

REGIONAL STRUCTURE OF HARYANA .

**DISSERTATION SUBMITTED IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF PHILOSOPHY**

**by
ASHOK KUMAR GOGIA**

**CENTRE FOR THE STUDY OF REGIONAL DEVELOPMENT
SCHOOL OF SOCIAL SCIENCES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067
1978**

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

We certify that the dissertation entitled
"Regional Structure of Haryana" submitted by Ashok
Kumar Gogia in fulfilment of twelve credits out of
the requirement of twenty four credits for the Degree
of Master of Philosophy (M.Phil) of the University is
a bonafide work to the best of our knowledge and may be
placed before the examiners for evaluation.

Supervisors

S. Nangia

S. Nangia

M. H. Qureshi

M.H. Qureshi

Chairman

A. K. Dey

Dated:

2.1.79

CONTENTS

		Page
	Acknowledgement	i
	List of Maps	ii-iii
	List of Diagrams	iv
	List of Tables	v-vii
	List of Appendicis	viii-ix
CHAPTERS		
I	Introduction	1 - 9
II	Historical Background	10 - 25
III	Physical Setting	26 - 46
IV	Population - Demographic Occupational and Social Characteristics	47 - 68
V	Settlements - Size, Spatial and Functional Characteristics	69 -100
VI	Economy - Land Use, Agriculture and Industries	101 -139
VII	Summary and Conclusion	140 -159
	Appendix Tables	160 - 184
	Bibliography	185 - 187

ACKNOWLEDGEMENT

It gives me a great pleasure to express my heartiest gratitude towards my Supervisors Dr. S. Nangia and Dr. M. H. Qureshi for their expert guidance, encouragement and valuable time, which they spared with interest in going through the matter several times and enabled me to complete the study.

I am highly thankful to Professor Moonis Raza, Professor G.S. Bhalla, Dr. M.K. Premi, Dr. K.S. Siwaswami and Dr. G.K. Chadha for their valuable suggestions.

Finally, I am also thankful to my dearest brother Suresh Gogia for the help he extended to me during the course of study.

Ashok Kumar
(ASHOK KUMAR GOGIA)

LIST OF MAPS

<u>No.</u>	<u>Map No.</u>	<u>Title of the Map</u>	<u>Facing Page</u>
1.	1.1	Location of Haryana in India 1971	1
2.	2.1	Haryana Under Akbar	20
3.	2.2	Haryana - Administrative Divisions 1920	23
4.	2.21	Haryana - Administrative Divisions 1971	25
5.	2.3	Haryana - Administrative Divisions 1978	25
6.	3.1	Haryana - Geology	27
7.	3.2	Haryana - Physiographic Regions	29
8.	3.3	Haryana - Drainage Pattern	33
9.	3.4	Haryana - Climatic Elements	38
10.	3.5	Haryana - Annual Rainfall	39
11.	4.1	Haryana - Percentage of Urban Population to total Population	47
12.	4.2	Haryana - Density of Population 1971	51
13.	4.3	Haryana - Sex Ratio 1971	53
14.	4.4	Haryana - Dependency Ratio 1971	54
15.	4.5	Haryana - Percentage of Literate Population to total Population 1971	56
16.	4.6	Haryana - Size of Household 1971	57
17.	4.7	Haryana - Percentage of Workers engaged in Primary Sector 1971	59
18.	4.8	Haryana - Percentage of Workers engaged in Secondary Sector 1971	60
19.	4.9	Haryana - Percentage of Workers engaged in Tertiary Sector	61

<u>No.</u>	<u>Map No.</u>	<u>Title of the Map</u>	<u>Facing Page</u>
20.	4.10	Haryana - Percentage of Scheduled Caste Population to total Population	62
21.	5.1	Distribution of Settlements	76
22.	5.2	Haryana - Spacing of Villages 1971	82
23.	5.3	Haryana - Location of Towns 1971	83
24.	5.4	Haryana - Near Neighbour Distances. All Towns (District Wise) 1971	85
25.	5.5	Haryana - Near Neighbour Distances. All Towns 1971.	85
26.	6.1	Haryana - Land Use Pattern 1969-72	106
27.	6.2	Haryana - Intensity of Cropping 1969-72	109
28.	6.3	Haryana - Percentage of Gross Irrigated Area to Gross Cropped Area 1969-72	110
29.	6.4	Haryana - Crop Combination Regions 1969-72	127
30.	7.1	Haryana - Levels of Development 1971	148
31.	7.2	Haryana - Regional Structure	149

LIST OF DIAGRAMS

<u>S. No.</u>	<u>Fig. No.</u>	<u>Title</u>	<u>Facing Page</u>
1.	5.1	Haryana - Distribution of Rural Settlements by Lorenz Curve 1971	79
2.	5.2	Haryana - Distribution of Towns by Lorenz Curve 1971	87
3.	5.3	Haryana - Rank Size Relationship of Towns 1971	89
4.	6.1	Haryana - Trends in Land Use Pattern 1960-61 - 1975-76	104
5.	6.2	Haryana - Trends in Net Area Sown 1960-61 - 1975-76	107
6.	6.3	Haryana - Trends in Intensity of Cropping 1960-61 - 1975-76	109
7.	6.4	Haryana - Percentage of Gross Irrigated Area to Gross Irrigated Area 1960-61 - 1975-76	110
8.	6.5	Haryana - Percentage of Area under Wheat, Barley and Gram to Gross Cropped Area 1960-61 - 1975-76	114
9.	6.6	Haryana - Percentage of Area under Cotton, Sugarcane, Rape and Mustard to Gross Cropped Area 1960-61 - 1975-76	119
10.	6.7	Haryana - Haryana - Percentage of Area Under Rice, Maize, Jowar and Bajra to Gross Cropped Area 1960-61 - 1975-76	120

LIST OF TABLES

<u>S. No.</u>	<u>Table No.</u>	<u>Title of Table</u>	<u>Page No.</u>
1.	2.1	Haryana - Sarkars under Akbar	18
2.	2.2	Haryana - Administrative Divisions 1971	24
3.	3.1	Haryana - Drainage Density	35
4.	3.2	Haryana - Average Meteorological Parameters at various places	37-38
5.	3.3	Haryana - Area under Forests 1950-51 - 1975-76	44
6.	4.1	Ranking of Castes 1931	63
7.	4.2	Average Demographic Characteristics with reference to the Density of Population 1971	64
8.	4.3	Correlation Matrix (Demographic, Occupied and Social Characteristics)	66
9.	5.1	Haryana - Percentage Distribution of Rural Settlements and Rural Population by size class of Settlement 1971	71
10.	5.2	'R' Values of Rural Settlements	75
11.	5.3	Chi Sq. Test	77
12.	5.4	Haryana - Distribution of Rural Settlements by lorenz curve 1971	79
13.	5.5	Correlation Matrix (Characteristics of Rural Settlements)	82
14.	5.6	Haryana - Percentage Distribution of Towns and Urban Population with respect to Size Class 1971	83
15.	5.7	Haryana - 'R' Values of Towns (District-wise) 1971	84
16.	5.8	Haryana - 'R' Value of Towns by their size-class 1971	85

<u>S.No.</u>	<u>Table No.</u>	<u>Title of Table</u>	<u>Page No.</u>
17.	5.9	Haryana - Distribution of Towns by their size class and functions 1971	92
18.	5.10	Haryana - Distribution of Monofunctional Towns by their predominant function and degree of specialization 1971	95
19.	5.11	Haryana - Distribution of Towns by their functional type 1961-71	96
20.	5.12	Haryana - Changes in the functional character of towns 1961-71	97
21.	6.1	Correlation Matrix (Land Use Pattern)	105
22.	6.2	Haryana, Yield and Percentage of Area under different Crops to gross cropped Area.	112
23.	6.3	Correlation Matrix (Acreage Response of Wheat) 1960-61 to 1975-76	115
24.	6.4	Result of Stepwise Regression Analysis (Acreage Response of Wheat) 1960-61 to 1975-76	116
25.	6.5	Correlation Matrix (Acreage Response of Rice) 1960-61 to 1975-76	120
26.	6.6	Result of Stepwise Regression Analysis. (Acreage Response of Rice) 1960-61 to 1975-76	121
27.	6.7	Haryana - Cumulative Percentage of Number of Industrial Units, Production and Employment 1971	129
28.	6.8	Haryana - Distribution of Small Scale Industries (With Investment more than Rs. Lakh) by their size of production 1971	131

<u>S.No.</u>	<u>Table No.</u>	<u>Title of Table</u>	<u>Page No.</u>
29.	6.9	Haryana - Distribution of Small Scale Industries by their employment size 1971.	132
30.	6.10	Haryana - Distribution of large and medium scale industries by their size of production 1971	134
31.	6.11	Haryana - Distribution of large and medium scale industries by their size of employment 1971	136
	7.1	Haryana - Regional Structure	150

LIST OF APPENDICES

<u>Table No.</u>	<u>Title of Appendix Table</u>	<u>Page</u>
I	Haryana - Demographic Characteristics 1971	160 - 161
II	Haryana - Growth of Population 1901-1971	162-163
III	Haryana - Occupational Structure 1971	164
IV	Haryana - Concentration of Rural Settlements 1971	165
V	Haryana - Characteristics of Rural Settlements 1971	166
VI	Haryana - Concentration of Urban Settlements 1971	167
VII	Haryana - Towns According to Rank-Size Rule 1971	168-69
VIII	Haryana - Occupational Structure and Functional Classification of Towns 1971	170-171
IX	Haryana - Land Use Pattern, Intensity of Cropping, Irrigation and Rainfall 1960-61 - 1975-76	172-173
X	Haryana - Land Use Pattern, Intensity of Cropping, Irrigation and Rainfall 1969-72.	174-175
XI	Haryana - Percentage of Area under Different Crops to Gross Cropped Area 1960-61 - 1975-76	176
XII	Haryana - Ranking, Percentage of Area under Different Crops and Crop Combination Regions 1969-72	177
XIII	Haryana - Number of Industrial Units 1971	178
XIV	Haryana - Employment in Industries 1971	181

<u>Table No.</u>	<u>Title of Appendix Table</u>	<u>Page</u>
XV	Haryana - Production of Industries 1971	180
XVI	Haryana - Distribution of Small Scale Industries (Investment more than Rs. One Lakh) by their size of Production (In terms of Rs. in lakhs) 1971	181
XVII	Haryana - Distribution of Small Scale Industries (Investment more than lakh) by their size of employment (Number of Persons) 1971	182
XVIII	Haryana - Distribution of large and medium scale industries by their size of production (Production in Lakh Rs. per annum) 1971	183
XIX	Haryana - Distribution of Large and Medium Scale Industries by their size of Employment (Number of Persons) 1971	184

Chapter I

INTRODUCTION

Chapter I
INTRODUCTION

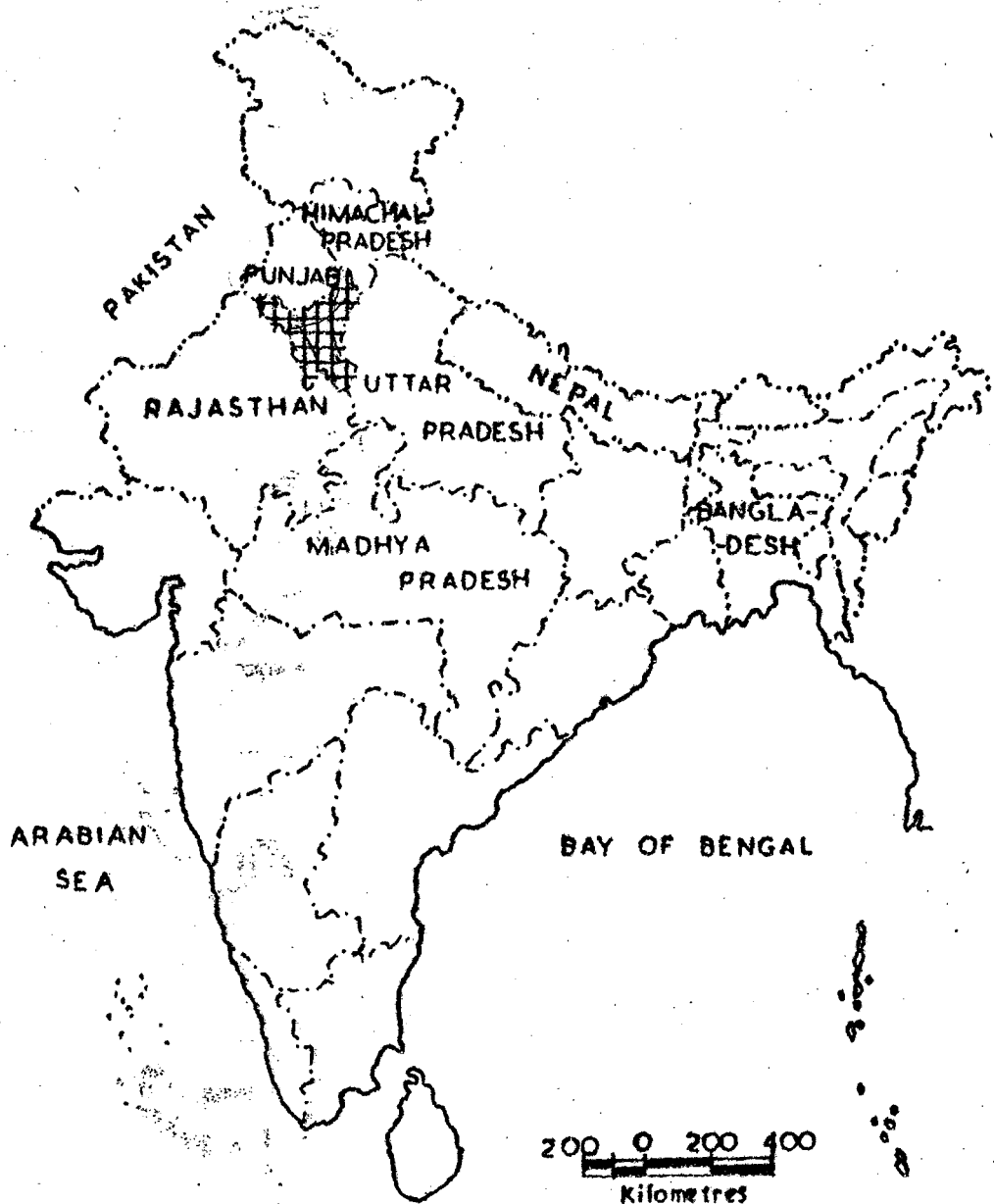
1.1 The term 'Regional Structure' as used in the context of present study, refers to the spatial arrangement of various attributes like physical (structure, relief, drainage, climate, soil etc.), socio-economic (population, settlements, agricultural and industrial activities). The main objective of this study is to analyse the above mentioned attributes in Haryana, so as to identify the regional pattern and also the problems pertaining to their development, so select some sample areas for detailed diagnostic investigation at a later stage and to give suggestions for a planned development.

1.2 Haryana, situated in the northern part of India (Map No. 1.1) lies between $27^{\circ} 35'$ to $30^{\circ} 56'$ north latitude and $74^{\circ} 30'$ to $70^{\circ} 36'$ east longitude. Situated within the Indo Gangatic plains and the Himalayan foothills, it covers an area of 44056 sq. kms. It is bounded by Himachal Pradesh and Punjab in the north, Rajasthan in the West and South and Uttar Pradesh in the east, where river Yamuna forms the physical boundary. The plains of Haryana are formed by the most recent deposits from the rivers.

Haryana can easily be differentiated from the surrounding regions. It is separated from upper Ganga

MAP NO. 1-1

LOCATION OF HARYANA IN INDIA 1971



plain by river Yamuna and this river behaves like a barrier between these two regions. Upper Ganga plain is situated on the east of this river and Haryana is situated on the western side of this river. Moreover, Haryana is quite different from Upper Ganga plain, a humid region, while Haryana is drier one. Again in Upper Ganga plain the alluvial deposition is also more in comparison to Haryana. It is situated on the great Indian water divide separating the Indus system from Gangetic drainage system consequently does not have any river of consequence.

Roughly, Ghaggar makes the northern boundary of the region and separates it from Punjab. Physically, Punjab and Haryana cannot be separated as both are the parts of Indo-Gangetic plain but culturally we can attempt the differentiation as the Haryanvi dialect spoken in Haryana is a branch of Hindi, while Punjabi a language with Gurmukhi script, spoken in Punjab.

In the west and the south, Haryana is bounded by the arid part of Rajasthan which has quite different characteristics. In Haryana, the climate is sub-humid and semi arid. In Rajasthan, aridity is more pronounced. The rainfall is scantier and more erratic and water table is lower than that in Haryana.)

1.3 Review of Literature

Sufficient literature has appeared on Haryana since its inception as a separate State on November 1, 1966. Ample literature is available on agriculture, but not much work has

done on industries, settlements and demographic characteristics of the State. In the following paragraph an attempt has been made to give a critical assessment of the literature available on Haryana.

¹
Dubey and Negi have given a general description of Haryana. They have discussed mainly the four aspects of climate, agriculture, industries and population. This study presents a very general discussion at macro level.

²
Muni Lal has dealt with some aspects of the economy such as agriculture, irrigation, industries and transport. He has tried to focus the role of Congress Government in the recent developments of Haryana. The treatment is essentially political than being geographical.

³
Spate has given a very brief reference to Haryana under the heading, The Indo-Gangetic Divide. He has discussed the history of lost Sarsvati, uncertainty of rainfall, importance of irrigation, prospects of Nangal Dam and the historical importance of Panipat and Ambala. He has discussed all the aspects, but from economic point of view, it has not much relevance because after 1966, economy of Haryana has undergone a tremendous change.

-
1. ✓ R.N. Dubey and B.S. Negi, Economic Geography of India, Kitab Mahal, Allahabad, 1968, pp. 680-687.
 2. ✓ Muni Lal, Haryana, On High Road Prosperity, Vikas Publishing House, 1974, p. 144.
 3. ✓ O.H.K. Spate, India and Pakistan, Methuen and Co. Ltd., New Fatter Lane, London, 1967, pp. 534-541.

⁴
Singh has presented a more detailed description of Haryana. He has taken the Punjab plain as a whole and Haryana as a southern part of this plain separated by river Ghaggar. He has discussed the history, geology, relief, climate, drainage, agriculture, industries, transport and population. This study is sufficient to familiarize one with the region but it does not attempt in depth study of the above mentioned aspects.

⁵
Thani has discussed the history, different views about the name of Haryana, and different aspects of the culture. He has also discussed the development features of Haryana in the field of industries and dairy farming.

⁶
Duggal and Malik have discussed the classification of agricultural markets and have categorised them into four types. They have argued for more agricultural markets and to improve their conditions.

⁷
Jasbir Singh besides his book on Agricultural Geography of Haryana, has written several articles published in different journals. He has discussed the agricultural aspects of Haryana.

-
4. R.L. Singh, India - A Regional Geography, National Geographical Society of India, Varanasi, 1971, pp. 83-123.
 5. Y.R. Thani, Haryana, Raj Pal and Sons, Delhi, 1970, p. 116.
 6. S.L. Duggal and S.L. Malik, "A Classification of Agricultural Markets in Haryana" - The Geographical Observer, vol. x, 1974, pp. 73-78.
 7. (a) Jasbir Singh, "Irrigation Facilities in Haryana," Geographical Review of India, vol. xxxxi, 1974, pp. 102-113.
(b) Jasbir Singh, "Land Use Efficiency in Haryana", Geographical Review of India, vol. xxxiv, 1972, pp. 314-327.
(c) Jasbir Singh, "Regionalisation in the Cropping Pattern", Geography Outlook, vol. I, 1970, pp. 21-29.

One of the well known persons who have done research work on Haryana, but being an agricultural geographer, his main focus has been on the agriculture as an economic activity and on its environmental technological and institutional framework.

⁸
Behl has discussed the importance, sources and the development of irrigation and its impact on the changing cropping pattern. However, he has not presented any statistical proof to show the effect of irrigation on the changes in the cropping pattern.

⁹
Mann has discussed the rural settlement in Hansi Tehsil of Hissar district. He has identified the settlements into three categories based on the daily needs of inhabitants.

1.4 Data Base

The data for the present study is from secondary sources at the tehsil level except for agriculture because it is not available at tehsil level. District Gazetteer of ¹⁰Bohtak and ¹¹Karnal provided the information about the history of ancient

8. R.K. Behl, "Influence of Irrigation on Cropping Pattern of Haryana", The Geographical Teacher, vol.viii, 1973 pp.232-239.
9. R.S. Mann, "Rural Settlement Size in Hansi," The Deccan Geographer, vol.xii, 1974, pp. 27-38.
10. Haryana District Gazetteer Rohtak, Haryana Gazetteer Organisation, Revenue Department Chandigarh, 1970, p. 473.
11. Haryana District Gazetteer Karnal, Haryana Gazetteer Organization, Revenue Department Chandigarh, 1970, p. 645.

Haryana. Ain-i-Akbari¹² of Abul Fazal provided information for medieval period while the census reports¹³ give most of the information about modern times. For industries and agriculture the data has been collected from the 'Directory of small, medium and large scale industries'¹⁴ and the statistical abstract of Haryana.¹⁵

1.5 Methodology

For the physical structure of Haryana, the drainage density has been calculated with the help of simple formula (Drainage Density = length of streams in kms./Total area in kms.). The interpolation method is used to study the spatial distribution of rainfall. The moisture index has been calculated with the help of Thornthwaite's formula i.e. $Im = 100 (r/PE^{-1})$ where r is equal to rainfall and PE is potential evapotranspiration. The spatial association of socio-economic variables has been calculated with the help of correlation method.

-
12. (a) Abul Fazal, Ain-i-Akbari translated by H.S. Jarret vol.ii, Calcutta, 1873.
(b) Abul Fazal, Ain-i-Akbari, translated by H. Blochmann, vol.ii, Calcutta, 1872.
13. (a) Census of India, Series vi, Part VIA, Town Directory Haryana.
(b) Census of India, 1971, Series VI, Haryana, Part II-A, General Population Tables.
(c) Census of India, 1961, vol.xiii, Punjab, Part II-B (i), General Economic Tables.
14. Directory of small, medium and large scale industries. Directorate of Industries, Haryana, Chandigarh.
15. Statistical Abstract of Haryana, The Economic and Statistical Organisation, Planning Department, Government of Haryana.

The spatial distribution of settlements has been analysed with the help of Near Neighbour Distance Technique, Gini's concentration ratio and Lorenz curve. The spacing index has been calculated with the help of Mather's formula. Separate analyses have been done for rural and urban settlements. The effect of physical factors on the distribution of settlements is measured with the help of chi-square test. The hierarchical order of the urban centres has been worked out with the help of rank-size rule. To measure the economic base of the urban centres, the functional classification has been done with the help of Nelson's method.

The agricultural regionalization has been done with the help of lower limit method and Weaver's method. Nerlovian model has been tested to find out the shifts of crops in the region. For this the step-wise regression and multiple regression has been done with the help of computer.

Besides the above statistical tools, cartographic methods like isopleth, choropleth and diagrammatic representation have been applied to prepare maps and to understand the spatial arrangement of the phenomena.

1.6 Plan of the study

The study is divided into seven chapters. The first chapter gives an introductory idea about the location, objectives of the study data-base, review of literature and the plan of the study.

The second chapter deals with the historical aspects. In this chapter, first a brief discussion has been given on the controversy of the name of Haryana. Secondly, the analysis is done with reference to its spatial dimensions and socio-economic characteristics through ancient, medieval and modern periods.

Third chapter deals with the regional variations in physical attributes. The geology, relief, drainage, natural vegetation and climate have been discussed and attempt has been made to discuss physical aspects of Haryana.

Chapter fourth deals with the demographic aspects of Haryana. The six variables pertaining to density of population, sex-ratio, size of household growth rate and dependency ratio have been analysed both at rural and urban level. Besides these six demographic characteristics, the occupational structure of the people also has been discussed in this chapter.

✓ The fifth chapter brings out the detailed picture of the settlement structure of Haryana. The spatial distribution pattern of rural and urban settlements, spatial distribution of settlements by their size class, spacing of rural settlements have been studied. The concentration ratio, the rank-size rule and their functional classification is also discussed.

✓ Chapter sixth deals with the economy of Haryana. In this chapter the emphasis have been laid on the study of agricultural and industrial economy. The agrarian economy gives the idea of land use pattern, intensity of cropping, cropping pattern, crop

combination regions and acreage response of crops, while the industrial economy reflects the employment capacity, number of industrial units and production size of industries.

Finally, in chapter seven, attempt has been made to present summary, some conclusions and generalisations derived from the study of the regional structure of Haryana.

Chapter II

HISTORICAL BACKGROUND

Chapter II

HISTORICAL BACKGROUND

Haryana is a state with glorious past and historically it has been the area of various cultural currents which have come to India from west and north west and it remained the cockpit of battles and struggles.

In this chapter, an attempt has been made to discuss the evolution of Haryana with reference to its spatial dimensions and socio-economic characteristics through ancient, medieval and modern periods.

2.1 Haryana - The Controversy about the Name

The word Haryana has been a subject of considerable debate during the past many years but definitive opinion has not yet emerged. Consequently, no one seems to know for certain as to what does the name of Haryana mean and how the present state of Haryana came to acquire this name.

First time, the word 'Haryana' appeared in the Delhi Museum Inscription dated 1328 A.D. which refers to this region as 'heaven on the earth' and includes Delhi (Dhillika), founded¹ by the Tomaras in this region. The Palam Baloi Inscription calls this territory 'Hariyanaka' and states that it was first ruled² by the Tomars.

-
1. Haryana District Gazetteers, Rohtak, Haryana Gazetteers Organisation, Revenue Department Chandigarh, 1970, p. 21.
 2. Ibid., vol. v, Appendix, p.34.

According to the yan theory, Haryana is a compound word formed out of combination of the words HAR or HARI meaning God and YAN meaning Rath or Coach. So this conjective means, 'the coach of the lord' and signifies 'the land favourite to the Gods'.³ Due to religious importance of various places like Kurukshetra, Gurgaon and Asthal Bohar in Haryana, YAN theory gives an impression of being historically correct. However, it is open to objection on two grounds. It does not explain as to how the words HAR+YAN become suffixed with 'A' of Haryana. Secondly, the YAN theory does not help us in explaining the origin and meanings of the territorial divisions.

It is also believed that since this region was inhabited by the Ahirs during the post Mahabharata period, it came to be known after their name, as 'Abhirayana', 'Ahiryana', Hiriyana,⁴ Haryana.

In the Imperial Gazetteer of India, Haryana is explained to be derived from Hari (Green) and is a recollection of the time, when this land was rich and fertile.⁵ According to Wilson, the name Haryana is given to this land as it was

3. Arjan Dass Malik, "The Ethmology of the Word Haryana" Haryana Review, vol. viii, no. 10, 1974, p. 18.
4. K.C. Yadav, Haryana - The Land and the People, Glimpses of Haryana (ed.) by Budha Prakash, Kurukshetra, 1967, p. 179.
5. Imperial Gazetteer of India, vol. xiii, p. 54.

6
formerly a green forest.

7
Ross David, opines that literally means green lands.
The statement of Ross has also been corroborated in Hissar district Gazetteer, which mentions that Haryana is from 'Hara' (Green). It is correct derivation of the name, it is however scarcely applicable, but probably carries us back to a past in which Sarasvati was once the scene of flourishing
8
civilization.

Looking at the present conditions of the region in which green revolution has successfully been carried out could be written as the land of Hariyali (green land) and to be believed as the correct theory about the origin of its name.

2.2 Haryana During Ancient Period

Haryana has been the birth place of most ancient civilizations. Sothi civilization, which is more ancient than Harappan civilization was born and developed 5,000 years ago on the land of Haryana. The remnants of ancient civilization are available in the form of remains in the villages of

-
6. The Punjab Notes and Queries No.547, vol. 1, p. 54.
 7. Ross David, The Land of Five Rivers, p. 297.
 8. The Imperial Gazetteer of India, vol. xiii, p. 54.

Rakhigarh (near Jind), Sangatpura, Banawati (near Faridabad) and Mittathal (near Bhiwani).

