLE. IV - Distribution of Settlement on various lines of Transport

Transport Lines	Number of Settlements	Remarks
1. National Highway (NH)	65	
2. State Highway (S.H)	77	83 settlements are not connected with any type of transport line.
3. Other roads	138	
4. Broad Gauge	113	
5. Metre Gauge	9	

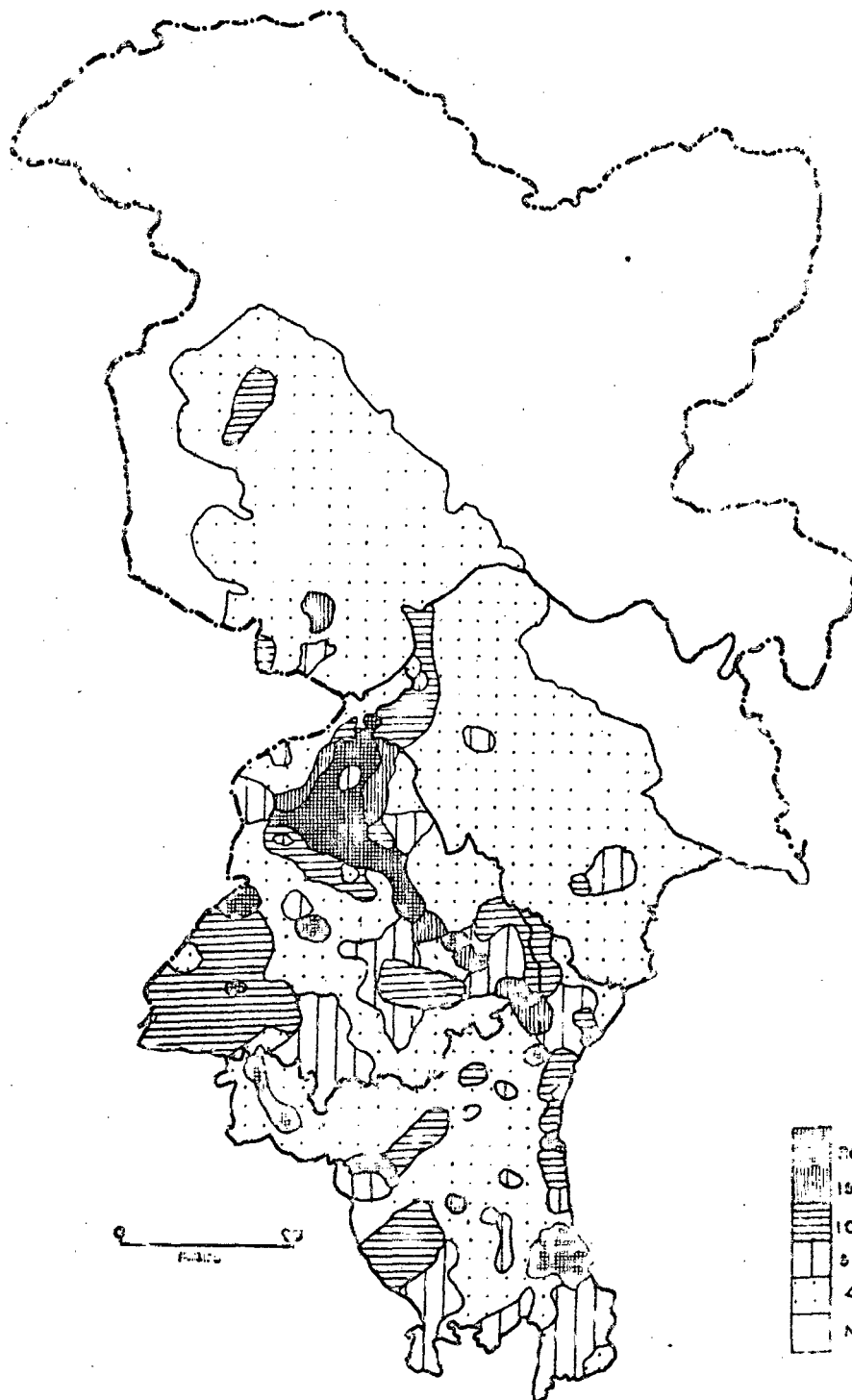
There are 65 settlements which are located on the N.H. All the class I and One Metropolitan city of Delhi is located on the N.H. On the S.H, other roads, Broad gauge railway and metre gauge railway 77,138,113,9 settlements are located respectively. Other roads have connected largest number of settlements. These roads includes district roads, and link roads which joined the large sized villages with urban centres. A glance at the transportation map shown that almost all the large sized villages including class V and VI towns are located either S.H. or linked with the large urban or as by other roads. On the other hand the railway network is also well spread through out the region.

Fig. 5

5

CONNECTIVITY

JAMMU & KASHMIR, HIMACHAL, PUNJAB & DELHI
1961



Finally connectivity index has been calculated on the basis of weightage given to each settlement.

TABLE. V - Connectivity Index.

Weighted Values	No. of Settlements.
5	126
5-9.9	85
10-14.9	51
15-19.9	8
20+	32

The table shows that 66 percent of settlements have connectivity less than 10, 20 per cent settlements have moderate connectivity and rest of 14 per cent settlements have 'very high' connectivity. In most of the areas the spread of transport net work is least. There are only few pockets which are highly connected. The regional variations with regard to development of areas of transportation are influence through the physical geography of the area. In the Punjab plains the Northern area have well developed means of transportation as compared to the southern counter part of the Punjab plains. Around the union territory of Delhi there has been a considerable urban development as a result of which means of transportation have developed to a greater extent.

A look at the map indicates that there are distinct interzonal variations in the levels of transport net work development. North, North-eastern and South-Western zone of

Punjab plains are making distinct zone of actual development of transport net work. If we compare the actual transport net work development with CI (Connectivity Index) this shows that the areas where net work of transport is complicated is well developed, the CI of the network is also high. For example Ludhiana district have complicated transport network and it has also high CI. From this correlation we can say that areas which have complex transport net work and high C.I. have also highest number of settlements located in that particular area. In Ludhiana district the number of settlements is highest and have clustered pattern of distribution.

In brief we can conclude that the physiography of area, the developments in the field of agriculture, industry and as well as rapid urbanisation lead to the development of means of transportation. All these factors combined can be held responsible for the growth and distribution of settlements.

In contrast to earlier discussion (for example the number of settlements per square unit of area) here greater emphasis is given to actual distance separating settlements. And the statistical technique which is used in this study is infact known as the 'Near Neighbour Analysis'. This technique has been developed by Professor L.J. King.

When the nearest straight line distance is measured between two points without taking into consideration the (Physical land scape) the actual route-distance, they have by rail or road it is known as the nearest neighbour measurement.

"Statistical analysis of the near neighbour measure which is the name suggests a straight line measurement of the distance separating any phenomena and its nearest neighbour in space, was originally developed by plant ecologists, who were concerned with the distribution pattern of various plant species over the surface of the earth."³

"With the help of N.N.D. the departure from observed spatial distribution to a theoretical random distribution between clustered and dispersed pattern of settlements has been identified and denoted with the help of 'R' scale."⁴

Distribution of Settlements According to N.N.D.

According to the 1961 census - in our study area there are 335 settlements (large sized villages and all urban centres) distributed over the state of Punjab, Himachal Pradesh, and Jammu and Kashmir and Delhi.

3. and 4. Peter Ambrose. Concepts in Geography 2.

Analytical Human Geography (Page 90). Longmans.

The 'R' value for the whole region has been calculated i.e. 1.122. This 'R' value shows that the settlements are randomly distributed through out the region.

The district is taken as the next lowest unit of analysis. The following gives the 'R' values for each district of the study.⁵

TABLE. VI - Distribution of Settlements 'R' Values.

Name of District.	'R' Values		Physiographic Regions	For Physiographic Regions R Values Region.
Rohtak	0.260	C	South Western Punjab Plains.	.960 R
Mahendergadh	1.390	R		
Gurgaon	0.853	R		
Hissar	1.315	R		
Jind	1.121	R		
Bhatinda	.768	R		
Sangrur	1.01	R		
Karnal	1.786	E	Eastern Punjab Plains.	1.290 R
Ambala	1.148	R		
Patiala	0.925	R		
Ludhiana	0.909	R	Bist Doab	0.836 R
Jullundur	0.434	C		
Hoshiarpur	1.147	R		
Amritsar	0.787	R	Northor Punjab Plains	1.150 R
Gurdaspur	0.628	C		
Kapurthala	1.909	E		
Farozpur	1.672	E		
Sialk	0.366	C	Himalayan Punjab and Himachal Pradesh.	1.29 R
Sirmaur	1.434	R		
Bilaspur	0.853	R		
Mandi	2.00	E		
Mahasu	1.320	R		
Kongra	1.930	E		
Kathua	1.440	R	Jammu	1.443 R
Jammu	1.122	R		
Udhampur	1.981	E		
Doda	1.220	R		
Anantnag	0.433	C	Valley of Kashmir	.439 C
Srinagar	0.699	C		
Baramulla	1.492	R		
Leh	0.00		Lehakh	

*R⁰ Scale of Nearest Neighbour technique

0 - .49	C
.5 - 1.49	R
1.5 +	E

- C refers to clustered,
- R refers to Random, and
- E refers to Even pattern of distribution.

A contrast can be made between northern and southern districts of the region. The most marked tendency towards an aggregated or clustered settlements pattern appears in the North of this region except for few districts. The Northern districts are wetter and richer than semi arid southern districts, they therefore, attracted more people to settle in the past. The districts which have clustered pattern are Jullundur, Gurdaspur, Rohtak, Simla and Jrinagar. As we move south wards except for the Union Territory of Delhi and its adjacent districts of Gurgaon and Rohtak, the pattern of distribution of settlements is 'Random' in Bhatinda Sangrur, Hissar, Mahaendargarh and Jind districts. At the other extreme, a tendency towards 'Uniform' spacing is apparent in districts of Karnal, Ferozepur, Kapurthala, Kangra, Mandi, and Udhampur.

An examination of the above table (no. VI) reveals that the variations in values for the near neighbour statistic 'R' did occur and it is apparent that the tendencies towards clustered, random and even spacing of settlements vary considerably through out the region. In other words the values

-
5. The 'R' value has been calculated by the following formula.

$$R = \frac{\bar{r}_o - \bar{r}_a}{\sigma_r}$$

\bar{r}_a refers to the mean observed distances in a given regions.

\bar{r}_o refers to the mean of the actual distances.

Where $\sigma_r = \frac{1}{\sqrt{2/P}}$

Here $P = \frac{N}{A}$

N denotes the number of settlements in a particular area.
A denotes the area of that particular unit.

calculated for the near neighbour statistic 'R' are varying with great magnitude. Thus clustered, random and even distribution of settlements is influenced through the variation in physical geography of the area, the economic base and transportation facilities, (see transport network pp28 and Chapter V)

III

DEMOGRAPHIC PROFILE

This region (the states of Jammu & Kashmir, Himachal Pradesh, Punjab and Delhi) is one of the moderately populated areas of the Indian subcontinent. This region ranks eighth in its man power and supports about 6.34 percent of the total population of India. Its total population estimated at 27.7 million in 1961 (Jammu & Kashmir 3.56 million, Delhi 2.65 million, Himachal Pradesh 1.35 million and Punjab 20.30 million). These 27.7 million people offer advantages of military expansion in peace as well as in emergency, inexhaustible reserves of cheap labour for producing food manufactured goods and a ready market at home for indigenous products.

With 1731 persons per square mile (as against 370 persons per square mile in India as a whole) region ranks first among the states of India with respect to density of population. (Density of population for Jammu & Kashmir is not available and for Punjab, Himachal Pradesh and Delhi, the density of population is 430, 124 and 4640 persons per square mile in 1961 respectively). A great increase in population has been recorded in this region during 1951-61 period. The percentage rate of increase during 1951-61 was 27.37 as against 21.50 percent in India as whole (percentage increase in population in 1951-61 in Jammu & Kashmir, Himachal Pradesh Punjab and Delhi was 9.44, 21.78, 25.86 and 52.44 respectively).

In this region, the number of females per 1000 males has increased from 854 in 1951 to 863 in 1961, whereas the sex ratio has decreased from 946 in 1951 to 941 for India as a whole. For census purposes, the test of literacy is satisfied if a person can, with understanding, both read and write. Thus literacy figures include persons who can both read and write and those who passed a written examination as proof of an educational standard. In 1961, 26.25 percent of population was literate as compared to 24.0 percent for India. There was 34.5 percent literacy among the males and only 16.7 percent among the females. (For India as a whole the male literacy was 34.4 percent and female literacy was 12.9 percent in 1961). In this region the female literacy was quite high. Quite a large proportion i.e. 32.55% of the total population according to 1961 census lives in towns. This high percentage of urban population was due to Delhi union territory where 88.75 percent of its total population was counted as urban. Excluding Delhi, the percentage of (13.84 percent) urban population is quite below the national average of 17.8 percent. This slow growth of urbanisation is due mainly to the fact that in the region, industrial development has been very slow in the past decades. Now the towns are the centres of administration, commerce, industry and education. For the whole region during 1951-61 the percentage increase of urban population was 46.36. This strategic increase of urban population has encouraged us to further investigate the demographic characteristics of urban population as well as the characteristics of population of the large sized villages.

In the proposed study, the main demographic characteristics of population which we have taken into consideration are - Growth rate of population of these selected settlements, density of population, sex ratio and literacy.

GROWTH RATE

With a population increase of 27.37% during 1951-61 this region has entered the explosive state of demographic cycle. Among the four states in this region Delhi has shown a highest growth rate of 52.44%. Only Assam, West Bengal, Gujrat and Rajasthan have recorded higher growth rate than Punjab and Himachal Pradesh. In Jammu & Kashmir the growth rate was only 9.44% in 1951-61.

There are wide variations in population growth in different sizes of settlements. The following table (III.1) gives the range of growth rate in different size classes during 1951-61.

Table No. III.1 GROWTH RATE OF SETTLEMENTS-1961

G.R.	Size class of settlements						
	I	II	III	IV	V	VI	VII
	Number of settlements						
Negative	-	-	1	5	9	8	3
+56	1	6	10	5	5	10	12
46-55.9	-	1	3	3	9	3	5
36-45.9	2	-	4	3	3	3	14
26-35.9	2	1	8	9	12	5	13
16-25.9	1	3	6	6	12	8	24
6-15.9	1	3	2	5	11	5	14
-6	-	-	-	5	3	10	9

Note:- Growth rate has been calculated only for 309 settlements.

Out of 309 settlements; 153 settlements have growth rate more than the regions average growth rate (27.3%) ~~rate~~ of population, and 199 settlements have the growth rate below the region's average. Rest of the 26 settlements have recorded a negative growth rate.

About 14 settlements in the highly densely populated districts of Hoshiarpur, Jullundur, Gurdaspur, Amritsar, and Kapurthala have experienced negative rates of growth. For example in Una Tahsil of Hoshiarpur district the urban areas like Una and Anandpur Sahib have shown negative growth rate of 4.42 and 1.80 percent respectively. In Mauzshahr tahsil of Jullundur district a settlement named Rahon has recorded a negative growth rate of 3.56% . In Tarntarn tahsil of Amritsar district; Valtoha(-7.20%) and Sursingh (-2.54%) villages have recorded negative growth rate. Similarly in Batala tahsil of Gurdaspur district; Quadian(-.25%) and Sri Hargobindpur(-23.22%) have registered lowest rates of growth. On the whole if we compare the growth rate of settlements with the over all growth rate of these areas we find that in these districts of Hoshiarpur ,Jullundur,Kapurthala,Gurdaspur,Amritsar have lowest rate of increase, mostly less than 20% and in these above mentioned particular tahsil the over all(tahsil level growth rate)growth rate was less than 10%. 'Assuming a rate of natural increase of 28%, these areas have evidently been important source of out migration to other parts of Punjab and other states of India and abroad'.1

The size of land holdings is generally small and nutritional density is high in these areas. Also the economy is predominantly agricultural. The problem of water logging is assuming alarming in some parts of this area. On the other hand in those densely populated districts some of the industrial towns have recorded very high rates of increase e.g. Phagwara in Kapurthala district, Dera Baba Bank in Gurdaspur district have recorded growth rate of 73.4% and 84.37% respectively. In these two towns this increase is associated with the development of agro-based industries, which have attracted migrants from (Skilled and Unskilled labour) other parts of the state as well as from densely populated areas of the country. In Simla, Mandi, Mahasu, Bilaspur and Kangra districts the average growth rate of settlements is below average and it is varying between 6 to 18%. This small growth rate is the outcome of the physiography of the region. By contrast all the settlements lying in the central zone extending from north-east to south-west experienced very high rates of population increase ranging between 27 and ~~more~~ 50 percent and above. All the settlements in Sirsa and Fatehbad tahsils of Hissar district have growth rate 64 and 60 percent respectively. Similarly the settlements situated in the tahsils of Jagadhri, Thanosar and Raithal have recorded very high rate of increase. This big increase is associated with the extension of irrigation, reclamation of waste land and considerable development in the field of industries. Thirdly parts of Southern Punjab and also including the state of Jammu and Kashmir fall in between the two extremes discussed above.

Class wise variations of Growth rate.

The picture emerging from the table (III.2) have no relevance so far as the class wise variations of growth rate are concerned. In almost all the classes of settlements high growth rates are compensated by low values of growth rate. On the other hand, exceptions are there, for example in class II towns; no settlement have experienced negative growth rate and out of 14 class II towns 6 have recorded highest (56+) rate of increase. All other classes the settlements are equally distributed in all the categories of growth rate. The following table (III.2) gives the average growth rate in each class of towns and large sized villages

Table No.III.2 Class wise Growth rate of settlement-1961

Class of settlements						
I	II	III	IV	V	VI	VII
Growth Rate(percentage)						
39.9	62.7	49.2	40.6	33.4	41.0	29.1

Class II towns have recorded highest rate of growth where as class III towns hold a second position. Class I, IV and VI towns have almost equal rates of increase. And class V and VII(Villages) settlements have recorded lowest rates of growth.

Regional variations of growth rate.

There are wide regional disparities in population growth in this area. These wide regional disparities in the growth rate are the outcome of physiography of the region, agricultural and industrial and transport development of the region. The following table (III.3) throws a flood of light on growth rate in various regions.

Table No. III.3 Growth rate of regions-1961

Regions	% Growth rate
1. South western Punjab plain.	42.0
2. Eastern Punjab plain.	33.0
3. Bag Sulej Doab.	15.7
4. Northern Punjab plain.	45.2
5. Himalayan Punjab plain & Himachal Pradesh.	37.0
6. Jammu.	31.7
7. Vale of Kashmir	27.8
8. Ladakh	4.9

South western Punjab plain has semi arid and arid type of climate. The outer parts of the Aravalli hills have appeared in the Southern districts of this region. The outliers are low in height and are separated from one another by low-level alluvial plains. They appear in Mahendragarh and Gurgaon districts and Delhi state. In spite of these type of physical conditions this region shows a very high rate of growth(42.0%). This is only due to the union territory of Delhi which has recorded a growth rate of 52.4% and its surrounding settlements e.g. Faridabad, Rohtak have recorded highest growth rate. The union territory of Delhi and its periphery have achieved considerable development in the field of industries and the means of transportation ~~xxxxxxxx~~ are well developed. The rest of area have very low rate of population increase.

In Jammu, Eastern Punjab plain, Himalayan Punjab and Himachal Pradesh regions; the growth rate is varying between 31 to 37 percent. The Jammu region is a narrow strip of alluvial plain, Northern most part of Eastern plain consist of piedmont plains and the rest of the area is a flat plain. Secondly the growth rate is only 15.7% in Sutlej Beas Doab region. Evidently the small size of land holdings and the high nutritional density of rural population in the predominantly agricultural areas of this region, has provided a push to these people to migrate to out side areas in the state and out of the Indian territory in search of Livelihood and better prospects.

In Northern Punjab plain region the growth rate is 45.2% . The high rate of population growth through out the region is intimately connected with extension in irrigation which has facilitated reclamation and settlements of waste land, during the decade. This region has been observing migrants in a very large number from the densely populated areas in recent years. Although the percentage wise growth rate is very high in Lahul and Spiti district, yet it was small in actual numbers and that too due to the new road building activity attracting labourers from outside. The vale of Kashmir is the only large stretch of flat country in the state. With its fertile alluvial soil, cool temperate climate and irrigational facilities, the vale supports fairly a dense population. The population growth rate is 27.8% in this region. On the other hand Ladakh region is extremely rugged mountainous area north of the greater Himalayas.