The philosophy of 'Karamyoga' also took shape on the holy land of Haryana. It was here that the Aryan civilization took roots and flourished and the great scriptures were composed and the first hymns sung by the Aryans. The most renowned scripture "Srimad Bhagwadgita" was first expounded here in the holy land of Kurukshetra by Lord Krishna and the war of Mahabharata, fought in Kurukshetra has become an unforgettable chapter of Indian history.

Haryana has also been the centre of economic resurgence of India. History of agricultural India is a witness to the fact that Sarasvati Valley in Haryana was the first place to be made culturable by Aryans, as a result of which agricultural economy of India flourished in old days. /The Mahabharata knows Haryana as the land of plentiful grains (BAHUDHANYAKA) and immense riches (BAHUDHANA). The account of the expedition of Nakula relates that he advanced on Rohtak, full of horses, cattle, wealth and crops. ⁹ Rohtak seems to have been the centre and possibly the capital town of the Yandheya tribe, which ruled over a large area extending over Haryana and adjoining

9. Budha Prakash, Glimpses of Haryana, University of Kurukshetra, 1967, p. 13.

tracts of Uttar Pradesh and Rajasthan, between 150 B.C. and 350 A.D. It is supported by the discovery of a large number of coinmoulds of the Yandheya tribe from Khokra Kot.¹⁰ It still occupies a place of pride on the agricultural map of India.

On account of its strategic position, Haryana occupied a key position in the political history of India from very early times. In this first half of the fourth century Chandragupta I and Samudragupta reconstituted and consolidated the Magdhan empire and in that process annexed Hariyana also. In the sixth century, the Gupta empire broke down and about 510 A.D. the Hunas, led by Toramana, swooped from the north-west and sacked cities and religious establishments from Sanghol in Ludhiana district to Kausambi near Allahabad. Obviously, they passed through Hariyana leaving some settlements, like Jaula, which bears the name of their ruling clan.

Under the Vardhana rulers (606-647 A.D.), Haryana was called Srikanta Janpada. In the beginning of the seventh century, the court poet of Harsavardhna, Bana and the Chinese pilgrim Hsuan Chuwang gave adequate details of its people and their pursuits, which enables us to form a clear idea of its economic, social and cultural set up.

10. Haryana District Gazetteers, Rohtak District, Revenue Department, p. 12.

The secret philosophy of prosperity of this region was the fertility of its soil which its people skilfully exploited. Wells and Wheels supplied water to the crops and farms were full of high heaps of harvests. Wheat, sugarcane,¹¹ and paddy were the important crops.

The contribution of the people of Haryana in the field of music and dances, fine arts and sculpture, has been no less important. Haryana enjoyed the privilege of being a centre of Indian culture and art in the days of Gupta Kings, which is known as 'the Golden period of Indian history'. This is evident from the writings of Bana Bhatt, great poet of Harash Vardhna, who has given the richest tributes to social, cultural and economic prosperity of Haryana. Bana spoke of rich city of Thanesar and like Bana, Hsuan Chwang has also given a glowing description of Sthanvisvara region. He said that it was above 7,000 li, (3 li = 1 mile) in circuit and its capital, with the same name, was above 20 li in circuit. The soil was rich and fertile, the crops were abundant and the climate was warm.¹²

During the period of Pratihar, Haryana reached at the top of its progress and prosperity and Somadeva has written

11. Ibid., pp. 257-262.

12. Budha Prakash, Glimpses of Haryana, The University of Kurukshetra, Kurukshetra, 1967, p. 18.

beautifully in "Yasastilakacampu". In his view, this region was like an ornament of the earth and was replete with all requisites of good and happy life. The people of this region were having all the necessary items. The villages of this region were full of cattle wealth, cows, buffaloes, goats, sheeps, camels and horses. Abundance of irrigation works rendered them free from the vagaries of rains. The main occupation of the people was agriculture and they were yielding bounteous harvests from the fertile soil of the region.

2.3 Haryana During Medieval Period

During medieval period, Haryana witnessed a decline in economic prosperity and educational and intellectual pursuits. It was a centre of political instability and this instability retarded the development of the region.

In the beginning of this period (1030 A.D.), the Tomara Rajputs ruled over Haryana from Delhi when the Ghaznavi invaded from the north west. In 1036 A.D., Sultan Masud in the effort to extend the power advanced towards Hansi and seized it but in 1043 A.D. it was recovered by the Delhi Raja (Tomar). After the defeat of Prithvi Raj by Muhammad of Ghor in 1192, the Jats laid siege of to Hansi but were defeated by Kutb-ud-din. Hansi then became a part of Delhi Kingdom.

13. The Imperial Gazetteer of India, vol. xiii, pp. 145.

The sultanate of Delhi established in 1206 depended on the support of Muslim nobles. The restless Hindu chiefs of the area, ready to assert their independence, were kept in check by the newly settled Muslim chiefs. The Haryana region became the source of strength and weakness to the Sultans depending on the political circumstances and action of the chiefs.

During the Mughal period, Haryana comprised of the Sarkars of Delhi, Rewari, Hissar, and Sarhind¹⁴ and due to its geographical situation, it occupied an important position in the history of that period. It was here that at the battle-field of Panipat., Babar laid the foundations of Mughal empire. After Babar's death on December 26, 1530, Humayun assumed the kingship of Hindustan. He ruled for a decade till he was expelled from India by Sher Shah Suri in 1540. After Sher Shah's death Humayun again took the Indian empire from his weak successors, but he died soon. At that time his 13 years old son Akbar was in Punjab and he proceeded at once towards Delhi in order to meet the Afghan army under the great Hindu General Hemu of Rewari in Haryana.

Akbar put the seal of his genius on every aspect of the things that he touched. At that time, however, Haryana did not

14. Abul Fazal, Ain-a-Akhali translated by Jarret, IInd ed. vol. ii, p. 43.

form a separate Subah but it was a part of Delhi Subah about whose geographical situation Abul Fazal has written that on the east of Delhi Subah lies capital of Agra, on north east it manges with Khairabad in the south of Oudh; to the north are Himalayan mountains on the south the subahs of Agra and Ajmer and on the west is Ludhiana.¹⁵ It shows that at this particular time Delhi Subah was not a homegeneous unit because it consisted of three distinct cultural divisions viz., Rohilkhund, the upper doab and Haryana tract.

Table 2.1

HARYANA

SARKARS UNDER AKBAR¹⁶

S1. No.	Name of Sarkar	Area in Bighas	Percentage to total area	Total revenue in Dams ¹⁷	Percentage to total revenue	Zami-dars
1.	Rewari	1155011	13.32	35222658	13.67	Rajput, Jat, Ahir
2.	Hissar	3114497	35.92	52554905	20.39	Jat, Rajput
3.	Delhi	2772333	31.97	18189414	7.05	Afghan, Gujjar
4.	Sirhind	1628857	18.79	151775859	58.89	Rajput, Jat, Brahmin
5.	Region	8670698	100.00	257742836	100.00	

15. Abul Fazal, Ain-i-Akhali, translated by Jarret, vol.II, p. 283.

16. Ibid., pp. 204-205.

17. 40 Dams were equal to one Rs. of Akbar's time.

The Table 2.1 depicts that at the time of Akbar, Haryana was divided into four Sarkars. The Hissar was the biggest Sarkar in terms of its cultivated area but the revenue collected was the maximum from Sirhind.

The percentage values worked out for this table show that the cultivated land of Sirhind was very much fertile since 58.89 per cent of total revenue was collected from only 19.79 per cent of the total cultivated area 67 per cent of total cultivated area was in Hissar and Delhi Sarkars, but they are contributing 27.44 per cent of the total revenue.

Revenue rates for principal crops for Polaj Bigha in the spring harvest in Haryana of the year 1581 A.D. shows that the sugarcane, wheat, barley, gram and mustard seed were the important crops, grown in the rabi season.

During Akbar's period the administration of Sarkars was run by a Fauzdar whose duties were multifarious and he was the commander of military force stationed in the Sarkar to put down smaller rebellions.¹⁸ Most of the Zamindars were Jats, Rajputs and Brahmins and it shows that these were the major castes of the region which were dominating. Even now a days, these castes bear a strong influence on the socio-political structure of Haryana.

18. Jadunath Sarkar, Mughal Administration, Bombay, 1972, p. 42.

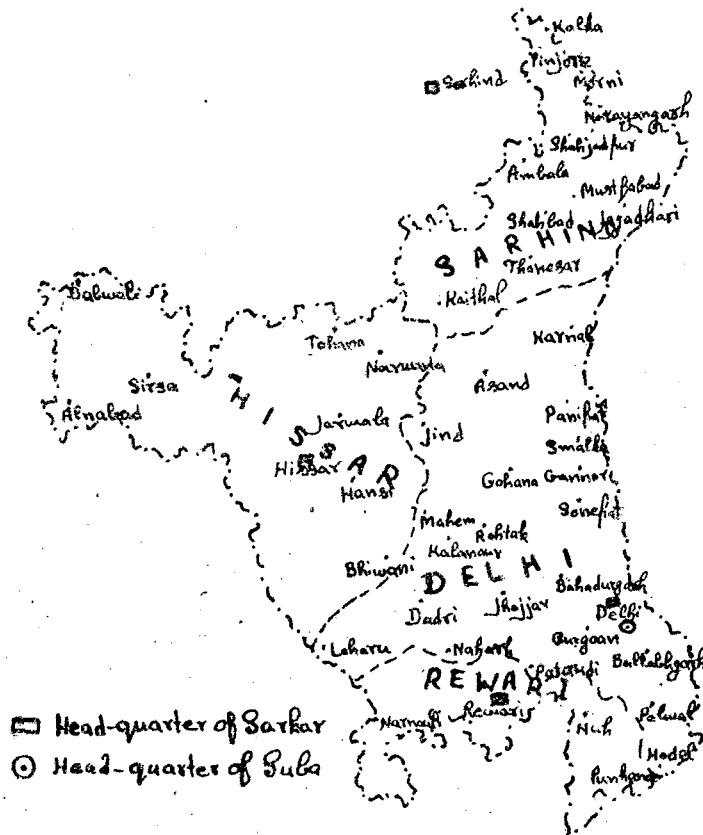
These four Sarkars of Haryana were further sub-divided into seventy Parganas (Mahals), and were the administrative-cum-Fiscal units (Map No.2.1). Some of the important Parganas were Bawal, Pataudi, Taoru, Rewari, Sohna and Nirmana of Rewari Sarkar where Ahir, Rajput, and Jat were in majority. Agrawa, Ahroni, Athkara, Bhangoyal, Puniyana, Barwala, Bhatu, Bhatner, Tohana, Sirsa, Siwani, Fatehbad and Hansi were in Hissar Sarkar where Rajput and Jat were dominant castes. Panipat, Palwal, Beri, Jhajjar, Dadri, Rohtak, Sonapat, Safidon and Karnal Parganas of Delhi Sarkar where Afghan, Gujjars, Rajput and Jat were in majority. There were 33 Parganas in Sirhind Sarkar, but only six of them have been included in the present Haryana. There are Ambala, Kaithal, Pundri, Shahabad, Chahai and Thanesar.

Haryana enjoyed peace and prosperity during the regimes of Jahangir and Shah Jehan but the history of Aurangzeb (1659-1707 A.D.) is full of oppressive acts towards his opponents. During his regime, he destroyed the shrine of Kurukshetra. These tyrannical oppressions led to a number of people from all faiths against him and the Satnamis of Narnaul rose in rebellion in 1672 A.D. to save their life and faith.

With the death of Aurangzeb in 1707, the Mughal rule in India ceased to be an effective force but Haryana suffer a lot during this period. However, living in these political and social conditions, people used to celebrate their fairs and

MAP NO. 2.1

HARYANA UNDER AKBAR



festivals, auspicious occasions like marriage and birth, engagements with special songs.

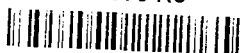
At the end of the eighteenth century, Haryana was a veritable no-man's land, acknowledging no master and tempting none, and thus it remained the cok-pit of battles and struggles which culminated in the battle of Panipat on January 14, 1761. This was clearly decided that neither the Marathas, nor the Afghans, and/nor even the Mughals would rule over India but a different power would rule, which came out to be the British.

2.4 Haryana During Modern Period

Haryana had experienced great political disturbances in the eighteenth century. These were identified with the terms 'Singhashani Ka Ram Raula' or 'Bhaggardi', the 'Sikh hurly burly or the Martha anarchy. The Mughal authority lost its grip over the region and Sikhs never really established their grasp over the country south of Panipat, and they held, what they did possess, only as feudatories of the Marathas. During this whole period, it was a constant contest between these three powers, and the tract formed a sort of buffer. In 1760, Ahmed Shah Abdali had to approach Delhi by way of the Ganga Doab, as owing to the constant passage to and fro of the Marathas

19. Karnal District Gazetteer, Haryana Gazetteer Organisation, Chandigarh, 1976, p. 37.

DISS
352.007220954558
G5578 Re



TH219

TH-219



troops. However, finally, British took over the region.

From the beginning of the 19th century, most of the present areas of Haryana were ceded to the East India Company by Daulat Rao Scindia. Only the district around Sirsa remained semi-independent under the Bhattis, but they were also defeated and this area became a part of British India. By 1819 A.D., it became difficult to administer the areas reaching up to Hissar District from Delhi. It was, therefore, decided to create four divisions of Delhi, viz., Delhi, Rohtak, Gurgaon and Hissar. Small principalities like Jhajjar, Bahadurgarh, Rewari and others remained under Nawabs and Rajas who accepted the British rule.

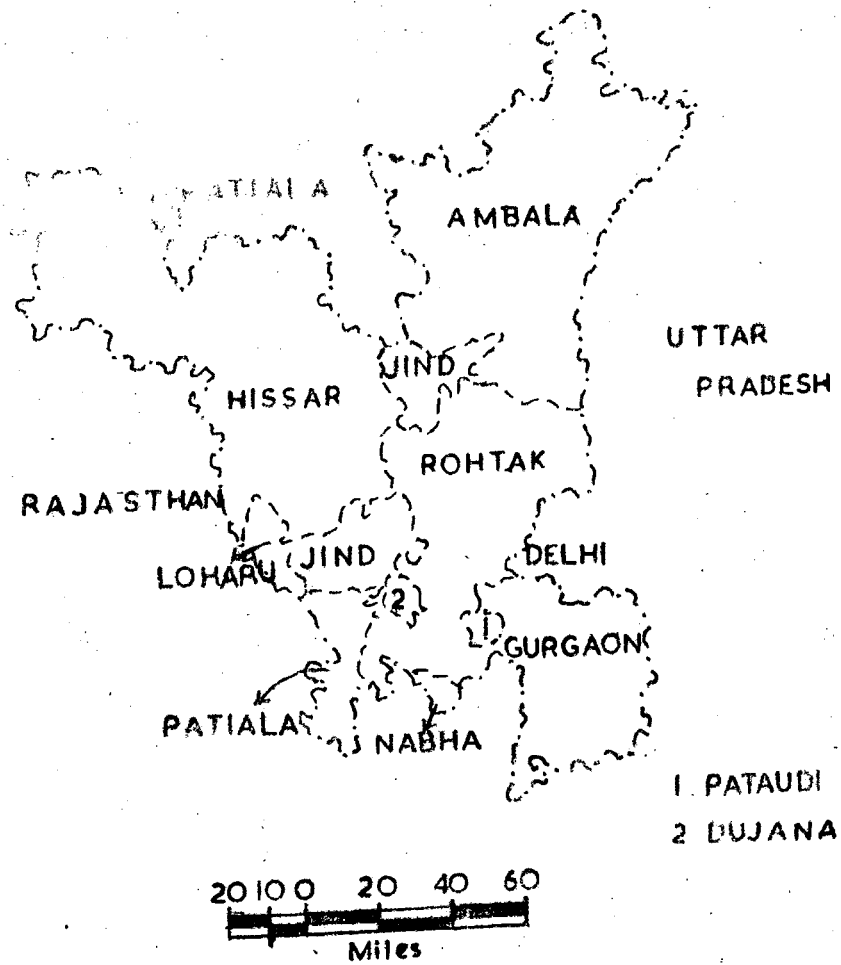
In the war of independence of 1857 A.D., Haryana as a whole revolted against the British empire and gave the full support in the struggle for independence. In spirit of revenge, Haryana was disintegrated and attached to the neighbouring state, which stood by the British empire. At that time, it was integral part of Agra and Delhi provinces, but it was then tagged with the Punjab beyond Sutlej (Map No.2.2). All this was done to punish the people of the area with perpetual backwardness.

Haryana After 1947

In 1947, with the achievement of independence, the Punjab was partitioned - western part became the part of Pakistan and the east Punjab remained within India and Haryana became a part of the east Punjab.

MAP NO. 29

HARYANA ADMINISTRATIVE DIVISIONS 1920



Source: - Punjab Disturbances, Govt. Printing Press, INDIA, 1920

The areas now constituting Haryana remained backward as compared to the present Punjab. The economic imbalances were becoming apparent. Throughout this period, the language controversy had been brewing in Punjab and in the course of time it got linked up with the state politics. To meet the pressing demands a regional formula was evolved in 1956 and according to this formula, Punjab was declared a bilingual state in which both the Hindi and Punjabi were recognised as official languages.

On March 20, 1965, Haryana development Committee was set up by the Punjab Government to look into the development disparity between the Haryana region and the rest of the state and to recommend remedial measures for correcting this imbalance. However, much before the submission of report bringing out the backwardness of Hindi region, late Sant Fateh Singh demanded the formation of Punjabi Subah.

Another Committee ²⁰ submitted its report on 18th March 1966 and gave two reasons for a separate state of Haryana:

- (i) Imposition of compulsory teaching of Punjabi in the Hindi region;
- (ii) Backwardness of Haryana and its economic and political exploitation by the Punjabi speaking region. The committee also recommended that a

20.

Parliamentary Committee under the chairmanship of S. Hukam Singh, the Speaker of the Lok Sabha at that time.

Commission should be set up to adjust the boundary between the three states i.e. Punjab, Himachal Pradesh and Hindi speaking state, to be known as Haryana.

Formation of Present Haryana

On April 23, 1966 the government of India published a resolution appointing commission to examine the existing boundary of Hindi and Punjabi regions and to recommend what adjustments are necessary to secure linguistic homogeneity in the proposed Punjab and Haryana States. This commission submitted its report on May 31, 1966 and on the basis of this report Haryana came into existence, on November 1, 1966.

Table : 2.2

HARYANA

ADMINISTRATIVE DIVISIONS

1971

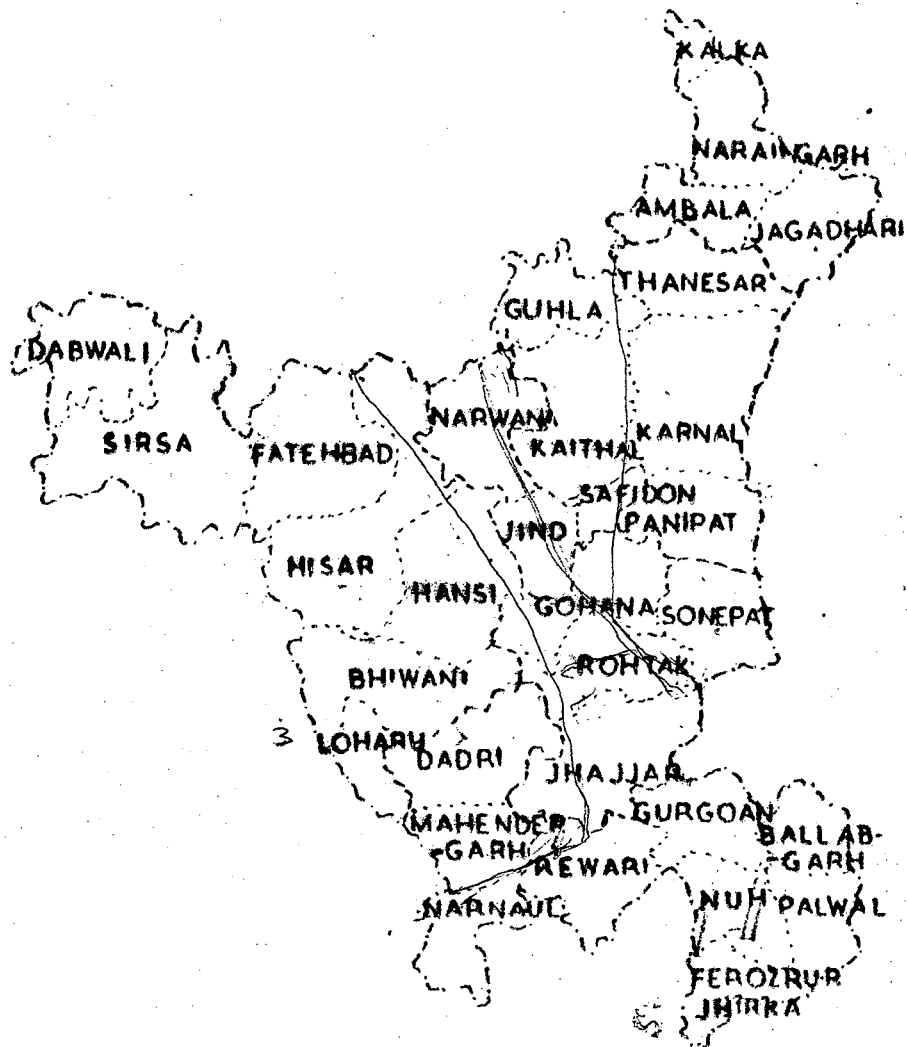
<u>Sl. No.</u>	<u>Name of Dist.</u>	<u>No. of Teh.</u>	<u>Name of Tehsil</u>
1.	Ambala	4	Kalka, Naryangarh, Ambala, Jagadhri.
2.	Karnal	5	Guhla, Kaithal, Thanesar, Karnal and Panipat.
3.	Rohtak	4	Gohana, Sonepat, Rohtak, Jhajjar
4.	Gurgaon	6	Rewari, Gurgaon, Ballabgarh, Nuh, Palwal, Ferozpur Jhirka.
5.	Mahendragarh	3	Narnaül, Dadri, Mahendragarh
6.	Jind	3	Jind, Narwana, Safidon
7.	Hissar	7	Dabwali, Sirsa, Fatehbad, Bhiwani, Loharu, and Hansi
21.	The Commission consisted of J.C. Shah, S. Dutt and M.M. Phillip.		

Administrative Divisions

According to 1971 Census, Haryana is divided into seven districts. These seven districts are again sub-divided into 32 tehsils (Map No.2.21). The table given above clearly shows that at present Haryana is divided into seven districts with the upgrading of Sonapat, Bhiwani, Kurukshetra and Sirsa units into districts but this study is based on 1971 administrative divisions have been taken into consideration (Map No.2.3).

MAP NO-221

HARYANA ADMINISTRATIVE DIVISIONS 1971



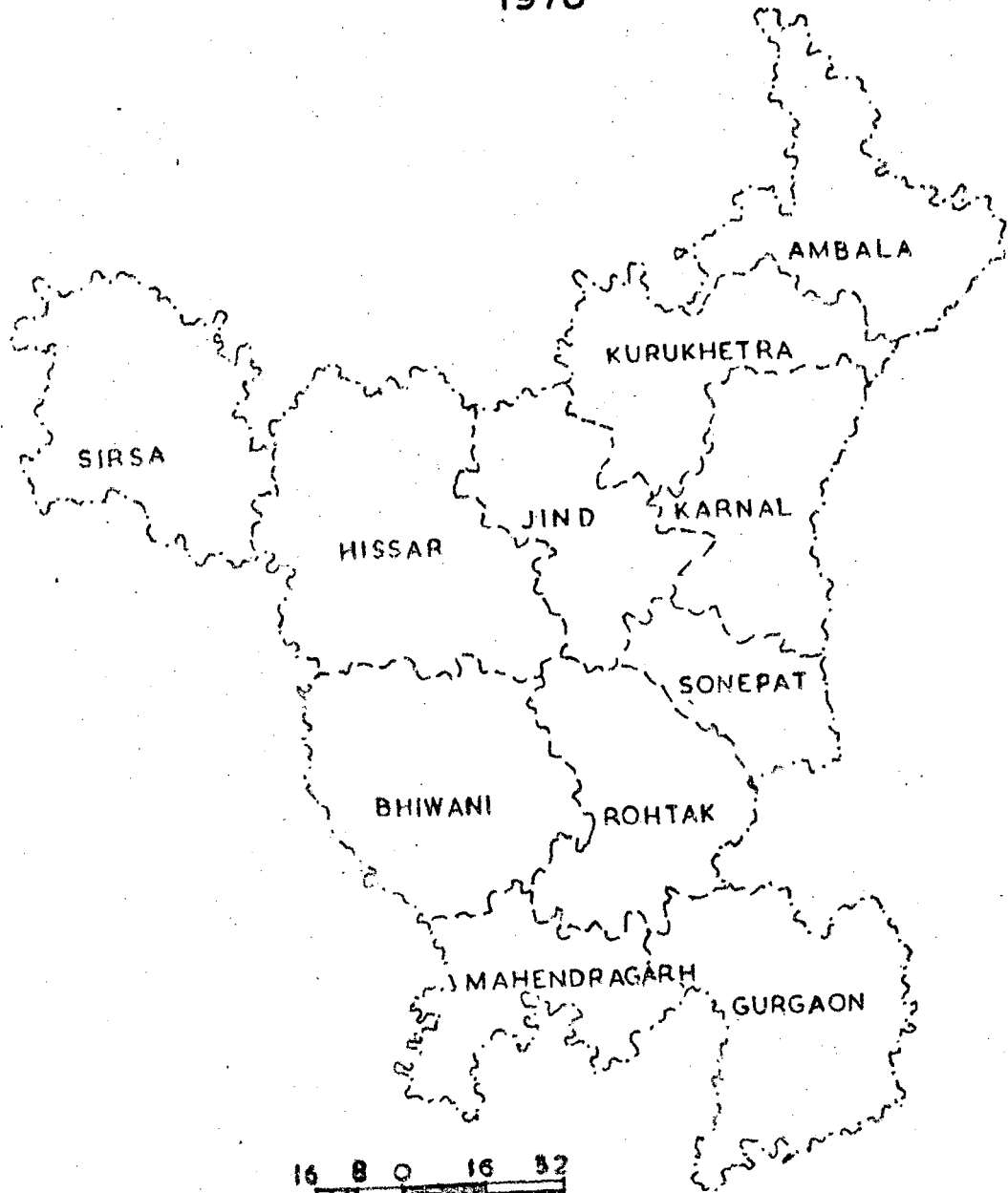
--- District Boundary

..... Tehsil Boundary



MAP NO. 2-3

HARYANA ADMINISTRATIVE DIVISIONS 1978



16 8 0 16 32
Kilometres

Chapter III

PHYSICAL SETTING

Chapter III

PHYSICAL SETTING

Haryana is a broad level plain forming the water divide between the basins of river Indus on the west and the Ganga on the east. Most of Haryana is formed of alluvium and the entire region, except the flood plains of Yamuna and Khaddar the alluvium is "old", generally known as Bangar containing sand, clay, silt and hard calcareous concentrations about the size of nuts, known as 'Kankars'. In the Khadar land, the recent deposits of alluvium are found, which consist of coarse sand and some silt regularly deposited by the rivers and small hill streams of Indo-Ganga water shed.

In this chapter, an attempt has been made to discuss the attributes of physical environment e.g., structure, relief, drainage, climate, soil and natural vegetation of the region.

3.1 Geology

Geologically, most of the northern region of Indian plain is a very recent origin and the material has been brought by the streams. The Siwalik foothills situated in this region are composed of tertiary and mainly of upper tertiary sedimentary deposits brought by the streams. The hills of north-east are newly formed but in southern Haryana, the Aravalli's outcrops are unconformably overlain by Delhi system, which are

exposed mainly in Gurgaon and Mahendragarh district. (Map No.3.1) The formation of these rocks took place during the lower Cuddaph age.¹ Geologically, Haryana can be divided into three regions.

3.11 Sub-Montane Tract

It is mainly composed of boulders, gravels and unconsolidated sand with clay. The area which lies near the foot hills forms part of the sub montane tract. The rocks of this tract belong to the Siwalik system.

3.12 Alluvium Tract

Geologically this sub-region is divided into Khadar and Bangar. Khadar constitutes newer alluvium of sandy part, generally light coloured and having less 'kankar' composition. Bangar is formed of older alluvium of more clayey composition, generally of dark colour and full of kankar.

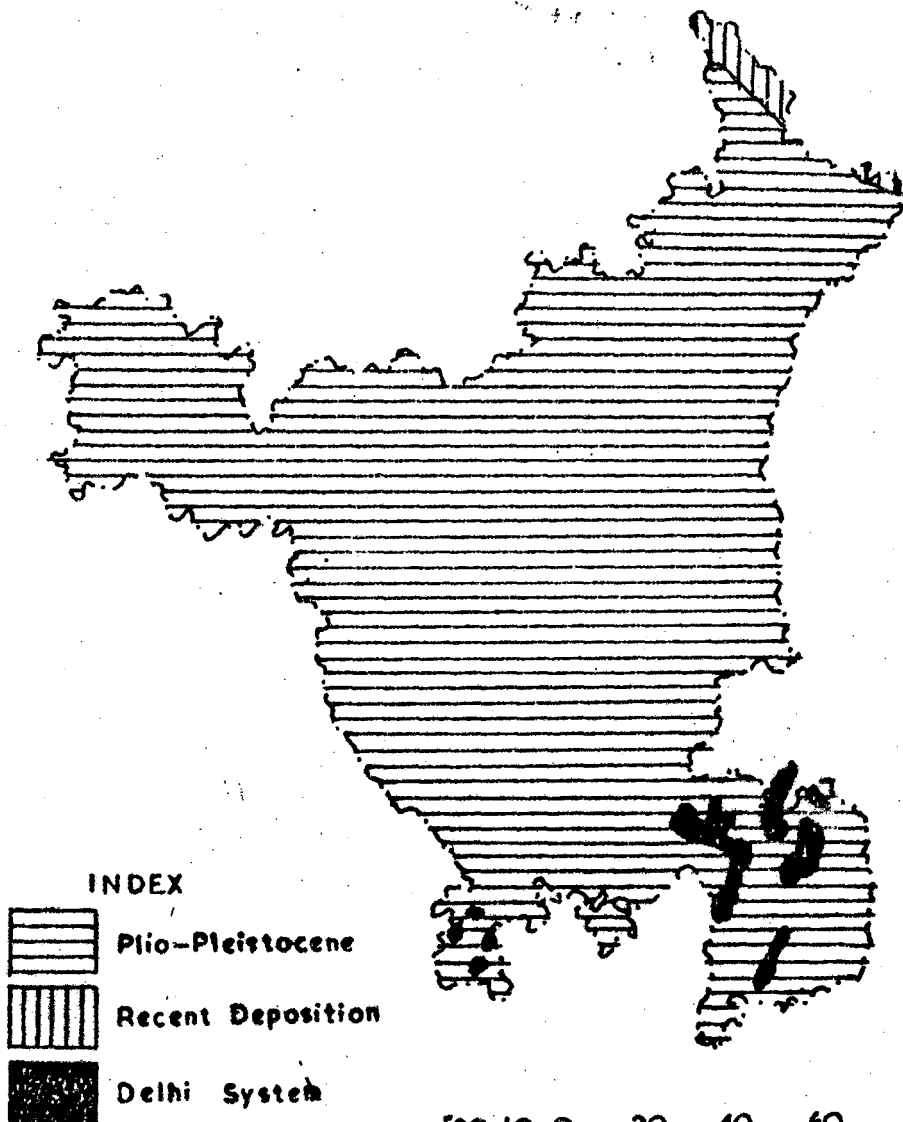
3.13 Aravalli Inliers

The small hills of Gurgaon and Mahendragarh districts are remanants of the old mountain chain known as Aravallis. The Aravalli mountains of the southern part of the region, were subjected to considerable erosion till the late cretaceous,

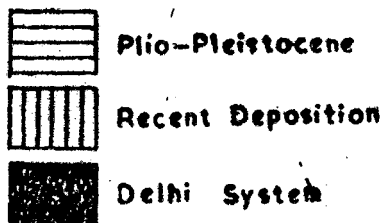
1. D.N. Wedia, Geology of India, London, C.I.B.S., and MacMillan, 1970, pp. 121.

MAP NO. 3-1

HARYANA GEOLOGY



INDEX



20 10 0 20 40 60
Kilometres

when the Himalaya started rising. The earth movements continued till the middle miocene when the Himalayas came into existence. As a result of the strong impulse, which brought the youngest mountain chain into existence, a fore deep was formed in front of the rising Himalaya.

The granite and gneisses of Bundelkhand, normally considered to be oldest rock formations, are found overlying the banded gneissic complex. These are also exposed in some parts of Rajasthan, which is close to the region and they constitute part of the Aravalli system. The rocks belonging to this system extended to the southern part of Haryana and the slate quarries of Kund (a name of village) are considered to belong to this system.

3.2 Relief

Looking at the physiography, it can be said that most of the region is a broad level plain. In the north-east, Siwalik foothills represent a high elevated area, where in some of its parts, the height is above 600 meters. Again in its southern part, Aravalli range, related to Delhi system also disrupt the region. Some parts of district Mahendragarh and Gurgaon are covered by the rocky outcrops of the Aravalli hills.

Broadly, Haryana has three physical divisions - the plains, the Sivalik foothills and Aravalli range. The plain area covers the entire state except southern part of Mahendragarh, south-western part of Gurgaon and Mahendragarh district and

northern part of district Ambala. On the basis of aridity, the plain area can further be sub-divided into eastern plain (highly fertile) and western plain (covered with sand dunes). It is very clear that since the Siwalik foothills and Aravalli hills belong to the different geological systems, they cannot be treated as one sub-region.

However, the present relief of the region gives us the idea that on the basis of its relief characteristics, it can be divided into four sub-regions (Map No.3.2)

- 3.21 Sub Montane Region
- 3.22 Eastern Plain Region
- 3.23 Western Dunny Region
- 3.24 Southern Hilly Region

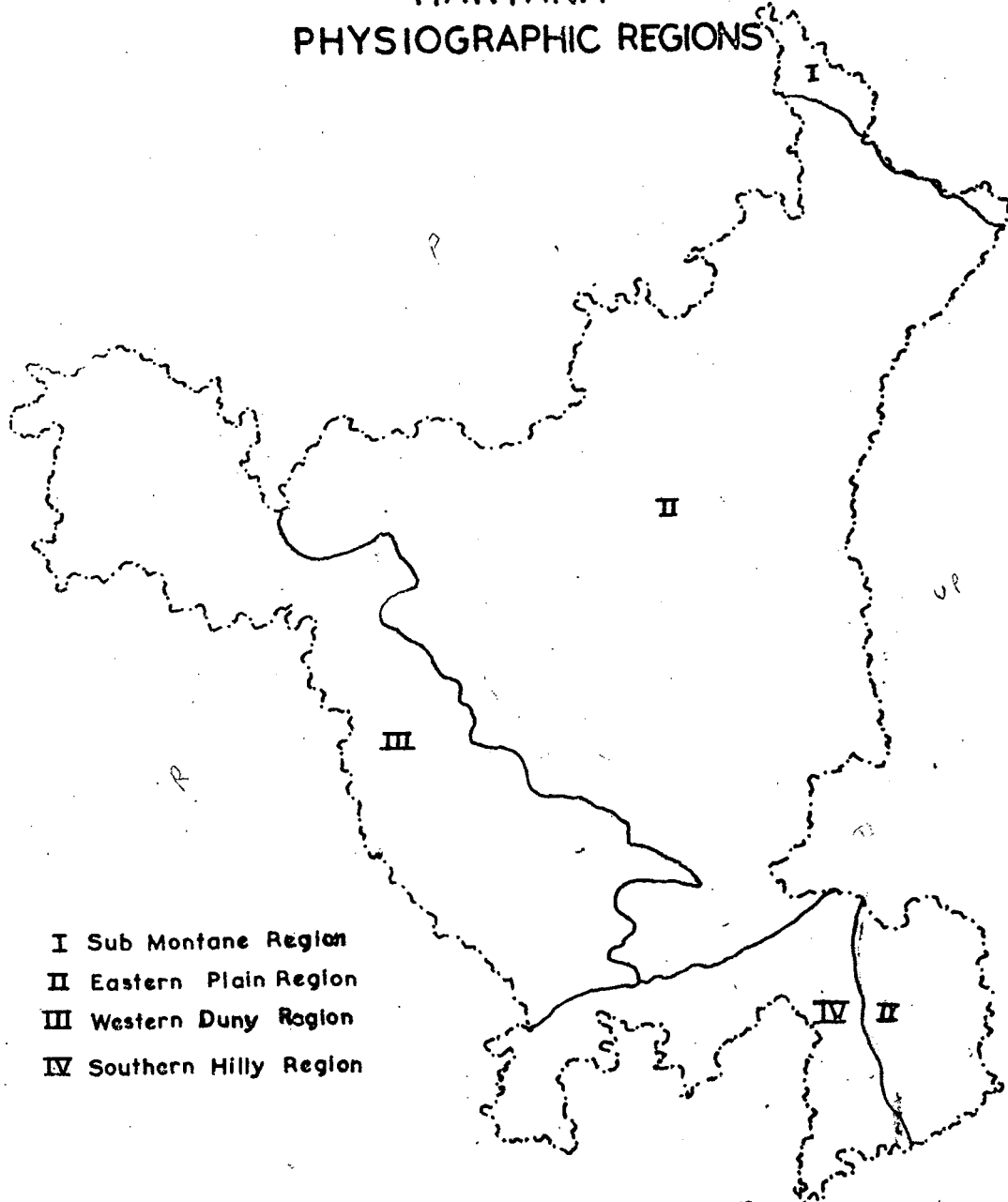
3.21 Sub-Montane Region

This region consists of foothills of Siwalik, situated in the north eastern part of Haryana. It has a slope towards south and south west ward from the foothills of Siwalik.² In this region, 'chos' (hill torrents) are very important and they create the problem of soil erosion. These 'chos' are nothing but seasonal streams. In the north east corner of the region, lies Morni hill, which is the highest hill (5,000 mt.) of sub montane region.

2. R.L. Singh, India - A Regional Geography, Silver Jubilee Publication, NGSI, Varanasi-5, pp. 85.

MAP NO. 32

HARYANA PHYSIOGRAPHIC REGIONS



- I Sub Montane Region
- II Eastern Plain Region
- III Western Dunes Region
- IV Southern Hilly Region

20 10 0 20 40
Kilometres

3.22 Eastern Plain Region

It is made up of alluvial deposits. The eastern plain extends from the west of the Yamuna to the land representing the absence of sand dunes. The plain is flat and its general elevation varies only between 200 and 230 meters, above mean sea level. Within this, some of areas are more fertile consisting of narrow strips of low lying flood plains.

The northern part of this region is almost an alluvial plain sloping very gently towards the south-west, broken at short intervals by the beds of the mountain torrents. In the southern part of this region, from six to twelve miles from Yamuna, the water shed is located but it is not easily perceptible. To the east of the water shed lies the riverine tract of Yamuna, called the 'khadar'. It is a low lying area of new alluvium and makes the western limit of the insinuations of the Yamuna. The area is prone to floods. To the west of the watershed lies the Bangar, stretches a high table land called the 'Nardak' is composed of old alluvium.

3.23 Western Dunny Region

It is covered with sand dunes and is reflected by its arid nature in comparison to the east. This region, covering a large part of Hissar district, shows a higher degree of aridity. This is characterised by the presence of sand dunes of various shapes. These dunes are sometimes quite high and go

beyond miles in length. The alluvium is covered by sand. The only parts useful for cultivation and production in this region are the places, where the efforts have been made to cultivate the land with the help of irrigation and these places are locally called 'tals'.

3.24 Southern Hilly Region

In this region, a number of detached hills appear here and there and they are the parts of Delhi system of the Aravalli ranges and are called Alwar and Ajabgarh series. The Aravalli range is a narrow ridge stretching into Haryana for 90 kms. in the north east to south west direction upto Delhi. ³ It covers the southern parts of Mahendragarh and the adjoining area of Gurgaon district. In this region, the maximum height is above 518 meters (above mean sea level) and the area is generally unfavourable to man due to its rocky nature.

3.3 Fluvial History and the Drainage

Fluvial history of Haryana has proved that Haryana, known as green land was also a big producer of grains in ancient days. It was due to the deposition of fertile soil deposited by Sarasvati.

3. Techno-Economic Survey of Haryana, National Council of Applied Economic Research, 1970, pp.2.

During historical times, Ghaggar has been an important and an independent non-perennial river. But Ghaggar of today, although the only river actually piercing the Siwaliks between Sutlej and Yamuna and at a short distance from the hills it becomes non-perennial.

Yamuna discharged into the western sea in early historic times through the present neglected bed of the Sarasvati. More recently, R.L. Raikes,⁴ an Italian hydrologist, has suggested on the basis of his investigations in the dry bed of Sarasvati near Hanumangarh in North Rajasthan that the Yamuna had flowed through this dried up course upto the Indus in sub-recent times and it is suggested to have divulged westwards near Indri in the North of Karnal.

In the southern part of Haryana, where Aravalli range is predominant, some gaps (like Sahibi gap, Dohan gap) were formed by the rivers and they have provided entry routes to the central and western India. Previously they had been utilised by roads before the railway era and now the railways have penetrated. The Sahibi gap is particularly important as the town of Rewari has become an important railway junction. Several other towns as Nuh, Ferozpur Jhirka and Narnaul have grown along these routes.

The main rivers of the region are Yamuna making eastern boundary. Yamuna is the only perennial river. The Dangri

4. Raikes, R.L., "Kalibangan: Death from Natural Causes," Antiquity, vol.xcii, no. 168, December, 1968, pp. 286-91.

Chautang Markanda Kasauti, Dohan, Sahibi and Indori are the seasonal streams. Chos are very important in the north eastern sub-montane areas. (Map No.3.3)

3.31 The Yamuna

The river Yamuna, the only big and the perennial stream of the region flows all along its eastern boundary. It provides irrigation for large tracts through the western Yamuna canal and is responsible for high productivity of the land situated along the river.

3.32 The Ghaggar

The Ghaggar rises in the outer Himalayan range between the Yamuna and the Sutlej. It enters the plains as a rapid and variable mountain torrent, passes near Ambala, after a south westerly course of about 110 kms, chiefly through the Sangrur district of Punjab, where it is joined by the limited streams of the Sarswati, Markanda and other numerous hill torrents.

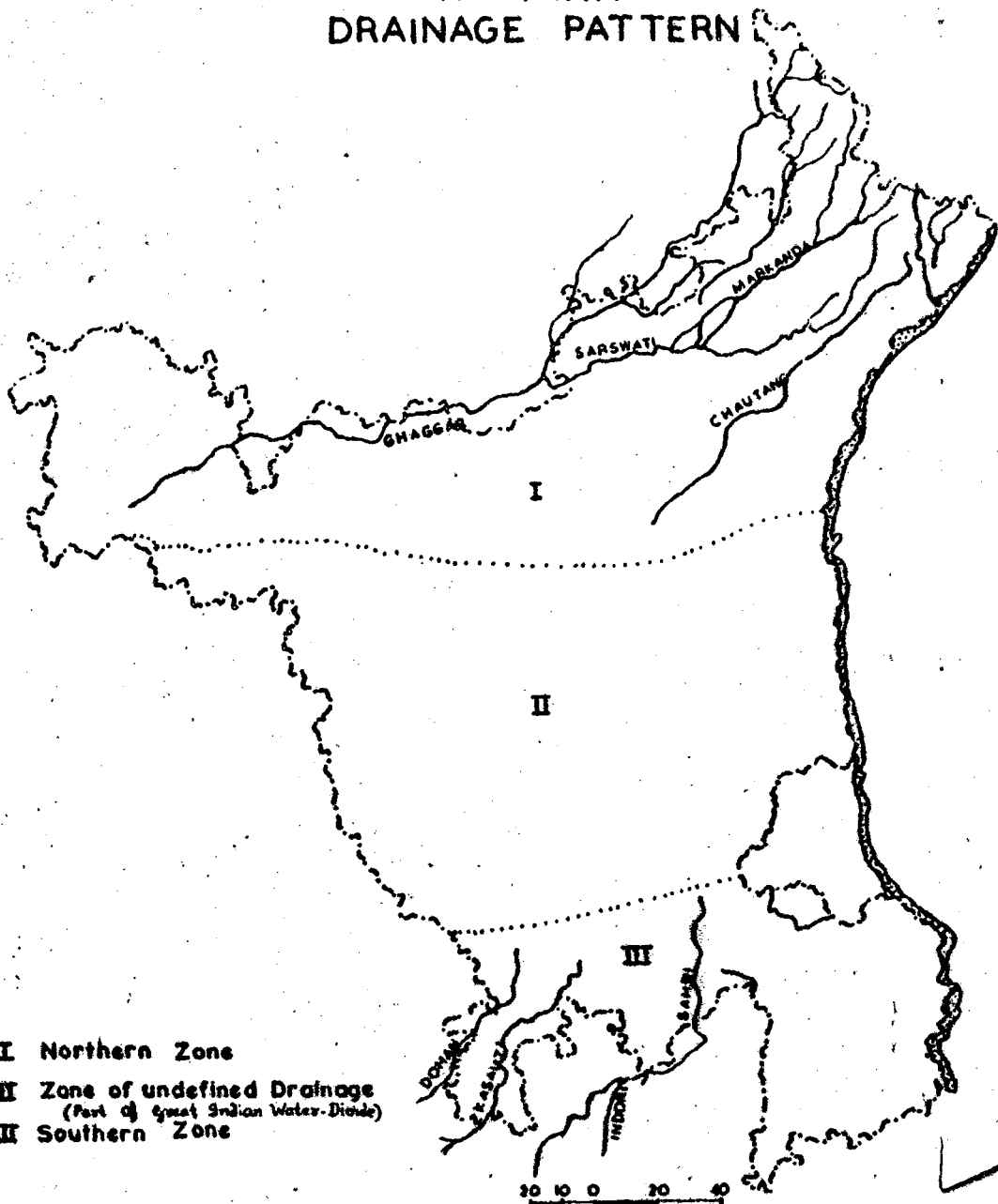
3.33 The Sarsvati

It was an important river in ancient days.⁵ It used to join the Arabian sea but now a days, it is a very small rivulet. Its floods rarely extend to any distance and its banks are usually high and steep.

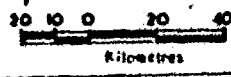
5. The Imperial Gazetteer of India, vol.xiii, pp. 54.

MAP NO. 3-3

HARYANA DRAINAGE PATTERN



- I Northern Zone
- II Zone of undefined Drainage
(Part of Great Indian Water-Divide)
- III Southern Zone



3.34 Markanda

It is a seasonal stream and takes its origin in the lower Siwalik hills. After flowing in the southwesterly direction for about 48 kms., it joins Ghaggar river.⁶

3.35 The Sahibi

It rises in the Mewat hills near Manoharpur and Jitgarh, about 110 kms. from Jaipur. Through Nirmana and Shajahanpur, enters Rewari above Kotqasim and flows through Jhajjar tehsil and finally enters in Rohtak tehsil. In this tehsil it is divided into two branches and re-unites near Sondhi, Yakubpur and Fatehpur. It turns to the north again and going a few kilometers more through the district (Rohtak) it passes into Delhi territory where it is made to meet Yamuna through a channel.⁷

3.36 The Indori

It rises near the old ruined city and fort of Indore perched on the Mewat hills, west of the town of Nuh of Gurgaon district. The main branch of this river goes off north-west and joins the Sahibi at the southern boundary of Rewari tehsil.

Except Sahibi and Indori, there are two more rivulets in southern Haryana named Dohan and Kasuati but they are not so important.

6. Karnal District Gazetteers, 1976, pp. 8.

7. Rohtak District Gazetteer, Haryana, Gazetteer Organisation, Revenue Department, Chandigarh, 1970, pp. 5-8.

3.37 Drainage Regions

Looking at the drainage map of Haryana, it can be divided into three sub-regions.

Table: 3.1

HARYANA

Drainage Density

<u>Sl. No.</u>	<u>Region</u>	<u>Length (kms.)</u>	<u>Area</u>	<u>Density/sq. kms.</u>
1.	Northern	770	17900	4.30
2.	Southern	180	8856	2.04
3.	Zone of undefined drainage	-	17300	-
4.	Haryana	950	44056	2.1

(i) The Northern Zone

The flow of the rivers in this region is from north east to south west and Sarsvati, Ghaggar, Chautang and Markanda are the important rivers. It covers the area of about 17900 kilometers⁸ and the drainage density is 4.3 kilometers per sq. km. It is quite high in comparison to the average drainage density which comes to 2.1 kms. per sq. km. (Table 3.1)

8. Drainage Density - Length of Streams in Kms/Total area in Kms.

(ii) The Southern Zone

The flow of the rivers is mainly from south west to north east and the important rivulets are Sahibi and Indori and others are Dohan and Kansavati. This region covers the area of 8856 sq. kms. and the drainage density is 2.04 kms. per sq. km.

(iii) Zone of undefined Drainage (A part of great Indian divide)

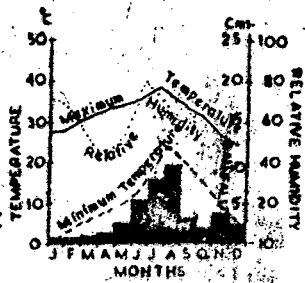
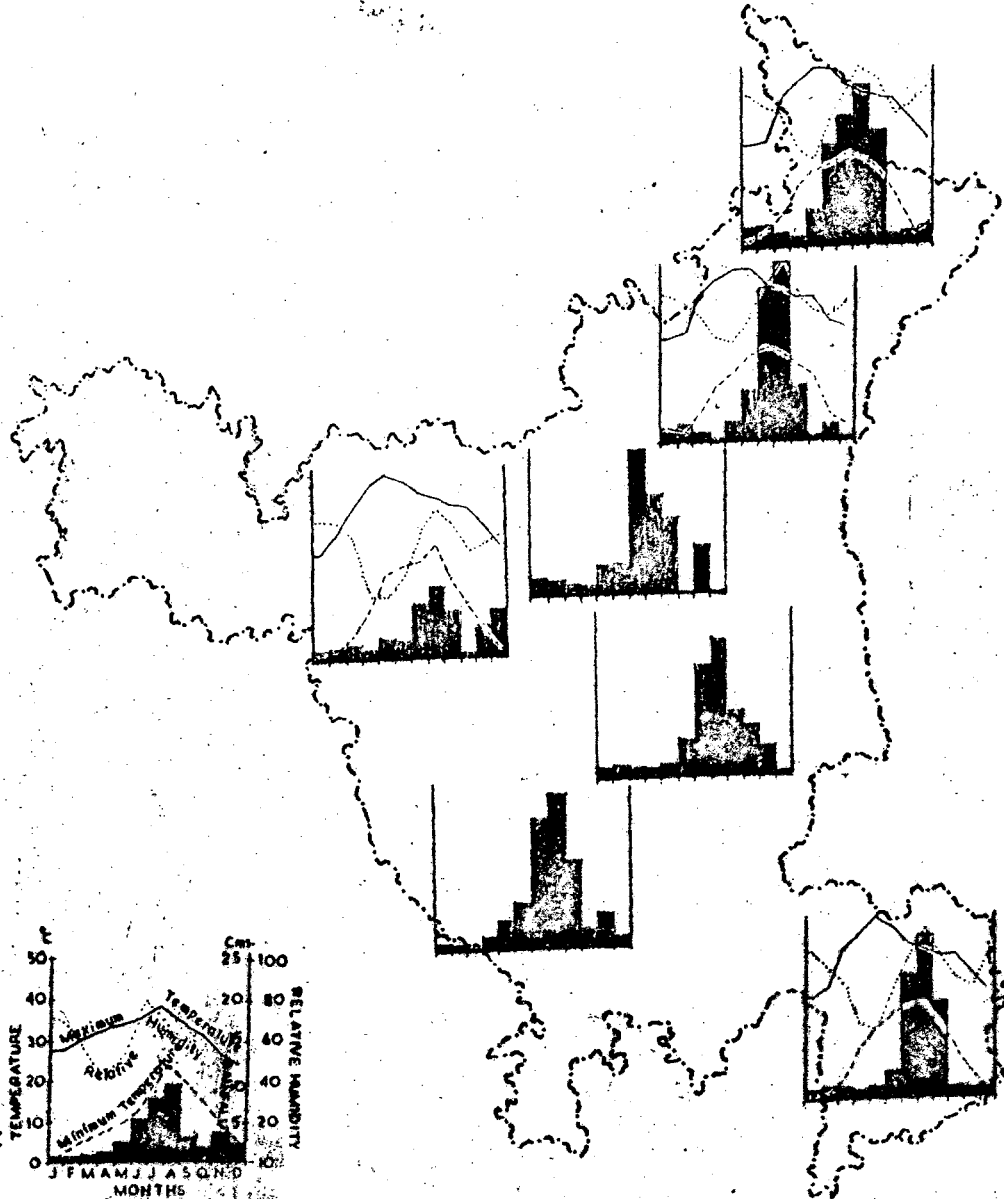
From the point of view of drainage, it is not an important region because the whole area is blank and not even a single stream flows in this region.

3.4 Climate

Haryana lies almost 480 kms. north of the tropic of cancer, and its climate is more or less tropical. It is hot in summer and markedly cold in winter. The maximum temperature in the months of May and June goes up to as high as 46°C. The temperature falls to the lowest in January when frost is not uncommon. Since, it is customary to divide the year into three seasons in India everywhere, in Haryana also three seasons ^{can} be identified. The cool season extends from November to February, the hot season from March to early June; and the rainy season from June to October.

MAP NO. 3-4

HARYANA CLIMATIC ELEMENTS



10 0 10 20 30 40
Kilometres

Table: 3.2

- 37 -

HARYANA

AVERAGE METEOROLOGICAL PARAMETERS AT VARIOUS PLACES

(Rainfall = mm.)

(1962-72)

Station 1.	Jan. 2.	Feb. 3.	March 4.	April 5.	May 6.	June 7.	July 8.	Aug. 9.	Sept. 10.	Oct. 11.	Nov. 12.	Dec. 13.	Annual 14
Hissar	13.5	14.8	20.6	14.4	26.2	21.4	69.6	89.5	59.8	10.3	41.0	5.8	386.9
Rohtak	16.3	18.0	13.2	12.7	19.7	44.7	137.6	167.9	80.3	12.7	38.4	4.0	565.5
Gurgaon	16.0	17.1	18.9	12.9	19.8	39.4	157.2	204.5	12.0	16.9	14.9	1.0	328.6
Karnal	20.4	23.0	12.2	9.9	26.5	63.6	186.8	217.4	70.8	10.6	22.4	5.0	674.6
Ambala	24.8	26.1	18.2	15.4	48.0	122.2	258.9	341.1	129.4	15.3	19.1	21.5	1040.0
Jind	23.2	22.8	14.6	14.5	35.1	36.0	170.9	120.5	90.7	22.0	55.0	2.0	587.3
Mahendra- garh	23.0	16.3	4.8	15.4	36.4	55.0	158.7	189.4	104.9	25.3	46.6	1.3	677.1
	<u>MAXIMUM TEMPERATURE (°C)</u>												
Ambala	25.1	27.9	36.1	40.3	43.1	42.8	39.3	37.3	36.4	35.6	31.1	25.8	
Hissar	25.8	30.1	38.7	42.1	44.2	43.1	40.2	39.0	38.8	38.1	32.6	27.2	
Karnal	25.2	27.4	35.6	39.8	41.8	41.9	37.5	36.4	34.8	34.8	29.8	26.7	
Gurgaon	25.5	28.8	37.5	41.6	45.8	43.6	39.5	37.0	36.4	36.8	31.1	27.3	

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14.