DENSITY OF POPULATION

Generally the density of population corresponds to a great extent with the productive capacity of the soil. In areas where the land is flat, soils are fertile and enough of water supply from rainfall and irrigation facilities adequate, the population is dense. In this region there are large regional variations in density of population. These regional variations correspond to the above given factors. Region's urban population is asymmetrically distributed. The over all urban density of the region is 11869 persons per square mile as against 5305 persons per square mile of India's urban density. The following table (III.4) gives the range of density of population in various size class of settlements.

Table No. III.4 Density of population of settlements-1961

Density in per square miles.	Size class of settlements						
	I	II	III	IV	V	VI	VII
	Number of settlements.						
50,000+	-	-	1	2	1	2	-
25,000-50,000	3	1	5	6	8	5	-
10,000-25,000	2	8	16	12	13	14	-
5,000-10,000	2	3	8	11	14	9	5
1000-5,000	-	-	6	14	25	28	22
500-1000	-	-	-	-	2	1	42
500-	-	-	-	-	2	10	40

Class wise variations in Density of population

The following table (III.5) shows that as the size of town goes on increasing the density of population will also increase.

Table No. III.5 Class wise density of settlements-1961

Class of settlements						
I	II	III	IV	V	VI	VII
Density in per square miles						
15752	13358	15735	14287	12551	10325	1076

If we hypothesise that there is a ~~inverse~~ inverse co-relation between the density of population, and growth rate of population, we will find that this hypothesis is very close to reality. In class II towns there is a sudden decline in density of population as compared to other class I, III and IV towns. But on the other hand the growth rate is highest in class II towns. In all other classes of towns density is symmetrically arranged.

Regional variations in Density of population.

There are wide regional variations in the density of population. These wide regional disparities correspond to the physical conditions and social-economic development of the area. In various regions, the regional disparities in density of population could be observed through a glance at the following table (III.6)

Table No. III.6 Region wise density of population
of the settlements-1961

Regions	Density of Population in per square mile.
1. South western Punjab plain.	7368.7
2. Eastern Punjab plain.	8686.5
3. East Sutlej Doab.	13140.0
4. Northern Punjab plain.	15152.0
5. Himalayan Punjab & Himachal Pradesh.	4564.0
6. Jammu	7139. 4
7. Vale of Kashmir	4496. 0
8. Ladakh	1052. 0

In the south western punjab plain the urban population is much smaller and towns fewer and for more widely spaced. Density of population is highest only in towns around the union territory of Delhi and in Delhi itself. Because industrial activity is still largely confined to the towns around the union territory of Delhi. Probably it is the spill over of the industrial activity from the national capital where the price of land is high. The over all density of this region in other settlements is very low. The over all lack of urbanisation in this region is explained by the lack of industry and commerce. Most of the important towns having high density of population are situated along the main ~~high~~ rail routes connecting Delhi with Amritsar and Ferozepur respectively. In eastern punjab plain the density of urban population is 8686.5 persons per square miles. This high density of population is explained in the light of industrial development and highly developed means of transportation.

In Beas Sutlej Doab region the density of urban population is very high. The same hypothesis again could be tested in this regional analysis of density: There is an inverse relationship between the growth rate and density of population. In Beas Sutlej Doab region the growth rate of settlements is only 15.7% whereas the density is very high (13140 persons per square mile). Similarly the density of population is also highest (15152 persons per square mile) in Northern Punjab plain. In these two regions of high density of population, large scale inter-district migration is being observed. There is a central zone (Punjab) extending from North-East to South West which have been observing migrants in a very large number from densely populated areas in recent years. This central zone has experienced rapid agricultural development owing to the extension in irrigation which has facilitated reclamation of waste land. The low density of urban population is governed by the rough topography of the Himalayan Punjab and Himachal Pradesh region. In Jammu region the density of population is moderately high because the population is concentrated in a narrow strip of alluvial plain. The vale of Kashmir is about 40 KMs wide and 130 KMs long and it represents conspicuously the largest leveled stretch of fertile land set gracefully in otherwise highly rugged mountainous country. The average urban density of the valley is 4496 persons per square mile. But the overall density of the state of Jammu and Kashmir is varying between 20 to 80 persons per square mile (1961).

SEX RATIO

With a sex ratio of 863 females per 1000 males, this region has one of the lowest sex ratios in the country. There has, however, been a substantial improvement in the sex ratio since 1921. It is thought by many that epidemics and famines were selective in

their mortality impact in favour of females and there has also been a prejudice against begetting girls. During recent decades control over the epidemics and famines conditions have been strengthened and the survival rate of females has also improved slightly. Simultaneously, the prejudices of which the females have been victim in the past are disappearing gradually. As a result, the proportion of females has been improving. In this region sex ratio has ~~has~~ improved from 854 in 1951 to 863 in 1961. Where as the sex ratio has decreased from 946 in 1951 to 941 in 1961 for India as a whole. The following table (III.7) shows the sex ratio in different sizes of settlements.

Sex Ratio	Sex ratio of settlements-1961						
	Size class of settlements						
	I	II	III	IV	V	VI	VII
	Number of settlements.						
945+	-	-	1	2	-	5	6
895-944	-	-	5	7	16	9	22
845-894	2	7	12	17	32	21	40
795-844	3	4	10	10	18	20	12
745-794	1	2	1	2	4	4	5
695-744	2	-	-	1	1	2	1
695-	-	3	3	2	2	18	4

Class wise variations(Sex Ratio).

From the following table (III.8) we have observed that there are wide class wise variations in sex ratio.

Table No.III.8 Class wise sex ratio of settlements-1961

Class of settlements.						
I	II	III	IV	V	VI	VII
Sex Ratio						
753	795	816	848	909	802	840

There is a bimodal co-relation between the size class of the settlements and sex ratio. The low sex ratio in the large size settlements mainly correspond to male selective migration from the rural areas as well as from the urban areas. These large sized urban ~~market~~ centres (Class I, II and III) are mainly industrial and commercial in nature. The male selective migration is partly because of inadequacy of residential accommodations for the workers(migrants) many of who decide to leave their families in parental homes and live alone in the city. Among all the size classes of towns, class V have the highest sex ratio(909). These class V towns are mainly grain market in which both male and female labour is demanded. Due to the increase in the production of commercial crops, large number of mandies sprang up during 1961 decade and these mandies have attracted large number of migrants both from rural and urban areas. In large sized villages and class VI towns the sex ratio is lower than the national average(941) as well as lower than region's average sex ratio of 863. These settlements may also have experienced male selective out migration.

Regional variations(Sex Ratio)

In the South Western Punjab plains and Eastern Punjab plains the sex ratio is quite high. To a considerable extent this high sex ratio is due to male selective out migration from these regions. Due to the development of many industrial complexes like Faridabad,

Sonepat and Jagadhari, large number of Intera-regional and Inter-regional migrations have taken place. With the result; these industrial towns have very low sex ratio and on the other hand rest of the settlements have quite high sex ratio (other than industrial towns).

Table No. III.9 Region wise sex ratio of settlements-1961

<u>Regions</u>	<u>Sex ratio</u>
1. South Western Punjab Plain	875
2. Eastern Punjab plain.	854
3. Beas Sutlej Doab	815
4. Northern Punjab plain.	813
5. Himalayan Punjab & Himachal Pradesh	753
6. Jammu	823
7. Vale of Kashmir	813
8. Ladakh	1012

In the Himalayan Punjab and Himachal Pradesh region the sex ratio of settlements is very low (753). Because (the data at tahsil level shows) these settlements have experienced in migration. In this region the rural sex ratio is varying between 900 to 1000. In Jammu and Vale of Kashmir region sex ratio is quite low in urban settlements. The Jammu region is well developed in industries. Due to this industrial development it has attracted large number of migrants from the state itself. Similarly the vale of Kashmir has a considerable development in the field of industries, it is famous tourist centre also.

In short we could say that variations in sex ratio are due to an improvement in the proportion of females. This may be due to a reduction in females mortality, an increase in male mortality, male selective out migration or in migration². In the region as a whole the sex ratio has risen from 858 in 1951 to 863 in 1961. The increase during 1951-61 is a continuation of the trend since 1921.

In the region like Beas Sutlej Doab the low sex ratio is governed by the huge Bhakra Mangal project where the industries had attracted migrants from outside. The mountainous areas which continue to send out their males in search of livelihood have witnessed a substantial increase in their female ratio.

In contrast the settlements of areas of in-migration have generally experienced decrease in sex ratio; the settlements around Bhakra Mangal project in newly canal irrigated areas, and the growing industrial towns are the areas of in-migrations.

LITERACY

In this area the literacy rate was above national average. On an average for the whole region literacy is varying between 22% to 52% but in some cases it is more than 52% e.g. in Chandigarh the literacy rate is 60.5% in 1961. This high literacy rate in Chandigarh is due to the Educational Institutions like Punjab University, P.G.I. etc. and administrative oriented function of the town. Most of the large sized villages have literacy rate below 22% . 3

2. Determinants and Consequences of population Trend
U.N. Publications.

In Jammu and Kashmir state one class III settlement named as Anantnag has literacy rate 20.03%. This town is a manufacturing town and on the other hand it is a tourist centre also. It has attracted both unskilled and skilled labour. It has been observed that all the industrial towns experienced low literacy rate than the service and commercial towns. Similarly in Srinagar(class II town) the literacy rate is 24.43%. This town is also a big centre of silk weaving, wool carving, carpet making, making of paper, boat building and woollen textiles. This is located in the heart of the vale of Kashmir. It sprawls on both the banks of the Jhelum. By contrast in Delhi the literacy rate is very high because of its mono-functional nature. It is by and large administrative town. The following table (III.10) shows the literacy rate.

Table No. III.10 Literacy rate of settlements-1961

Percentage Literacy.	Class of settlements						
	I	II	III	IV	V	VI	VII
	Number of settlements						
52+	5	5	5	6	4	12	6
52-47	-	4	9	8	11	4	3
47-42	2	2	4	8	14	9	4
42-37	-	1	8	7	10	4	4
37-32	-	1	5	5	11	11	3
32-27	-	1	2	8	4	13	9
27-22	1	-	1	2	5	6	20
22-	-	-	1	3	10	11	56

On the basis of the analysis of the data we can say that there is a strong co-relation between functions of the settlements and literacy rate. The general pattern shows that on one hand agricultural and industrial settlements have lowest literacy rate, on the other hand administrative and other services settlements have highest literacy rate and commercial towns fall in between the above two extremes.

Class wise variations (Literacy)

It is hypothesised that there is a positive co-relation between the size of settlement and literacy rate. In other words larger the size of a settlement higher will be the literacy. The following table shows that this hypothesis holds a true.

Table No.III.11 Class wise literacy of settlements-1961

Class of settlements						
I	II	III	IV	V	VI	VII
Percentage literacy.						
49.2	47.7	44.0	39.6	41.0	38.6	26.6

As discussed above the general pattern shows that literacy is directly related to different functions of the settlements (agricultural, manufacturing, trade and other services are the main functions of the settlements in this region^{*}). And it is also worth saying that as the size of the settlements go on increasing the settlements become multi-functional (Functions become more complex). All the class I, II and III towns in this region have complexity of functions (Multi-functional towns). So it is clear that larger the complexity of functions in a particular settlement, larger will be the size of that settlement and higher will be the literacy in that settlement.

* See chapter V-2 Functional classification

Regional variations(Literacy)

The general regional pattern of literacy of urban population as emerging from the table(III.12) is quite similar to that of general literacy of total population. There is a strong inverse co-relation between the literacy and the sex ratio.

Table No.III.12 Region wise literacy rate of settlements-1961

<u>Regions.</u>	<u>Percentage literacy.</u>
1. South western Punjab plain.	28.6
2. Eastern Punjab plain.	35.8
3. Beas Sutloj Doab	44.2
4. Northern Punjab plain.	38.7
5. Himalayan Punjab & Himachal Pradesh.	62.5
6. Jammu	31.8
7. Vale of Kashmir	14.6
8. Ladakh	21.5

In Himalayan Punjab and Himachal Pradesh region the rate of literacy (62.5%) is very higher than the south western Punjab plain region i.e. (28.6%). In these two regions the sex ratio is 753 and 875 respectively. Similarly in all the regions as the sex ratio goes on decreasing the literacy rate goes on increasing. In last five years plans more emphasis has been given on spread of education on mass level especially in rural areas. The spread of education resulted in the shifting of occupation from agricultural to non-farm activities. This shift of occupation led to large streams of migration from rural to urban areas as well as from urban to urban areas. The migration streams mainly consist of male selective migrants which lowered the sex ratio of places of destination. In addition to this, in different regions the literacy rates are varying according to the functions, size and dynamics of the urban

Table No. 111.12a Co-relation Coefficient between literacy and sex ratio.

Regions	Age Literacy	Sex ratio	R ² Value	Remarks
1. South Western Punjab Plain	28.0	875		There is inverse co-relation between sex ratio and literacy
2. Eastern Punjab Plain	35.8	854		
3. Beas Sutlej Doab	44.2	815		
4. Northern Punjab Plain	39.7	813		
5. Himalayan Punjab & Himachal Pradesh	62.5	763	-0.5917	
6. Jammu	31.8	823		
7. Vale of Kashmir	16.0	813		
8. Ladakh	21.5	1012		

$$r = \frac{\sum_{i=1}^n X_i Y_i - \left(\sum_{i=1}^n X_i \right) \left(\sum_{i=1}^n Y_i \right) / n}{\sqrt{\left[\sum_{i=1}^n X_i^2 - \frac{\left(\sum_{i=1}^n X_i \right)^2}{n} \right] \left[\sum_{i=1}^n Y_i^2 - \frac{\left(\sum_{i=1}^n Y_i \right)^2}{n} \right]}}$$

R² refers to co-relation coefficient

centres. In the large growing industrial , commercial and administrative towns the literacy rate is higher than small slowly growing urban settlements.

III.2

DEMOGRAPHIC INTER-RELATIONS

DEMOGRAPHIC INTER-RELATIONS

The economic development in this region is directly or indirectly related to the development in agriculture and means of transportation. In other words the rapid urbanisation which corresponds to rapid industrialisation and spread of means of transportation and communication is the result of agricultural development. The impact of agricultural development on demographic characteristics may be significant. So the inter-relations of demographic characteristics has been analysed with cropping pattern, soil types and means of transportation.

Cropping pattern and demographic characteristics.

Four crop regions has been demarcated on the basis of major crops of the region i.e. wheat, gram, maize and rice. The wheat region consists of 172 settlements. Similarly gram region holds the second position, ~~and~~ maize region third and rice region fourth.

Table No. III.13 Cropping pattern and demographic characteristics of population - 1961

Crop regions	Density in per sq.mile.	Growth rate	Sex ratio	Literacy	Depen- dency ratio.
Wheat	130804	26.37	854	39	257
Gram	8437	44.8	863	28	233
Maize	4702	30.54	759	46.9	165
Rice	4589	22.29	822	22	147

From table (No. III.13) we can conclude that as the importance of crops goes on increasing the density of population also goes on increasing and vice-versa. Secondly there is strong inverse co-relation between sex ratio and literacy. On the other hand there is a positive co-relation between sex ratio and dependency ratio. On the whole we can say that wheat region is mainly a out migrating area where as gram and maize regions are the areas of in migration. In the rice producing areas the lowest growth is associated with the physiography of the region.

Analysis of variance.

The growth rate of a region apart from its natural growth rate is attributed either by size class of settlements, cropping pattern or due to the impact of both. It is hypothesized that:-

1. Cropping pattern have impact on growth rate.
2. The size class of settlement have impact on growth rate.
3. Crop types and size class of settlements, both have ~~have~~ impact on growth rate.

Additive model of two way analysis.

T_{ijk} = Growth rate of particular settlement.

$$= A + D_i + C_j + D_{ij} + t_{ijk}.$$

Where A = Component of over all system.

D_i = Influence of cropping pattern (i=1,2,.....)

C_j = Component of size class of town (Class I, II, III, IV & V)

t_{ijk} = Random component of settlements.

Crop regions on the basis of cropping patterns

<u>Region</u>	<u>Number of settlements.</u>
Wheat region	161
Gram region	125
Maize region	13
Rice region	10

Table No. III. 14

Variation due to.	Sum of squares.	df	Mean of square.	F.	Table value of F at 95%
Crop type	25419.52	3	8473.17	1.96	
Size class	39755.35	5	7951.07	1.84	1.67
Interaction	79295.19	15	5286.35	1.24	
Error	1211484.17	285	4250.82		
	1291779.36	300	4302.59		
Total:-	1355954.23	309			

The calculated value of F i.e. 1.24 is smaller than the table value of F at 95% i.e. 1.67. This implies that it is insignificant. Both cropping pattern and size class of settlements have no impact on the growth rate of population.

The second value of F is 1.84, this is larger than the table value of F at 95%. That means; that the size class of settlements has an impact on the growth rate of population.

The third value of F is 1.96, this is larger than the table value of F at 95%. This also shows that the cropping pattern alone has an impact on the growth rate of population.

Soil types and demographic characteristics.

Generally these population characteristics corresponds to the productivity of the soil. As the history reveals that great civilizations were formed in fertile soils. The following table(III.15) gives the trend of major population characteristics in different soil regions.

Table III. 199 Rank co-relation between Soil types and Demographic characteristics.

Density of population	Growth rate	Literacy	Sex ratio °
r	r	r	r
+ .54	+ .20	+ .77	- .43

There is a strong positive correlation between soil types and density of population.

There is a positive co-relation between growth rate and soil types.

Literacy is strongly related with the fertility of the soil. As the quality of the soil goes on increasing the literacy rate will also go on increasing.

Sex ratio is negatively co-related with the soil types. As the quality of the soil goes on increasing the sex ratio will go on decreasing.

$$r = 1 - \frac{\sum C^2}{n(n-1)}$$

Table No.III.15 Soil types and demographic characteristics of population-1961

Soil regions.	Density in per square mile.	Growth rate	Literacy	Sex Ratio
1. Alluvial	8976	35.0	34.6	828
2. Forest soil & Alluvium	10933	7.7	50.0	764
3. Saline River Alluvium	7400	11.8	38.1	872
4. Alluvium & Desert soil.	12192	53.3	31.2	839
5. Forest & Hill soil.	4056	32.4	32.7	829
6. Forest Hill soil and Glacier.	4710	12.2	22.0	834

Very high density of population per square mile in alluvial, Forest and alluvium soil and Alluvium & desert soil regions is due to the fertility of soil and adequate supplies of water from rainfall or irrigation. These regions produced large quantities of wheat and gram for the population.

Growth rate is higher in Alluvium and desert soil region, Alluvial soil region and forest & hill soil region. The lowest rates of growth have been recorded in Forest and Alluvium soil region.

It has already mentioned above that literacy, sex ratio and growth rate are strongly inter-related with each other in the soil regions.

It has been seen that the pattern of population characteristic is greatly influenced by agricultural development of a region. In other words the geographical factors.

Table No. 111.16a Rank co-relation between transport net work and Geographic characteristics.

Density of population	Page Growth rate	Sex ratio	Page literacy
r	r	r	r
+ .80	+ 1	+ .65	+ 1

There is very strong correlation between growth rate and literacy on one hand and transport-net-work on the other hand.

There is strong co-relation between density of population and sex ratio on the one hand and transport-net-work on the other hand (see table No. 111.16 for detail of mode of transport net work).

59

Relationship between means of transportation and population characteristics.

Amongst the other factors, the extent of means of transportation are important. There is relationship between the type of mode of transport lines and population characteristics. The following table (III.16) shows the relationship existed.

Table No. (III.16) Transport net work and demographic Characteristics

Mode of transport lines.	Density in per sq.mile.	%Growth rate.	Sex Ratio	% Literacy
National high way	18276	48.5	835	43.0
State highway	12725	36.0	830	38.8
Other Roads	9334	35	842	35.6
Broadguage railway line.	12287	41.1	830	41

It is clear from the table (III.16) that the settlements which are on the main transport routes (N.H, S.H, B.G.) have ~~been~~ very high density of population, growth rate is higher than region's average growth rate, sex ratio is quite low and literacy rate is very high. In contrast the settlements which are on the other roads, there is quite low density of population, sex ratio is high, growth rate is quite low and literacy is low.

IV

POPULATION POTENTIALS

In recent years much attention has been paid by social scientists and city planners to the so-called gravity and potential concepts of human interaction. The reason of this interest is that social scientists are trying to discover the fundamental relationships to help to explain the structure of urban areas. Secondly an attempt has been made to quantify the urban theories with the help of gravity model.