MINIMUM TEMPERATURE (°C)

Ambala	2.2	4.1	8.4	14.8	19.2	20.2	22.5	22.2	19.1	12.9	4.2	4.4
Hissar	1.6	3.2	6.3	12.9	20.3	22.2	23.1	26.8	18.5	13.1	7.1	2.7
Karnal	4.0	3.9	6.9	14.2	18.7	21.0	22.7	21.4	19.7	13.4	8.0	4.4
Gurgaon	0.5	1.8	5.0	12.7	18.7	21.9	22.5	22.6	18.2	11.8	6.3	2.6

RELATIVE HUMIDITY (%)

Ambala	75	68	64	48	44	63	77	87	80	65	68
Hissar	67	66	57	32	30	41	61	71	63	51	54
Karnal	72	67	60	50	47	60	74	83	70	61	60
Gurgaon	73	67	58	38	35	55	72	85	73	60	57

TOTAL POTENTIAL EVAPOTRANSPIRATION (mm.)

Hissar	49.7	71.6	124.1	168.4	221.9	231.4	197.6	164.2	153.8	118.5	66.9	47.0
Ambala	45.9	67.4	120.9	163.2	209.8	214.5	162.8	142.6	140.8	107.0	63.0	43.2

3.41 Temperature

Table 3.3 depicts that in this region, the temperature varies between 0.5°C (at Gurgaon in the month of January) to 45.8° (at Gurgaon in the month of May). The difference between maximum and minimum clearly indicates the continentality in climate. The range of temperature is maximum (43.3°C) at Gurgaon followed by Hissar, which is 41.5°C and the minimum range of temperature is at Ambala (40.2°C).

The spatial variations between the temperature is not much, yet the range of temperature increases from north to south and from east to west (Map No.3.5).

3.42 Rainfall

Rainfall is deficient in Haryana and large areas suffer from the uncertainties of it. The classification of variability of rainfall is 20 per cent in Haryana and in the greater parts of the southwestern Haryana, it is over 30 per cent.

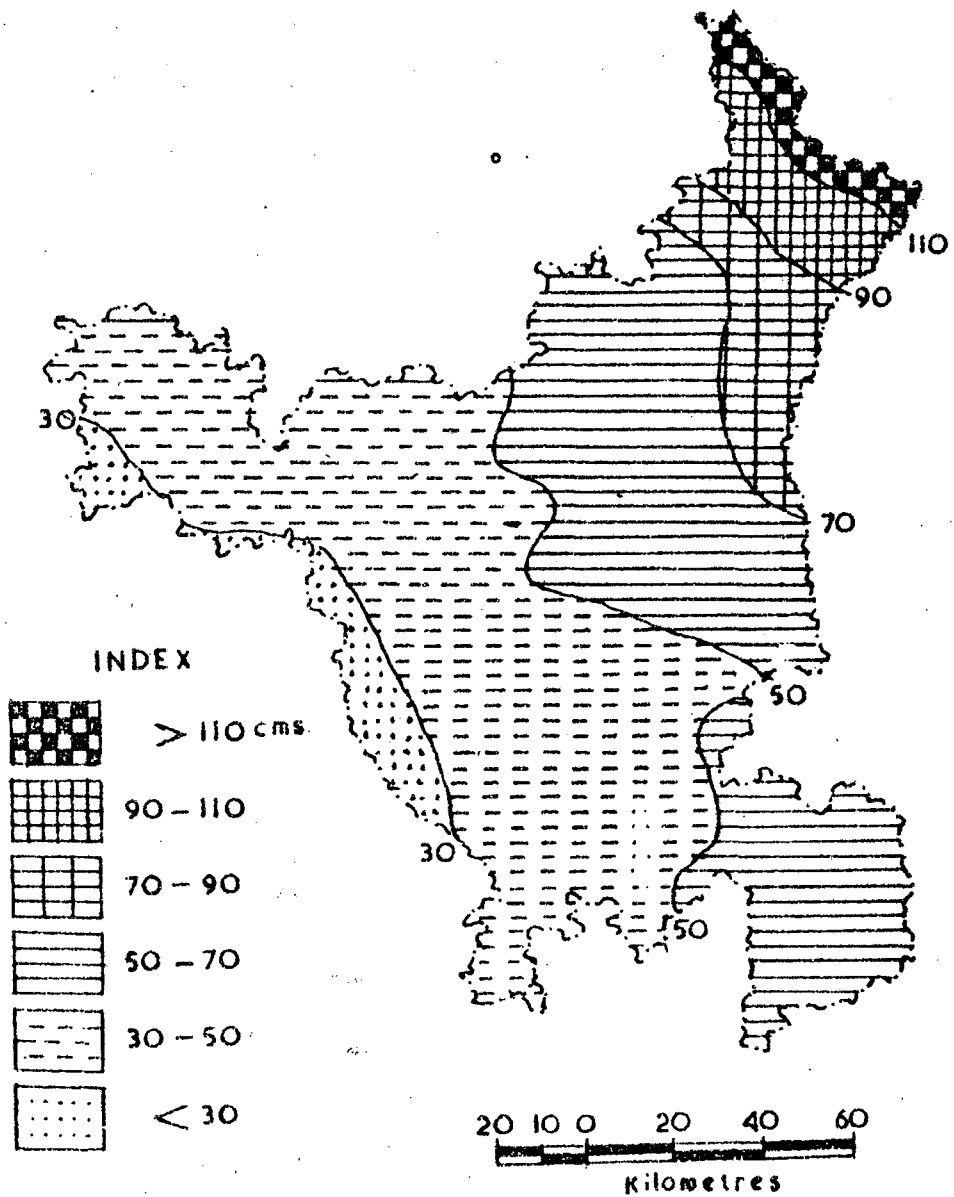
There are two well marked rainy seasons in Haryana:

- (i) The monsoon period lasting from the middle of the June till September;
- (ii) The winter rains which occur from December to February, although insignificant in quantity, they materially affect the prosperity of the spring harvest.

9. Jasbir Singh, "Regional Imbalances and Temporal Developments in Irrigation Facilities in Haryana," Geographical Review of India, vol.36, 1974, pp. 103.

MAP NO. 3.5

HARYANA ANNUAL RAINFALL



9.
About 80 per cent of the rainfall in Haryana falls between July and September, while there is a pronounced rainfall peak in the months of July, August and September. There is a little amount of rainfall during the winter season by the cyclones highly beneficial to the Rabi crops.

Table 3.3 reveals that Ambala gets the maximum annual rainfall (104 cms.). Out of this rainfall, 84 per cent occurs during the months of June, July, August and September. Karnal and Mahendragarh receive equal amount of rainfall followed by Jind and Rohtak. Gurgaon receives the minimum amount of rainfall in the whole region.

It has been observed that not much of the variations exist in temperature but there is a large variation in the occurrence of rainfall at various places. The amount of rainfall use to decline from north to south and from east to west. It shows the effect of monsoons on its rainfall. The western duny region of Haryana gets low rainfall in comparison to the eastern part. (Map No.3.4). The rainfall pattern of Haryana has been affected considerably by the continental location, the nearness to the sub-tropical upper air, high pressure and the direction of monsoons.

3.53 Moisture Index

It has been calculated with the help of the following formula,¹⁰ for the two stations i.e. Ambala and Hissar for

10. R.G. Barrey and R.J. Chorley, Atmosphere Weather and Climate, The English Language Book Society and Methun & Co. Ltd., 1972, pp. 347.

which the data are available for evapotranspiration.

$$I_m = 100 (r/PE - 1)$$

where I_m = moisture index
 r = rainfall
 PE = Potential Evapotranspiration

The moisture index for Hissar is -76 which indicates the arid conditions and for Ambala it is -30, which indicates the presence of dry sub humid conditions.

It explains that the climate of Haryana is neither humid and for completely arid but it varies between dry sub humid to arid type of climate.

3.5 Soils

Haryana is covered by the variety of soils and these different types of soils are closely related to geological formations and surface deposits.

The increasing salinity and alkalinity indicates the extension of the waterlogging tendencies. The sandy soils, found in the southern part, have more alkalinity, while the loamy soils are saline and alkaline. However, both are poor in humus because of the absence of natural vegetation cover as a result of dry conditions.

The result of the sample analysis conducted by various organizations reveal that about 32 per cent of the soil cover in Haryana is in various stages of deterioration. As a result of salinity and alkalinity at the surface or at some depth below

the surface and rest is fit for normal cropping.¹¹

Looking at the type of soils found in different physiographic regions, Haryana can be divided into four soil type region. These different types of soils are the products of different combinations of rocks, climate, slope, vegetation and lime.

3.51 Soils of Sub Montane Region

The soils of this region are loamy and slightly acidic in nature. The concentration of soluble salts in this region is relatively lower than the area of the south.

The soils of this region are mixed with pebbles. In the areas of good rainfall, these are rich in humus and very fertile. In this region, the cultivation of paddy is important. Most of these soils are low in lime content and are acidic in character.

3.52 Soils of Eastern Plain

Agriculturally, the most important soils, which occupy extensive tracts of land, are found in this region. These soils are derived mainly from the debris brought down from the Himalayas by Yamuna. Geologically, the alluvium is divided into newer and older alluvium. The former (known as Khadar),

11. Jasbir Singh, An Agricultural Geography of Haryana, Vishal Publication, 1970, pp. 80.

vary mostly from clayey to sandy loam in texture and generally are acidic in reaction. These soils are also deficit in lime, phosphoric acid and humus. The latter (known as Bangar) are more clayey in composition, generally of dark colour and full of kankar.

The fertility of these soils is due more to the mixing up of the debris derived from new rocks of the Himalayas and therefore contain a great variety of salts. In Karnal district, the soil is highly alkaline and water logging is very common. These soils are very fine-grained, highly porous and light so that they are easily tilled and therefore the best agricultural soils. Wheat and rice are the important crops of this region.

3.53 Soils of Western Duni Region

These types of soils occur under arid and semi arid conditions. These soils contain high percentage of soluble salts, varying percentage of calcium carbonate and are poor in organic matter, the limiting factor being mainly water. The soils may be reclaimed if proper facilities of irrigation are available. Very few crops specially millet, jowar and Bajra are grown for want of water supply.

3.54 Soils of Southern hilly region

These soils are highly deficient in nitrogen. The sub soil water in this tract is mostly brackish. The loam of this part may be divided into hard, light and sandy, locally known as Dakar, Rausli and the third is Bhur.

The Dakar being hard, requires much ploughing and good rain; while the Rausli needs little ploughing and readily retains moisture. Rausli is the best soil for barani cultivation. Bhur is very poor land but it requires little ploughing as the sub-soil retains whatever moisture it receives.

At many places, the soil is bedded with lime, kankar and stone.

3.6 Natural Vegetation

The flora of the plains bears resemblance to those of Iran, Arabia and North Africa. The largest of the truly indigenous trees are Shisham (*Dalbergia sissoo*), Kalki kiker (*Acacia farnesiana*) and Babul (*Acacia arabica*). The jungle consists mostly of jhar (*Zyzyphus nummulasia*), jand (*Prosopis spicigera*) and dub (*Cynodon dactylon*).

Table - 3.3

AREA UNDER FORESTS 1950-51-1975-76

Year	Proportion to Total geographical area (%age)
1950-51	0.5
1955-56	0.7
1960-61	1.4
1965-66	1.9
1970-71	2.1
1975-76	2.3

The table shows that only 2.3 per cent (1975-76) of the area is under forests. It is true that the area under this category is increasing continuously since 1950-51 and it has increased almost about five times but even the present situation is not very much satisfactory since 23 per cent of total area in our country is covered by forests. The prevailing aridity and long human occupation have been responsible for the poor vegetal cover. However, in the remote past, there were extensive areas covered with natural vegetation, particularly in the southeast and sub-montane region.

3.63 Forest Types

Haryana, although relatively small in extent, has a variety of forest types related to climatic and adaphic conditions. The important types are:

(i) Northern Tropical Dry Deciduous Forest

It extends over the north eastern region. Shisham (*Dilbergia sisoo*) is favoured for canal banks, railway tracts and the roads. Kikar and Kabli kikar (*Acacia arabica* and *Acacia farnesiana*) are other common trees.

(ii) Tropical Thorn Forest

These types of forests are distributed in western and south-western part of the region. The important trees are Neem (*Meliae azadirachta*), frash (*Tamarix orientalex*) and Kabli kikar (*Acacia farnesiana*). The Sirkanda is found on

Ghaggar banks. Its thin stalks are used for thatching, for covering for carts and for making the baskets.

(iii) Scrub Tropical Pine Forest

These are confined to a small portion of Ambala district viz., Morni Hills. The forest growth is quite dense composed of miscellaneous scrub intermixed in the upper portions with other trees. Lower down in the valleys of these forests, the scrub is mingled with Siris (*Ablizzia lebbeck*) and Kair (*Capparis aphylla*).

3.7 / Summarily, it can be said that geologically, Haryana has been formed during the recent period except the northern foothills and Aravalli outcrops. The recent plains of 'Khadar' and 'bangar' are more fertile than the western dunes and southern hilly region. All the rivulets which flow within this region are seasonal streams and cause a lot of damage to the region. Among these rivulets Sahibi is an important one and it has recently brought devastating floods.

Climatically, this region comes under the arid, semi arid and sub-humid type of climate. There is a lot of difference in the annual range of temperature and the amount of rainfall is highly affected by the monsoons. This nature of the climate has given rise to the vegetation of thorny bushes like babul (*Acacia arabica*) and some other trees like Neem and Shisham (*Melia azadirachta* and *Dalbergia sissoo*).

Chapter IV

POPULATION

DEMOGRAPHIC, OCCUPATIONAL AND
SOCIAL CHARACTERISTICS

Chapter IV
POPULATION
DEMOGRAPHIC, OCCUPATIONAL AND
SOCIAL CHARACTERISTICS

4.0 In this chapter, demographic, occupational and social structure of Haryana have been analysed which are of crucial importance in the formulating of any plan for the economic development of a region.

The chapter has been divided into two sections. First section deals with the demographic and occupational structure, while second deals with the social structure of Haryana.

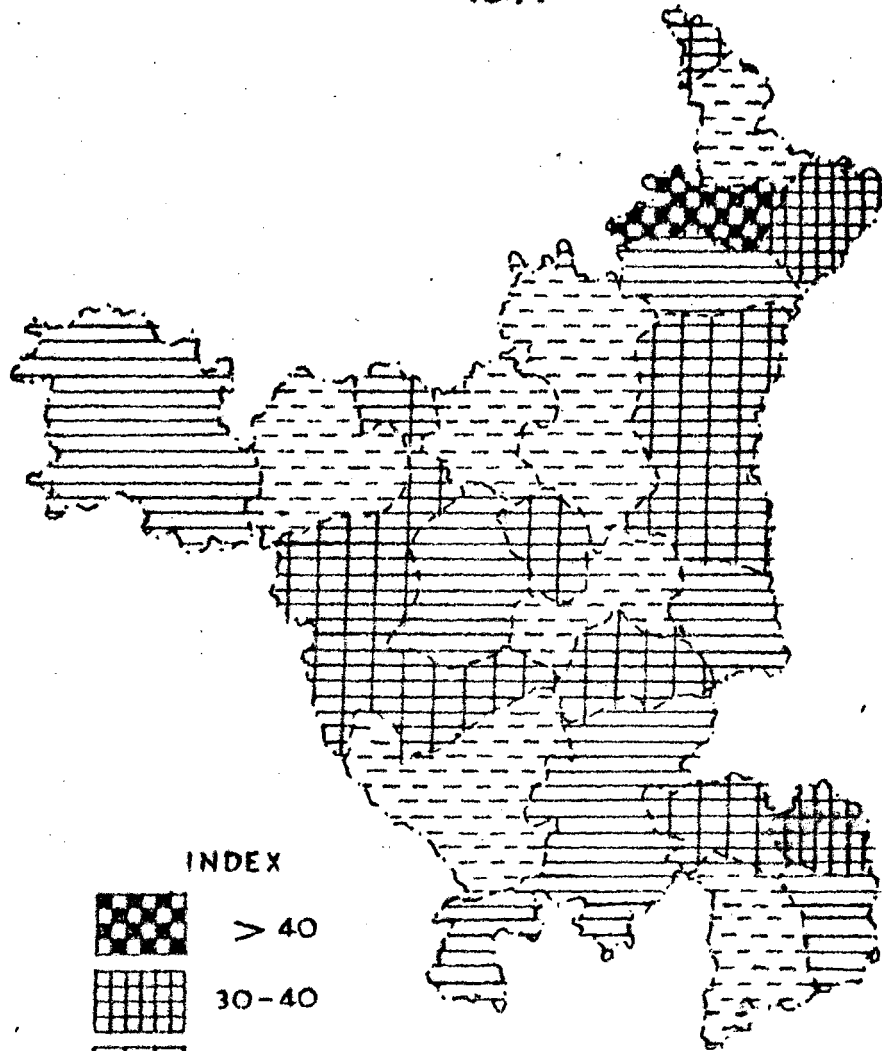
4.01 Rural and Urban Population

The percentage of urban population to total population in Haryana is 17.66 (1971). It was 17.07 and 17.23 per cent in 1951 and 1961 respectively. While comparing the percentage of urban population to population in different tehsils, it has been found that Ambala tehsil records the maximum population of urban population. It is 43.12 per cent in Ambala tehsil and it is only 2.05 per cent in Nuh tehsil. Out of 32 tehsils, eleven tehsils have more than 20 per cent of urban population, while the remaining 21 tehsils records even less than 20 per cent of total urban population. The concentration of urban population, is quite high in the eastern plain region, while it is quite low in the western dunes region and in the extreme south and south west part of Haryana (Map No.41).

MAP NO. 4.1

HARYANA

Percentage of Urban Population to Total Population 1971



INDEX

	> 40
	30-40
	20-30
	10-20
	< 10



The spatial variations in rural population depict the opposite picture because proportion of rural and urban population is inversely related.

Section-I

Demographic and Occupational Characteristics

The present section is mainly confined to following demographic characteristics:

- I Growth of Population
- II Density of Population ✓
- III Sex-Ratio ✓
- IV Depend~~ngy~~Ratio
- V Literacy
- VI Size of Household

4.11 Growth of Population

For measuring the change in population size, the growth rate has been worked out for all the seven districts of Haryana and the temporal and spatial variations have been measured by using the following formula:

$$\frac{P_2 - P_1}{P_1} \times 100$$

P_2 = Population size at one point of time

P_1 = Population size at later point of time

During 1901-11, Haryana has shown the negative growth rate, which comes to -9.70. Except Hissar district, where the growth rate is positive, all the districts have depicted the negative growth rate. It is all due to the political disturbances and diseases, which were predominant in those days.

The second decade (1911-21), has reflected a growth rate of 1.95 and during this period, Rohtak district has shown the maximum growth rate (7.81). Even during this decade, Ambala and Gurgaon were the areas of negative growth rate (Appendix Table-II).

The decade between 1921-31 has depicted the growth rate of 7.14 for the region as a whole. After 1901, it was the first decade in which all the ^{districts} decades have shown positive growth of population. However, the relative growth declined from 11.65 to 5.19 during this period.

The fourth decade (1931-41) has registered the growth of 15.63 and it is highest in comparison to the first three decades. For this decade, none of the district has reflected the negative growth rate and the relative growth rate has also increased to 7.49.

For the decade, during 1941-51, Haryana has shown the growth rate of 7.60 and it is quite low in comparison to the fourth decade. It has happened due to the disturbances, which took place at the time of division of India and Pakistan. During this decade, again Rohtak district has reflected the maximum growth rate followed by Karnal, Gurgaon Ambala and

Hissar. Since the growth rate is quite low for this decade, the relative growth rate has declined to 8.03.

During 1951-61, Haryana has shown the growth rate of 33.79 and it is maximum in comparison to all the decades, since 1901. During this decade, district Gurgaon has shown the maximum growth rate followed by Karnal, Jind, Gurgaon, Rohtak and Mahendragarh. The relative growth rate is also very high (25.19) in comparison to all the previous decades (since 1901).

During 1961-71, Haryana has registered the growth rate of 32.23 and again in this decade the maximum growth rate has been found in Hissar district. However, the relative growth rate declined to 0.46. It has happened mainly due to out migration from Haryana to Punjab.

It has been observed from the above discussion that though not much of the spatial variations have been observed but however, areas adjoining to Delhi have shown the higher growth rate of population in comparison to other areas. Secondly, it has been found that the total population of Haryana has increased from 4,623,079 in 1901 to 1,00,36,808 in 1971 and has doubled itself during this period of 70 years (Appendix Table-II).

4.12 Density of Population¹

The average density of population in Haryana is 227 persons per sq. km. There is a big gap between the density of

1. Density of Population: $\frac{\text{Total Population of Tehsil}}{\text{Total area of the Tehsil}}$

rural and urban population. The density of rural population is 189 persons, while the density of urban population is 3928 persons per km.²

The map (Map No.4.2) showing the density of population depicts a decrease in density from north east to south west. Ballabgarh tehsil, situated in the south east part, reflects the highest density (431 persons per km²) followed by Ambala, Rohtak and Sonapat.

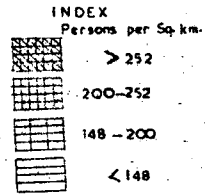
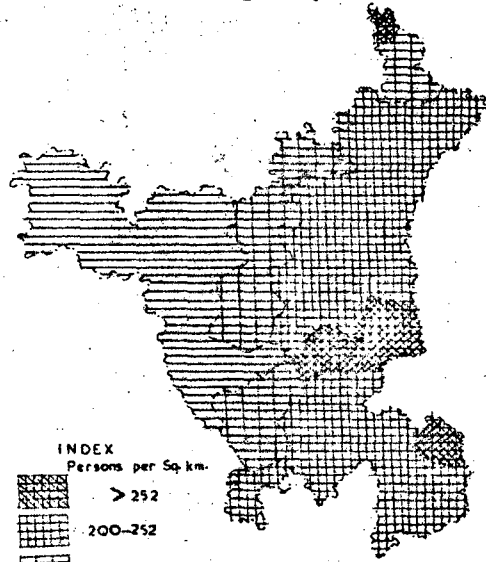
The western duny region, comprising the Tehsil of Loharu, Bhiwani, Fatehbad and Dabwali have low density of population. In Loharu tehsil, the density of population is the lowest (98 persons per km²) followed by Dabwali, Sirsa and Bhiwani. The Nuh tehsil situated in the Aravalli outcrops show the lower density of population (834 persons per sq. km.), followed by Narayangarh and Mahendragarh tehsil. As Ballabgarh tehsil depicts the highest density of rural population followed by Rohtak, Sonapat and Kalka, it has been found that in those tehsils, where the density of population is low, the concentration of urban population is also low. The map showing the density of rural population (Map no.4.2) and total population reflect almost the same pattern.

The density of rural population is quite low in comparison to the density of urban population. There are so many factors, which have given rise to this gap. One of the major factor is that the most of the infrastructural facilities like education, health, water etc. are also concentrated in the urban areas. Looking at all these facilities, people agglomerate in the

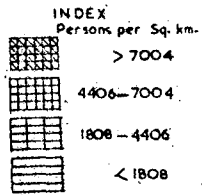
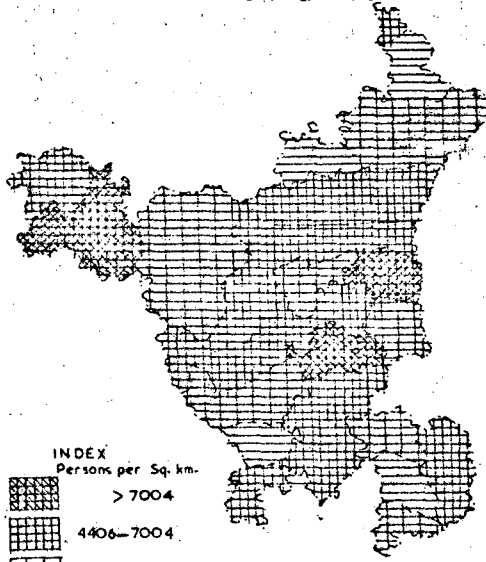
MAP NO-4-2

HARYANA DENSITY OF POPULATION 1971

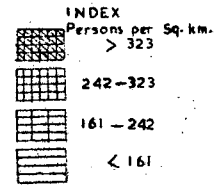
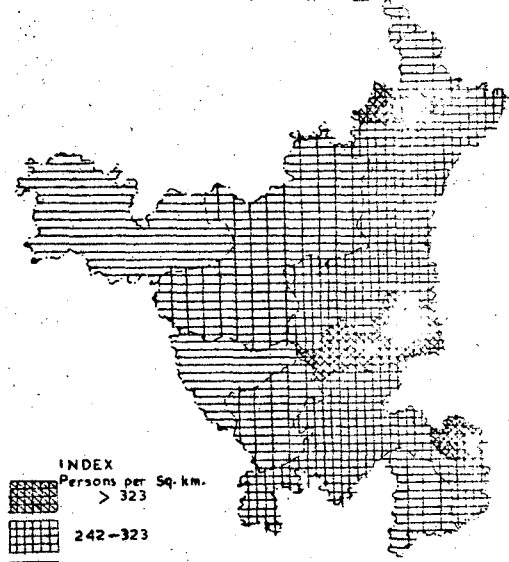
RURAL



URBAN



TOTAL



urban areas instead of rural areas. The concentration of this process has created the large amount of gap between the density of rural and urban population.

Other reason behind this gap is that the density of rural population is worked out on the basis of total area of all villages including the area outside the habitats of village, i.e. fields, waste lands etc. The density of urban population is worked out, taking into account only the areas within the municipal limits of the towns. In this way, it is quite clear that the density of rural population per km² would be quite low in rural areas as compared to urban areas.

4.13 Sex-Ratio³

A clear knowledge of the pattern of sex-ratio helps to explain the employment consumption, social needs and perhaps the psychological characteristics of community.⁴ The variation in the number of two sexes are not widely divergent but their diversity is of interest to geographers because of the contrasting roles of the two sexes in our society.

The average urban sex-ratio in Haryana is 863 and it varies between 753 in Ballabgarh tehsil to 930 in Narayangarh tehsil. Though urban sex-ratio does not show any pattern in

2. Census of India; 1971. Series VI - Haryana Part II-A. General Population Table pp. 15.
3. Sex Ratio = $\frac{\text{Total number of females}}{\text{Total number of Males}} \times 1000$
4. S.H. Franklin, 'The Pattern of Sex Ratio in New Zealand', Economic Geography, vol.32, April, 1956, pp.162-176.

space but it has been found that in those urban areas, where the proportion of population in primary sector is high, the sex-ratio is also high (significant correlation at 1 per cent level). It shows that non primary activity of urban areas is negatively correlated with high sex ratio and positively correlated with primary activity.

The average rural sex ratio in Haryana is 868 females per thousand of males and it varies between 807 to 925. It is very high again in the south west part (hilly region) of Aravalli and decreases towards the north.

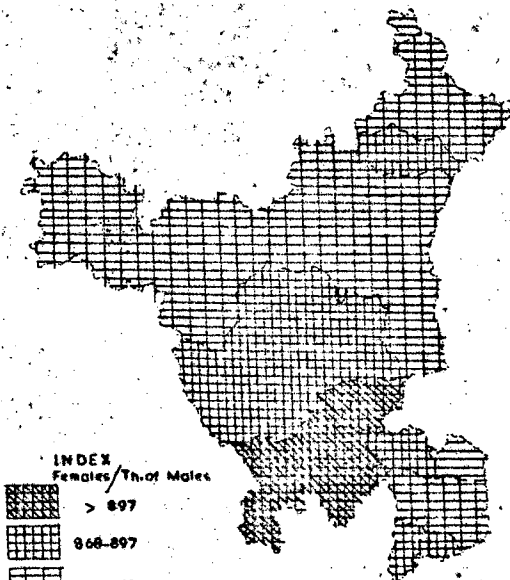
For certain tehsils, where industrial centres have developed (Ballabgarh, Sonapat, Jagadhri and Bhiwani), the urban sex-ratio is quite low, in comparison to the rural areas. The industrial centres attract the migrants from rural areas due to employment opportunities.

However, it is interesting to note here that out of 32 tehsils in Haryana, 13 tehsils have shown more urban sex-ratio in comparison to rural areas. In these urban areas like Nuh, Ferozpur Jhirka, no industrial development has taken place. They are known as urban areas, because they have been declared municipalities, town areas or notified area, while they do not fulfil the minimum characteristics of urban areas as required by census definition. In these towns, primary activity is the main occupation of the people and not the secondary or tertiary.

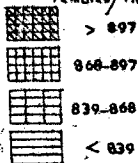
MAP NO. 4.3

HARYANA SEX RATIO 1971

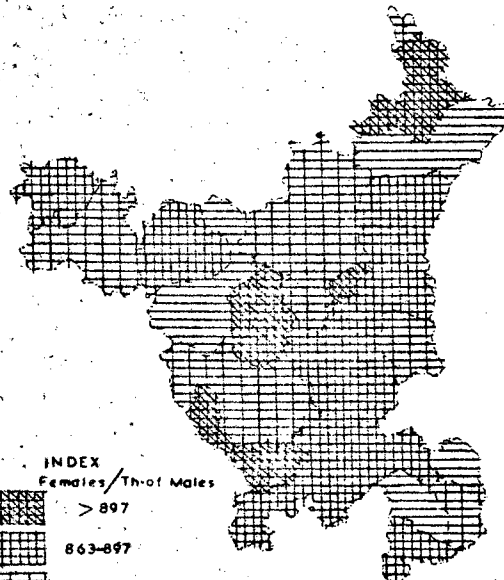
RURAL



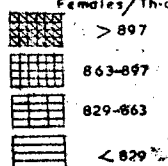
INDEX
Females/Th. of Males



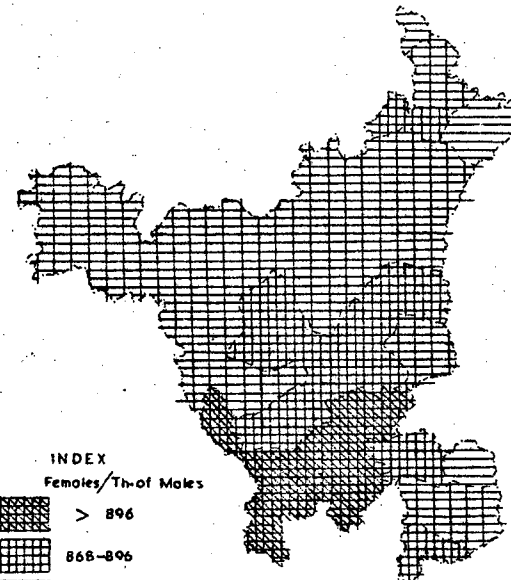
URBAN



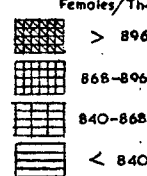
INDEX
Females/Th. of Males



TOTAL



INDEX
Females/Th. of Males



0 20 40 60 80
Kilometres

4.13 Dependency Ratio⁵

It is an important aspect because it is a good indicator for the measurement of economic development of a region. The variation in the dependency ratio depends upon the demographic, social and economic factor. However, it is closely related to the size of the total population but the demographic regime and age structure also important determinants.

In Haryana, the average dependency ratio is 2.73 and it varies between 2.20 to 3.47. In the south east part, Ballabgarh tehsil shows the lowest dependency ratio and it is the highest in Rewari tehsil, followed by Jhajjar, Rohtak Gurgaon. The spatial variation in the dependency ratio (Map no.4.3) indicates that the group of tehsils falling in the southern hilly region and south west dunny region record the maximum dependency ratio.

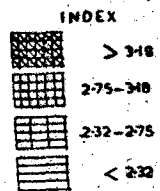
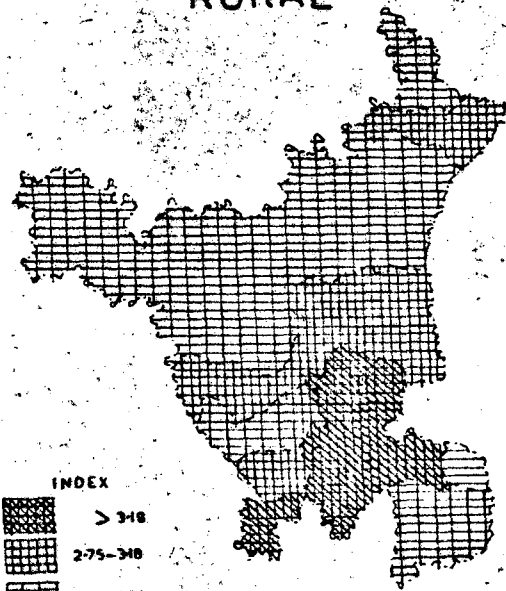
The rural dependency ratio varies between 2.26 to 3.52 following the same pattern as discussed above. However, the urban dependency ratio varies between 2.02 in Ballabgarh tehsil to 3.41 in Mahendragarh tehsil. It has been found that higher percentage of workers engaged in secondary sector has given rise to low dependency ratio (negatively significant correlation at 10 per cent level). So it has become very clear that industrial development can reduce the dependency ratio at certain level.

5. Dependency Ratio: $\frac{\text{Total number of non workers}}{\text{Total number of workers}}$

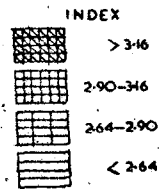
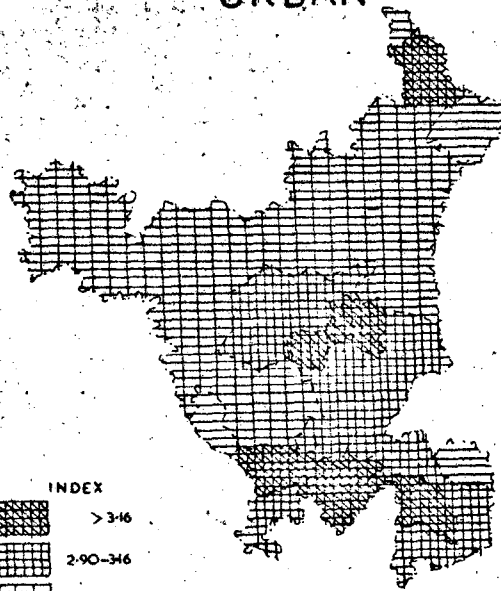
MAP NO-4.4

HARYANA DEPENDENCY RATIO 1971

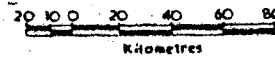
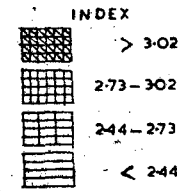
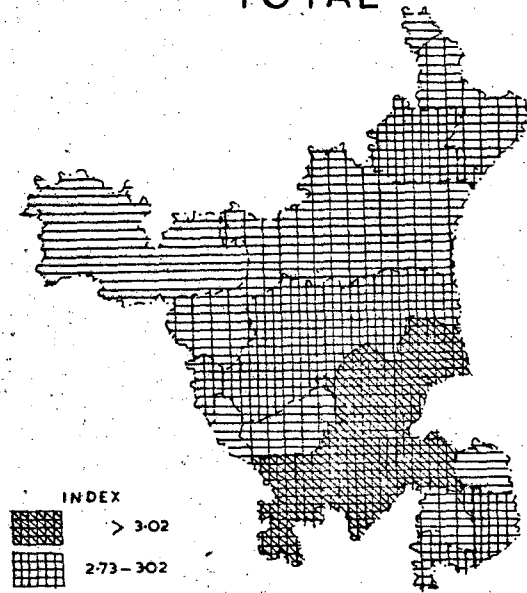
RURAL



URBAN



TOTAL



4.15 Literacy

Educational attainment plays a vital role in the betterment of the economic conditions of the people and also provides condition necessary for bringing change in the social and cultural life of the people, low degree of literacy and lack of adequate training are serious obstacles in the economic development of the region.

In Haryana, literacy varies between 13.36 to 41.75 per cent and the average literacy is 25.96 per cent. Ambala tehsil recorded the highest literacy followed by Kalka and Gurgaon, while the lowest literacy is found in Ferozpur Jhirka tehsil followed by Narwana and Fatehbad (Appendix Table-I). The literacy is high in the eastern part of Haryana as compared to the western dunny region (Map No. 4.4). It is observed that in those areas where the density of population is high or the dependency ratio is low, the literacy tends to be high. (Map No.4.2, 4.3 and 4.4).

The average rural literacy in Haryana is 21.96 per cent and it varies between 12.10 to 32.72 per cent. The literacy rate in urban areas is 46.14 per cent. The reason for this marked difference among rural and urban areas is the availability of more educational facilities in towns. Educated employed persons of urban areas have also contributed towards the high literacy rate in urban areas.

The urban literacy varies between 31.85 to 56.83 per cent. The variations in the urban literacy is highly affected

by the development in tertiary sector of employment. It has been found that in those urban areas in which the percentage of urban workers engaged in tertiary sector is high, the literacy is also high (significant at 1 per cent level), while the urban literacy does not depict any regional pattern of variation. Rural literacy is quite low in the western dunny region and southwestern part in comparison to eastern fertile plain (Map no. 4A). Half of the urban population is illiterate and three fourth of the rural population is illiterate and three fourth of the rural population is illiterate. It is true that the literacy rate in urban areas has increased to 51 per cent in 1971 as against 44.74 per cent in 1961 and in rural areas, it has increased from 14.77 to 21.72 per cent.

The percentage of literate population to total population in India is 29.4. It comes to 23.8 per cent for rural areas and 52.3 per cent for urban areas. Though in Haryana the literacy rate is not low in comparison to India taken as a whole but looking at the economic condition of the region, it is not satisfactory.

4.16 Size of Household⁶

According to the concepts adopted in 1971 census, a household was defined as a group of persons living together ~~as a group of persons living together~~ and having their meals from a common kitchen.⁷ Size of household, gives the idea of the

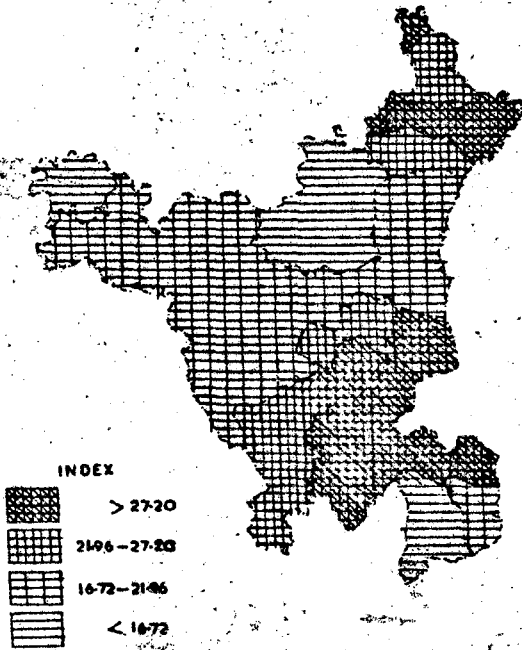
6. Size of Household: - Total Population of Tehsil
Total number of Household

7. Census of India 1971 Series VI. Haryana Part IV. Housing Report and Tables, pp.82.

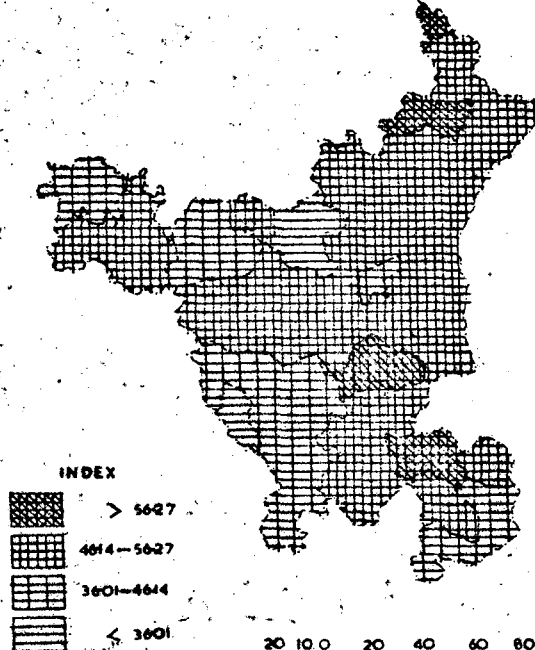
MAP NO. 4.5

HARYANA PERCENTAGE OF LITERATE POPULATION 1971

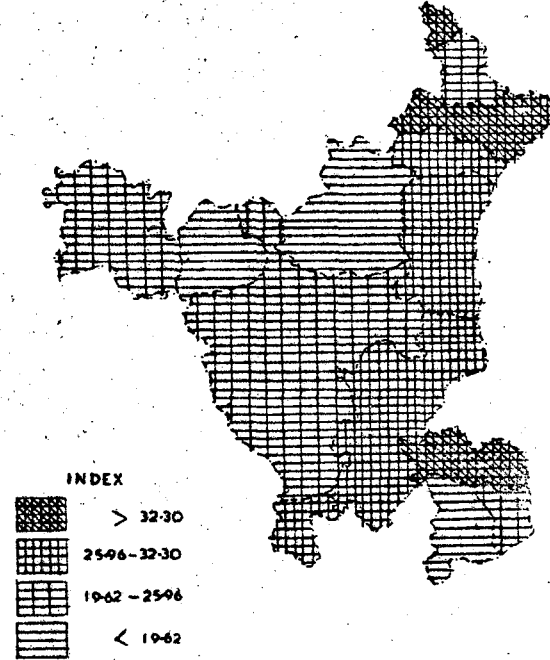
RURAL



URBAN



TOTAL



20 100 20 40 60 80
Kilometres

size of family i.e. how many persons are living in one family under the control of one head of the family.

At the time of 1971 census, the total number of households were 15,96,825. Out of these households 79.1 per cent are in rural areas and 20.9 in urban areas. The average number of persons per household in Haryana is 6.31 and it varies between 5.15 to 6.97.

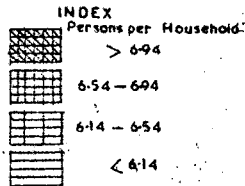
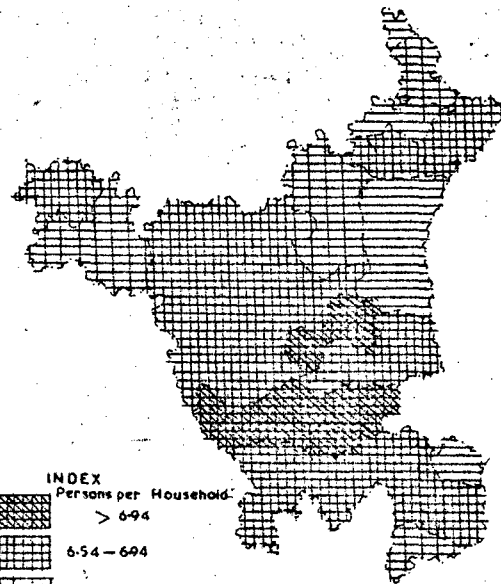
The size of the urban household depicts less variation in comparison to rural areas. In urban areas, it varies between 4.48 in Ballabgarh tehsil to 6.03 in Narwana tehsil. In Haryana, 17.06 per cent of total population lives in urban areas, but 20.9 per cent of total households are found in urban areas. It shows that the size of the families is small in urban areas in comparison to the rural areas. However, the superimposition of the maps of the density of urban population and the size of the urban households show that in those areas, where the density of population is low, the size of the household is large and vice-versa.

The size of the rural household varies between 5.34 in Kalka tehsil to 7.31 in Loharu tehsil. Though, not much of the regional variations have been observed, but it has been found that extreme eastern fertile plain of Haryana reflects small size of household and it is increasing towards north west and south west part. (Map no. 4.6)

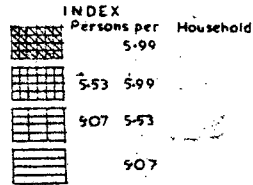
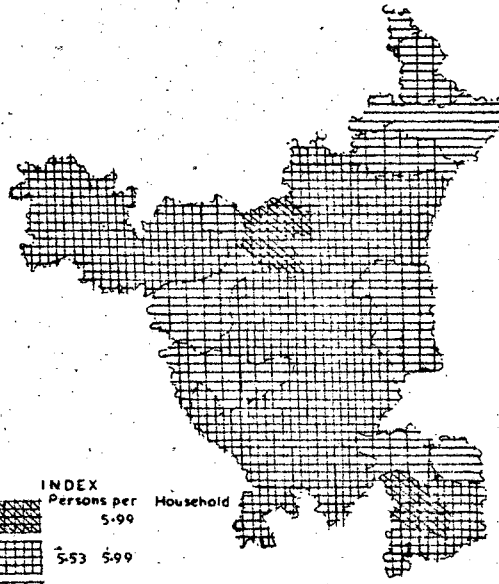
MAP NO. 4-6

HARYANA SIZE OF HOUSEHOLD 1971

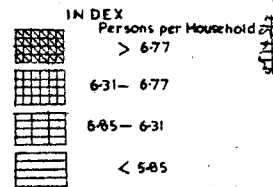
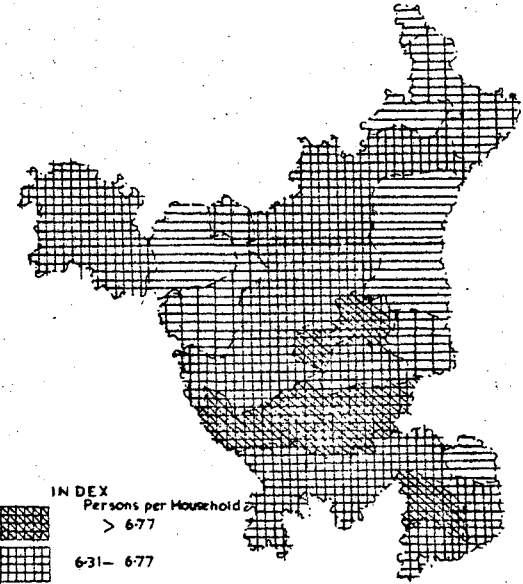
RURAL



URBAN



TOTAL



20 10 0 20 40 60 80
Kilometres

4.2 Occupational Structure

In Haryana (according to 1971 census), 26.4 per cent of the total population constitutes the work force, while remaining 73.6 per cent is dependent out of this work force, the majority of the people engaged in primary activity and it comes to 67.9 per cent of total workers. In this way primary activity is the main occupation of the people because only 32.1 per cent of total workers are engaged in secondary and tertiary sector of the economy.

4.21 Primary Sector:

The work force in primary sector consists of:

- I Cultivators
- II Agricultural labourers
- III People engaged in livestock, forestry, fishing, hunting and plantations, orchards and allied activities.
- IV Mining and Quarrying.

Haryana is mainly an agricultural region and most of its population is engaged in the first two categories of this sector. These two categories account for 66.25 per cent of total workers, which clearly shows that 2/3 of total workers of the region earn their livelihood from agriculture.

Mining and quarrying accommodates only 0.80 per cent of total workers, which is insignificant. It is evident that

the mining activity has no role to play in the regional economy. Only 1.57 per cent of total workers are engaged in livestock forestry and fishing and it is highest in Loharu tehsil (8.19 per cent).

The spatial variation in the workers engaged in primary sector shows that it varies between 30.49 in Ballabgarh tehsil and 82.82 per cent in Guhla tehsil. However, the map (Map no. 4.7) does not show any clear cut pattern over the space that in which direction it is increasing or decreasing.

4.22 Secondary Sector

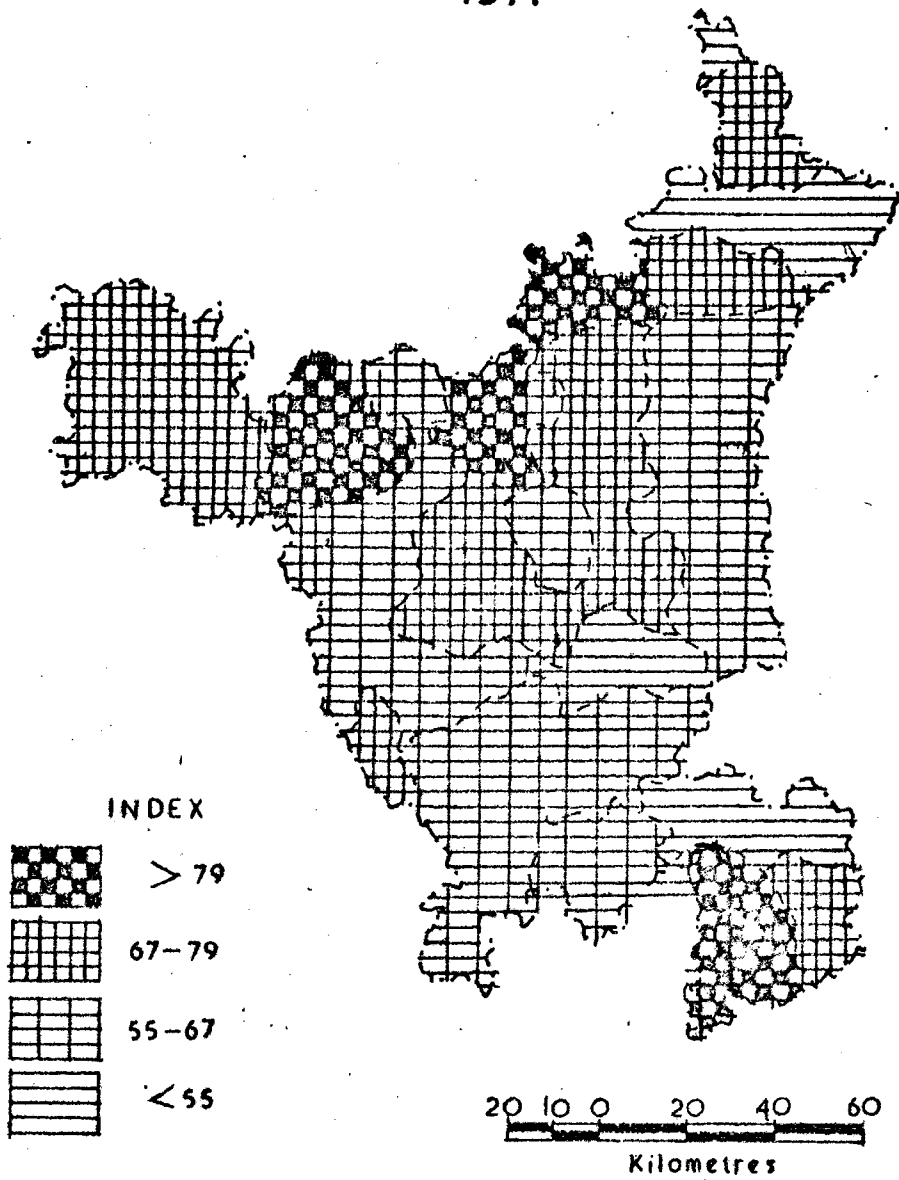
In Haryana, 11.8 per cent of total workers are engaged in secondary sector of the economy. In this sector, the proportion of workers is lowest in comparison to other two sectors of the economy. Within this sector of the economy 6.35 per cent of the total workers are engaged in manufacturing other than household, followed by household industry (5.13 per cent) and construction (2.32 per cent).

The percentage of workers engaged in secondary sector varies between 3.12 per cent (in Loharu tehsil) to 42.37 per cent in Ballabgarh tehsil. In this sector, the situation is just opposite to primary sector because in Ballabgarh tehsil, where the value is the lowest in the primary sector, it is highest in secondary sector. It has happened because of 44 per cent of total industries are concentrated in this tehsil in which

MAP NO. 4-7

HARYANA

Percentage of Workers Engaged In Primary Sector 1971



52 per cent of total industrial workers are engaged.

The map showing the spatial variations in the proportions of workers engaged in secondary sector (Map no.4.8) reveals that in the eastern part of the region concentration of workers engaged in secondary sector is more in comparison to its western part. Again it has been found that the tehsil, which are contiguous to the union territory of Delhi show the higher concentration of workers engaged in secondary sector. It has happened due to the industrial concentration around the capital city of the country.

4.23 Tertiary Sector

This sector of the economy, includes trade and commerce, transport, storage and communication and other services. In this sector 20.3 per cent of the total workers are employed. Other services alone account for 11.52 per cent of the total working population. In Ambala tehsil, 23.94 per cent of total workers are engaged in other services, followed by Gurgaon and Ballabgarh.

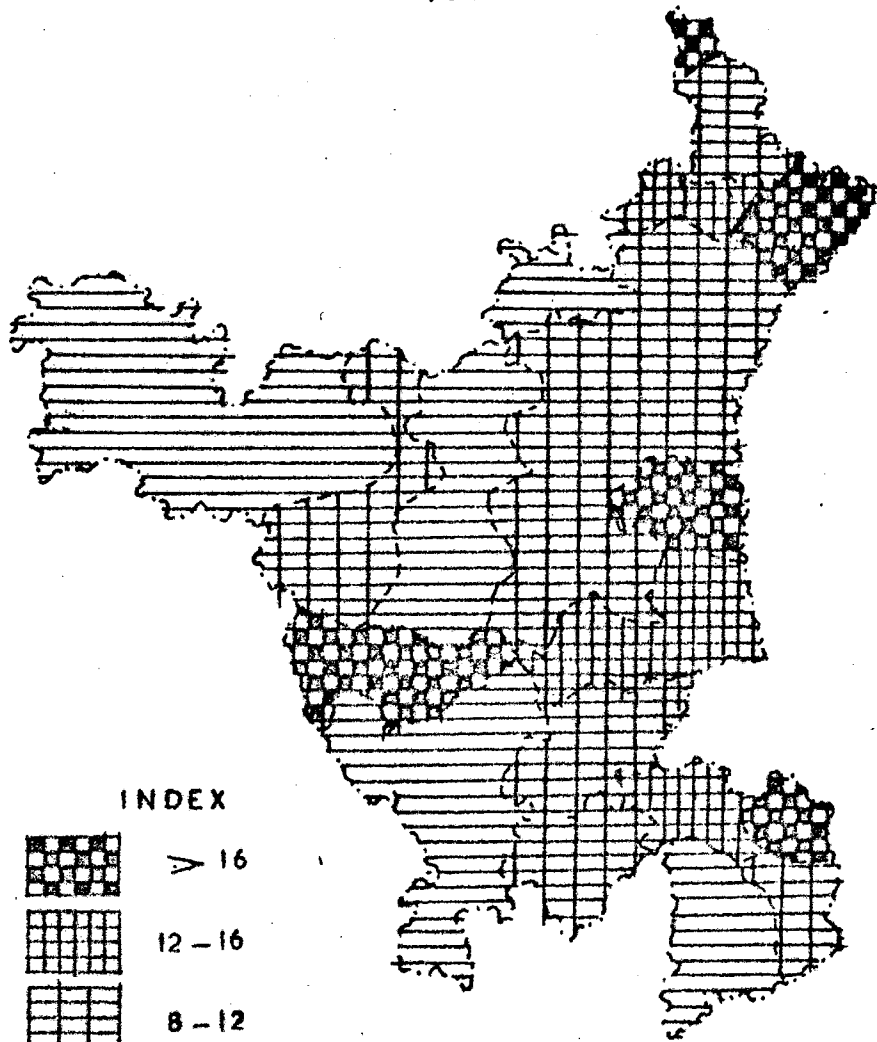
In trade and commerce, 6.32 per cent of total workers are engaged in Haryana and Rohtak tehsil records the highest percentage of 10.59 employed in tertiary sector.