The 'Potential' and 'gravity model' is one of the simplest models in geography. "This seeks to predict the amount of human interaction of various sorts which will occur between two places. It is based on two simple principles. The first is that the likelihood of our making a journey to another place, normally a distant town; is positively related to the amount of activity occurring at that place. In other words given that two points towns of unequal size are equally distant, we are more likely to visit larger one than the smaller. This clearly does not mean that we will always visit the larger one but simply that it is more likely that we shall, since almost by definition there is more there to visit. The second principle is that given two destinations of equal attractiveness situated at unequal distances, we are more likely to travel to the nearer town than to the farther. We shall not very often waste time and money on fares to visit the farther town if it offers us no more than the nearer.¹"

¹Peter Ambrose, Concepts in Geography 2
Analytical Human Geography

The term population potential can be defined as the summed up values, at any point in a particular area of all the individual points in that area is the total potentials of population at that point. Population potential is always expressed in terms of units of people per square unit of area, whereas density of population is expressed as persons per square unit of area.

In our study region (the states of Jammu & Kashmir, Himachal Pradesh, Punjab and Delhi, 1961) the population potential has been calculated for 338 settlements. These settlements include large sized villages having population of 5000 and above and all urban centres. For calculating the population potential; the most appropriate formula furnished by Professor Zipf has been used:

$$P = \frac{N_1 \times N_2}{d} \quad (2)$$

Population potential at a point P will be

$$\frac{N_1}{d} + \frac{N_1 \times N_2}{d_1} + \frac{N_1 \times N_3}{d_2} + \frac{N_1 \times N_4}{d_3} + \frac{N_1 \times N_n}{d_4} \dots\dots\dots$$

e.g. Population potential of Gurgaon.³

² Where P refers to the Population Potentials at point P
 N1 : Population of a particular point whose potentiality is being calculated.

N2 : Population of another point.
 d : Is the straight line distance between these two points.

³ Population potential for each settlement has been worked out on a district level i.e. we have taken district as unit.

$$\begin{array}{r}
\frac{37868}{0} + \frac{37868 \times 5775}{48} + \frac{37868 \times 10558}{46} + \frac{5330 \times 37868}{32} + \frac{37868 \times 27863}{30} + \\
\frac{37868 \times 3772}{25} + \frac{37868 \times 5775}{18} + \frac{37868 \times 6889}{16} + \frac{37868 \times 8330}{21} + \frac{50709 \times 37868}{21} + \\
\frac{37868 \times 5286}{4} + \frac{37868 \times 8127}{7} + \frac{37868 \times 1728}{12} + \frac{37868 \times 5890}{17} + \frac{37868 \times 4243}{18} + \\
\frac{37868 \times 4948}{14} + \frac{37868 \times 5237}{27} + \frac{36914 \times 37868}{32} + \frac{5924 \times 37868}{32} = 2642 \text{ million}
\end{array}$$

or 2642358052

Similarly population potential has been calculated and obtained values plotted on the map at each settlement and then iso-potential lines have been drawn.

(a) There is a positive association between the size of the settlement and population potential. A glance at the values of population potential shows that (see appendix CIV.3) all the large size settlement (mainly class I and II) have very high population potentials. For example, Jammu (139 millions), Srinagar (209), Amritsar (5209), Ludhiana (517), Ambala (441), Hissar (516), and Delhi (7200) etc. constitutes very high population potential⁴. Similarly class III towns have also quite high values of population potential as compared to smaller towns.

(b) As already discussed (in Chapter No. V Part V.2) the larger the size of settlement the larger will be the complexity of functions. In other words there is a strong association between the functions of the settlement and population potential. From the functional classification of

⁴ Figures of population potentials are in millions.

settlements we have seen that as the complexity of functions goes on increasing, the size of the settlements will also increase at the same rate. So, large sized settlements have shown large values of population potential. But there are few functions such as manufacturing which alone act as 'pull' factor i.e. some functions attract more people than other functions. The following table depicts above mentioned statement.

Table IV.1. Population Potentials - 1961

Functions	Number of Settlements	Average Population Potentials in(000,000)
Manufacturing	64	185.85
Services	129	175.83
Trade & Transport	60	127.14
Agriculture	85	104.20

Since industrialisation is associated with economic development in modern times, all those settlements which clamour for rapid industrial development and as the history reveals rapid industrialisation lead to rapid urbanisation. In other words, rapid urbanisation results in influx of population to urban areas. The population potential is highest in manufacturing(185.85 millions) settlements owing to the influx of population to these settlements.

As the development of industrial sector creates more employment and the process continues; whereas in the agriculture sector there is limited scope for further employment because of

non-availability of additional land. Moreover, further development of agricultural sector requires further industrial development whereby increasing industrial employment. In this process agricultural labour becomes surplus which is absorbed in the industrial sector.

The economic development which is associated with industrialisation always encourage the tertiary sector. The high values of population potential shows that tertiary sector also attracts more people than agricultural function.

(e) The physical, economic and cultural factors are major determinants of population potential. And these physical, economic and cultural factors have major role to play in determining the distributional pattern of settlements. So in order to analyse the determinants of population potential we must look at the distributional pattern of settlements in this region.

The distribution of settlements is the outcome of number of factors such as physiography, drainage pattern, soil types, crop pattern and transport net works etc. Among these factors topography has a major role to play. On the basis of topography this region can be divided into two parts:

1. The Punjab Plains;
2. The Himalayan Region(Jammu & Kashmir and Himachal Pradesh)

The settlement map of this region shows that most of the settlements are concentrated in the Punjab plains owing to fine topography of the Punjab plains; the means of transportation are high-ly developed, availability of large

amount of arable land and soils are very fertile. On the other hand Himalayan region has a very rugged topography and due to its rough topography the means of transportation are poorly developed, availability of arable land is very small and soils are less fertile. The following table shows the distribution of settlements in physiographic regions according to the soil types.

Table IV.2. Distribution of Settlements in Punjab Plains, 1961

S.No.	Soil Types	Number of Settlements
1.	Alluvial Soils	194
2.	Alluvium Desert Soil	45
3.	Saline River Alluvium Soil	18
4.	Forest and Alluvium Soil	9
5.	Forest and Hill Soil	7

Distribution of Settlements in Himalayan Region, 1961

S.No.	Soil Types	Number of Settlements
1.	Alluvial Soils	22
2.	Saline River Alluvium Soil	20
3.	Forest and Hill Soil	13
4.	Forest Hill Soil and Glacier	7
5.	Forest and Alluvium Soil	4
6.	Forest Hill Soil and Eternal Snow	1

Secondly the distributional pattern of settlements is quantitatively assessed by the nearest neighbour distance (N.N.D.) techniques.⁵

⁵ N.N.D. is considered as a straight line measurement of the distance separating any location in space from its nearest neighbour in space.

The districts of Gurgaon, Mahendargarh, Hisar, Jind, Ambala, Patiala, Sangrur, Bhatinda, Ludhiana, Hoshiarpur, Amritsar, Bilaspur, Chamba, Reasi have random distribution of settlements.

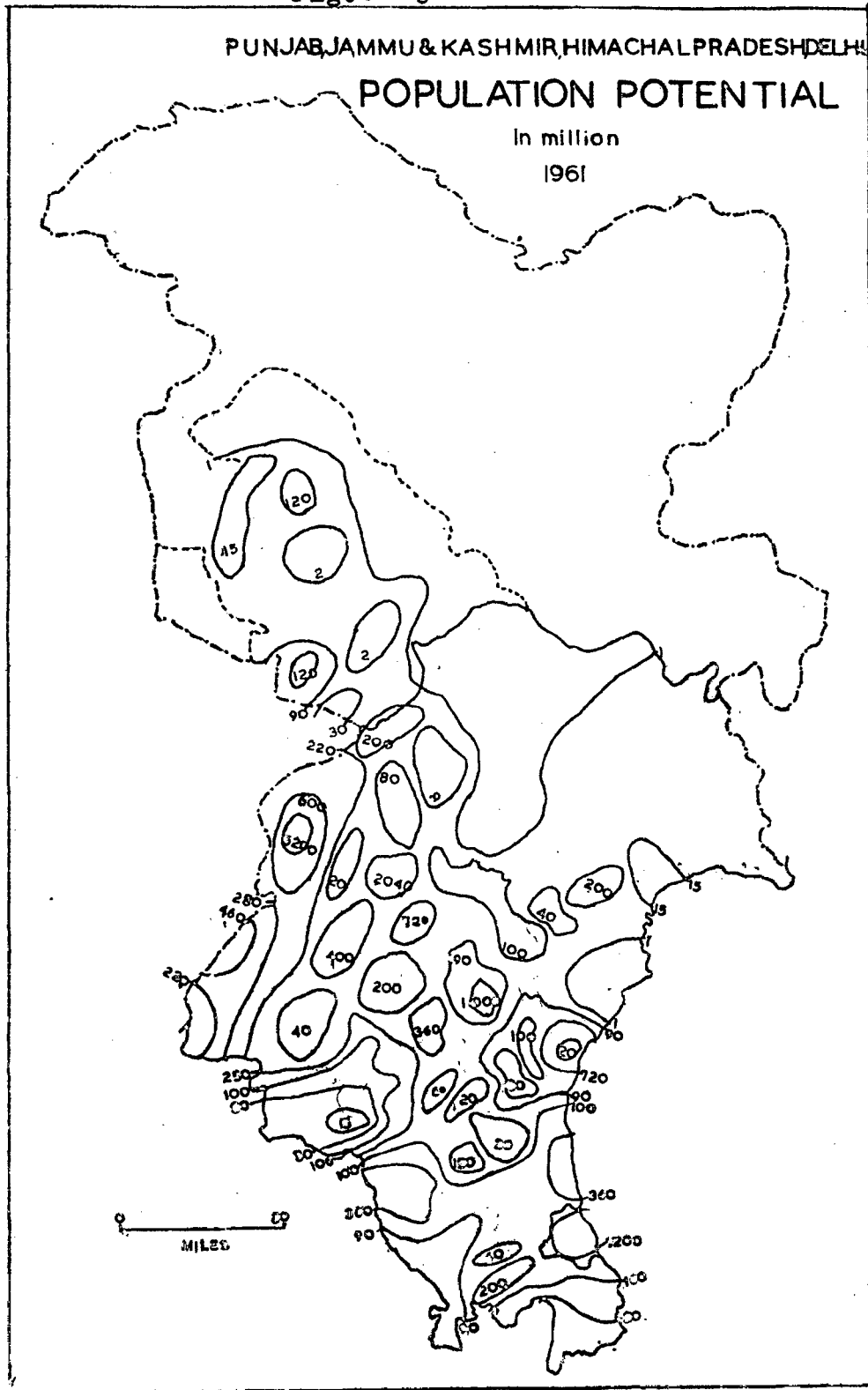
The districts of Rohtak, Jullundur, Gurdaspur, Simla, Jammu and Srinagar have clustered pattern.

The Kangra and Udhampur districts have even pattern of distribution of settlements.

The analysis of distributional pattern of settlements shows that the higher the quality of soil, the larger will be the number and size of settlements. The fertile alluvial soil and saline river alluvium soil have highest concentration of settlements. And those two regions consist of 79% of the large size(class I, II and III) settlements. The large number and large size of settlements is the indicator of high values of population potentials(this is already mentioned above with the help of data). In other words as the quality of soil goes on decreasing the number and size of settlements will also go on decreasing. For example forest and Alluvium soils and Forest and Hill soils, have only 13 and 20 settlements respectively. In conclusion the size and number of settlements is positively associated with values of population potential. The size and number of settlements is determined by the physical and economic factors.

The factor of distance also has a major role to play in determining the population potentials. The N.N.D. techniques shows that population potentials are highest in

Fig.6 6



the areas where the settlements have followed the 'clustered pattern'. And on the other hand population potential is moderately high where the pattern of distribution is random.

(d) If we super-impose the map of population potential on the physiographic map of this area we find that as the contour values go on increasing (height above sea level) the values of population potential goes on decreasing. As in the Himalayan region the figures of population potentials varying between .17 to 10 millions (except for two peak cities of Jammu and Srinagar) as compared to Punjab and Delhi where the values of population potential are varying between 40 million to 7200 million the whole discussion can be summarized as follows:

Where the population potential sums up to large values, we have 'high lands' and 'peaks' of influence. Such points are nearer to more people and all kinds of sociological activities are expected to be at a high level there. Where few people are nearer; there are 'low lands' of influence. In the map the 'high lands' and peaks are found in all the big cities like Delhi, Amritsar, Ludhiana, Jullundur, Patiala, Ambala, Jammu, Srinagar, Ferozpur, Phagwara, Simla and Gurdaspur etc. The major peak in every concentration is a manufacturing, trade and service from which runs a dominant 'axis' or 'ridge' descending gradually in the hinter land or in the periphery. The major

peaks and ridges might be explained in part or wholly as a matter of easy internal communication, fertility of soil, topography of the region and development in manufacturing and trade. If we generalise the whole discussion the population potential is dependent on the cost of journey rather than on the distance.

As such 'Population Potential' is determined by the physical, cultural and economic factors. At the same time regional development objectives are determined by a variety of considerations. The regional development objectives could also be broadly divided in terms of economic, social and political objectives. The analysis of population potentials in a region will make us possible to find out the less developed areas. The areas which have less varied activity have low population potential. Why because there is a positive correlation between the high values of population potentials and high economic development. Thus in order to make a balanced regional development the analysis of population potentials has major role to play. In short we can say that this type of analysis will help the regional planners in clear delineation of the regions.

ECONOMIC STRUCTURE

The mobilisation of human resources is a pre-condition to economic advancement. Therefore, an attempt has been made to analyse the participation of male workers¹ in actual economic activities in selected settlement. Participation of females in the occupational work in the Punjab, Himachal Pradesh, Jammu and Kashmir and Delhi is almost negligible and they too are found generally in cultivation, household industry and miscellaneous services in a minute number.

In the region, workers constituted 42.3% of the total population, where in the state of Himachal Pradesh has the highest (59.62%) percentage of workers. The working force comprised of 56.53 percent male and 25.55 percent female workers. Great variations in the participation rate have also been noted. It was 32.1% in Delhi and highest percentage has been recorded in the state of Himachal Pradesh. For males it was about 52% in Delhi and Punjab and highest being 63.11% in Himachal Pradesh state. In case of females the participation rate varies between 6% to 56%. The share of rural workers was 44.55% while for the urban area it was 32.45%. If two extremes of rural and urban workers are taken separately, the state of Himachal Pradesh constituted 60.7 and 37.7 percent respectively.

1. The census of India, 1961 has defined workers as those persons who are gainfully employed but the definition of non-workers is confusing and complex, it includes persons engaged in unpaid home duties, full time students, retired persons, beggars, convicts persons employed before but now out of employment etc..... (Gupta 1965)- Settlement Geography of The Indian Desert by R.C.Sharma.

For the purposes of analysis the proportion of male workers are grouped into five main categories.

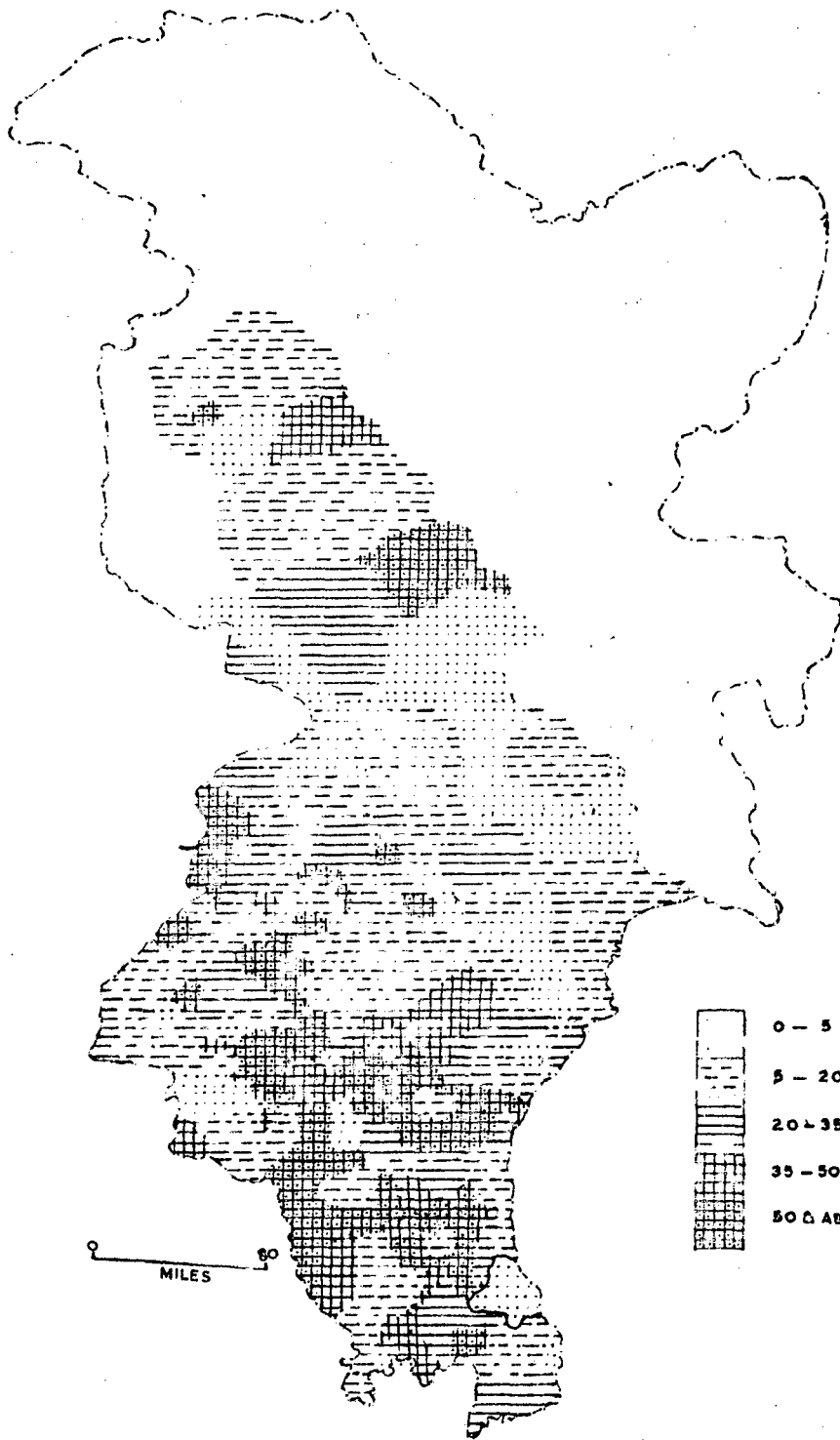
1. Agriculture (I+II)
2. Mining and Quarrying etc.(III)
3. Manufacturing and Household Industry(IV+V)
4. Trade and transport(VII + VIII)
5. Other services (IX)

Agriculture.

In this region 12.8% of the workers are engaged in agriculture. However there are significant variations in this respect. There is fairly a strong inverse co-relation between the size of the town and the proportion of agricultural male workers. In almost all the large towns the agricultural male workers are less than 6 percent. For example Amritsar, Pathankot, Hoshiarpur, Jullundur, Patiala, Ludhiana, Srinagar, Ambala and Simla constitute 1.36, 1.75, 5.31, 2.5, 2.50, .90, 3.51, 3.26 and 3.1 percent of male workers respectively. They are old towns and have in due course of time shed off part of their agricultural character. In the towns of Ferozepur, Dhatinda, Sangrur, Jammu and Hissar the proportion of male workers in agriculture is fairly high in correspondence with the predominantly agricultural economy of this area. Most of the towns have only recently ~~grown~~ grown from agricultural villages as market centres hence in several of the class V & VI towns more than 50 percent of the male workers to the total male workers are still engaged in agriculture. And on the other hand in almost all the large size villages more than 50 percent of the male working population is engaged in farm activities. Even in large towns like Dhatinda, Abchar, Fazilka, Muktesar, Kothapura, Moga, the proportion of male workers is high.

Fig.7 7

J & K HIMACHAL PRADESH PUNJAB & DELHI
PERCENTAGE OF MALE WORKERS IN
AGRICULTURE - 1961



Regional variations. (Agricultural male workers)

There are wide regional variations so far as the participation of male workers in agriculture are concerned. The variations in various regions are summarised as follows:-

The Vale of Kashmir.

In the Northern part of the vale the proportion of male workers varies between 5-20 percent. The central-western part of the vale is marked by very low percentage (less than 5%) of workers, this is because of the Srinagar urban centre, in which majority of the male working population is engaged in non-agricultural activities. While in the central eastern part of the vale the proportion of workers is varying between 20-35 percent. The whole of the southern part is aligned with the northern part of the vale of Kashmir i.e. percentage of male workers is varying between 5-20 percent.