Only 2.46 per cent of the total workers are dependent on transport, storage and communication. In this category, Kalka tehsil has the maximum proportion followed by Ambala and

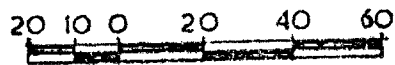
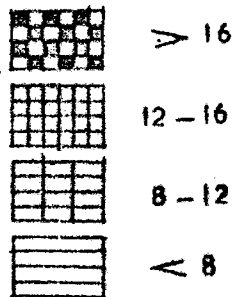
MAP NO. 4-B

HARYANA

Percentage of Workers Engaged In Secondary Sector 1971



INDEX



Kilometres

Jagadhri. The percentage of workers engaged in tertiary sector varies between 10.51 in Faridabad tehsil to 44.11 per cent in Ambala tehsil. The map showing the spatial variations in the tertiary sector depicts that roughly the eastern part has higher proportion of the workers engaged in this sector (Map No.4.9). Again most of the tehsils contiguous to Delhi, also show the higher proportion of workers engaged in Tertiary Sector.

Section - II

Social Structure

In this section, an attempt has been made to see the distributional pattern of scheduled caste population, while schedule tribe population has not been discussed at all. The enumeration of 1971 census, shows that in Haryana scheduled tribe population is nil. Besides the scheduled caste population, the distribution pattern of caste have also been discussed on the basis of 1931 census, because after 1931, the data is not available for caste.

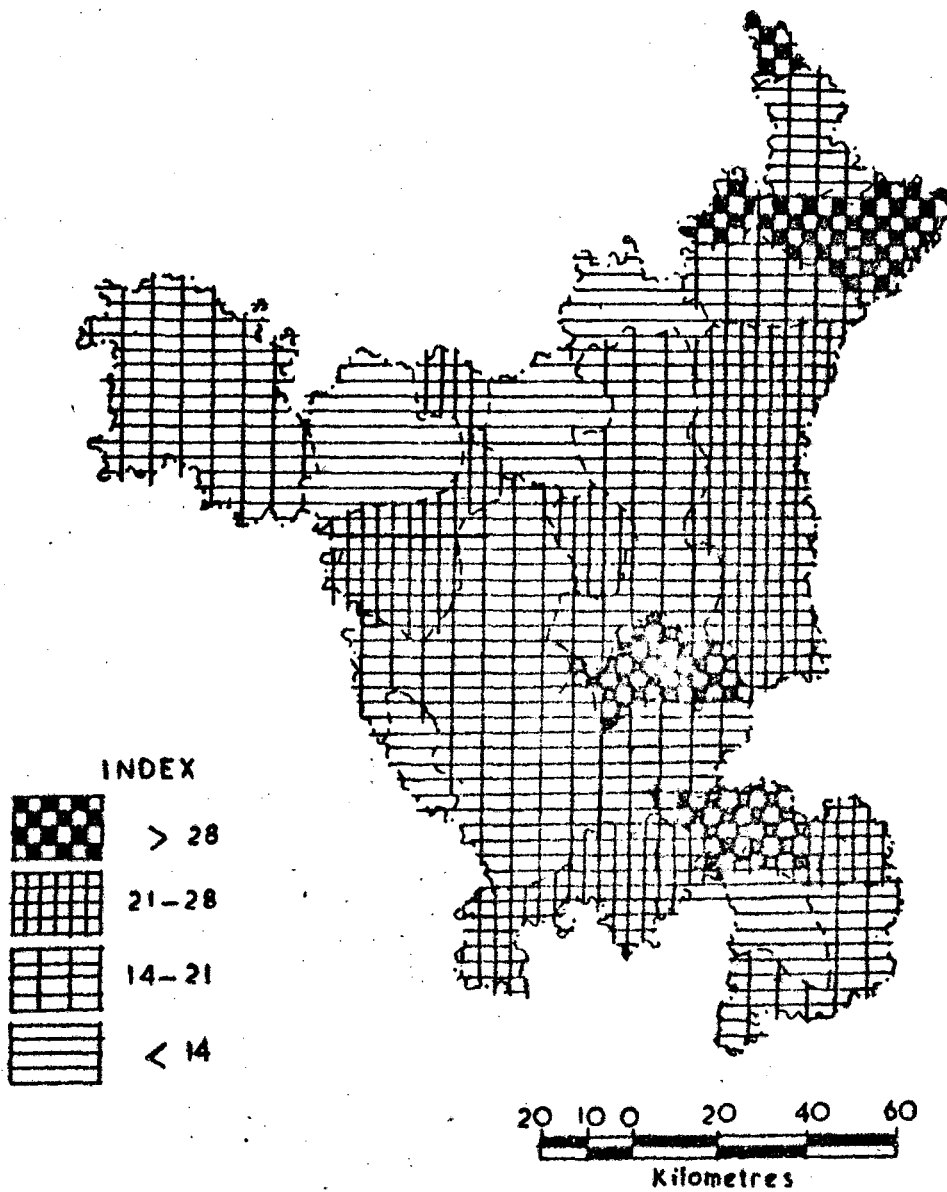
4.31 Distribution of Scheduled Caste

According to 1971 census, 18.28 per cent of total population is comprised of scheduled caste population, which varies between 8.86 in Nuh tehsil to 28.04 in Dabwali. The regional variations in scheduled caste population show that the

MAP NO. 4-9

HARYANA

Percentage of Workers Engaged In Tertiary Sector 1971



western dunny region depict the higher concentration of scheduled population and it is more than 17 per cent in all the tehsils situated in this. Eastern part of Haryana reflects the lower concentration of scheduled caste population, while in the western part, it is high (Map No.4.10).

The average percentage of scheduled caste population for rural areas of Haryana is 20.23, while it is only 12.65 for urban areas. It shows that in rural areas the concentration of scheduled caste population is more in comparison to urban areas. It has happened because more skilled labour is required in urban areas in comparison to rural areas. It is difficult for these people to be absorbed in skilled labour intensive jobs and they are concentrating more in rural areas.

The percentage of urban scheduled caste population varies between 7.54 to 27.54 and the maximum concentration has been observed in Loharu tehsil and minimum in Guhla tehsil. It has been again observed that lower order of urban centres show higher concentration of scheduled caste population rather than higher order towns. The class II towns show 8.32 per cent of total population as scheduled caste, while class V towns register 16.99 per cent.

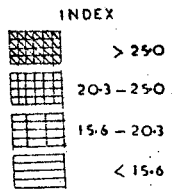
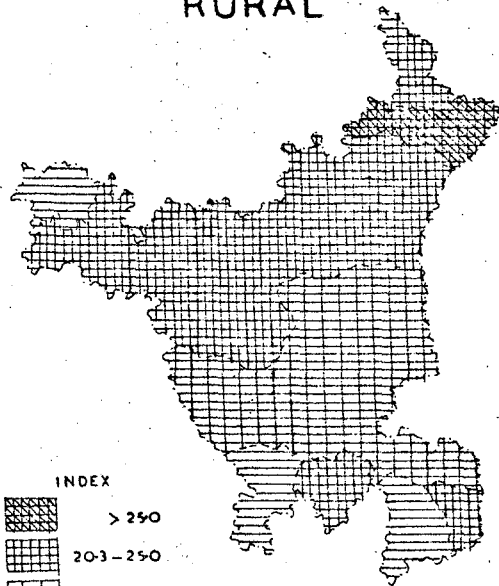
4.32 The Distribution of Castes

1931 census was the last census in which the data on castes has been given but after this census no data is available

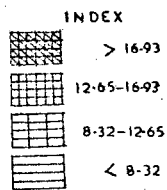
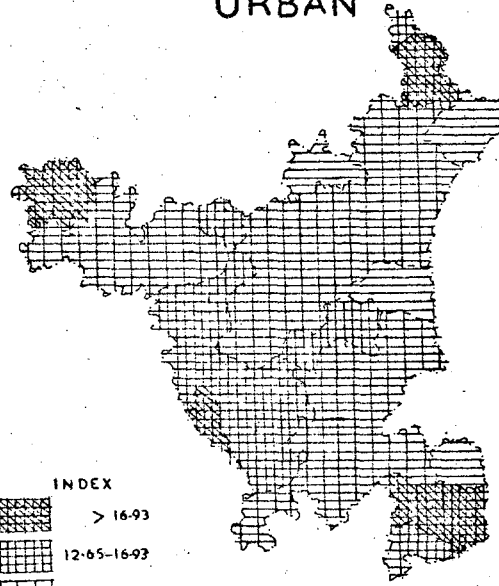
MAP NO. 4.10

HARYANA PERCENTAGE OF SCHEDULED CASTE POPULATION 1971

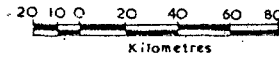
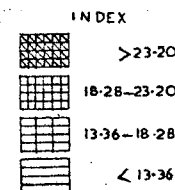
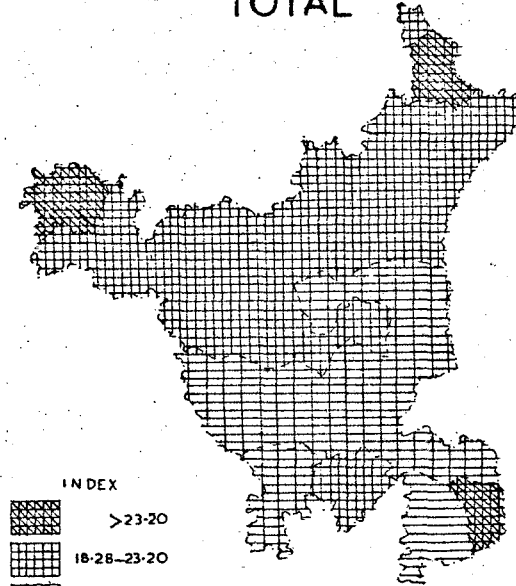
RURAL



URBAN



TOTAL



on castes. In 1931, Haryana was a part of old Punjab and Mahendragarh district was a part of Gurgaon district and Jind was a part of Ferozpur district.

Table: 4.1
Ranking of Castes

1931

Sl. No.		First Ranking	%	Second Ranking	%	Third Ranking	%	Fourth Ranking	%
1.	Hissar	Jat	28	Rajput	16	Chamar	9	Brahmin	5
2.	Rohtak	Jat	46	Chamar	14	Gujjar	13	Rajput	7
3.	Karnal	Jat	15	Rajput	13	Chamar	9	Chura	7
4.	Gurgaon	Ahir	11	Chamar	11	Jat	10	Brahmin	7
5.	Ambala	Jat	16	Rajput	10	Chamar	7	Gujjar	7
6.	Ferozpur	Rajput	10	Chuhra	9	Gujjar	5	Jat	5

The above table explains that Jat, Rajput, Ahir, Chamar, Chuhra, Gujjar and Brahmin are major castes, because they constitute more than 50 per cent of total population. In four districts, Jat is major caste and it ranks first, while Ahir and Rajput are first ranking caste in Gurgaon and Ferozpur. Rajput is an other important caste, which ranks second in these three districts. The distribution pattern explains that south and south west part show higher concentration of Ahir and western. Western, northern and north west parts depict higher

concentration of Jat, Chamar, Brahmin and Gujjar are other castes which come at second, third and fourth rank.

Table: 4.2

Haryana

Average Demographic Characteristics with
Reference to the Density of Population

S1. No.	Name of Variable	High Density Areas	Medium Density Areas	Low Density Areas
1.	Sex Ratio	896	856	870
2.	Dependency Ratio	2.84	2.89	2.57
3.	Literacy Rate	34.99	28.20	22.20
4.	Size of Household	5.76	6.21	6.45
5.	Percentage of Scheduled Caste	17.25	19.08	18.65
6.	Percentage of urban population	30.82	18.28	11.92
7.	Percentage of primary workers	45.76	64.15	77.20
8.	Percentage of secondary workers	21.66	12.67	6.65
9.	Percentage of Tertiary workers	30.75	23.16	15.51

The above table depicts that areas of high density reflect the higher proportion of literate and urban population.

In these areas the concentration of workers engaged in secondary and tertiary sector is more, while the concentration of workers engaged in primary sector is low. The values obtained for all these variables are decreasing in medium and low density areas. It has also been found that the size of the household is also more in areas of low density in comparison to high density zones. Except these six variables other three variables i.e. sex ratio, dependency ratio and percentage of scheduled caste population does not show any clear cut pattern. These three demographic and social characteristics are not much influenced by the density of population. However, it is very much clear that the density of population is highly affected by the various socio-economic factors and these variables are inter related.

Table: 4.3
Correlation Matrix
(Demographic, occupational and social characteristics)

1971

Sr. No.	Name of Variable	X 1	X 2	X 3	X 4	X 5	X6	X 7	X 8
X 1	- Density of Population	1.00	0.22	-0.24	0.65"	0.15	-0.81"	0.68"	0.75"
X 2	- Average size of household		1.00	0.12	0.66"	0.26 ^o	0.74"	-0.74"	-0.49"
X 3	- Percentage of Scheduled Caste Population to Total Population.			1.00	0.09	-0.07	0.04	-0.62	-0.02
					1.00	0.07	-0.09"	-0.43"	0.89"
X 4	- Percentage of literate population to total population						1.00	0.48"	0.02
								0.88"	0.89"
								1.00	0.58"
X 5	- Sex Ratio								1.00
X 6	- Percentage of workers engaged in primary sector								
X 7	- Percentage of workers engaged in secondary sector.								
X 8	- Percentage of workers engaged in Tertiary sector.								
			value		value		Sign		
	Significant at 1 per cent level		2.75		0.448		"		
	Significant at 2 per cent level		2.46		0.411		•		
	Significant at 5 per cent level		2.04		0.349		+		
	Significant at 10 per cent level		1.70		0.268		o		

4.5 Correlation Analysis

It has been found that density of population is very highly correlated with percentage of literate population to total population and the workers engaged in secondary and tertiary sector (Table 4.3). It explains that non-primary activity has given rise to high density of population.

The size of the household is very highly negatively correlated (at one per cent level of significance) with the percentage of literate population to total population. It is also positively correlated with the sex-ratio i.e. higher the sex ratio, higher the size of household. Again, it has been found that concentration of primary workers have given rise to larger size of household.

Percentage of literate population to total population has shown the high negative correlation (significant of 1 per cent level). With the percentage of workers engaged in primary sector. It explains that wherever the concentration of primary workers is more, the literacy is very low. However, in those areas, where the concentration of workers engaged in secondary and tertiary sector is more the literacy is very high.

Percentage of workers engaged in primary sector is more in only those areas, where the density of population is low, size of household is large and the literacy is low. Again it has been found that the workers dependent on secondary and tertiary sector is more in those areas where the density of population is very high,

size of household is small, the literacy is high and the concentration of scheduled caste population is low.

The table 4.3 also depicts that in those areas where the population of scheduled caste population is more, the literacy rate is low and primary activities is the main occupation of the people.

Chapter V

SETTLEMENTS

SIZE: SPATIAL & FUNCTIONAL CHARACTERISTICS

Chapter V

SETTLEMENTS

SIZE: SPATIAL & FUNCTIONAL CHARACTERISTICS

5.0 Settlement is man's first step towards adapting himself to his environment. It is a concrete expression of human occupancy of the earth's surface. Certain lodgements and forms of dwellings are very closely connected with the details of relief, geological structure and other physical features. The geographer considers first of all how the material environment has a paramount influence in the disposition and forms of man's dwelling.

The study of the settlement has been one of the most significant themes of human geography. Recently in the light of statistical testing, some attempts have been made for the precise description of the relative degrees of nucleation and dispersion. Newly devised mathematical techniques, many of them borrowed from the plant ecologist, are now being tested in a renewed attempt to provide mathematically precise and objective descriptions of settlement pattern.

In this chapter, an attempt has been made to see the analysis of spatial distribution pattern of settlements in Haryana. The significance of such study in the present framework of analysis has its large potentiality of application to the problems of regional development. As every social and economic provision ultimately derives its significance from the range of

area, which it commands and it is obviously a function of distance or spacing of settlements for which the study of distributional pattern has been done.

The present chapter has been divided into two sections. The first section deals with the rural settlements, while the second section brings out the distribution, rank-size relationship and functional classification of towns.

Section I

Rural Settlements

5.1 In Haryana, 82.3 per cent of total population lives in rural areas and 17.7 per cent of the total population lives in urban areas. So the rural settlements have become important dwelling places for the people of the region. The table given below clearly states that how the rural settlements are distributed by their size class and how much the proportion of population is living in these settlements.

Table: 5.1

Haryana

Percentage Distribution of Rural Settlements
and Rural Population by Size Class of
Settlements

1971

S1. No.	Population size	Percentage of villages to total villages	Cumulative percentage of villages	Percentage of population to total population.	Cumulative percentage of population
1.	< 200	9.18	9.18	0.81	0.81
2.	200-499	20.80	29.98	6.07	6.82
3.	500-999	28.36	58.34	16.80	23.62
4.	1000-1999	24.85	83.19	28.56	52.18
5.	2000-4999	14.49	97.68	35.13	87.31
6.	5000-10,000	2.20	98.88	11.49	98.80
7.	> 10,000	0.12	100.00	1.20	100.00

5.11 One of the important point, which is clear from the table (Table: 5.1) is that 50 per cent of total population is living in only 17 per cent villages, while remaining 50 per cent population is living in 83 per cent of the rural villages.

Secondly, the above table explains that among 75 per cent of rural settlements, population size varies between 200-1999 but in these settlements only 51 per cent of total population is living. It shows that there are some settlements in which the population is highly concentrated, while in others the concentration of population is very low.

5.12 Distribution of Rural Settlements

Following methods have been used to see the distributional pattern of the rural settlements:

- (i) Nearest Neighbour Technique
- (ii) Lorenz Curve
- (iii) Gini's Coefficient

(i) Nearest Neighbour Technique

The nearest neighbour analysis indicate the degree to which only observed distribution of points deviates from what might be expected if the points were distributed in a random manner, within the same area. A random distribution of points is defined as a set of points on a given area for which, "any point had the same chance of occurring on any sub area as any other point; that any sub-area of that same size and that the placement of each point has not been influenced by that of any other point."¹

This technique was originally developed by the plant ecologists, who were concerned with the distribution of plant species over the earth. As the name suggests, nearest neighbour measure is a straight line measurement of the distance separating

1. R.J. Clark and F.C. Evans, Distance to N.N.D. as a measure of spatial relationship in population, Ecology, vol.35, pp. 446. 1954.

any phenomenon and its nearest neighbour in space. However, this technique could effectively be used in the study of other distribution, also for this, the following formula has been used:-

$$R = \frac{\overline{ra}}{\overline{re}}$$

Where

\overline{ra} = mean of observed distances in a given region

$$\overline{re} = \frac{1}{2\sqrt{p}}$$

$$p = \frac{N}{A}$$

p = Density of settlements

N = Number of settlements

A = Area of the region

R value Pattern of distribution

0.00 Clustered

1.00 Random

2.15 Even

Since, it is difficult to do this exercise for all the 7064 villages, the random samples have been selected to draw the inferences. The selection of the sample is associated with different factors seem to be influencing the settlement distribution over space.

Some of the factors, randomly selected are physical

like hills, plain natural vegetation, hydrological like rivers, canals and transport communication lines. The sample area is uniform under all the factors, considered to be influencing the distribution pattern.

Table 5.2

'R' Values of Rural Settlements.
(Based on areal random samples)

- 75 -

Sl. No.	Topo Sheet No.	Land type	No. of observation	Size of Area (Sq. Kms.)	E of actual distance (in kms.)	Density of settlements per Kms.		p re		R	Remarks
						ra	le	p	re		
1.	53 <u>D</u> 7	Dunny Area	15	75.27	25.45	1.69	0.19	0.43	1.16	1.45	Random distribution with slight
2.	44 <u>O</u> 1	Canal (well-irrigated area)	8	75.27	17.75	2.21	0.10	0.31	1.61	1.37	Departure towards uniformity
3.	53 <u>F</u> 8	River (Near Yamuna)	24	75.27	25.32	1.05	0.31	0.55	0.90	1.16	Random
4.	53 <u>D</u> 7	Vegetated area	13	75.27	17.65	1.35	0.17	0.41	1.21	1.11	Random
5.	53 <u>F</u> 3	Choas	24	75.27	28.94	1.20	0.31	0.55	0.90	1.33	Random with a slight departure towards uniformity.
6.	53 <u>C</u> 14	Transport (well communicated area)	14	75.27	17.07	1.21	0.18	0.42	1.19	1.01	Random
7.	53 <u>C</u> 13	Plain area	20	75.27	25.00	1.25	0.26	0.50	1.00	1.25	Random
8.	53 <u>F</u> 2	Hilly area (Siwalik)	38	75.27	32.22	0.84	0.50	0.70	0.71	1.18	Random

The table 5.2 gives the idea of spatial distribution pattern of rural settlements in Haryana and it explains that the general distribution of rural settlements is random though the variations are there in the degree of departure from the random distribution. The departure is towards the uniform distribution.

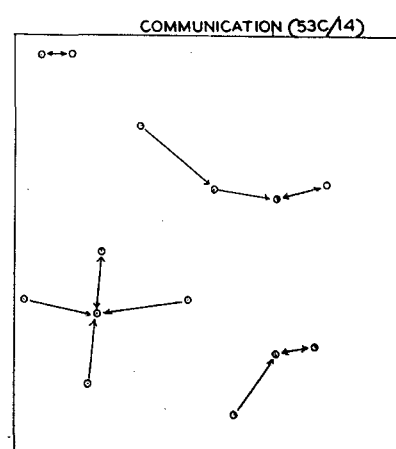
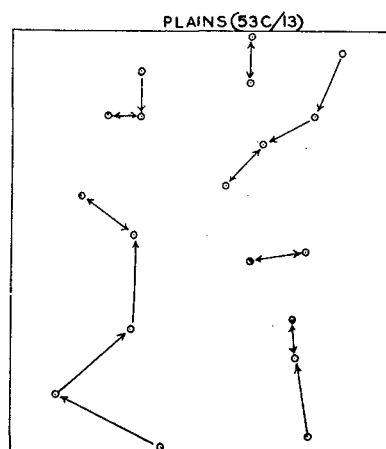
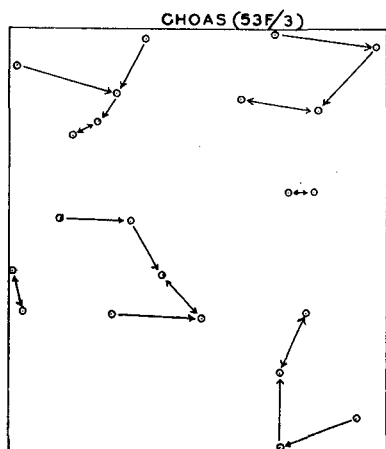
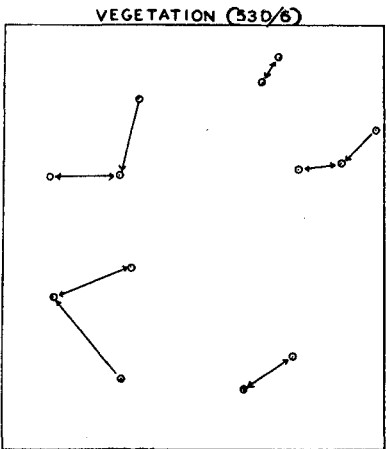
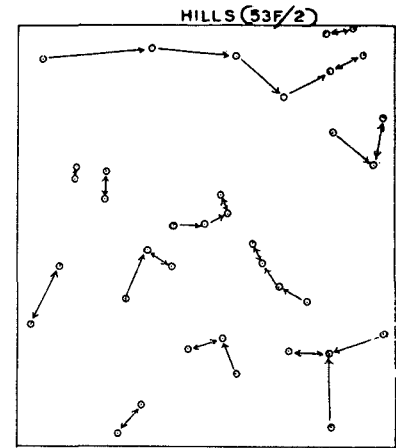
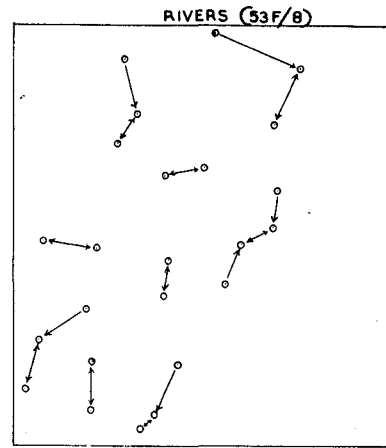
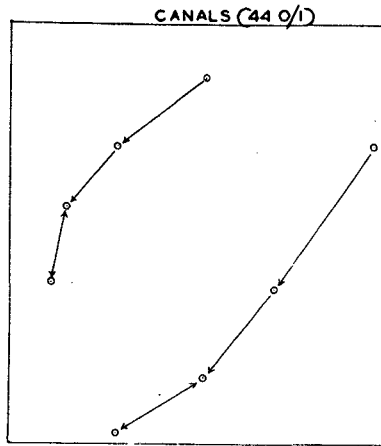
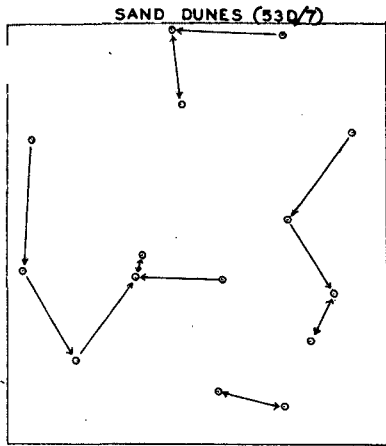
The 'R' value varies between 1.01 to 1.45. For the well connected area, the value comes to 1.01, while it is 1.45 for the dunny region. It reflects that the transport facilities have given full choice to the settlements to develop at any place. The settlements are not evenly distributed in the dunny region, but they reflect slight departure towards the uniform distribution of settlements. (Map No.5.1). However, not in any part of the region, the clustering of the settlements have been observed.

In this way, the above table (table No.5.2) clearly explains that five samples (river area, vegetated area, communicated area, plain area and hilly area) show the random distribution of settlements but three sample areas (dunny area, well irrigated area by canals, and area covered by small seasonal streams) depict slight departure towards the even distribution.

5.13 Role of various factors on the distribution pattern of settlements

In the following discussion, it has been tried to see the role of various physio-cultural factors on the distribution

DISTRIBUTION OF SETTLEMENTS



1000 0 1000 2000 3000
Metres

pattern of settlement. For this the chi sq. test, technique has been used.

Table: 5.3

Chi Sq. Test

Sl. No.	Factors affecting the distribution pattern	Observed number of settle-ments	Expected No. of settle-ments	$(O-E)^2$	$\frac{(O-E)^2}{E}$
1.	Duny Area	15	20	25	1.25
2.	Canals (well irri-gated area)	8	20	144	7.20
3.	River area (near Yamuna)	24	20	16	0.80
4.	Vegetated Area	13	20	49	2.45
5.	Vhoas (Small streams)	24	20	16	0.80
6.	Transport area	14	20	36	1.80
7.	Plain area	20	20	0	0.00
8.	Hilly area	38	20	324	16.20
Total		156	160	510	30.50

$$\frac{E = E_o}{N} = E \frac{(O-E)^2}{E} = 30.50$$

Tabulated chi sq. value at 1 per cent = 18.48

Calculated chi-sq-value at 1 per cent = 30.50

It has been found that the tabulated value is less than calculated value and it shows that these factors have played

a significant role in the distributional pattern. The settlements do not have full choice to be developed at any place.

It has been found that in some of the cases the distribution pattern of settlement is almost random, while in other cases, the departure is towards uniformity from the random distribution. The chi-sq. Test analysis have proved that this amount of departure is affected by the various physio-cultural environment. These environments are not uniformly distributed over the space and it has given rise to the variations in the amount of departure from the random distribution.

5.14 Measures of concentration of rural settlement:

The degree of concentration of rural settlements, reflects the uneven distribution pattern. The degree of concentration will be greater, if the rural settlements are assembled in a particular region and least if they are evenly spaced.

Lorenz Curve

It basically deals with the cumulative percentage distributions of the two attributes at different points. The cumulative percentages of one variable up to the same points. The different points so obtained are then joined by a smooth free hand curve. For comparison a diagonal line is also drawn, joining the last point and the origin, showing the line of equal distributions.

2. Aslam Mahmood, Statistical Methods in Geog. Studies, Rajesh Publications, New Delhi 1977, pp. 109.

In this study, Lorenz Curve has been used to see the concentration of rural settlements. For this, two variables have been selected.

- i) Number of rural settlements in a Tehsil.
- ii) Area of the Tehsil.

The percentage for both the variables has been calculated to the state i.e. the percentage of rural settlements in a tehsil to total number of rural settlements in the state. (Appendix Table IV). Then, according to the ratio of these two variables, both the variables have been adjusted according to decreasing ratio. The cumulative percentage of rural settlements has been plotted on X axis and cumulative percentage of area on X axis. (Fig. No. 5.1)

Table 5.4
Haryana
Distribution of Rural Settlements
by Lorenz Curve
1971

<u>Sl.No.</u>	<u>Cumulative - Percentage of Area</u>	<u>Cumulative percentage of rural settlements</u>
1.	10	18
2.	20	36
3.	30	45
4.	40	62
5.	50	66
6.	60	79
7.	70	85
8.	80	90
9.	90	96
10.	100	100

HARYANA
DISTRIBUTION OF RURAL SETTLEMENTS
BY LORENZ CURVE
1971

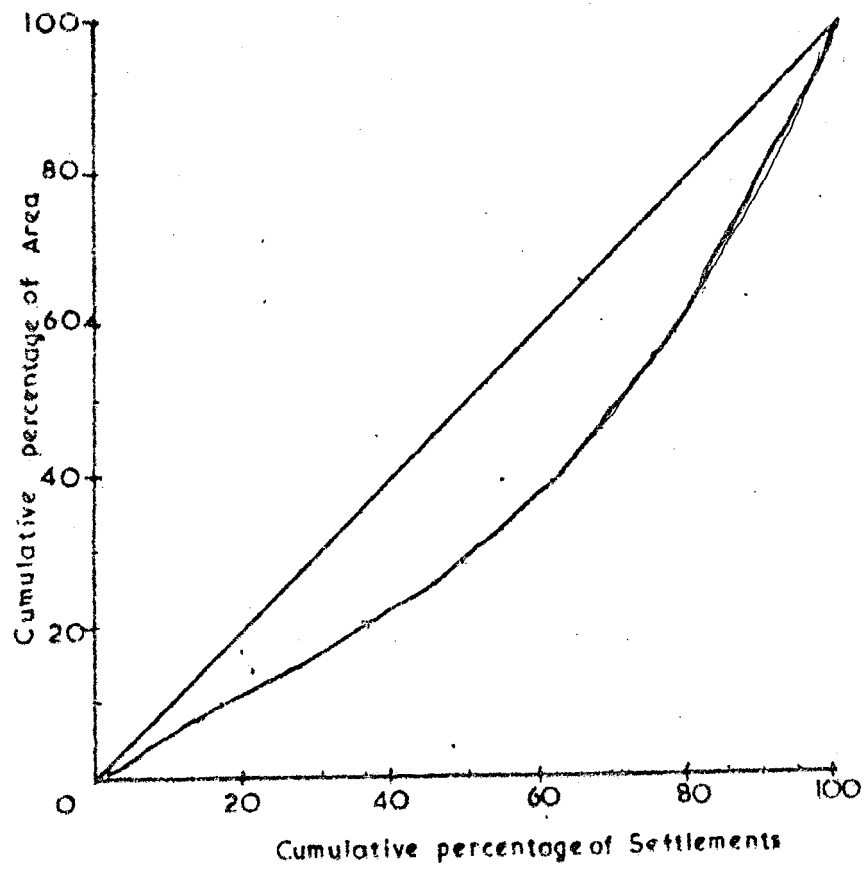


Fig. No. 5-1

The above table explains that in 50 per cent of area, sixty six per cent of settlements are concentrated while in remaining fifty per cent of area only thirty four per cent of rural settlements are distributed.

Gini's Coefficient

It is a statistical method for the measurement of concentration, which express the area on a graph between the lorenz proportion of the total area below the diagonal.³

For Gini's concentration ratio, the results which have been already calculated for lorenz curve are used by calculating two further steps. Xi and Yi are cross multiplied and then the sigma for these values has been calculated (Appendix Table: IV) and the formula given below has been applied to calculate concentration ratio:

$$G = \frac{1}{100 \times 100}$$

Xi = Cumulative percentage of total rural settlement in a tehsil

Yi = Cumulative percentage of the area of a tehsil

$$G = \frac{1}{10000} \left\{ \begin{array}{l} 1340 \quad 21.09 \quad - \quad 132178.97 \end{array} \right\} = 0.18$$

This value of 0.18 explains that in Haryana, the concentration of rural settlements is very low. Neither the

3. John, I. Clark, Population Geography, IIInd ed., 1972, pp.40-49.

rural settlements are evenly spaced and nor clustered distributed with a tendency towards uniformity.

5.15 Spacing of Rural Settlements

Spacing of the settlements has a significant place in theoretical consideration of distribution, defined as the locational arrangement of villages with respect to one-another. The theoretical distance is based on the density of settlements referred to the rural area. Theoretical basis of transformation of density into spacing is provided by an ultimate development of a hexagon into a circle to build spatial structure without leaving any empty space; it is best known example in this context described by Christaller.

The formula for computation of spacing (in Kms.) used in this study is $D = 1.0746 \frac{1}{\sqrt{d}}$ as described by Mather.⁴

D = Spacing Index

d = Density of settlements per unit of area.

In Haryana, the spacing index varies between 1.07 to 4.23 per sq. kms. The spacing is very low in the North eastern part of Haryana. Since the density of settlement is very high in this part, it has given rise to the low spacing. The central part of Haryana, reflects moderately high spacing and in Western

4. E.C. Mather, A Linear - Distance Map of Farm Population in U.S. A.A.A.G. vol.34, (1944), pp. 173-80.

duney region, the spacing is very high.

It is evident from the map (map No.5.2) that the spacing of rural settlements is quite high in the western part, while it is quite low near the Yamuna river, where the density of population and density of settlements is quite high.

Table 5.5

Correlation Matrix

(Characteristics of rural settlements)

<u>Variable No.</u>	<u>Variables</u>	<u>X1</u>	<u>X2</u>	<u>X3</u>	<u>X4</u>
X1	Spacing Index	1.00	-0.90	0.96	0.81
X2	Density of population		1.00	-0.80	0.02
X3	Average size of Villages (Area)			1.00	0.66
X4	Average size of Villages (Pop.)				1.00

The above table shows that wherever the spacing index is high, the size of the settlements in area as well as in population is large and where the density of population is high, the spacing index is low and vice-versa.

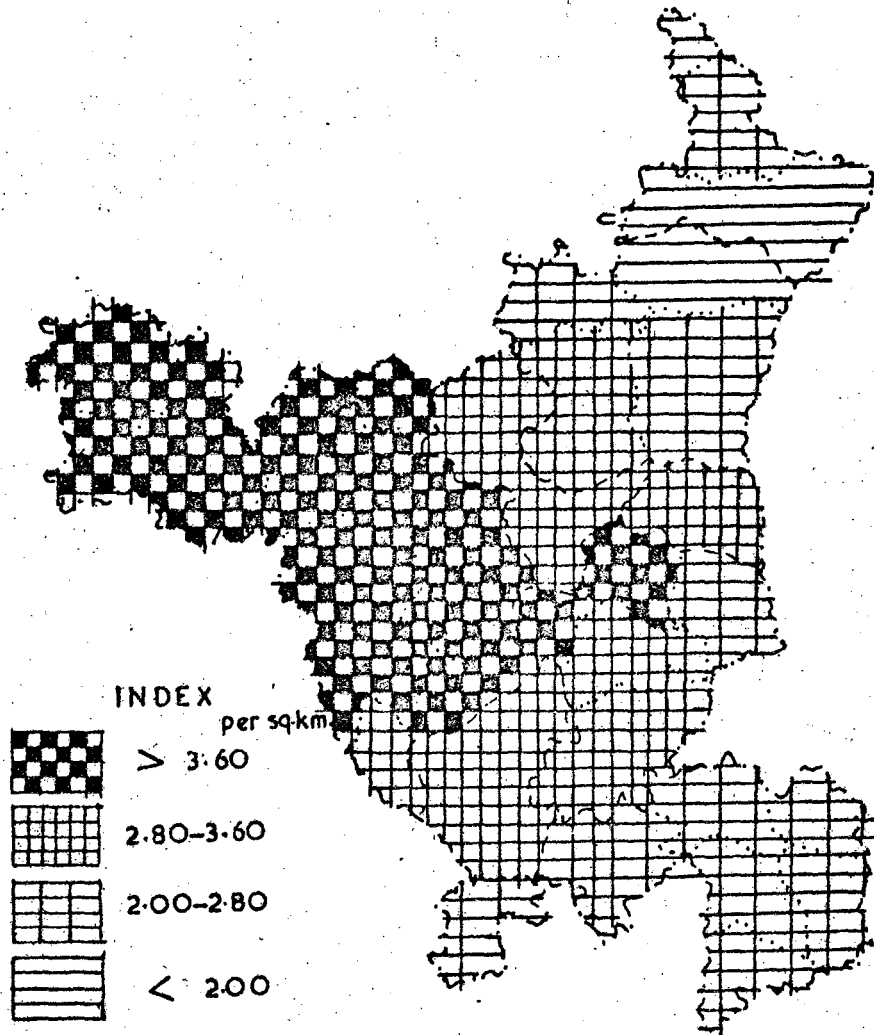
Section II

Urban Settlements

In Haryana, there are 65 towns (1971 census) of which two are cities (population more than 1,00,000) namely Rohtak and Ambala. There are nine class II towns and most of these

MAP NO. 5.2

HARYANA SPACING OF VILLAGES 1971



20 10 0 20 40 60
Kilometres

towns are industrial towns. Among class three towns, some of towns like Ballabgarh and Jagadhri are industrial towns. Class five towns are maximum in number and most of these are agricultural towns and class VI towns are market centres. (Map No.5.3).

Table : 5.6

Haryana

Percentage Distribution of Towns and Urban Population with respect to size class

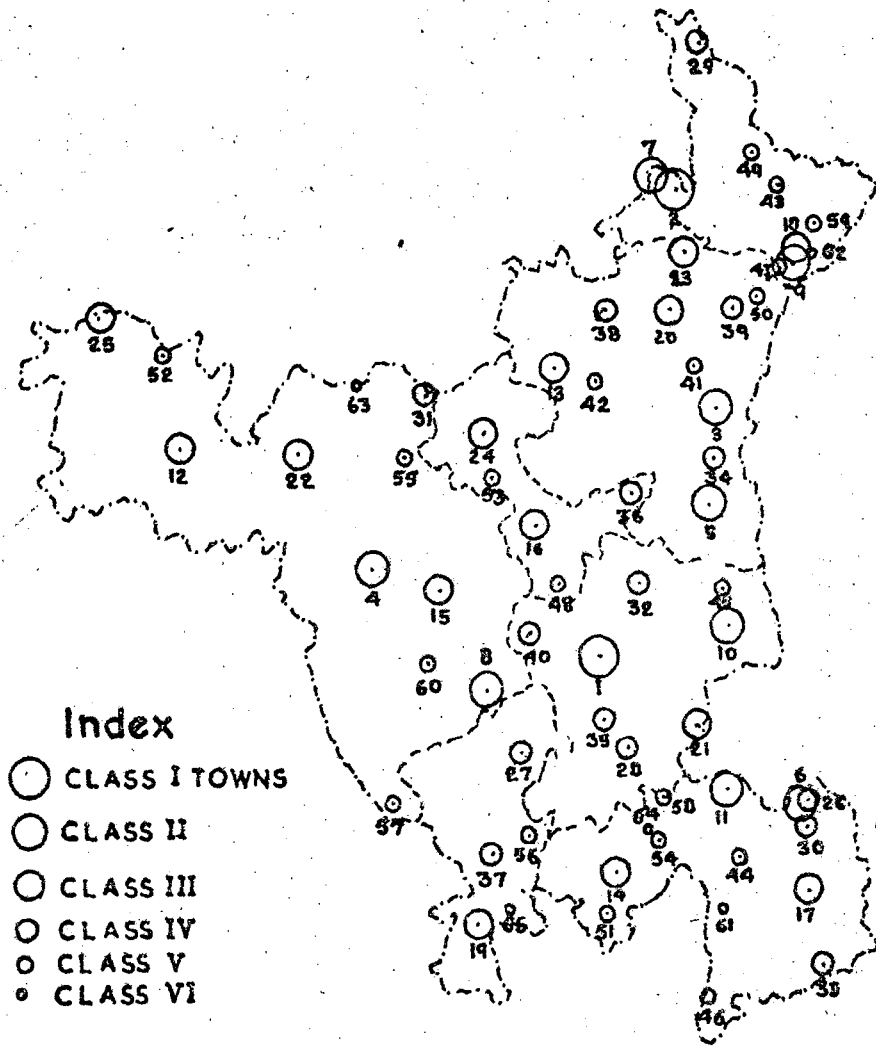
1971

S1. No.	Size class	Percentage of towns no. total town	Cumulative % of towns	Percentage of population to total urban population	Cumulative % of population
1.	<5000	7.69	7.69	0.99	0.99
2.	5000-9999	30.76	38.45	7.84	8.83
3.	10000-19999	23.08	61.53	12.54	21.37
4.	20000-49999	21.54	83.07	26.06	47.43
5.	50000-100000	13.85	96.92	39.75	87.18
6.	>100000	3.08	100.00	12.82	100.00

5.21 The above table depicts 30.76 per cent of total towns are class V towns but number of class I towns is insignificant.

MAP NO. 5.3

HARYANA LOCATION OF TOWNS 1971



Again, it explains that half of the urban population is living in those towns, where the population size is below 50,000 and 39.75 per cent of urban population is residing in class II Towns. 8.83 per cent of urban population is living in 30.76 per cent of total towns and these towns are small towns. It is also clear from the table that 13.85 per cent of total towns have provided shelter to 39.75 per cent of total population and these towns are highly developed in the industrial sector.

5.22 Distribution of Towns in Haryana

The spatial distribution of towns is analysed by using the nearest neighbour Technique⁵ and the analysis have been done for the region as a whole, district wise and with the help of size class of towns.

Table : 5.7
Haryana
'R' Values of Towns (District wise).
1971

S1.No.	Name of ^{DISTRICT} Towns	No. of Towns	Area in sq.km.	Σ of actual distance	ra	re	R Value
1.	Ambala	10	3833	143.14	14.31	10.00	1.43
2.	Karnal	11	8068	161.03	14.63	13.88	1.05
3.	Rohtak	8	6043	153.66	19.20	16.66	1.15
4.	Gurgaon	14	6146	185.24	13.23	11.11	1.10
5.	Hissar	12	13982	324.17	27.01	17.24	1.56
6.	Jind	5	2691	94.72	18.94	11.62	1.62
7.	Mahinder-Garh	5	3459	101.04	20.20	13.51	1.49

5. The technique has been discussed in the first section of this chapter.

The importance of making analysis at district level is to see the spatial distribution pattern of towns in Haryana, since it was not possible to do this exercise at the tehsil level, because there are some tehsils (like Loharu, Nuh etc.) in which only one town is located.

The table 5.7 clearly depicts that the large amount of variations exist in the R values. It varies between 1.05 in Karnal to 1.62 in Jind district. The districts situated in the southern and western part reflect more departure from random distribution tendency towards uniform distribution. (Map No.5.4). However, it is noticed that in two districts, adjoining to Delhi, the distribution is exactly random and away from Delhi, the departure from random towards even spacing is increasing.

Table: 5.8.

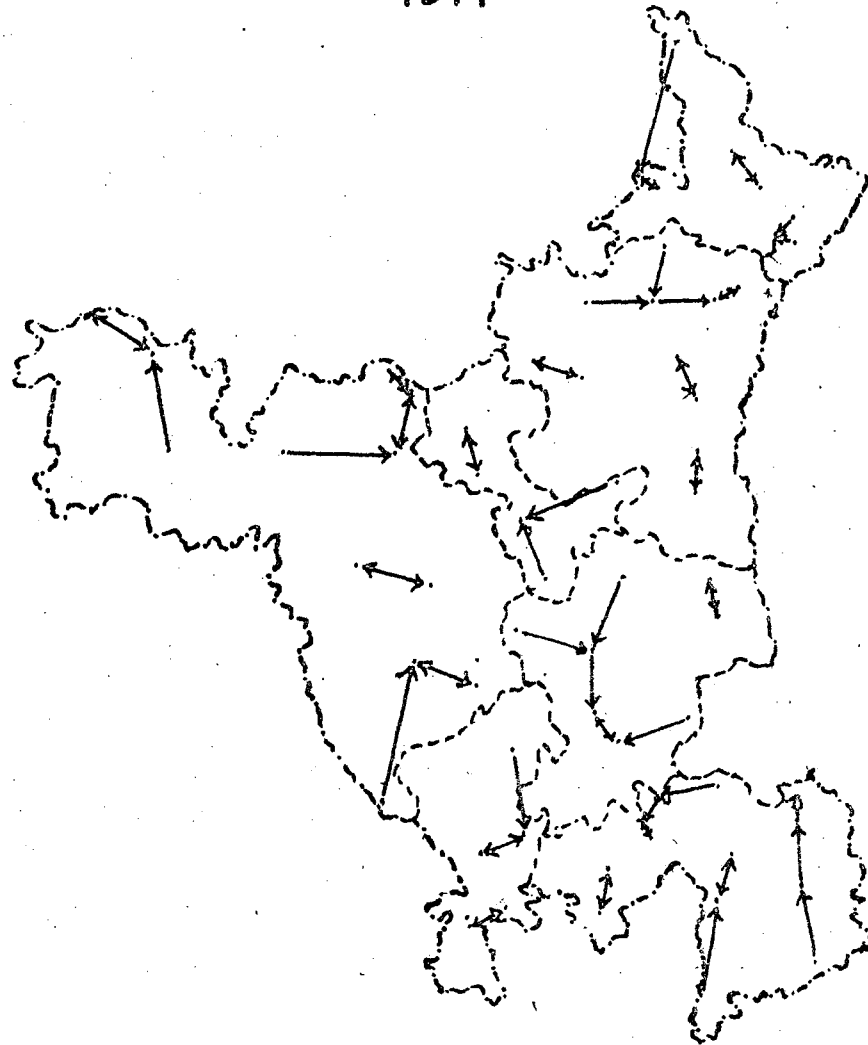
Haryana

'R' Values of Towns by their size class
1971

S1. No.	Class	No. of towns	Area in Sq.Kms.	Of actual \sum distances in sq.kms.	ra	re	R Value
1.	I	2	44222	330.48	165.24	79.11	2.08
2.	II	9	44222	397.85	44.21	35.26	1.25
3.	III	14	44222	672.58	48.04	28.86	1.66
4.	IV	15	44222	556.72	37.11	28.00	1.28
5.	V	20	44222	683.05	34.15	25.00	1.36
6.	VI	5	44222	437.83	87.56	50.00	1.75
7.	All Towns	65	44222	1197.77	18.42	13.36	1.37

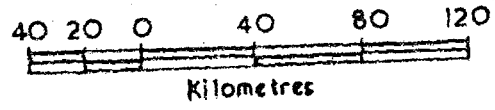
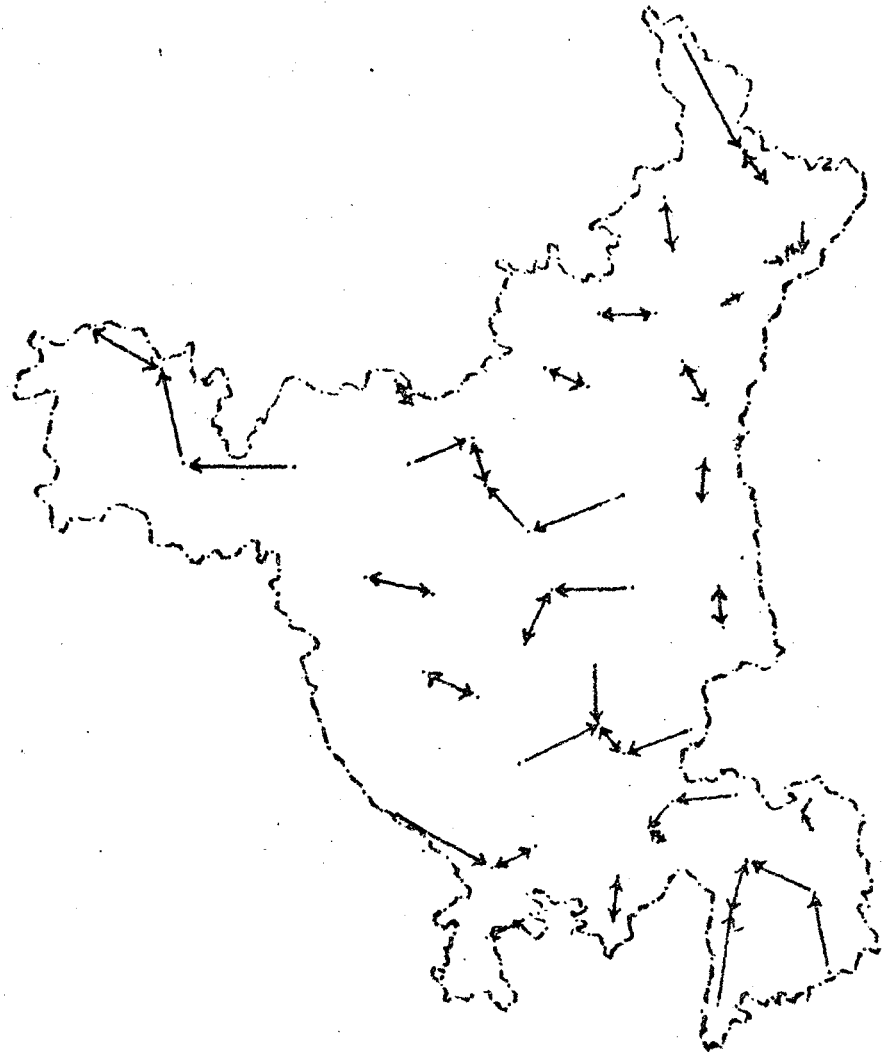
MAP NO. 5.4

HARYANA
NEAR NEIGHBOUR DISTANCES
ALL TOWNS (District wise)
1971



MAP NO. 5.5

HARYANA
NEAR NEIGHBOUR DISTANCES
ALL TOWNS
1971



The above table explains that class I towns are evenly distributed in Haryana. Both these towns are located in the two different parts of Haryana, (one in north and other in Central) and they have shown the uniform distribution.

R value varies between 1.25 to 1.75 for the lower order of towns (Class II to class VI towns) Class II, Class IV and Class VI towns depict slight departure from random distribution with a tendency towards uniform spacing. In the case of class-III and class IV towns, the departure from random distribution towards uniform spacing is significant.

The 'R' value, calculated for the region as a whole, explains that the towns are randomly spaced in Haryana with a tendency towards even spacing.

5.23 Measures of Concentration of Towns

For measurement of the concentration of towns two variables have been taken into consideration.

- i) Number of towns in a Tehsil
- ii) Area of a Tehsil.

With the help of these two variables, the curve has been drawn,⁶ which gives the idea of the concentration of towns in Haryana.

-
6. The technique for drawing the lorenz curve has already been explained in the first part of this chapter.

The Lorenz curve (Fig. No.5.2) reflects that the concentration of towns is neither at one place, nor they are spaced at equal distance from each other. It depicts that in 48 per cent of the area, only 30 per cent of the towns are concentrated and in remaining 52 per cent of the area, 70 per cent of the towns are distributed. Gini's concentration ratio, which comes to 0.22⁷ explains that the towns in Haryana show some concentration and they are not evenly spaced.

5.24 Rank - Size - Rule of Towns

While expressing the rank-size-relationship of towns in any region, mainly there are two basic objectives.

- i) How much is the difference between the actual population and expected population of towns, within the hierarchy.

George K. Zipf, was the first person, who put forward the concept of Rank-size relationship. He has stated in its simplest form. The rule depicts a harmonic progression of cities within the urban hierarchy, so that, if the population of largest city is known, the population of all other cities can be derived from the rank of their size rule. However, for example if the largest city has 2,00,000 inhabitants, the 20th will have $\frac{1}{20}$ as many, or 10,000 and the 50th the town will have $\frac{1}{50}$ as many of 4,000 looking at this logic, one can come

$$7. \quad G = \frac{1}{10000} \times 132683.84 - 13483362 = \frac{2202.78}{10000} = 0.22$$

HARYANA
DISTRIBUTION OF TOWNS
BY LORENZ CURVE
1971

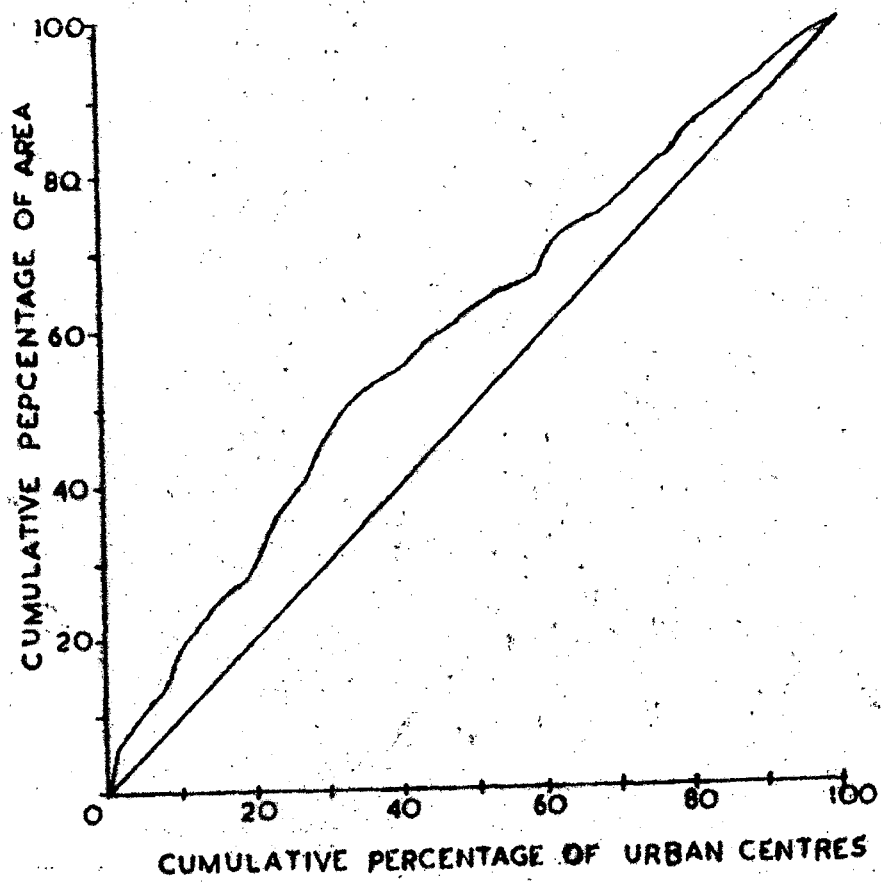


Fig. No. 5.2

out with this conclusion that this is a crude method, where it has been easily accepted that population of first order, town or city equal to expected population. Looking at this drawback of Zipf method, another method has been applied to derive the expected populations for each of the town of Haryana. The detailed steps in derivings the rank-size expected populations of towns are as follows:

- (i) All the towns have been arranged according to population size and the rank has been assigned to each.
- (ii) Reciprocal of each rank has been calculated.
- (iii) The sigma for all the 65 reciprocals and the population of these sixty-five towns has been calculated.
- (iv) Divide the sigma of actual population by sigma of the reciprocals to get the expected population of first highest order town and divide the expected population of the first highest town by two to get the expected population of the second highest town by three to get the population of third and so on.⁸

In this study, this method has been applied for the year 1971 to see the rank size rule during this year.

8. Harley L. Browning and Gibbs, Some Methods of Demographic and Spatial Relationship among Cities. Urban Research Methods ed. by Gibbs pp. 436-459, 1966.

Patterns of Deviation:

Fig. No.5.3 indicates the deviation from the rank-size rule. It has been found that the large and the small towns have greater discrepancy between its actual and expected size. In case of Rohtak, this discrepancy is 200.34 and 197.57 for Ateli (Appendix Table: VII). Again, it has been found that for four towns, viz., Ambala, Rohtak, Karnal and Hissar) the expected population is more. From fifth rank to fifty five rank, the expected population is less than actual population and it is maximum in the case of Jagadhri. The remaining twenty towns have more expected population in Comparison to their actual population.