Jammu Region

As one moves from south western part of the region to the north eastern part of the Jammu region, the percentage of the male workers in agriculture is found to be increased. In a long strip of alluvial plain running from south eastern to north western direction have very low proportion of male (less than 5%) workers in agriculture. This is because of the Jammu urban centre and its influence on the surrounding areas in which most of the male workers are engaged in non farm activities. In the central part of this region (Kathua and Udhampur district) the percentage of workers is ranging between 20 to 35 percent and in the north-eastern part of this region (Doda district) the percentage of male workers is more than 50.

Himalayan Punjab & Himachal Pradesh.

In the south of this region a narrow belt running from east to west have participation rate between 5 to 20 percent. In the north, the belt running parallel to this southern belt have very low participation rate (less than 5%). In this mountainous region the size of land holdings is generally small and agriculture is not so intensive, therefore needed small hands.

Northern Punjab.

In the whole of the north Punjab the percentage of male workers engaged in farm activities is below 20 except for a few pockets which show more than 50% of its male workers engaged in agriculture. Proportion of agricultural workers is high in the urban areas of Ferozepur, Bhatinda and Sangrur districts where the general economy is predominantly agricultural and also where most of the new towns which are agricultural mandies, have large farming communities.

South and South Western Punjab.

In contrast the whole of southern and south western Punjab is marked by very high percentage of male agricultural workers. Extension of canal irrigation and reclamation of waste land have attracted more agricultural workers in this region. On the other hand the size of land holdings is generally large and thus requires the help of additional hands. Therefore, ~~make~~ the proportion of male agricultural workers to the total male working population in the towns of this area ranging between 35 to 50 percent and above. ~~is~~

Many of the larger towns are found considerable amount of of vegetable cultivation. For example peripheral area of Delhi supplying vegetables to Delhi. Vegetable farming involves very intensive cultivation; hence additional hands are needed. Similarly around urban centres of Amritsar and Chandigarh vegetable farming is quite common e.g. Kharar which supplies large quantities of vegetables to Chandigarh have very high proportion of workers in agriculture.

Manufacturing and Household Industry.

Although agriculture is the main stay of the people of this region yet some industries are common and are quite sizeable in the urban areas. However, excepting a few large scale industries such as the manufacturing of woollen fabrics, bicycles, fertilizers engineering goods, paper, sugar and cotton textiles, industries of this region are essentially small scale ones. Household industry in the towns have an important role to play. In Jullundur, Amritsar, Ambala, Patiala, Srinagar and Jammu the household industry is relatively important. Panipat is an other large town where household industry holds an important place engaging more than 23 percent of its male workers, chiefly in making bed covers, bed sheets, pillow covers and carpets.

The map showing the percentage of male workers in manufacturing and household industry brings out a very contrasting regional pattern.

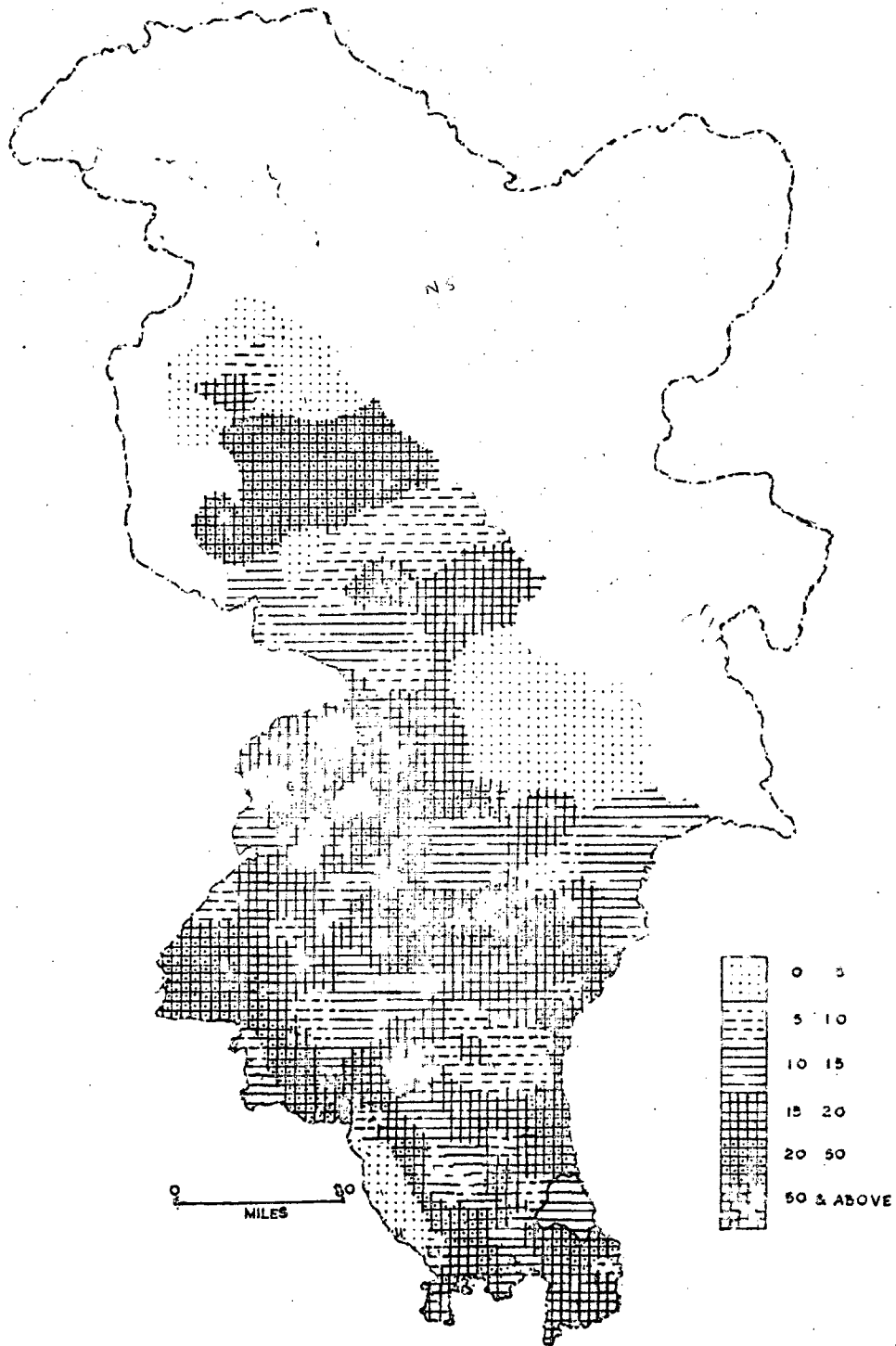
Vale of Kashmir.

During winter, agricultural activities comes to near stand still in the vale of Kashmir. Therefore people shifted to handicrafts. In the central part of vale of Kashmir (which includes the towns of Srinagar) the percentage of male workers is varying

Fig.8 9

J & K HIMACHAL PRADESH PUNJAB AND DELHI - 1961

PERCENTAGE OF MALE WORKERS IN
HOUSE HOLD INDUSTRY & MANUFACTURING



between 20 to 50 percent. North and Southern part of valley is marked by very low percentage of male workers.

Jammu Region.

In Jammu district, the percentage of male workers is varying between 10 to 15 percent while rest of the region is marked by less than 10 percent of male workers in industries. In this region except for the district of Jammu and Udhampur the percentage of male workers is largely engaged in services and in agriculture.

Himalayan Punjab and Himachal Pradesh.

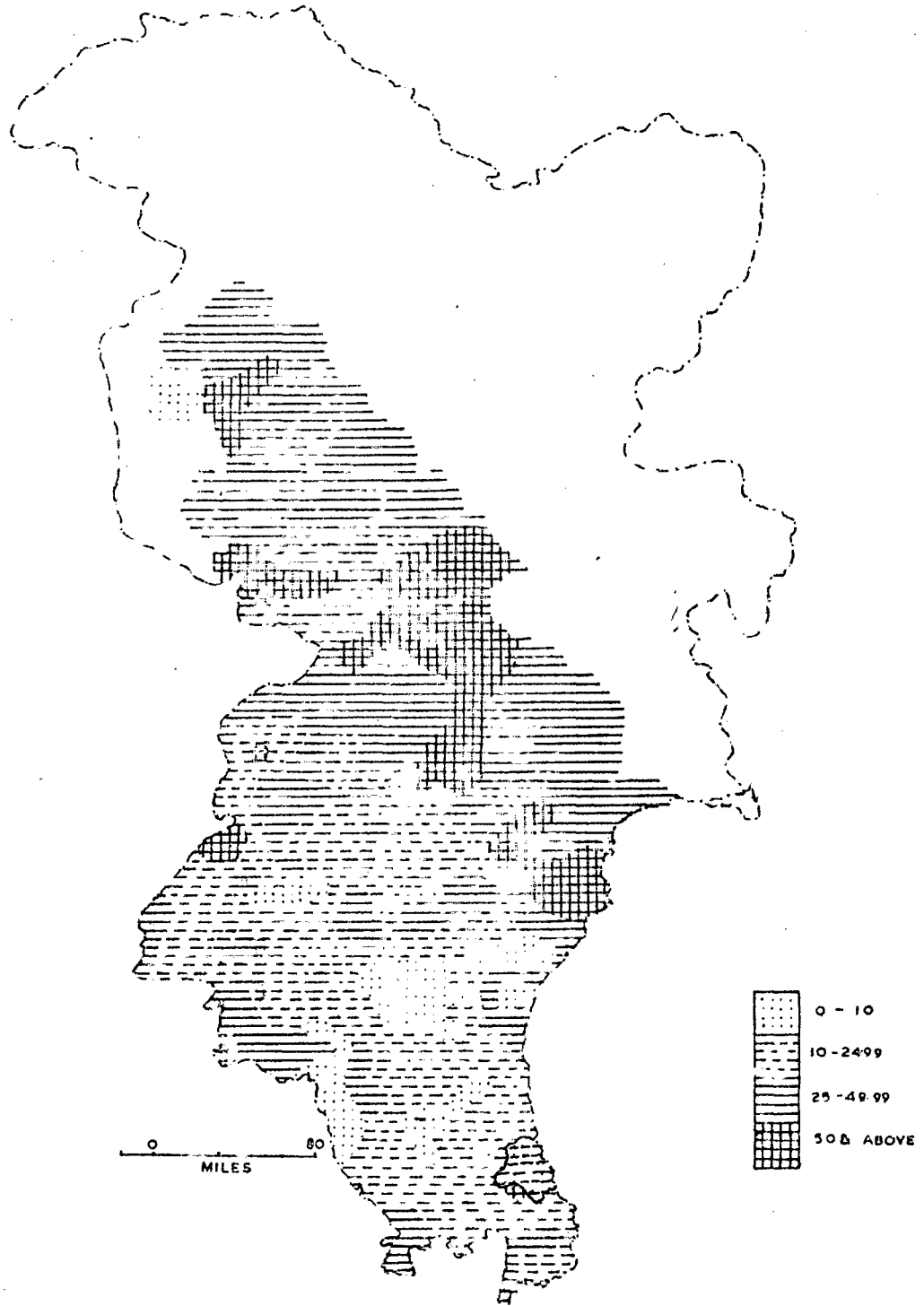
Due to rough topography (highly in accessible area as compared to other parts of the region) the industrial development is purely negligible in this region. Therefore the male workers in industries are very meager (less than 5%).

Punjab Plain.

Alongwith the Delhi- Amritsar railway line the concentration of household and manufacturing towns is maximum and sonapat, Jullundur, Rajpura, Gobindgarh, Ludhiana, Phagwara, Kapurthala, Amritsar and Chhoharta stand out very conspicuously in which the proportion of male workers is varying between 20 to 50 percent and above. Yamuna nagar and Jagadhari are two other important centres of manufacturing industries located on Ambala -Sangrur line. In these towns as much as more than 50 percent of male working population is engaged in manufacturing and in household industry. Along the Amritsar, Pathankot line Batala and Dhalival are predominantly manufacturing industrial places in which more than 50 percent of male working population is engaged in manufacturing and household industry. Cotton ginning is quite significant in the cotton growing areas. Ginning factories are located at

Fig.10 10

J&K HIMACHAL PRADESH PUNJAB & I
PERCENTAGE OF MALE WORKERS IN
OTHER SERVICES - 1961



In Himachal Pradesh and the Himalayan Punjab the trade and transport activity is quite significant (20% and above) except for few settlements like Naya Mangal, Mangal township, Dalhousie, Bakloh, Dhamsala, Yolcuh palampur, Kasauli, Dajotai & Sasathu.

In Punjab plains there are three main belts running from eastern to western in which the worker percentage is very high. The first belt is located in the north, the second belt covers the central part and the third belt covers the southern most tip of the region. In many of the small mandies in cotton growing areas of Ferozepur, Sangrur and Bhatinda and Hissar district commerce dominates all other activities. In Guruhar Sahai, Dabwali, Lehra, Bareilly mandies, Uklana mandia and Smana have the highest proportion of male workers in trade and transport. In this region commerce and transport activity is mainly associated with the disposal of crops. Secondly all the small towns situated at road junctions such as Rajpura, Gobindgarh, Dhuri, Malout, Mandi Dabwali and Jind, Dasuya, Mukerian, Kalka and Morinda have higher percentage of workers in transport. However in Kalka, Rajpura and Jind the proportion of male workers is exceptionally high. In all such towns which are away from the main road and rail routes the proportion of male workers is low even in large towns.

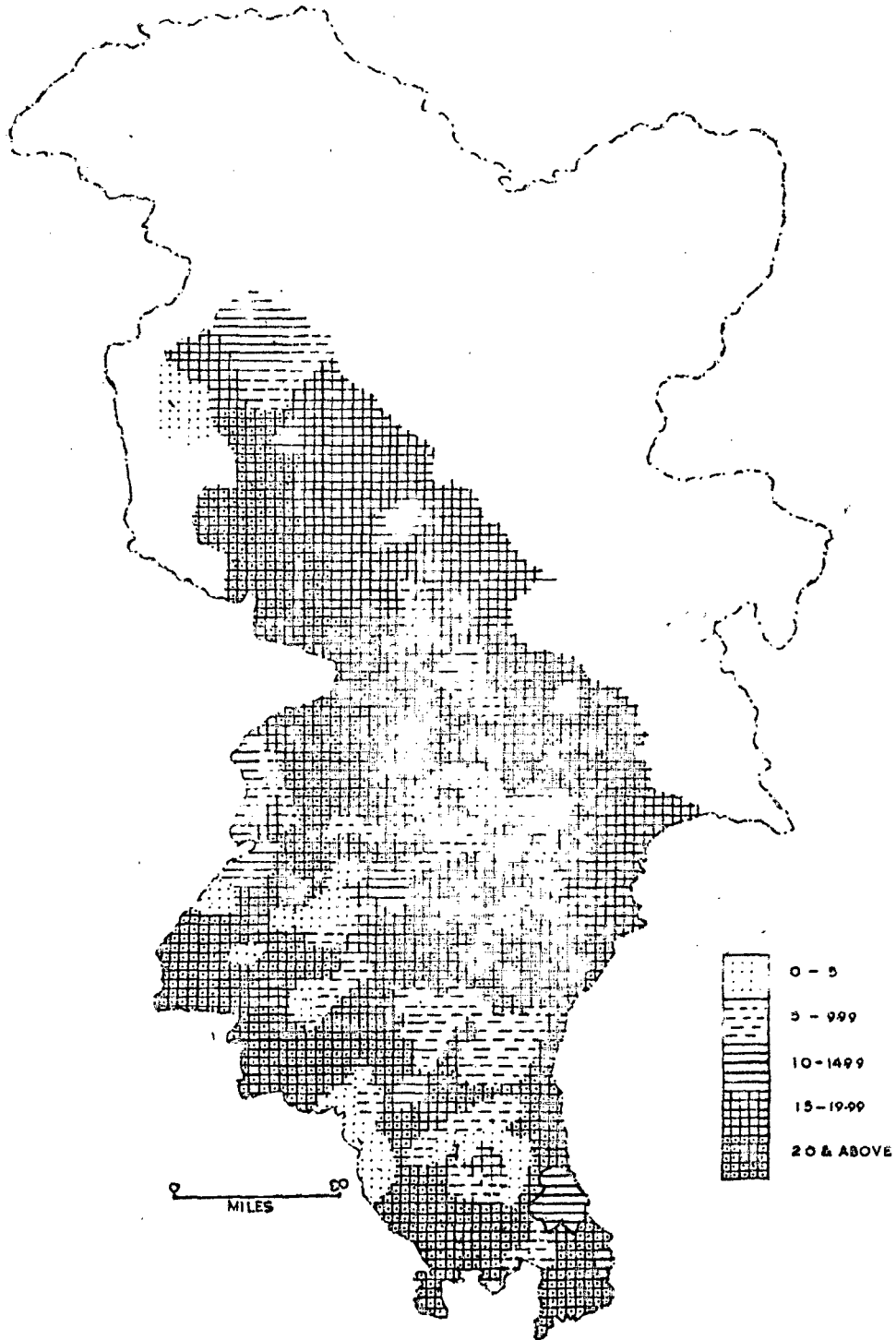
Other Services.

Every town is primarily a service centre, which term includes administrative, educational and numerous other type of services.

There are very few towns where male workers in services are less than 10% and such towns invariably small in size and mostly out grown villages serving as markets for agricultural produce, such as Sangrur, Pundri and Chaharta of the large majority of the towns have 10 to 50 percent of their male working force engaged in

Fig.9 9

J&K HIMACHAL PRADESH PUNJAB & DELHI
PERCENTAGE OF MALE WORKERS IN
TRADE, COMMERCE TRANSPORT &
COMMUNICATION - 1961



Abohar, Malout, Hansi, Fatchbad, Giddarbaha, Sirsa, Fuzilka, Khanna, Kaithal and Narwana. Oil seeds industries have also been set up in these towns and in all these towns as much as 20 to 50 percent of their male working population is engaged in these industries. Around the union territory of Delhi the percentage of male workers ranges between 20 to 50 percent, Faridabad, Palwal are main centres of manufacturing. Along on other transport line connecting Delhi Ferozpur via Bhiwani and Hissar the percentage of male workers is varying between 20 to 50 percent.

In whole of Northern Punjab except for foot Hill zone of Punjab where manufacturing industries are meger, have very high proportion of male workers in manufacturing.

Trade and Transport

Commercial activities is one of the basic functions of the town. In nearly all towns more people are engaged in commerce and transport than in any other single activity. Regional contrasts with respect to trade and transport are far smaller than in manufacturing and agricultural activities.

In Northern part of vale of Kashmir Uri, Bandipore and Sopore have very low proportion of male workers in trade and transport. To the west of the national highway (connecting Jammu and Srinagar) the percentage of male workers is more than 20 and towards the east of the N.H. the proportion varying between 15 to 20 percent.

services. Usually they are either cantonments, such as Ambala Cantt, Jullundur Cantt, Ferozepur Cantt, Bakloh, Yol Camp or hill stations such as Dharmasala, Dalhousie, Kangra, Palampur, Simla, Sabathu, Kasauli, Daghshai, Gulmarg, Pahalgam, Anantnag or capital towns of Chandigarh, Srinagar and Jammu. There are towns of highly specialised functions with a large majority of workers serving the Government in one capacity or the other. Among cities Patiala and Jullundur have 44.4 and 31.4 percent of male workers respectively engaged in services. The district headquarters have also higher percentage of workers in services. In Karnal, Rohtak, Gurgaon, Kapurthala, Ambala, Ferozepur, Simla, Kangra, Udhampur, Jammu, Anantnag the proportion of male workers in services ranges between 25 to 50 percent.

In the states like Himachal Pradesh and Jammu and Kashmir; the percentage of male workers in services varies between 25 to 50 percent and above. In Punjab the percentage of male workers in services ranges between 10 to 25 percent and there are few pockets in the district of Sangrur, Patiala, Jind and Hissar where the percentage of male workers in services is less than 10 .

Non-Workers

For the region as a whole the dependency ratio is higher for the urban population than the rural population. For urban areas the average dependency ratio is 232 non-workers per 1000 workers. The following table (V.1.1) shows the general pattern of dependency ratio.

Dependency ratio of 169 settlements is more than the region's average dependency ratio. And 104 settlements have very low dependency ratio (192 non-workers). Out of these 104 settlements, 52 large

sized villages fall in this category. This low dependency ratio in large size villages is associated with the agricultural economy of the villages which always counts high percentage of workers.

Table No.V.I.1 Dependency ratio of settlements-1961
class of settlements

Dependency ratio per 1000 workers.	Number of settlements						
	I	II	III	IV	V	VI	VII
282+	-	2	3	6	7	11	9
257-281	2	4	13	9	20	11	7
232-256	3	6	8	13	16	9	11
217-231	1	1	4	4	7	6	15
192-216	-	1	2	5	8	4	9
192-	1	-	5	5	14	16	62

There is a strong association between the types of functions of the settlements and the dependency ratio. All the manufacturing towns have medium dependency ratio, for example Mangal township(133) Pathankot(172), Jullundur(175), Gobindgarh(172) and Ludhiana(237) etc.

Secondly, all the settlements in which agriculture is the dominating function and have very low dependency ratio. Thirdly all the service towns are being shown the highest dependency ratio.

Regional variations in dependency ratio

The regional analysis of dependency ratio shows that there is a positive co-relation between the density of population and dependency ratio. Beas, Suklej Doab, eastern punjab plains and northern punjab plains are the highly density populated regions of the area and these regions have recorded highest dependency ratio. In Himalayan Punjab & Himachal Pradesh and south western punjab plains the lowest density corresponds to lowest dependency

ratio. In all the three regions of Jammu & Kashmir state the dependency ratio is quite low. But in all the three regions as the density of population goes on increasing; the dependency ratio also goes on increasing.

Table No.V.I.2 Region-wise dependency ratio of settlements-1961

<u>Regions</u>	Density in per sq.miles.	Dependency ratio per 1000 workers.
1. South western Punjab plain.	7869	217
2. Eastern Punjab plain	8687	230
3. Beas Sutlej Doab	13140	248
4. Northern Punjab plain	15152	223
5. Himalayan Punjab & Himachal Pradesh	4564	157
6. Jammu	7139	216
7. Vale of Kashmir	4496	141
8. Ladakh	1052	66

Secondly, there is a strong association between the economy of the area and dependency ratio. South western Punjab plain and Himalayan Punjab & Himachal Pradesh regions have experienced very slow industrial development as compared to other (Northern Punjab plain and Beas Sutlej Doab) regions. The dependency ratio is very low in these regions which is associated with the agrarian economy of the region.

It is observed from above discussions that all large sized villages and small towns have higher percentage of male workers in agriculture. But in large sized settlements, there is a smaller percentage of workers in cultivation.

Household industry has a larger percentage of male workers in smaller towns than in larger towns, though in Ludhiana city this activity is more pronounced. In manufacturing industry Amritsar and Ludhiana have a very high percentage of workers; in Ambala contonment and Patiala city this activity, judging from the proportion of male workers, is less pronounced than in urban areas in general. Amritsar is notable for higher percentage of male workers in trade and commerce. In other services the proportion of workers is conspicuously high in almost all the contonments of the area, owing to the presence of Defence personnel.

V.3Functional Classification of Towns.

Towns as concentrations of human population are devoted to a number of functions performed by the working section of their inhabitants. The size of the population, the number of functions and the character of these functions are indicative of the environmental setting as well as the nature of urbanisation taking place-in the region.

Prior to 1951 census, towns had been grouped on the basis of the size of population. In 1951 in one or two states of India, an attempt has been made to classify the towns on the basis of their predominant characteristics. The predominant characteristics of a city or town is that it may be important as a part or centre of commercial, industrial, transport, communication, administration, residential and educational activities.

An analysis of the functional structure of the towns of J&K, Himachal Pradesh, Punjab according to the census of 1901, has been done. The functions of the towns are entirely dynamic in nature, they present different picture from time to time. This is probably due to number of reasons. One of these is the rapid pace of industrialization in many towns raising the properties of industrial function at the cost of other functions. Similar has been the effect of development of transportation and communication. And thirdly reduction in the agricultural function in most of

- 1 3 -

the towns.

There are numerous functions, which are performed in a city, though in varying degree. It becomes therefore, difficult to call a city as mono-functional. So Murphy says, "To say begin by saying that every city worthy of the name is multifunctional. Trade is ubiquitous to urban centres, every city is to some degree a focus of transportation, and it is hard to conceive of a city so small and specialized that it would not have at least a minor development of manufacturing. Universities, hospitals, recreational facilities, Government buildings, and other specialized establishments gives evidence of an even greater complexity in the functional make up of some cities".¹ In spite of the admittedly multifunctional character of cities, however, some single function usually dominates. So we can yet distinguish the general and dominant functions of the settlements.

Survey of Methods Previously Adopted.

I. In their two master-pieces Berry and Smith have employed the multivariate statistical analysis in order to classify the towns. One group of classification is purely

1. MURPHY R.E. The American City: An urban geography.
Mc Graw Hill Book Company 1966.

- 1 3 -

based on the empirical approach. The other group makes use of precise numerical data and it is known as 'quantitative' approach.²

Marcel Aunosson³ is the pioneer of non-statistical procedures. He classified towns first in to active and non-active types. Active towns were further divided in to centres of administration, defence, culture, production, communication and recreation. Weimer and Hoyt considering the source of employment, categorized towns into industrial, commercial, political, recreation or health resorts and educational centres.⁴

Quantitative statistical method also sometimes become very useful in functional analysis of towns. The common assumption in these studies being that 'labour force is the best indicator of the nature of the urban economy'. The classification of the United States proposed by Harris⁵ was perhaps the first classification to use statistical criteria. After a close study of the occupational structure of certain typical centres, he evolved certain generic standards, which

- 2 1. BERRY D.T.L. "Urban Development in the urban development pattern", Annals of the Association of American Geographers, Vol 49, 1959, pp. 145-55.
11. SMITH J.H.T. "The Function of Australian Towns", Tijdschrift voor Economische en Sociale Geographi, vol 53, 1905, pp. 145-55.
3. Op. Cit., No. 3, p. 5001.
4. WEIMER A.H. and HOYT, H. Principles of Urban real Estate, 1954, p.p. 1001.
5. HARRIS, C.D., "Functional Classification of the cities in the United States", Geographical Review, Vol. 33, 1943, p.p. 00-99.

may be applicable in general for determining various functional categories.

Harris's method was followed with certain modifications by several persons notable of whom are Kneedler⁶ and Victor Jones⁷. Hart⁸, following Harris, made a classification of the cities in the American South based on the occupation data of 1950. Duncan and Reiss also worked on similar lines.⁹

Another classification was developed by Fownall¹⁰ for New Zealand's towns based on the analysis of the occupational structure of each town.

Mattila and Thompson¹¹ have given a new method to assess the significance of a function of a town. This method develops an 'Index of surplus workers' -over the national average for the function. Nelson¹² developed Fownall's ideas.

-
6. KNEEDLER, G.M. "Economic classification of cities and Metropolitan Areas". The Municipal Year Book, Chicago, 1945.
 7. VICTOR JONES, "Economic Classification of Cities". The Municipal Year Book, Chicago, 1954.
 8. JOHN P. HART. "Functions and occupational structure of cities in the American South". Annals of the Association of American Geographers. Vol 45, 1955. p.p. 269-86.
 9. DUCAN, U.P. and REISS, A.J. Social Characteristics of urban and Rural Communities. New York. 1956, p.p. 13-16.
 10. FOWNALL, L.L. "Functions of New Zealand's Towns". Annals of Association of American Geographers. Vol. 43, 1953. p.p. 332-50.
 11. JOHN M. MATTILA and WILBUR, R. THOMAS. "The Measurement of the Economic Base of the Metropolitan Areas". Land Economics. Vol 31, 1950. p.p. 215-36.
 12. HOWARD J. NELSON. "A Service Classification of American Cities". Economic Geography. Vol 44, 1954. p.p. 172-200.

He used arithmetic averages of percentages of labour force engaged in various functional group of all the towns of the region. He calculated, separately, the mean percentage of each function for the towns of the region and also their standard deviations.

Rafiullah¹³ in his new approach to the functional classification of towns has basically taken the idea under-laying the technique of crop combination used by Professor Weaver¹⁴ for delineating the complex structure of agricultural regions of the middle west in the United States.

From the foregoing review it is evident that the practical method of classifying towns according to the different functions which they perform consist of analysing the occupational structure of each town. The classification based on the amount of surface devoted to different uses is both impractical and theoretically imperfect as a measure of functional importance.¹⁵

The method used for the functional classification of towns in northwestern part of India is introduced by Dr. Ashok Mitra.¹⁰ The method is known as 'Triangular Co-ordinate'. This method is efficient than other methods of functional classification because triangular-co-ordinate method gives

13. RAFIULLAH, S.M. "A New Approach to Functional Classification of Towns". The Geographer. Vol 12, 1965.

14. WEAVER J.C. "Crop Combination Region in the Middle West". Geographical Review. Vol 44, 1954, pp. 173-300.

15. OP. Cit., No. 13

10. For Detail study of method used.... see
CEASE Expert Working Group on Problems of Internal Migration and Urbanisation. Bangkok, Thailand . 24 May- 5 June 1967.

further stratification of different functions in a particular town. The broad industrial classification of all workers adopted at 1901 census provided the basis for the functional classification of towns attempted below.

Brief Description.

	<u>Census industrial categories of workers</u>
1. Cultivators	I
2. Agricultural labourer	II
3. Forestry, Fishing, Plantations mining and quarrying etc.	III
4. House-hold industry	IV
5. Manufacturing other than house-hold industry	V
6. Construction	VI
7. Trade and Commerce	VII
8. Transport, storage and communi- cation	VIII
9. Other Services	IX

continuation of 16.

Internal Migration and urbanisation in India.
Part I: Towns and Micro. Reg. India.

Brief description of triangular-coordinate method:

The point of intersection of the perpendiculars represents a value of $33\frac{1}{3}$ for each of A, B, and C (These three broad classification of towns are discussed above). Three circles are now drawn around this point of intersection in the field of the triangle with the intersection point as centre. The first circle has a radius of $6\frac{2}{3}$ (at 40%), the second, a radius of $11\frac{2}{3}$ (at 45%), the third, a radius of $16\frac{2}{3}$ (at 50%). It will be readily conceded that (1) the three sectors A, B and C for any town falling inside the first circle will be highly balanced, that is, the function of the town will be composite in character; (ii) the three sectors

The settlements which have 50 per cent of their workers engaged in agriculture are regarded as agricultural settlements. For rest of settlements in which more than 50 percent of workers are engaged in non-agricultural activities; three main functions are taken into consideration. The non-agricultural industrial categories are sought to be grouped under three categories:

<u>Group of Towns</u>	<u>Census Industrial Categories</u>
A Industrial or manufacturing Towns	III+IV+V+VI
B Trade & Transport Towns	VII + VIII
C Service Towns	IX

For each town a P.C. distribution of workers has been worked out in respect these categories on the assumption that aggregate number of workers falling in these categories is taken as 100.

continuation of foot note

A, B and C for any town falling outside of the first but inside the second sector circle will be moderately balanced with the sector values farthest away from the centre tending to distribute the equilibrium. Here, too; the functions of the towns will be generally composite in character; (iii) the three sectors A, B and C for any town falling out side of the two inner circles but inside the third circle will be ill-balanced, the sector values farthest away from the centre accentuating the predominant characteristics of a town; (iv) The three sectors A, B, and C for any town falling out side of the three circles will give the town a very pronounced character of that predominant sector the values of which pushes its position farthest away from the centre. In numerous cases the values were so close to each other that a particular character was picked upon as the most expedient although the economic diversification was

The per centage sum of the values of A, B & C for each settlement is being plotted in the triangle, then the position of each town in different co-ordinates of the triangle is being noted down.

The closer the position of town to the point of intersection of the perpendiculars, the more balanced would be the function of a town. The further away the position of a town from the point of intersection, the more pronounced would be the functions whose value pushes its position away from the point of intersection.

After plotting all the values of A, B & C in a triangle, the following table (V.3.1.) has been prepared; in order to show the number of towns in different functions at micro level. We present the following picture of the functional structure of the towns has been prepared for the region as it was in 1961.

continue.....

such that still another rubic might be equally apt. It will also be appreciated that in the marginal cases, especially, the consideration of the agricultural components (I & II) might tip the scales in favour of still another appellation

Degree of Intensity of functions according to position of town in any of the six triangles of triangular co-ordinates.

Table No. V.2.1.

Functional Type	Degree of Functional diversity or accentuation	Predomi- nant func- tion high- ly accen- tuated	Predomi- nant func- tion acc- entuated	Number of Settlements	
				Functions moderately diversified	Functions Highly Diversified.
1. Manufacturing Town		19	13	15	17
a. Low trade and Transport and moderate services		13	11	7	10
b. Low service, moderate trade and transport		06	02	08	01
2. Trade and Transport Town		10	4	26	18
a. Low Service, moderate industry		0	2	13	4
b. Low Industry, moderate services		01	02	13	14
3. Service		55	19	23	25
a. Low industry, moderate trade and transport		09	03	04	14
b. Moderate industry and low trade & transport		46	16	19	11

1. Manufacturing Towns: There were 64 towns where industrial and manufacturing activities are the dominating feature. From the table we can conclude that :-

1. In manufacturing towns, majority of the towns, industrial activity is accompanied by the moderate services.

ii. In trade and transport towns, trade and transport function is accompanied by moderate industrial function.

iii. And in service towns, service function is accompanied moderate industry.

In trade and transport and in service towns, the moderate industrial function is existing. In other words the areas towns have made a considerable industrial development.

All the manufacturing towns are large in size - in terms of population. The industrial towns generally consist of class I, II, III & IV towns. Out of 7 class I towns and one metropolitan city, Amritsar and Ludhiana are conspicuous for workers in industry and manufacturing while service is the chief characteristics of Jullundur town group, Ambala, Patiala and Delhi. The large size of manufacturing towns is associated with the expansion of industries which acted as the 'Pull' factor (demand for labour in industries).

The over-whelming majority of the industrial towns located along the main rail route which goes parallel to Grand Trunk Road connecting Delhi with Amritsar. Some of the manufacturing towns are distributed along the branch railway lines. Bhatinda which is the convergence point for a number of local rail routes, provides a good illustration of relationship between transport lines and industrialization.

With the development of further transport network majority of the industrial towns have shown ribbon-type of development. For example Faridabad town group, comprising Faridabad town and

Faridabad township have acquired an oval shape. At the same time factories are being built along the main road both towards Delhi and Mathura and this will introduce simultaneously a ribbon-type of development. Similar the case with Chandigarh, the industrial area now started expanding along the recently built road connecting Chandigarh with Rajpura and also along a road connecting Chandigarh with Tharar.

Trade & Transport Towns: There are 58 towns in which trade and transport is the main function. Only 14 towns have; trade and transport as the predominant function in which 50 percent and above of its working population engaged in trade and transport. Rest of 44 settlements have diversified function in which the percentage of workers engaged in trade and transport is ranging between 45 to 33. These towns are mainly market towns and distributed largely in western and South Western Punjab plains (Ferozpur-Bhatinda region and whole of Southern Punjab excluding Delhi and its peripheral area where industrial activity is dominating). In this area where canal irrigation makes for prosperous farming economy. The towns are primarily agricultural markets. Some of them are also centres of processing industries based on cash crops, particularly cotton and oil seeds.

In the absence of large scale manufacturing industries towns in trade and commerce are small and medium size.

Service towns : By service towns meant those towns where central and state government servants and persons in profession such as teaching, law, medicine, laundering, hair dressing and domestic servants form a conspicuous portion of the population. Of all the functional types service towns are larger in number. There are 122 towns in which service is the dominating function.

The service towns consist of large and medium size settlements. Of the seven class I and one metropolitan city, Jullundur, Ambala, Patiala, Jammu and Srinagar are conspicuous for workers in services. These large size towns are also marked by moderate industrial functions. On the whole 75% of the service towns are marked by moderate industrial function and rest of 25% service towns are associated with moderate trade and transport function.

As already mentioned in our area the service towns consist of large and medium size settlements while for India as a whole service towns consist of small size settlements. Dr. Asok Mitra has already presented the picture for India as a whole as follows: "The overwhelming numerical predominance of service towns, particularly the number in which this function is accentuated lays the finger on the main weakness of the urban growth in India. It suggests the weakness of the "Pull" factor (usually denoting shortage of, and demand for labour) which is associated with the expansion of industries"

But in our area the cause of this inverse picture is mainly because the service towns are accompanied by moderate industrial activity, the expansion of industries acted as "Pull" factor.

VI

SOCIAL AMENITIES AND INFRASTRUCTURE FACILITIES

Third world nations like India which have predominantly agrarian economy are struggling hard to raise the standard of living of their people. Since living standard is associated to economic development in modern times and comprehensive development of an area can be judged by glancing at the various indicators of development. The provision of public utilities, facilities and necessities is one of the most important indicator of development. So the main purpose of this paper is to do an analysis of these public utilities, facilities and necessities in large sized villages and for a clear understanding of this, a consideration has been made of the overall facilities in the settlements.

The term social amenities are basically functions. Christaller's central place theory is based on the criterion of amenities or functions of the settlements. Much of the work relating to centre place theory has been concerned with the identification of hierarchies of settlements. And these hierarchies are determined through ~~the~~ ^{the} employment of the ^{CRITERION OF} amenities found in a region. So the second purpose of our study is to establish a hierarchy of settlements on the basis of centrality score or composite index.

In the district census handbooks of Punjab 1961, the data regarding amenities for the urban areas are not available and data are available only for rural settlements. The census, however, presumed that in all urban centres, all these amenities that have been taken into consideration are present.

So they neglect this information.

Taking into consideration the above limitations of data, we have taken 113 rural settlements (large sized villages). In these villages eleven existing amenities are taken viz. Primary school, Middle School, High School, College and technical institution, post office, dispensary, electricity for domestic use as well as for agriculture use, supply of drinking water, maternity and child welfare centre, rural health centre and medical practitioner. All these amenities of the area can be grouped under the following three heads.

(i) Education:

This includes Primary, Middle and High schools, technical institute and college.

(ii) Medical:

This includes dispensary, medical practitioner, maternity and child welfare centre, rural health centre.

(iii) Infrastructure:

Post Office, electricity, supply of drinking water, and roads.

Methodology:

The method used here is the centrality score. It is supposed that the level of functional hierarchy should be given numerical values on the basis of their importance. For example, if there is one primary school in settlement number one, it will get one point, on the other hand if

there are two primary school in settlement number two it will get two points. In addition to it two points are given to electricity, one for electricity for domestic use and one for electricity for agriculture use. Similarly two points are given to post and Telegraph offices, one point to post office and one point to telegraph office. So that the points for all amenities will be given according to the number of amenities present in the concerned settlement.

Weightages are obtained for each of the functions by using the following formula :

$$W = \frac{\sum S}{\sum F}$$

$\sum S$ refer to the total number of settlements in a region and

$\sum F$ refers to the total number of particular function present within a region.

The following weightages are obtained for the functions

Table : IV.1

S.No.	Functions or Amenities	Weight
1.	Collogo	7.9
2.	Maternity and Child welfare Centre	7.9
3.	Supply of drinking water	3.7
4.	Rural Health Centre	3.5
5.	High School	1.6
6.	High School	1.5
7.	Electricity	1.3
8.	Post Office and Telegraph Office	.90
9.	Dispensary	.76
10.	Medical Practitioner	.23

Four Hierarchical orders of functions are considered on the basis of weightage given to each function. First order functions are college, maternity and child welfare centre. The primary school also comes in the first order function - but actually it is a disguised function which can not be isolated from middle school and high school. Because every middle and high school must have primary classes. So it is considered as a non-central function.

Second, order functions are water supply and Rural Health Centre. Third, order functions include Middle school High School, and Electricity for domestic use as well as for agricultural use. Fourth, order functions include Primary school, post, office, Dispensary and Medical Practitioner.

A weightage thus shows the centrality of a particular function i.e. if the function is ubiquitously distributed within a region it has a low weightage and is a lower order function. Higher the weightages of the function in hierarchy the more central will be the function and vice-versa.

Distribution of the Functions:

From the weightage indices we can generalise the distributional pattern of various amenities e.g., distribution of educational amenities, a glance at weightage indices shows that Primary, Middle and high School are non-central functions which means that these are uniformly distributed all over these settlements. On the other hand college and

technical institutions are central functions. Higher the level of education imparted, more the central functions will be. Distribution of medical amenities both the medical facilities, dispensary and medical practitioner are non-central functions. So far as the maternity and child welfare centres is concerned it is central function and rural health centre is second order function. In other words rural health centre is moderately distributed over these settlements. In infrastructure facilities, from all the rural settlements about 76% settlements were electrified and almost all the rural settlements are connected by transport lines. On the other hand supply of drinking water is second order function i.e., its distribution is restricted to few settlements.

From the above analysis of distribution of various amenities one can conclude that the adequate services were not there. Even the essential services like education, drinking water and some medical facilities were inadequate.

For each settlement composite index has been calculated and from values obtained proportionate circles are drawn on the map.

Identification of Core and Periphery Area:

It is very difficult to depict a core and peripheral region on the basis of the centrality of various functions, as it is obvious that the towns form the cores and the villages surrounding it the periphery. If we superimpose the settlement map on the map showing the distribution of social amenities the

pattern emerges as such : all the villages which are very near to the (5-8 Kms of radial distance) towns have lack of central functions. This shows that these villages are directly depending upon the towns near to them.

In Punjab there are three main belts where basic amenities are concentrated.

In the north there is a largest belt of 'very high' concentration of amenities running from southeast to north west direction (Along the borders of Himachal Pradesh). This belt passes through the districts of Amritsar, Kapurthala Jullundur, eastern part of Ludhiana, central and Southern parts of Hoshiarpur and northern parts of Ambala. This belt constitutes 'very high' (more than 30) and 'moderately high' (20 to 30) concentrations of amenities. To the South; there lies a belt of 'very low' concentration of amenities running parallel to the former belt. It passes through the districts of Patiala, Northern parts of Sangrur, western parts of Ludhiana and Southern parts of Ferozepur. The Central belt which runs in Southeast to north-west direction have ('low' concentration of amenities (values varying between 10 to 20). This 'low' distribution and concentration of functions is prevailing in the districts of Bhatinda, Southern parts of Sangrur and northern parts of Ferozepur. In further South there lies a belt of very low concentration of amenities. This belt also runs parallel to the Central belt. This belt consist of districts of Hisar, Jind and Karnal.

The southern belt lies around the Delhi metropolitan city. It lies in the districts of Rohtak, Gurgaon and Mahendergarh, and the weighted values are less than 20.

The reasons for the disparities among the distribution of amenities follows the imbalanced regional development. The means of transportation and communication are skeloton. Economic inequality matches social inequality in the region, differences in the level of urbanisation and the centralisation of industries are some of the reasons which are responsible for the inadequate amenities.

In short we can say that there is an unequal distribution of functions in this region. In these villages the lack of amenities is due to the presence of large number of towns. The spacing of towns have reduced in 1961 from the previous decades and the regional disparities with respect of proximity to urban centres have greatly reduced. These villages tend to depend on these towns to a great extent.

VI-2.

SETTLEMENT SYSTEM AND HIERARCHY

The analysis of settlement systems and hierarchy of settlement based on the operational characteristics of the central place theory. It is obvious that settlements differ, each from others, on the intuitive level one notion of difference is that of classes of urban and rural settlements. The stereo house of descriptive terms available illustrates this notion: Hamlet, village, town, city and metropolis and the like. As we are only concerned with large sized villages our main emphasis would be on distinguishing the various system of classes or hierarchical class system based on size of settlements. Secondly we are going to establish a hierarchy of settlements based on various functions of these settlements. As the hierarchy of settlement is the product of the centrality of settlements and centrality of a place is equal to its surplus importance i.e. how much extra population, a central place and a central function can support other than its own population.

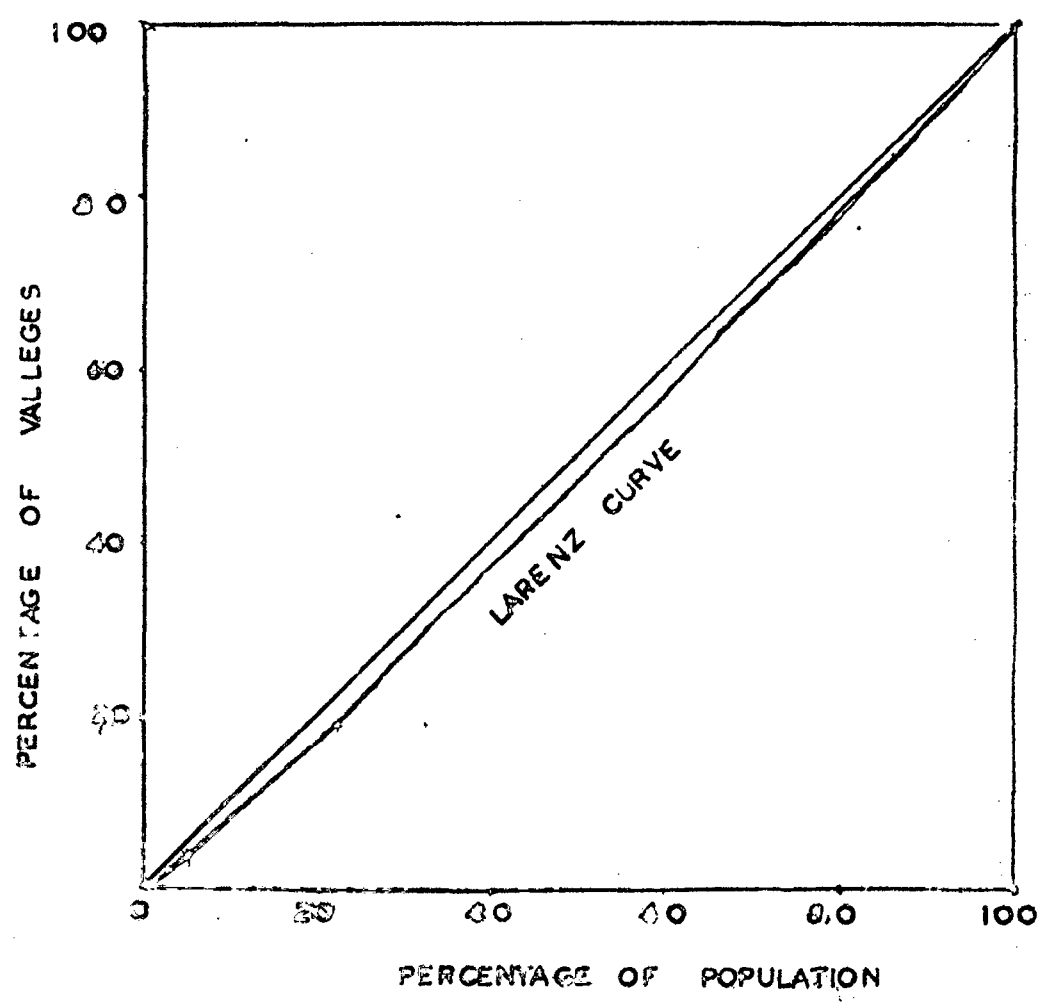
There are 113 large sized villages which have population 8000 and above. On the basis of their size of population; these villages are divided in to three system of classes.

Table - VI.2.1

Population Size	Number of villages
5,000-6999	87
7,000-9999	22
10,000+	4

Fig. 12 | 2

DISTRIBUTION OF POPULATION IN VILLAGES



GINNIE'S COEFFICIENT

Size Class of villages	% of population to the total population of villages X_1	% of villages to the total villages Y_1	Commu- lative % of the popu- lation ΣX_1	Commu- lative % of the villa- ges ΣY_1	ΣX_1^2	ΣY_1^2
5000-6999	71.45	76.90	71.00	76.90	-	6924.03
7000-8999	23.90	19.47	94.95	96.37	7255.8	9435.01
10,000	5.65	3.54	100.00	100.00	9033.8	-
					16885.6	16359

$$G.C. = \frac{16885.6 - 16359}{100} = .049$$

This shows that population in these villages is evenly distributed in all the size classes.

$$G.C. = \frac{\Sigma X_1^2 + \Sigma Y_1^2 - \Sigma X_1^2 - \Sigma Y_1^2}{100} = \text{Ginnie's Coefficient}$$

The above table shows that 87 villages have population between 5000 to 7000. On the other hand in the second and third category there are only 22 and 4 villages respectively. Due to the tremendous development in agriculture; large number of market towns have come up. Most probably these large sized villages(having population 7000+) were converted to market towns. That is why the number of villages having population 7000+ is small.

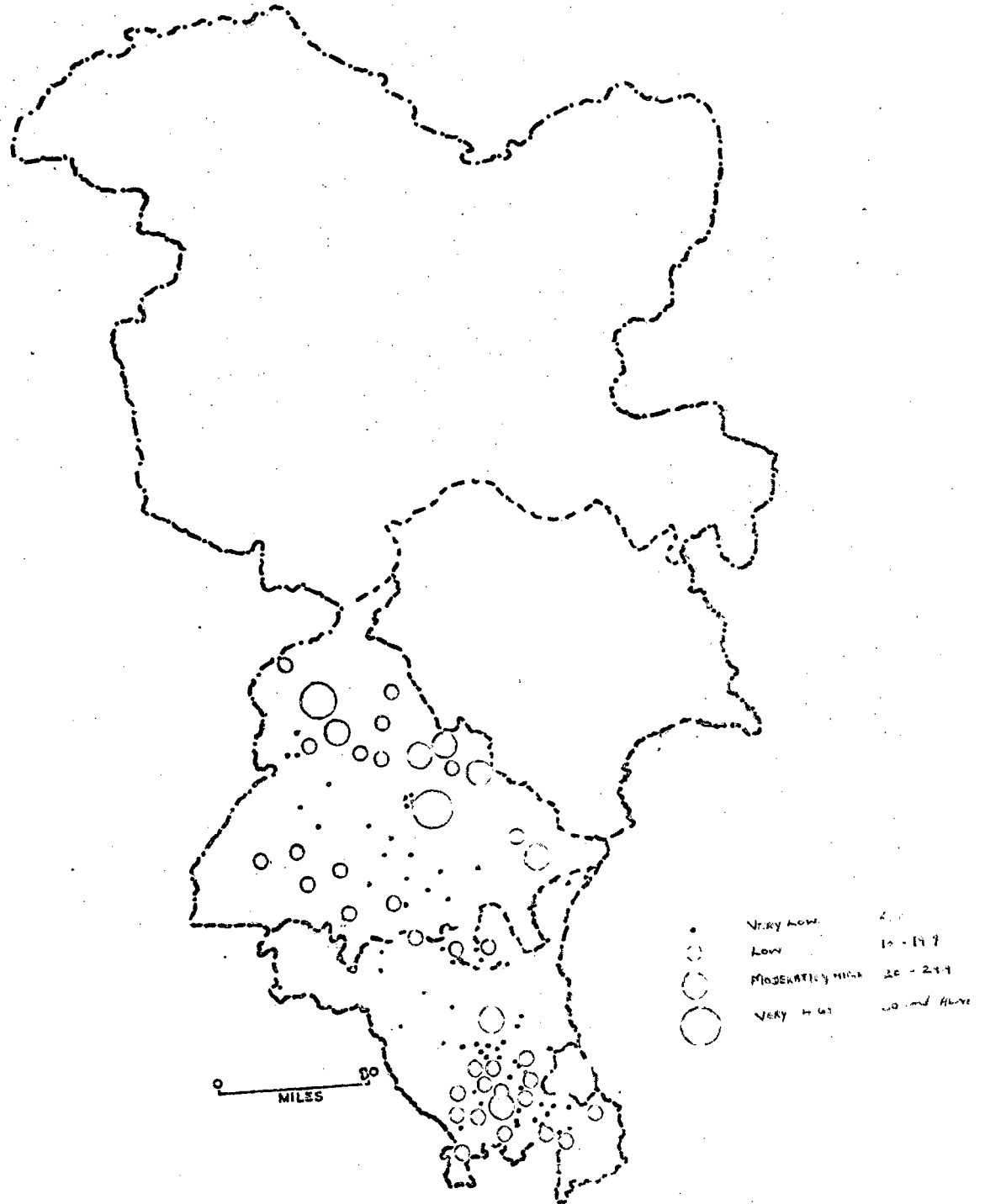
So far as the distribution of population among these villages is concerned 'A Lorenz Curve' has been drawn which is almost straight shows cumulative proportion of population closely follows the cumulative proportion of settlements. In other words there is no concentration of population in any particular class of village. About 72.4 percent population is concentrated in about 77 percent villages, 22.8 percent population is living in 19 percent villages, and rest of 4.8 percent population is living in 4 percent villages.

Hierarchy of Settlements

In the previous discussion a central score was derived for each large sized village by multiplying the number of amenities within each village by the weightage given to each amenity. These figures then added up to give a composite index or central score. The composite index varies between 1.4 to 41.3 depending on the ubiquitous and non-ubiquitous distribution of amenities. On the basis of

Fig. 11

J & K, HIMACHAL PRADESH, PUNJAB & DELHI
FUNCTIONAL HIERARCHY OF RURAL SETTLEMENTS
1961



their central score a hierarchy of settlements can be derived by working out a dependency ratio for each of the settlements having various amenities. For this purpose we could divide the centrality score into four classes as follows.

TABLE : VI.2.2

Centrality Score	No. of Settlements	Order of Settlements.
30+	7	I
20-30	11	II
10-20	40	III
Less than 10	50	IV

On the basis of composite index four hierarchical orders of settlements are considered. The first order settlements - have centrality score more than 30 i.e. these settlements consist of all amenities existed. In other words all the central and non central functions are available in these settlements. Similarly in the second order settlements the availability of amenities is moderate as compare to the first order settlements. As the order of settlements hierarchy goes on increasing the number of amenities available goes on increasing.

Depending on the centrality score index the dependency ratio is worked out as follows.

The 1.6 settlements with in the second category depend on each settlement with in the first category for its functions. Similarly 3.6 settlements of category third are depending upon each settlement with in the category second and 1.25 settlements of category four depend on each settlement within the third category.

Ratio of dependency between	I and II	=	1:1.6
" " " "	II and III	=	1:3.6
" " " "	III and IV	=	1:1.25

The third order settlements depend more on the second order settlement. In other orders of hierarchy the dependency is quite low as compared to third order settlements.

Identification 'K' values:

In the absence of adequate data especially for urban areas, it is of no use to discuss the applicability of the central place hexagonal concept. Nevertheless, on the basis of data available only for the rural settlements (Map.I) one may assess whether the hexagonal arrangement of central places exists or not.

A glance at the map (I) shows that there is no hexagonal arrangement of central places. But as already discussed above, there is the phenomenon of dependence and inter dependence among the places of lower order to the higher settlements order, successively.

"Further as Decey (1962) ^uthought "A point distribution is uniform or hexagonal when the nearer neighbour analysis indicates that distribution is neither random nor clustered."²

Accordingly, the distribution of central places must be uniform to be hexagonal in their arrangement. But here in the region the case is entirely in inverse. The distribution of central places followed the clustered pattern. Therefore the hexagonal arrangement of central places does not exist in the region.

C_O_N_C_L_U_S_I_O_N

The region has such natural environment which does permit population concentration uniform or evenly. It comes under one of the most organised region or part of India i.e. 20% of the total population is found in urban centres of the region. The industry too well developed. The means of transportation and communication are highly developed. But adequate services are not there especially in the Central south western and extreme southern parts of the region. Even the essential services like education and medical facilities are inadequate. The functions are weak in nature and limited their influence. Therefore there is a need for proper planning for creating the services in order to strengthen the existing functions and establishing new ones for the proper development of the region.

Z. H.C. Sharma. Settlement Geography of the Indian Desert. 1972.

PRELUDE
DECLASSIFIED TOWNS

Twenty places taken as towns in 1961 census do not appear as such in 1971 census. In fifteen towns among them, government has abolished the local administration during the decade, and by the personal visits the state superintendent satisfied himself that they did not have the prescribed urban characteristics. The remaining five urban areas had been emerged in the main towns which they formed integrated parts including Pathankot Military Area to which municipal limits do not extend. In Haryana in 1971 no town has been declassified. But in Punjab in 1971 three places were declassified. These three places have population less than 5,000. That is why these are again considered as rural. In Jullundur district three towns named Jandiola, Bilga and Bindola have growth rate -6.36, +5.34 and .68 respectively. This low growth rate shows that these towns have experienced out migration. In Amritsar and Gurdaspur districts there are two towns named Sultanwind and Narot Jaimal Singh respectively whose growth rate was 104.2 per cent in 1961 and 74.8 per cent in 1971. But these are considered as rural in 1961 and 1971 respectively. Narot Jaimal Singh has population less than 5,000 that is why it is closed as rural. The main reason for the declassification of Sultanwind urban centre may be that it is just located on the international border line. In Sangrur district three places Handiaya, Gehana and Mohak have growth 46.80, 10.73, and 18.69

per cent respectively. Among these three towns Monek has population less than 5,000 but all the urban amenities are not available and secondly these places are located away from the main transport lines. In Hoshiarpur district out of three declassified towns two have experienced negative growth rate and one has population less than 5,000 that is why these are classed as rural.

In Jammu & Kashmir in 1961 one town named Verineg has been declassified. But in 1971 five towns were declassified. Out of 5 places 3 had population less than 5,000 but remaining two had population more than 5,000. One town known as Nantipur emerged in Baramula urban centre. The first three were declassified on the basis of population. The average growth rate of these five towns was 59.8 per cent during 1961-71. Palahalan was declassified due to the effect of border.

In Himachal Pradesh in 1961 census four urban places were declassified. These four urban places have population less than 5,000. So these towns were declassified on this very basis. The growth rate of Gorkhal and Sanawar was +45.2 and 12.9 in 1961. But Kandeghat and Dharempur have recorded negative growth rate(-3.2 and 75.8 respectively).

It is hypothesised that there is negative association between economic development of an area and declassified towns. The above discussion shows that most of the towns are declassified in the areas where economic development is highest as compared to other areas of this region. So this hypothesis is rejected. The reasons for the declassification of towns are out migration from these towns. The negative growth rate in 1961 shows that these towns have experienced out migration. Secondly towns which are near to the Indo-Pak border are being declassified. Thirdly majority of the towns which were being declassified have not fulfilled all the conditions of census definition. Fourthly changes in the concept and definition of urban has led to the declassification of many towns.

In the states of Punjab, Haryana, Himachal Pradesh and Jammu and Kashmir the degree of urbanisation is quite high. The number of new towns added in each census is very large as compared to the other states of India. And on the other hand, the towns being declassified are fewer in number. The majority of the towns declassified in the last two decades are due to the changes in the concept and definition (census definition) of urban.

DECLASSIFIED TOWNS DURING 1961-61 and 1961-71

Sr. No.	Town	Growth Rate		Sr.No.	Town	Growth Rate	
		1961	1971			1961	1971
<u>Jullundur District</u>				<u>Jammu & Kashmir</u>			
1.	Jandiala	-6.36		15.	Kukernag		
2.	Bilga	+5.34		16.	Handwara		
3.	Bindiala	+ .68		17.	Chenani		
<u>Ludhiana District</u>				18.	Verinag	33.4	
4.	Payal	+ .59	22.37	19.	Nanipur 25		
<u>Amritsar District</u>				20.	Patan	32.6	
5.	Sultanwind	+104.21		21.	Palholan 10		61.2
6.	Sursingh	- 2.5		22.	Hajin 2		32.9
<u>Gurdaspur District</u>				23.	Azes 3		52.6
7.	Narot Jaimalsingh		74.8	24.	Sumbal 5		43.6
<u>Hoshiarpur District</u>				25.	Kargil 4		
8.	Khanpur	-20.99		<u>Himachal Pradesh State</u>			
9.	Miani	+3.78		26.	Nerkanda	-N.A.	
10.	Jaijen	-4.76		27.	Sanswar	129+	
<u>Sangrur District</u>				28.	Kandeghat	322-	
11.	Hadiaya	46.80		29.	Dherampur	75.8-	
12.	Sehena	10.73		30.	Garkhal	45.2+	
13.	Moonek	18.69					
<u>Kapurthala District</u>							
14.	Dilwan	3.86	16.60				

VII

CONCLUSION

The settlements of this North-western region of India are of great interest because they illustrate some of the main, themes of demography and geography .

- (a) They show how, in a region, natural conditions, socio-economic and demographic factors influence the spatial distribution of settlements.
- (b) They also illustrates the swift changes that modern technology can bring out.
- (c) They reveal the strong effect of the economy.
- (d) They also reflect the power full forces of regionalism- or in other words they make us to realise the need for regional approach to our subject.

(1) 1.1. In whole of the region the settlements have followed the random pattern of distribution. Among the two broad physiographic regions; the Himalayan region which includes the states of J and K and Himachal Pradesh have clustered and random distribution pattern of settlements respectively. On the other hand in the Punjab plains the settlements are more or less evenly distributed.

1.2. The larger settlements in the region are located on the main lines of communication. And about 93 per cent of settlements are located either on roads or on railway lines.

(2) There are large number of factors such as fertility of soil, means of transportation, development of non-farm activities which determine the population potential in this region.

- 2.1. All the large sized settlements have highest potential of population.
- 2.2. Population potential of is highest in the areas where settlements have followed the 'clustered' pattern. And on the other hand population potential is moderately high where the pattern is random.
- 2.3. The manufacturing and 'other service' towns have recorded highest potential of population. In trading towns the population potential is moderately low. In all the settlements where agriculture is dominant function, the population potential is very low.

(3) 3.1. The percentage of rate of increase of urban population has been increasing decade after decade and it has been higher than the all. India percentage rate of increase for the corresponding period. The rate of increase of urban population is much higher than the rate of increase of rural population. Excluding Delhi area, the general process of urbanization in the whole region has shown a tendency towards decrease in the rate of urbanization during the decade of 1951-61.

- 3.2 The urban population has the tendency to be concentrated in smaller number of centres in large numbers. The urban density has been increasing very rapidly.
- 3.3 The It is very interesting to note that the sex ratio in this region is increasing where as for India as a whole it the sex ratio has been declining.
- 3.4 In this region the literacy is moderately high and it changed the outlook and brought a revolution in their line of thought.
- (4) The economic development of the area is partly responsible for increase in the size and distribution of the existing towns and large villages.
- 4.1. In cities (large size settlements) percentage of male workers engaged in agriculture is negligible. But in large size villages and small towns the percentage of male workers in agriculture is very high.
- 4.2 Settlements located in the central districts of Jullundur, Ludhiana, Amritsar, Kapurthala, Hoshiarpur and Ambala, percentage of male workers engaged in household industry and manufacturing is highest. In Jammu and Kashmir (except the district of Jammu) and Himachal Pradesh; the proportion of male workers in manufacturing is very low. The settlements located in the southern districts of Mahendragarh, Meerutpur, Hoshiarpur, Hissar and Karnal the percentage

of male workers fall in between these two extremes. The proportion of male workers around Delhi is very high.

- 4.3. All the cantonments and administrative head quarters have very high percentage of male workers in other services.
- 4.4 Increased agricultural production has developed the markets to a large extent and also the business activity which is generally confine to towns. So percentage of male workers is quite high in trading towns.
- 4.5 The functional classification of towns indicates that . most of the towns of the region function as service, manufacturing, agricultural and trading towns. But among the broad physiographic regions, in the Himalayan region (Jammu and Kashmir and Himachal Pradesh) most of the towns have not yet become the centres of production but still are functioning on the basis of a non-productive tertiary sector which is a symbol of region's backwardness.
- (5) An attempt has been made to analyse the social amenities in rural areas. Data for urban areas is not available. This analysis is concluded in the following lines.

The region (Punjab Plain) has such natural environment which do permit population concentration evenly. It comes under one of the most urbanized part of India i.e. 20.3 percent of the total population is found in Urban centres of the region. The industry is well developed. The means of transportation and communication are highly developed. But adequate services are not there especially in the central and southern part of the

region. Even essential services like education and medical facilities are inadequate. The functions are weak in nature and limited in their influence. Therefore, there is need for proper planning for creating the services in order to strengthen the existing functions and establishing new ones for the proper and balanced development of the region.

APPENDICES

Tables C.

Table No. III.8 Major Demographic Characteristics of Settlements

Name of Settlement	Code No.	Age Growth Rate	Sex Ratio	Density in per sq. mile	Age Literacy	Depen- dency Ratio
1	2	3	4	5	6	7
Ran Das	62	3.51	921	6306	30.2	298
*Sultanwind Suburban	64	104.20	842	3798	21.6	274
*Verka	65	43.9	859	1305	29.4	245
*Bondsala	74	- 7.1	880	710	20.1	241
*Sathiala	67	12.6	951	916	26.1	278
Majitha	66	- 5.3	899	87162	33.2	267
Chhoharta	68	32.7	717	2752	43.0	196
Amritsar Suburban	69	N.A.	818	3193	53.4	228
Amritsar	69	15.5	801	28945	52.5	227
Amritsar Cantt	69	221.7	412	7265	62.2	76
Jandiala	78	- 6.2	903	7637	45.3	254
Tarn Tarn	72	28.2	908	4192	51.2	262
*Velhoha	71	- 7.2	841	608	15.6	223
*Chariala	73	14.7	892	4736	14.7	227
*Sursingh	76	- 2.5	829	497	22.9	244
*Sobhrai	77	105.8	899	283	18.1	234
Rhen Karan	77	1.0	867	7142	28.5	253
Patti	75	10.7	864	15833	40.1	252
Dalhausio	26	N.A.	304	9312692	63.8	146
Dalhausio Cantt	26	146.0	310	1697	72.1	56
Bakhel	28	N.A.	583	N.A.	67.5	121

1	2	3	4	5	6	7
Sujanpur	29	1.8	909	8715	30.7	260
Pathankot	30	69.0	667	27984	46.4	172
Nerot Jaimalsingh	46	97.3	949	16445	29.3	285
^o Kelansur		4.8	889	350	29.4	263
Dinanagar	47 -	1.8	902	2399	44.2	279
Gurdaspur	48	21.9	793	26099	57.5	231
Dhariwal	50	24.1	859	7659	50.0	286
Batalo Camp	53	N.A.	876	1654	9.9	339
Dera Beba Nanak	49	84.3	882	17626	43.9	277
Fetchgarh Churian	55	65.1	918	37876	42.3	245
Batalo	52	81	871	21923	46.8	275
Qadian	54 -	.25	910	3286	41.8	327
Hargobind Pur		23.2	897	11706	44.8	303
Mukerian	51	15.7	859	8676	41.6	267
Dasuya	56	10.4	893	13416	43.6	291
Urmar Tanda	57	5.3	898	2077	45.9	288
Garhdiwala	60	4.4	870	24253	52.1	250
Nariana	58 -	5.4	916	17872	50.0	256
Sham- chaurasi	59	17.3	860	35285	40.0	266
Hoshiarpur	68	12.0	813	12976	57.2	255
*Badher urf Dohlen	196	N.A.	970	1242	23.8	126

1	2	3	4	5	6	7
Una	38	- 4.4	910	8200	44.5	234
Nangal Township	45	N.A.	590	26238	53.2	133
Anandpur Sahib	61	- 1.8	841	12694	46.8	201
Garhsenkar	90	8.0	851	11962	46.9	250
Dhiltan	198	3.8	1003	21475	35.5	387
Kopurthala	81	8.8	839	2666	52.5	253
Sultanpur	80	- .93	875	1915	49.7	267
Phagwara	86	73.4	843	9482	50.3	261
Nakodar	85	27.8	933	13258	47.0	250
Garhwalidan		11.8	910	7038	31.5	337
Dakoba		46.3	859	7889	45.4	382
Sansher	84	5.0	908	1236	35.4	288
Kartarpur	82	8.7	883	9386	41.6	245
Alawalpur	79	1.9	861	5673	46.0	286
Adampur	88	27.6	802	4930	52.3	263
Jullundur City	83		847	13092	53.2	175
Jullundur Contt	83	31.8	543	7041	58.7	117
Banga	89	3.7	891	53747	50.0	292
Nawanshar	91	7.2	839	9525	50.0	283
Rahon	92	- 3.5	888	3158	40.2	267
Jandiála	63	- 6.3	903	1204	33.4	272

1	2	3	4	5	6	7
* Bundala	133	.68	914	1280	29.3	136
o Furka Kalan	94	1.1	884	1401	31.3	271
* Bilga	93	5.3	929	1303	29.6	314
Nurmahal	64	1.6	929	3110	44.4	263
Philaur	87	16.5	884	65047	52.2	274
Nabha	132	19.1	804	18002	49.0	240
Doraha	125	50.2	864	9204	57.0	259
Gobindgarh	119	107.5	682	7026	51.3	172
Amloh	120	25.1	873	4776	42.2	246
Bassi	117-	.82	874	8694	43.1	270
Sirhind	116	23.0	842	12642	48.5	236
* Lalru	113	25.9	865	8887	19.6	248
Derabasi	108	17.23	903	13057	42.8	284
Banur	112	24.2	830	1914	33.7	235
Rajpura	114		807	5505	49.2	239
Rajpura Township	116	119.7	948	8750	39.5	278
* Tirpari Saidan	131	N.A.	923	3626	38.4	219
Patiale	130	27.9	798	9633	53.4	244
Sneur	188	11.7	909	4504	23.9	230
Samana	261	5.0	867	8066	25.9	252
* Kaonke	200	14.9	869	614	23.6	251
Jagraon	128	20.7	895	23693	47.0	276

1	2	3	4	5	6	7
Raikkot	129	9.2	919	33055	40.0	244
* Dholewal	199	N.A.	612	6172	44.1	142
* Gili	134	71.2	691	924	39.4	224
Ludhiana	127	58.6	820	32151	55.6	237
* Machhiwa- Pa	123	15.6	884	720	43.6	247
* Payal	124	.59	854	3578	34.1	283
Samrala	122	14.8	835	11100	46.1	199
Khanna	121	93.0	886	3221	51.7	290
* Panjgrain Kalan	168	46.6	847	488	16.5	137
Faridkot	160	73.0	831	11047	42.9	247
Kotkapural	150	62.6	866	32021	34.0	253
Jaitsu Mandi	162	125.2	850	13736	32.3	251
* Bhaipura	166	25.1	855	352	19.2	270
* Kotshamir	161	27.1	853	285	12.6	189
* Talwandi Sabo	170	23.9	825	324	19.3	158
Goniene Mandi	163	104.0	822	8054	31.1	221
Bhatinda	164	49.3	804	6531	40.4	225
Bucho Mandi	169	23.6	799	13394	49.3	277
Rampura Phul	165	35.7	878	23452	36.9	266
Kotfatch	170	495.0	861	25386	24.1	214
Reman Mandi	167	47.4	814	10447	35.7	231

1	2	3	4	5	6	7
Sengat	151	208.0	822	1916	28.1	198
Maur Mandi	172	184.4	822	10944	29.1	228
*Bhikhi	173	68.8	846	560	19.2	70
Budhlada	175	N.A.	850	690	25.8	242
Baretamandi	176	32.4	822	7041	24.7	175
Manse	171	47.3	838	8989	34.8	260
Budhlada	174	21.8	835	8620	45.2	257
Jalelebad	143	22.9	894	19307	46.7	247
Fazilka	144	23.4	886	15245	46.7	253
Abohar	145	83.9	824	8567	41.6	146
Guruhar Sehai	267	21.5	904	341	12.2	209
Ferozepur City	142	216.6	843	13331	47.5	276
Ferozepur Centt	142	75.3	576	6039	57.7	131
Tankanweli		19.6	825	181800	54.9	262
Talwandi Bhai	268	64.2	863	37584	36.6	296
Guruhar Sehai		36.8	871	14310	45.9	257
Zira	141	27.0	901	4612	49.5	287
Dharankot	269	249.2	878	30680	38.7	273
* Baghapurana	283	41.3	854	988	27.8	257
* Buttar		N.A.	918	530	23.5	304
* Manoke	284	78.5	541	89	45.7	180

1	2	3	4	5	6	7
*Rode		19.4	852	490	19.3	186
*Samedhke Bhai	282	15.9	905	525	13.4	224
Moga	140	30.5	862	17374	47.3	261
^c Kot Bhai		12.3	862	303	17.6	170
*Dode	281	25.4	771	362	11.4	75
Muktsar	149	39.1	863	30765	37.9	232
Malout	147	N.A.	833	51935	36.8	238
Giddarbeha	148	133.9	851	25165	32.0	240
*Sehohna	263	10.7	794	426	19.7	216
*Handaya	262	46.8	838 x 2922	361	18.6	237
Tape	177	33.1	904	44428	35.0	260
Bhadeur	178	21.7	850	9407	20.8	149
Barnala	185	33.4	852	4270	40.0	263
Dhanaula	183	17.6	838	4994	23.9	231
Ahmedgarh	264	44.9	854	7034	48.8	273
Malerkotla	126	21.3	892	2426	25.0	225
Dhuri	186	52.6	780	14835	47.0	229
^c Chhazli	180	N.A.	840	308	15.2	193
*Dirbha	181	20.1	793	600	12.6	182
Longowal		41.3	815	3083	15.1	180
Sangrur	184	51.2	803	4079	46.5	239
Bhawanigarh	187	27.8	854	3624	28.6	242
Sunam	182	27.5	937	20584	34.4	248

1	2	3	4	5	6	7
Lehragaga	179	117.0	847	10325	33.1	262
*Ujhana	230	41.6	845	413	6.6	133
*Batta		43.6	818	411	10.0	182
*Kalayat	233	60.3	869	426	20.1	266
*Balu	227	57.2	844	551	8.6	139
Narwana	220	35.3	829	16514	31.1	179
Uchana	266	59.8	794	19940	22.9	192
Jind	176	24.5	853	2584	42.5	253
Safidon	177	- 2.1	267	3689	34.0	231
Julana	261	46.3	800	10968	27.0	189
Ropar	95	- .64	835	6396	62.0	254
Morinda	118	24.2	850	7540	21.8	267
Halagarh	97	N.A.	820	6070	21.2	226
Kuroli	110	70.9	808	4877	45.7	247
Kelke	105	28.5	752	16425	56.8	201
Kharar	111	30.0	812	28331	49.8	157
Chandigarh	107	N.A.	625	6751	60.5	154
Moni Majra	106	74.2	784	35503	52.9	102
*Naraingarh	190	35.5	882	3249	41.7	291
Sedhaura	191	2.7	940	1705	42.3	309
*Badiel	293	11.7	871	5158	36.7	227
Ambala	189	44.5	838	22679	54.0	268
Ambala Cantt	189	6.2	727	7538	53.9	193
*Sasuli	292	N.A.	768	4438	52.1	225

1	2	3	4	5	6	7
Buria	194	8.8	841	5112	34.5	218
Chhachhraul	193	13.3	850	23990	51.2	324
Jagadhari	193	36.3	812	23997	46.7	228
Yamunanagar	291	229.6	754	12925	52.8	207
*Siwan	226	43.5	857	413	21.1	250
*Gumthale	215	53.8	888	552	20.5	221
*Koorak	228	16.7	733	509	12.0	192
*Kaul	221	N.A.	860	605	17.8	188
*Habri	218	17.7	915	374	19.5	229
*Pai	219	16.4	855	647	11.2	188
*Karora		15.8	865	621	7.3	147
*Rejaund	214	38.4	836	1311	14.1	211
*Chatter	216	31.4	856	419	6.1	125
*Assandh	213	47.3	891	461	24.2	255
*Selwan		18.7	838	492	14.5	202
*Muana	225	22.1	873	397	7.2	134
*Alewah	217	22.2	847	494	9.9	166
Pchowra	224	N.A.	814	11844	40.4	206
Kaithal	223	35.5	870	16614	39.6	273
Pandri	220	16.9	852	5107	25.5	210
Thenesar	204	49.2	825	2804	39.5	235
Ladwa	203	32.4	870	33036	36.6	254
Radeur	201	34.3	873	5155	38.7	229
Shahbad	202	9.6	867	27904	45.8	265
*Taraori Jagir	211	24.2	888	2434	24.1	237

1	2	3	4	5	6	7
*Gonder	295	.97	847	510	10.4	214
*Jundla	213	35.9	860	384	23.9	196
*Bala Khalse	207	30.6	841	706	13.3	172
Nilokheri	205	27.8	737	4439	49.6	281
Karnal	206	20.6	877	18976	49.4	284
Gharaunda	208	21.5	832	29155	32.1	266
*Samalkha	210	31.9	855	2774	40.1	233
Panipet	209	21.9	885	22342	48.4	229
*Mundiana	254	28.9	907	595	10.5	161
*Kathura		19.3	882	512	10.6	151
*Mokhrekhas	253	25.0	862	764	13.4	150
*Bahlba	249	28.1	891	443	9.1	106
*Nadana	252	17.8	874	488	12.6	139
Mahan	250	8.9	928	6788	37.0	268
Gohana	255	25.9	290	20138	39.0	257
*Kurthal	258	17.3	862	728	23.3	178
*Gansur	250	25.4	880	1209	40.0	234
*Chulkana	255	19.7	799	1165	15.1	175
Sonepat	274	51.9	827	27149	47.4	262
*Kharkhanda	273	28.9	883	913	31.9	235
*Sisana	322	10.8	877	665	18.1	209
*Bohar		18.6	866	619	25.1	175
*Sanghi	257	14.9	897	595	13.2	152

1	2	3	4	5	6	7
*Bahu Akbar- Pur	20.8	20.8	900	633	19.6	153
*Kahnaur	271	18.2	1003	627	20.0	300
*Kalanaur Kalan	246	16.5	1023	622	24.7	359
*Kalanaur Khurd	247	19.6	954	647	29.6	298
*Kalange	248	36.3	788	519	10.9	171
*Kharek Kalan	246	35.3	883	1380	17.2	216
Rohtak	259	22.6	863	19698	49.1	295
*Dighal	272	20.5	926	964	16.6	159
*Chhara	275	30.3	895	602	16.0	121
*Mendothi	276	29.4	908	727	19.5	132
*Badli	280	19.7	917	476	23.1	163
Behadurgarh	278	34.1	873	14982	44.3	243
Beri	270	8.9	983	10840	31.2	277
Jhajjar	279	35.3	926	21898	35.7	282
*Bondkalan	244	H.A.	820	573	19.7	217
Charkhidadri	238	57.3	825	1628	35.3	214
Kaniana	286	32.6	973	5036	30.2	286
Mehendargarh	237	31.7	901	6389	52.3	261
Ateli	290	49.8	804	6084	45.5	268
Narnaul	289	31.7	883	10648	37.0	218
*Chutala	320	40.8	785	1835	19.5	150
*Rania	237	102.7	867	241	18.9	580

1	2	3	4	5	6	7
*Sri Jiwannagar		N.A.	872	377	14.2	245
*Ellenabad	321	84.6	838	305	25.7	211
Mandi Dobwali	236	48.5	853	29655	39.9	262
Kalenwali	235	81.7	855	4079	33.8	260
Sirsa	234	33.5	835	16681	43.1	259
*Rettia	301	45.7	829	439	21.1	184
*Bhoon	240	N.A.	894	210	21.4	165
*Bhirana	302	N.A.	880	218	11.6	126
*Pebra		25.4	845	421	11.9	114
*Sadalpore	319	22.3	910	302	8.5	88
Fatehbad	233	319.8	874	3115	39.8	239
*Barwala	293	72.6	881	332	22.5	177
Jakhal Mandi	232	53.8	809	62760	43.8	237
Tohana	304	55.0	870	3099	33.2	304
Uklana Mandi	231	12.0	796	11960	50.6	239
Hissar	238	70.6	779	8895	31.0	240
*Narnaund	294	18.3	870	673	21.3	162
*Petwar		1.1	908	369	13.7	93
*Barsi		37.6	916	516	13.0	183
*Bawanikhers	303	62.5	890	335	19.1	217
*Dhanana	241	39.1	896	423	10.6	132
Hansi Rural	239	77.2	849	192	9.7	159
Hansi	239	30.4	892	6020	39.8	277
Bhiwani	242	11.5	878	11639	36.7	269

1	2	3	4	5	6	7
Loharu	243	29.8	536	5724	28.0	177
Jutogh	99	69.6	645	2940	65.3	120
Simla	96	- 7.6	629	2940	65.4	132
Sabathu	103	73.5	640	6085	62.1	118
Dagshai	104	92.6	689	2174	63.7	73
Kassuli	109	- 2.4	623	4102	60.5	127
Nurpur	31	6.4	834	2270	46.9	263
Dharmsele	32	38.0	667	2284	61.9	164
Yol	37	23.8	497	2600	50.3	72
Kangra	33	7.1	900	8250	55.8	221
Nagrote	34	3.5	1062	1728	50.9	206
Pelampur	35	30.9	400	23523	73.0	79
Kulu	36	N.A.	770	2443	52.1	165
Bawal	298	9.8	900	37025	33.0	249
Rewari	297	8.5	902	15809	43.0	293
Pataudi	300	15.0	890	2122	28.0	287
Hailey Mandi	308	28.3	819	1728	54.6	289
* Bahora Kalan	299	17.1	889	580	24.9	199
*Gurgaon	306	48.6	824	1253	34.5	195
*Jharsa	295	25.8	918	1357	19.9	224
*Badshahpur	309	25.6	912	994	25.3	268
Farukhnagar	305	.02	884	26042	28.22	276
Gurgaon	307	103.4	868	18934	53.6	282
Sohna	310	34.0	894	49207	41.5	257
*Tigeon	311	23.6	838	1281	25.6	116

1	2	3	4	5	6	7
Faridebad Township	313		816	8067	52.1	218
Faridebad	313	72.3	875	2713	39.6	246
Ballebgarh	316	28.8	849	8330	40.1	264
Palwal	314	100.2	901	139362	38.5	269
Hodal	318	27.5	852	10653	37.2	211
Nuh	312	30.4	884	1456	38.2	267
Singer	317	21.8	910	878	7.6	105
Ferozepur Jhirka	315	29.9	858	4375	36.6	213
Bilaspur	39	N.A.	675	2164	45.6	132
Naina Devi	44	N.A.	988	1925	40.2	188
Nahan	104	31.8	731	3110	54.6	178
Paonta Sahib	197	93.7	749	2854	55.5	162
Chamba	43	20.3	828	9483	57.4	220
Arki	98	16.5	795	2179	60.8	168
Narkanda	101	N.A.	400	763	53.0	24
Rampur	329	42.5	438	4158	58.8	108
Theog	100	72.7	444	5632	58.7	73
Solan	102	42.6	620	2188	58.5	157
Nandhpore	326	N.A.	882	1552	6.0	93
Bademibagh	10	56.9	773	3033	31.4	241
Srinagar	10	19.7	865	17829	24.7	255
Charisharif	3	N.A.	856	692	9.4	130
Leh	27	4.9	1012	1052	21.5	66

1	2	3	4	5	6	7
Jammu	22	34.1	784	25684	45.0	237
Jammu Cantt	22	- 21.0	849	1414	28.1	248
Samba	25	52.6	899	12082	35.7	284
Bishna	24	N.A.	687	3327	27.0	241
Arnia	26	N.A.	838	790	16.1	245
Ranbirsingh Pura	23	33.3	839	25290	22.7	252
Akhnoor	19	6.1	842	5388	33.3	281
Ramnagar	21	- 5.0	856	1214	35.9	190
Udhampur	20	37.5	858	1978	42.2	246
Katra	18	17.1	825	3219	35.3	229
Reasi	14	120.8	828	1435	36.1	224
Benihal	330	N.A.	645	571	24.6	119
Ramban	331	N.A.	680	851	31.8	164
Entote	328	N.A.	702	712	31.2	192
Doda	15	N.A.	779	575	31.5	203
Kishtwar	16	12.2	889	17094	30.4	142
Bhaderwah	17	16.0	883	1943	35.5	197
Anant Nog	13	27.5	832	3374	20.6	203
Dijbehara	327	17.0	828	6866	14.9	205
Pahalgan	7	N.A.	752	240	5.6	62
Kulgaon	323	N.A.	872	767	14.7	174
Shupiyan	12	15.8	860	2862	20.3	197
Pampore	11	11.3	849	3712	10.6	203
Baramule	4	21.9	834	8283	25.7	222
Gulmarg	9	N.A.	126	68	38.3	16
Sopore	2	19.0	864	34424	18.7	211

1	2	3	4	5	6	7
Bandipore	1	N.A.	870	2123	13.0	148
Kalaruch	5	N.A.	864	1008	3.2	105
Hoí Hama		N.A.	923	1160	5.2	113
Sumbel	324	N.A.	831	3417	7.5	81
Hajin	323	N.A.	864	624	8.7	92
Palhalan	325	N.A.	864	1004	5.3	197
Ajas	338	N.A.	867	6336	11.5	79
Uri	8	48.7	890	960	27.4	81

Code Number of Settlement refers to the location of Settlement on the map.

*This symbol indicates villages.

Table No. IV.3 Population Potential of Settlements

Name of Settlement	Population Potential in million	Name of Settlement	Population Potential in million	Name of Settlement	Population Potential in million
Porozopur Jhirko	63	Charkhidabri	12	Baoli	86
Hodal	69	Bondkalan	15	Bahadurgarh	194
Singar	62	Loharu	25	Jhajjar	223
Palwal	191	Bhiwani	361	Mandothi	196
Ngh	34	Dhanana	71	Chhara	291
Tigaon	78	Bhawanikhera	103	Beri	234
Sohna	98	Hansi	372	Dighal	270
Ballabgarh	144	Bhoon	162	Sisone	99
Parisabad	220	Hissar	516	Kharkhaunda	135
Badshahpur	103	Narnaund	65	Sonopot	449
Gurgaon	2642	Berwala	110	Kohneur	104
Gurgaon Rural	206	Ranis	85	Chulkona	149
Halley Mandi	40	Sadulpur	51	Gansur	168
Faukhnagar	60	Patchbad	137	Rohtak	2095
Pataudi	60	Bhirana	52	Sanghi	106
Rewari	258	Uklana Mandi	31	Mokhra Khas	109
Bawal	53	Ratio	4	Gohana	229
Bahorakalan	83	Sirsa	179	Mundlana	101
Jharsa	60	Mandi Dabwali	97	Kalanour Kalana	119
Narnaul	19	Chutalo	26	Kalanour Khurd	208
Ateli	5	Kolanwali	26	Khark Kalana	150
Mahendergarh	9	Allenabad	49	Kalanga	148
Kenina	8	Jri Jivonnagar	28	Echhla	245

Name of Settlement	Population Potential in million	Name of Settlement	Population Potential in million	Name of Settlement	Population Potential in million
Maham	273	Assandh	78	Patiala	1099
Nadana	234	Rajaund	132	Rajpura Township	190
Julana	15	Gumthala	62	Rajpura	209
Safidon	20	Alewah	83	Banur	58
Jind	60	Hebri	80	Dera Bassi	48
Uchana	26	Gonder	76	Lelru	57
Narwana	56	Pai	157	Sirhind	165
Ujhana	13	Pundri	137	Bassi	186
Kalayat	42	Keorala	87	Gobindgarh	155
Balu	45	Kaul	68	Amloh	64
Bohr	13	Kaithal	339	Nabha	383
Dangri	2	Pehowa	82	Dirbha	711
Bahu Akbarpur	5	Maura	87	Chhazli	80
Semalkha	76	Siwan	96	Lehragaga	84
Panipat	167	Yamunanagar	804	Sunam	249
Gharaunda	105	Jagadhari	728	Sangrur	359
Taraori Jagir	100	Buria	100	Dhuri	189
Jundela	81	Chhachhreuli	62	Bhawanigarh	85
Chhattar	83	Sadhaura	54	Longowal	133
Bala Khas	94	Narsingarh	50	Barnala	208
Thenoser	172	Ropar	238	Handaya	93
Ladwa	77	Amela	441	Tapa	84
Radour	65	Semana	180	Sohehna	93
Shahbad	182	Sansur	188	Bhadour	77

Name of Settlement	Population Potential in million	Name of Settlement	Population Potential in million	Name of Settlement	Population Potential in million
Ahmedgarh	132	Ferozepur	808	Newanshehr	398
Malerkotla	275	Zira	80	Rahon	117
Bareilly	48	Moga	487	Burkhalan	143
Budhlada	66	Smedhbhai	60	Bundala	117
Manse	208	Kotbhai	58	Phagwara	2464
Kotfateh	57	Manoke	52	Jullundur	2049
Bhikhi	57	Baghapurana	39	Kartarpur	343
Bhaipure	94	Butter	72	Sultanpur	20
Bhatinda	436	Dharmkot	82	Kapurthala	31
Ramamandi	126	Guruharsehai	39	Dhilsen	14
Sangat	15	Talwandi Bhai	38	Jamsher	58
Panjgoin Kelen	64	Jagraon	378	Allawalpur	35
Gommanamandi	40	Rekot	192	Adampur	80
Kotkapura	329	Ludhiana	517	Dekohe	79
Faridkot	119	Gill	807	Jendiala	83
Kotshamir	117	Payal	280	Bondala	132
Gidarbaha	168	Khanna	280	Sur Singh	191
Malout	224	Samraja	90	Serhalikalan	234
Abohar	361	Machhiwara	88	Tarn Tarn	945
Fazilka	335	Nekodar	401	Valtoha	113
Jalalsbad	73	Phalour	187	Amritsar	8209
Muktsar	283	Nurmahal	192	Chheharta	756
Doda	63	Banga	170	Jandiala	698

Name of Settlement	Population Potential in million	Name of Settlement	Population Potential in million	Name of Settlement	Population Potential in million
Verka	267	Shamcheurasi	15	Kishtwar	3
Tungpoin Suburban	103	Harians	10	Shupyan	24
Randas	89	Urmer Tanda	114	Anantnag	17
Sethiala	92	Hoshiarpur	183	Pampore	22
Ghariala	89	Dasuya	63	Bijbehara	38
Sobharai	92	Mukerian	56	Gulmarg	39
Khem Karen	83	Garhdiwala	9	Batoto	.42
Patti	201	Una	13	Baramula	.14
Batala	404	Kharer	28	Sopore	.19
Batala Camp	192	Kurali	36	Bondipore	.17
Qudian	142	Morinda	9	Uri	.03
Dharival	203	Roper	47	Srinagar	209
Gurdaspur	233	Nangal Township	61	Charisharif	2
Dina Nagar	17	Samba	31	Leh	.002
Nirot Jaimal Singh	22	Bishno	39	Nahan	52
Dera Baba Nanak	32	Ranbirsingh Pura	80	Dagshai	18
Pothankot	605	Jammu	139	Sabethu	23
Sujanpur	209	Akhnoor	27	Arki	6
Dalhousie	31	Katra	17	Jutogh	34
Bakhol	20	Udhampur	5	Simla	99
Garhshenkar	14	Ramnagar	2	Theog	7
Bedhor urf Dohlan	12	Bhoderwah	3	Narkanda	1
Anandpur Sahib	20	Doda	3	Yol	3

Name of Settlement	Population Potential in million
--------------------	---------------------------------

Palampur	4
----------	---

Nagrote	4
---------	---

Rangra	5
--------	---

Dharamsala	32
------------	----

Nurpur	.18
--------	-----

Mandi	7
-------	---

Sundarnagar	4
-------------	---

Chamba	8
--------	---

Pacote Sahib	.19
--------------	-----

Rampur	.72
--------	-----

Bilaspur	3
----------	---

Hainodevi	.02
-----------	-----

Kulu	.24
------	-----

Table No.V.2.2 Functional Classification of Settlements

Manufacturing Towns			
Predominant function highly accentuated	Predominant function accentuated	Functions moderately diversified	Functions highly diversified
Tungpoin Suburb	Anandpur Sahib	Majitha	Adampur
Verka	Nakodar	Khem Karan	Fatehgarh Churian
Dharawal	Batala	Garhwahadan	Sri Hargobindpur
Hangel Township	Abohar	Alwalpur	Qudian
Chheharta	Panipat	Jandiala	Dakoha
Kartarpur	Buria	Dhuri	Tarn Tarn
Gill	Pai	Buttar	Nurmahal
Dholewal	Redaur	Malerkotla	Bhawanigarh
Ludhiana	Kharkhaunda	Rejpura	Raikot
Gobindgarh	Kharar	Charkhidadri	Bassi
Bondkalan	Bhiwani	Ballaigarh	Sangat
Rattia	Gurgaon rural	Jharra	Kalayal
Jagedhari	Bandipore	Ferukhnagar	Jhajjar
Manimajra	--	Kulu	Gansur
Barsi	--	Retwar	Sadhaura
Charisharif	--	--	Hodel
Faridabad	--	--	Hissar
Nandhpore	--	--	--
Amrit sar	--	--	--

Trade and Transport Towns

Predominant function highly accentuated	Predominant function accentuated	Functions moderately diversified	Functions highly diversified
Machhiwara	Talwandi Bhai	Dasuya	Kalaneur
Buchomandi	Lohregaga	Manse	Urmar Tanda
Tankenwali	Jind	Maur Mandi	Sultanpur
Ferozepur City	Loharu	Moga	Nawanshehr
Kalanwali	--	Raman Mandi	Fazilka
Seseuli	--	Rempura Phul	Kotkapura
Kalka	Goniamandi	Goniamendi	Tirpari Saidan
Halley Mandi	--	Guruhar Sahai	Jallalabad
Jakhal Mandi	--	Bhatinda	Saneur
Uklana Mandi	--	Tapa	Jeitomandi
--	--	Uchana	Doraha
--	--	Ahmedgarh	Girsa
--	--	Samana	Safidon
--	--	Malaut	Morinda
--	--	Mahendargarh	Keithal
--	--	Maham	Tohana
--	--	Ellenabad	Faridabad Town
--	--	Ateli	--
--	--	Gohana	--
--	--	Bahadurgarh	--
--	--	Kurali	--
--	--	Julana	--
--	--	Pehowa	--
--	--	Samalkha	--
--	--	Rewari	--

Service Towns

Predominant function highly accentuated	Predominant function accentuated	Functions moderately diversified	Functions highly diversified
Pathankot	Narot Jaimal Singh	Kapurthala	Dhillwan
Gurdaspur	Hariana	Rahon	Hoshiarpur
Dabhausie Cantt	Shamchuresi	Garhsanker	Mukerian
Jullundur Cantt	Nebhe	Batala Camp	Garhdiwala
Bekhol	Amlon	Una	Dinanagar
Dalhausie	Samraia	Badher urf Dehlan	Patti
Amritsar Cantt	Nalagerh	Narwana	Bonga
Sujanpur	Samraia	Philaur	Muktser
Sultanwind Suburb	Naraingerh	Dera Bassi	Dharmkot
Amritsar Suburban	Beri	Lairu	Khanna
Ferozepur Cantt	Ranbirsingh Pure	Chhachhrauli	Budhlade
Sangrur	Samba	Rohtak	Giddorbaha
Patiale	Bahadurgarh	Shahbad	Ferozepur City
Banur	Anantnag	Chareunda	Sirhind
Chutala	Nurpur	Harneul	Lodwa
Babial	Bhaderwah	Kenina	Kalanour Kelen
Chandigarh	Kulgaon	Ambele	Thanesar
Nilokheri	Banihal	Fatehbad	Ropar
Katra	Degshel	Gurgaon	Karnal
Udhampur	Pampore	Singar	Nuh
Pahalgam	--	Nagrote	Palwal

Service Towns

Predominant function highly accentuated	Predominant function accentuated	Functions moderately diversified	Functions highly diversified
Batote	-	Bijbihora	Bawal
Sopore	-	Narnaund	Ferozepur Jhirka
Baramula	-	-	Bishna
Riasi	-	-	Bedshahpur
Kishtwar	-	-	-
Jammu Municipality	-	-	-
Simla	-	-	-
Thoog	-	-	-
Gulmerg	-	-	-
Palempur	-	-	-
Yol	-	-	-
Sebathu	-	-	-
Jammu Cantt	-	-	-
Bodamibagh	-	-	-
Uri	-	-	-
Bilaspur	-	-	-
Dharamsala	-	-	-
Doda	-	-	-
Paonta Sahib	-	-	-
Chamba	-	-	-
Akhnoor	-	-	-
Arki	-	-	-
Ramban	-	-	-
Kangra	-	-	-
Rannagar	-	-	-
Nahan	-	-	-
Solan	-	-	-

Service Towns

Predominant function highly accentuated	Predominant function accentuated	Functions moderately diversified	Functions highly diversified
Chupiyen	-	-	-
Sri Nainadevi	-	-	-
Narkande	-	-	-
Rampur	-	-	-
Loh	-	-	-
Delhi	-	-	-

BIBLIOGRAPHYBooks

1. Alexanderson, G., Industrial Structure of American Cities, Nebraska, 1956.
2. Berry, B.J.L. and Horton, F.F., Geographic Perspective On Urban Systems, Prentice Hall, Inc., Englewood, New Jersey, 1970.
3. Bogue Donald, J., Principles of Demography, John Willey & Sons., Inc., 1969.
4. Bose, A. (ed), Patterns of Population Change in India, 1951-61, Allied Publishers Pvt Limited, 1967.
5. Bose, A., Studies in India's Urbanization, 1901-1971, Tata McGraw Hill Publishing Co., Limited, New Delhi, 1974.
6. Carter, Harold, The Study of Urban Geography, Edward Arnold, London, 1972.
7. Census of India, 1961, Vol.6, Jammu & Kashmir, Part I A(1) General Report.
8. Census of India, 1961, Vol. , Himachal Pradesh, Part I A(1) General Report.
9. Census of India, 1911, Vol.13, Punjab, Part I A(1) General Report.
10. Census of India, 1961, Vol.6, Census Atlas, Part 9, Jammu & Kashmir.
11. Census of India, 1961, Vol.20, Census Atlas, Part 9, Himachal Pradesh.
12. Census of India, 1961, Vol.20, Part 9, Punjab Census Atlas.
13. Clarke, J.I., Population Geography, Oxford, 1965.
14. Enayat Ahmad, Bihar: Physical, Economic and Regional Geography, Ranchi University, Ranchi, 1965.

15. Friedman, J. and Alonso, W., Regional Development Planning: A Reader, M.I.T. Press, 1964.
16. Hammond, R. and McCullagh, P., Quantitative Techniques in Geography: An Introduction, Clarendon Press, Oxford, 1974.
17. King, L.J., Statistical Analysis in Geography, Prentice Hall, Inc., Englewood Cliffs, N.J., 1969.
18. Mayer, H.M. and Kohn C.F., Readings in Urban Geography, University of Chicago Press, Chicago, 1963.
19. The Mysore Population Study, A Cooperative Project of the United Nations and the Government of India, United Nations Department of Economics and Social Affairs, New York, 1961.
20. Peter Ambrose(ed), Concepts in Geography, Analytical Human Geography.

Journals

1. Beckmann, M.J., "City Hierarchy and the Distribution of City Size", Economic Development and Cultural Change, Vol.6, 1958, pp.243-48.
 2. Berry, B.J.L., "Ribbon Development in the Urban Development Patterns", Annals of the Association of American Geographers, Vol.49, 1959, pp.145-56.
- ~~3. Clark~~
3. Clark, Colin, "The Economic Functions of a City in Relation to its Size", Econometrica, 1945, pp.45-113.
 4. Clark, P.J. and Evans, F.C., "Distance to Nearest Neighbour as a Measure of Spatial Relationship in Population", Ecology, Vol.35, 1954, pp.445-54.
 5. Dacey, M.F., "A Note on the Deviation of the Nearest Neighbour Distance", Journal of Regional Science Association, Vol.2, 1960, pp.81-87.
 6. Dacey, M.F., "Analysis of Central Place and Point Patterns by a Nearest Neighbour Method", Lund Studies in Geography, Vol.24, 1962, pp.55-75.

7. Farrington, J.H., "Field Testing a Simple Gravity Model", Geography, Vol.60, Part 4, November 1976.
8. Hart, J.F., "Functions and Occupational Structure of Cities in the American South", Annals of the Association of American Geographers, Vol.45, 1955, pp.269-286.
9. Harris, C.D., "Functional Classification of Cities in the United States", Geographical Review, Vol.33, 1943, pp.86-99.
10. King, L.J., "A Quantitative Expression of the Pattern of Urban Settlement in Selected Areas of United States" in Peter Ambrose(ed.), Analytical Human Geography, Longman, p.89.
11. Mitra, A., "Internal Migration and Urbanisation in India", Document prepared for UNECAFF Expert Working Group Meeting on Problems of Internal Migration and Urbanisation, Bangkok, Thailand, 1967.
12. Nelson, H.J., "A Service Classification of American Cities" in Mayer and Kohn(eds), Readings in Urban Geography, General Book Depot, Allahabad, 1967.
13. Pownall, L.L., "Functions of New Zealand's Towns", Annals of the Association of American Geographers, Vol.43, 1953, pp.332-350.
14. Pratiullah, S.M., "A New Approach to Functional Classification of Towns", The Geographer, Vol.72, January 1965, pp.40-53.
15. Smith, R.H.F., "The Functions of Australian Towns", Tijdschrift voor Economische En Sociale Geografie, Vol.56, 1965, pp.81-82.
16. Stewart, C., "The Size and Spacing of Cities", Geographical Review, Vol.48, 1958, pp.222-45.

Data Source

R.G. Mitra Asok, India-Levels of Regional Development in India,
being part of General Report on India-Text
Census of India, 1961, Vol.1, Part I-A(1)

R.G. Mitra, Asok, India-Levels of Regional Development in India, Tables,
Delhi Manager of Publications, 1966.

Census of India 1961 and 1951 District Census Handbooks of Jammu & Kashmir.

Census of India 1961 and 1951 District Census Handbooks of Himachel Pradesh.

Census of India 1961 and 1951 District Census Handbooks of Punjab.

Census of India 1961 and 1951 District Census Handbooks of Delhi.

Census of India, 1961 General Population Tables, Part II A(1),
Jammu & Kashmir, Himachal Pradesh, Punjab
and Delhi.