However, the total discrepancy $\frac{PE - PA}{PA}$ for all the 65 towns is 2047.25 which gives the average of 31.49 per cent for each town. It proves that towns of Haryana do not bear a regular relationship with each other but this irregularity is not very high. (Fig. No.5.3)

5.25 Economic Base of Towns

The towns play a major role in the economy of the region. One of the distinguishing characteristics of a town is the fact that the people of the towns are not primary food producers but some of these towns are basically manufacturing centers, while the others are trade, service or transport centers.

HARYANA Rank Size Relationship of Towns 1971

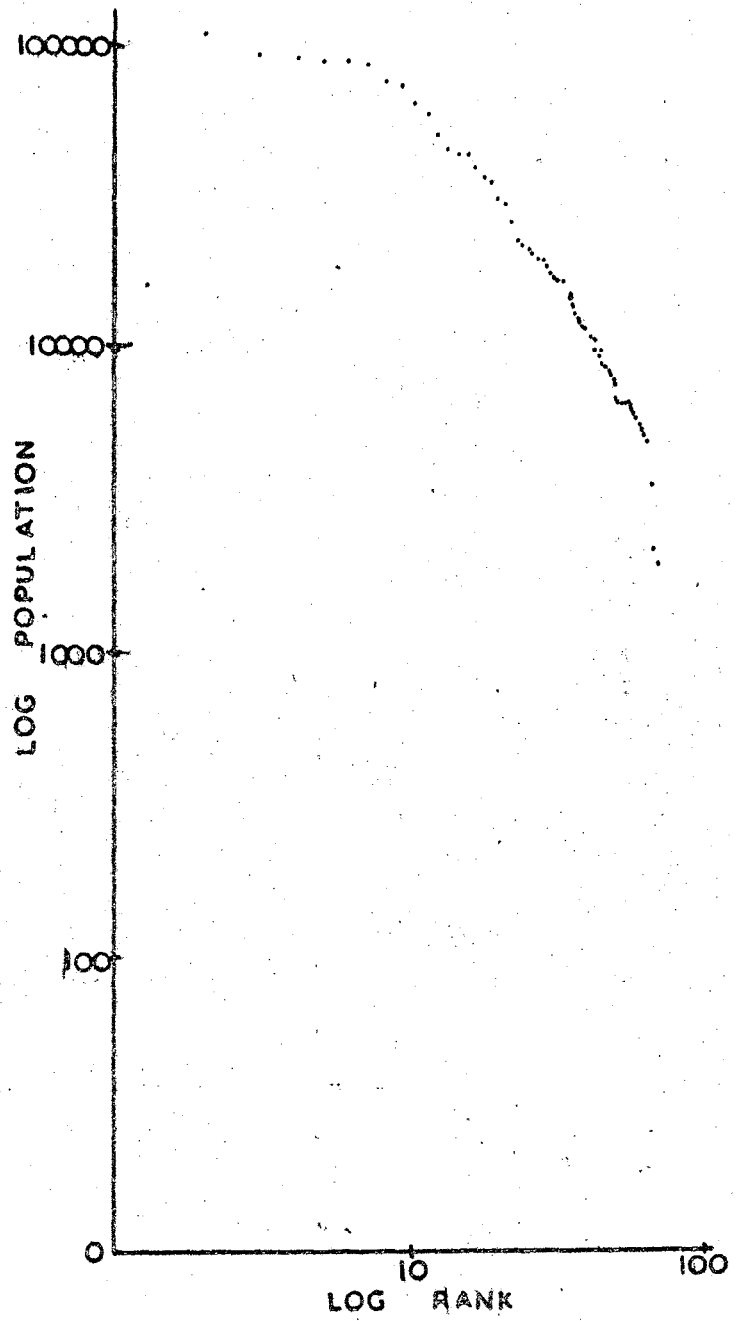


Fig.No-5-3

In this section an attempt has been made to bring out a functional analysis of the towns. The functional interpretation of towns is a significant aspect of urban study as it provides base for the regional planning.

The objective of functional classification of towns in this study is to give a base for the functional analysis of the towns of Haryana in relation to its population size and also to see the changes in the functional character of towns during the decade 1961-1971.

Method Used for This Study

The functional classification of cities and towns has been attempted by the geographers based on different criteria. To some up, these can be reviewed from two angles. Firstly in some cases, classifications are developed in terms of attributes and secondly, the classification developed in terms of variables, based on certain differences which are relative and not absolute. The second one is based on statistical approaches and is more scientific. Chauncy D. Harris⁹ devised a new dimension by adapting a quantitative method. Trying to eliminate the short comings¹⁰ of Harris method, Nelson developed method using arithmetic

-
9. C.D. Harris, "A functional classification of cities in the United States," Geographical Review, vol. ixxxii, January 43, pp. 86-99.
 10. H.J. Nelson, "A service classification of American Cities," Economic Geography, vol. xxxi, July 1955, pp. 189-210.

mean and deviations in the form of standard deviation for assessing the varying. To decide the functional character on the basis of relative strength of different functions, the deviation method has been adopted by many geographers, through modified according to the suitability in the region concerned.

The chief merit of Nelson's method is that it is simple and widely understood. The degree of specialisation can also be compared by the use of standard deviation. Moreover, the method is not mutually exclusive, i.e. a town can be included in more than one group of services or function. Therefore, Nelson's method has been used in this study.

The functional classification of towns adopted in this study is based on the 1961 and 1971 census data. The percentage of workers engaged in each industrial category has been worked out for all the 65 towns of Haryana. These percentage values form the basic data for analysing the classification. The standard deviation for all the percentage values are calculated for each industrial category. If the positive deviation from the mean percentage is more than standard deviation, only, for one function, that town has been referred to as monofunctional towns. Some towns have more than one S.D. from the mean in two industries and these towns have been classified as bi-functional towns. Those towns which are having deviation of more than one S.D. in three functions have been classified as tri-functional towns and rest of them are treated as diversified towns. In

some towns, the positive deviation is more than two or three standard deviation from the mean which explain the degree of specialization in that particular function. Therefore, in the case of monofunctional towns, these towns have been arranged according to the degree of variation from the mean as follows:

- I Towns of low specialization = Mean + One S.D.
- II Towns of moderate " = Mean + Two S.D.
- III Towns of high " = Mean + Three S.D.

Table 5.9

Haryana

Distribution of Towns by their size class and functions

1971

Sl. No.	Class	Mono-functional	Bio-functional	Tri-functional	Divergi fied	To-tal
1.	I	2	- -	-	-	2
2.	II	7	2	-	-	9
3.	III	7	2	-	5	14
4.	IV	8	3	-	4	15
5.	V	6	9	-	5	20
6.	VI	3	1	1	-	5
7.	Region	33	17	1	14	65

The table 5.9 shows that most of these towns (52.3%) are monofunctional and there are only 16 towns, which are bi-functional. The remaining fourteen towns are diversified. Both the class I towns are monofunctional and among class II the seven towns are monofunctional and two are bi-functional. However, the lower order of towns, depict their concentration either in the category of Bi-functional or as diversified towns.

5.26 Distribution of Monofunctional Towns by their Predominant Function and Degree of Specialization

The above table (5.10) shows that only one town is monofunctional in mining and quarrying but it is highly specialized in this activity. In other services, maximum towns are monofunctional and most of them are least specialized. Except other services, the important functions are Trade and Commerce construction. It is clear from the above table that 42.4 per cent of the total monofunctional towns, are specialized in Tertiary Sector, 36.8 per cent in secondary sector and remaining 20.8 per cent of total monofunctional towns are specialized in primary sector of economy.

The towns which would be called as trade towns according to their functional characteristics are Mandis. These towns are Uklanmandi, Jakhalmandi and Mandi Dabwali and most of these towns are small towns.

Agriculture, is an important activity in four towns and these are class IV and class V towns. Since the important

activity of these towns, is agriculture they are not growing fast in their population size as well as in their economy, while some other towns, like Faridabad, Sonapat and Ballabgarh etc. are growing very fast because of the development of industries in these towns.

5.27 Bi-functional and Tri-functional Towns

In Haryana, there are 16 bi-functional and one is tri-functional town. The table 5.10 gives the clear idea about the combination of the different functions. Twelve combinations have emerged with their different functional group. A comparison as revealed in the above table is showing their associations sometimes implies more existence in more than one function as for explain construction and other services. In other cases, the association may imply some organic relationship so that the presence of the one function accelerates some other functions.

Table: 5.10

Haryana

- 95 -

Distribution of Monofunctional Towns by their predominant function
and degree of specialization
1971

Sl. No.	Predominant Function	Low	Moderate	High	Mean	S.D.	Name of the Towns	Total
		specialization Mean + 1 S.D.	specialization Mean + 2 S.D.	specialization Mean + 3 S.D.				
1.	Agriculture	2	2	-	18.03	13.89	Uchana, Pataudi, Fundri, Beri	4
2.	Livestock, Forestry & Fishing	1	-	1	0.83	0.70	Narwana, Ferozpur Jhirka	2
3.	Mining & Quarrying	-	-	1	0.02	0.039	Shahabad	1
4.	Household Industry	2	1	-	3.15	2.01	Sadura, Nuh and Panipat	3
5.	Manufacturing other than household	-	2	1	16.06	10.29	Ballabgarh, Yamunanagar and Faridabad	3
6.	Construction	4	2	-	3.16	10.34	Hansi, Hodel, Fatehbad, Ambala Cantt, Behwa, Jind	6
7.	Trade and Commerce	2	2	1	26.02	9.07	Sirsa, Mandi Dabwali, Jakhal Mandi, Tohanam Uklanmandi	5
8.	Transport storage and communication	-	1	1	8.23	11.62	Kalka, J.R.W. Colony	2
9.	Other Services	6	1	-	24.54	7.66	Rohtak, Karnal, Hissar, Ambala, M. Garh, Buria, Gurgaon.	7
10.	Region	17	11	5	-	-	-	33

5.28 Diversified Towns

In Haryana, there are fifteen towns in which none of the economic activity is important, but so many types of economic activities are taking place. Among these towns, five towns are class III towns, four are class IV towns and five are class V towns. (Appendix table: VIII). It shows that the higher order of towns are specialized in certain type of activities but lower order of towns are not specialized in certain type of activities but they have different type of economic activities to do.

5.29 Changes in functional classification 1961-71

In Haryana, the important changes have taken place in the urban economy. Here an attempt has been made that how the specialization in different functions has been affected by the changes in the occupational structure.

Table 5.11
Haryana
Distribution of Towns by their Functional Type
1961-71

Sl. No.	Functional group	1961		1971	
		No. of towns	%age to total towns	No. of Towns	%age to total towns
1.	Monofunctional	36	58.2	33	50.8
2.	Pri-functional	5	8.0	17	24.6
3.	Tri-functional	1	1.6	1	1.5
4.	Diversified	19	32.2	14	23.11
5.	Total	61	100.00	65	100.00

The above total (5.11) clearly explains that during 1961-1971 there is a decline in the number of monofunctional towns and there is also a decline in the number of diversified towns. On the other hand number of tri-functional towns have increased three times during this period. Though it is a good sign for the developing economy in a underdeveloped country like India but again one needs to go into the further details of the change in their functions.

Table: 5.12
Haryana
Changes in the Functional Character of
Towns 1961-71

Sl. No.	Change	No. of towns	Percentage of total towns
1.	Without any change	20	30.8
2.	Monofunctional Towns with a change in their function	7	10.8
3.	A change from monofunctional to bi-functional	11	16.0
4.	Diversified to tri-functional	4	6.4
5.	Diversified to monofunctional	9	13.9
6.	Bi-functional to monofunctional	3	4.7
7.	Monofunctional to diversified	5	7.8
8.	Others	2	3.2
9.	Data not available	4	6.4
	Total	65	100.00

The above table 5.12 depicts that among one third of the total towns, no change has taken place in their functional character. Some of these towns like Faridabad have increased their specialization in that particular function but the character of the function is same.

The changing pattern of the functional characteristics of these towns explain that maximum numbers of towns have changed their character from monofunctional to bi-functional. These towns are Bhiwani, Sonapat, Farukhnagar, Kalanwali, Jagadhri, Thanesar, Sadura, Chhachhrauli and Hailymandi, Again 13.9 per cent of the total towns have changed their character from diversified activity to monofunctional type. So it is very clear that economy of the urban centres is changing in Haryana but the pattern of changes is different in the different order of towns. Some of the towns show a good indicator of development like Faridabad, Jagadhri etc. while others like Kataudi and Bawai are becoming backward.

5.3 Concluding this chapter, it could be explained that in Haryana 44 per cent of the population is living in medium size villages (ranges between 500-1999), but these villages constitute 53 per cent of total settlements. Further it shows that there are some settlements in which the population is highly concentrated, while in others, the concentration of population is very low.

Secondly, the distribution of rural settlements in Haryana is random with slight departure towards regularity and well communicated areas reflect exactly the random distribution. Other areas show the departure towards uniform spacing. Though, it has been found that various physio-economic factors play their significant role in the distribution of settlements. The northern part of the region, reflects low spacing but the index of spacing is quite high in the western dunny region.

Thirdly, fifty one per cent of urban population is residing in large size urban centres in which the population size is above 50,000 and it constitutes 17 per cent of urban settlements. The distribution of towns in Haryana reflects that districts near Delhi depict the random distribution of urban centres but away from it, the departure from random distribution, towards even spacing is increasing. The class-wise analysis explains that no pattern exist in the distribution pattern of towns. However, the towns are having some concentration but it is insignificant.

It has been observed that 24 towns (36.7) per cent show positive and 41 (63.3 per cent) towns reflect negative discrepancy i.e. the population size is not that large which it should be. This rank size relationship explains that these towns don't have regular relationship because the average

discrepancy 31.49 per cent for each town.

Lastly, the functional classification of towns concludes that half of the towns are monofunctional type, while one-fourth are bi-functional and remaining are mainly diversified because only one town (Ateli) is trifunctional. Most of the Mono-functional towns are trade and service towns. The changing pattern of the functional classification of urban centers shows that the towns are shifting from their monofunctional characteristics towards bi-functional which explains the development of allied activities.

Chapter VI

ECONOMY

LAND USE, AGRICULTURE AND INDUSTRIES

Chapter VI

ECONOMY

LAND USE, AGRICULTURE AND INDUSTRIES

6.0 The study of the economy of a region is very important, since it reflects the strength of sustenance, capacity of growth and the standard of living of the people.

Haryana is essentially an agricultural region because most of its population is engaged in the agricultural activity. It accounts to 66.25 per cent of total workers and it shows that two-third of total workers of the region are dependent on agricultural activity. In other two sectors of the economy, only 32.10 per cent of total workers are engaged. Secondary sector of the economy has given employment to 11.8 per cent, while tertiary sector has given employment to 20.3 per cent of total workers.

In the present chapter, an attempt has been made to study the land use, agricultural and industrial structure of Haryana.

6.1 Land Use Pattern

The increasing pressure of population on land and rapid economic development demand greater agricultural production. The land use survey provides relevant information related to the crops and crop land use pattern. The study of land use pattern enables to understand the utilisation of the land to its maximum efficiency and also deals with the problems of

conversion of land from one major use to another. Thus, this type of study deals with the problems arising out of the process of decision making for allocation of land between utilisation categories.

In Haryana, out of 4,404 thousand hectares of land 82.29 per cent is under plough and the remaining 17.71 per cent lies under different other uses. In 1950-51, 67.94 per cent of area was under plough, which has increased to 82.29 in the agricultural year of 1975-76, i.e. over a period of 25 years. It shows the growth rate of 17 per cent in the net area sown within a span of twenty five years of time. It is evident that large amount of changes have taken place in the land use pattern during the post independence period.

6.11 Area Under Forests

It includes the actual forested areas which have been classed or administered as forest under any legal enactment dealing with forests, whether state owned or private.

In Haryana, the area under forest is increasing slowly and steadily. It has increased from an insignificant area of 0.55 per cent (1950-51) to 2.36 per cent in 1975-76. In comparison to the country, this proportion of area under forest is very low but efforts have been made to increase the area under forests during the recent years. During sixties the area under forests has increased by 15 per cent recording a growth

rate of 1.5 per cent per annum. This growth rate in seventies (i.e. from 1970-71 to 1975-76) has declined to 0.9 per cent per annum.)

(The extension of cultivation under irrigation is so important that the forested area has reduced considerably. The afforestation of the south western part of the state is imperative to check its aridity and further deterioration and contamination of soil and also to check the spread of the sandy tract towards better areas.)

For the trinium 1969-72, 3.04 per cent of the total area has been categorised as forests 11.59 per cent of the total area in Ambala is under forests (which is the highest) followed by Gurgaon (2.78%), Rohtak (2.37%), Karnal (1.37%), Jind (1.36%), Mahendragarh (1.16%) and Hissar (0.62%). Since part of Ambala district lies in the Siwalik zone, where growth of natural vegetation has not been obliterated to great extent as in the case of other parts of Haryana (Appendix Table I).

6.12 Land Not Available for Cultivation

This includes barren and unculturable land like hills, deserts etc., which can't be brought under plough except at exorbitant cost. The land covered by buildings, roads, railways and water or otherwise appropriated for non agricultural purposes is also included in this category.

1. Statistical Abstract of Haryana, Economic and Statistical Organization. Planning Department, Government of Haryana, 1976-77, pp. 46-47.

This category of land use does not show any significant change over time. In 1960-61, 11.76 per cent of the total area was not available for cultivation which has declined to 10.74 per cent (1975-76). It shows the decline of 1.02 per cent but this decline is not continuous (Fig. No.6.1). It has registered slight increase during 1960-70 and 70-71 (11.9 and 11.13 per cent respectively) over the preceding year i.e. 1968-69. There is an increase in the land put to non agricultural use. It has increased from 5.84 per cent in 1966-67 to 8.49 per cent in 1975-76. The barren and uncultivable land has shown a decline. It has declined from 5.27 per cent (in 1966-67) to 2.25 per cent in 1975-76. These two sub categories show some sort of inter-relationship because if there is an increase in one category, there is a corresponding decline in the other one (Appendix Table IX).

Ambala district records the highest proportion of 18.09 per cent of its total area under this category followed by Gurgaon, Karnal, Rohtak, Mahendragarh, Jind and Hissar. Except Ambala, Karnal and Gurgaon, this percentage value varies between 8.50 to 8.77 per cent. Barren and uncultivated land varies between 1.10 per cent to 6.64 per cent being maximum in Karnal and minimum in Rohtak district (Map No. 6.1).

The western and southern districts show the lower proportion of area not available for cultivation in comparison to northern and eastern districts.

HARYANA TRENDS IN LAND USE PATTERN 1960-61-1975-76

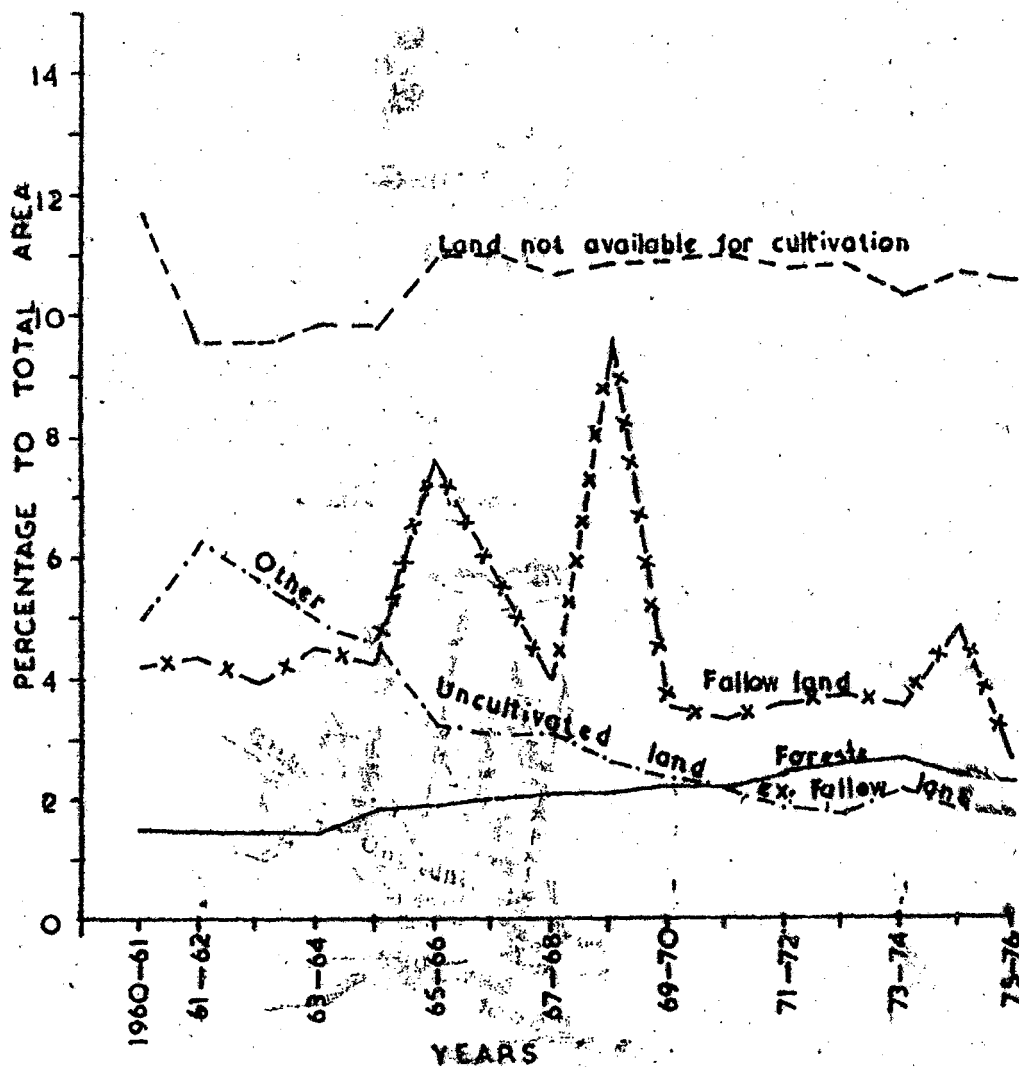


Fig. No. 6.1

6.13 Other Uncultivated Land
Excluding Fallow Land

This denotes land available for cultivation, whether it is taken for cultivation or abandoned later on for one reason or the other and includes culturable waste, permanent pastures and other grazing lands and lands under miscellaneous tree crops and groves not included in net area sown.

This category has shown a continuous decline since 1950-51. In 1950-51, 12.33 per cent of total area was under the category which declined to 1.77 per cent in 1975-76. It has shown the negative growth rate of 85 per cent which comes to -5.6 per cent per annum. During the fifty's the decline was radical but this rate of decline shrunk after 1960-61.

Within this category, permanent pastures and other grazing land and land under miscellaneous tree groups and groves do not show any significant decline but the third category i.e. the culturable waste land has declined from 1.98 per cent in 1966-67 to 0.77 per cent in 1975-76.

Table : 6.1

Correlation Matrix (Land Use Pattern)

	X1	X2	X3	X4
X1 Culturable waste	1.0	0.20	-0.23	-0.56
X2 Current Fallow		1.00	-0.80	-0.25
X3 Net Area Sown			-1.00	-0.57
X4 Net irrigated area to net sown area				1.00

The table 6.1 clearly stated that irrigation has played an important role in the decline of culturable waste land because

there is a significant negative correlation between irrigation and waste land.

In this category, variation is between 0.12 to 4.75 per cent has been noticed and Mahendragarh district has registered the highest proportion followed by Karnal and Rohtak. In Hissar district, only 0.12 per cent of total area is categorised as other uncultivated land. (Map No.6.1).

6.14 Fallow Land

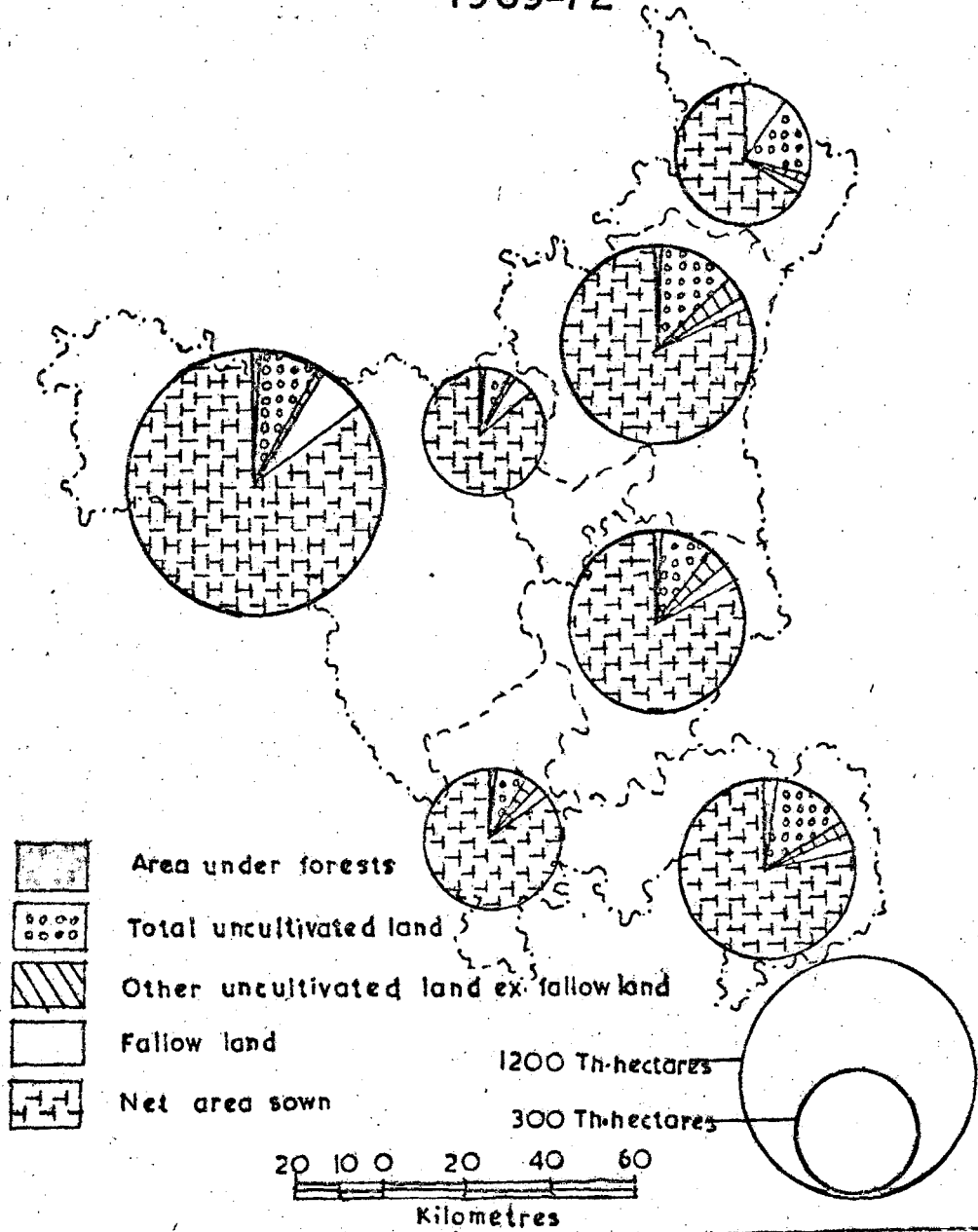
It denotes cultivable lands which are left uncultivated due to some soil constraints. The land left for a period not less than one year and not more than five years, is categorised fallow other than the current fallow and that kept uncultivated during the current year is considered as current fallow.

In Haryana, the fallow land has also shown a decline. In 1950-51, 9.50 per cent of the total area was categorised as fallow land and it has gone down to 2.84 per cent in 1975-76. The amount of area under fallow land other than current is very low and for most of the years, it is less than even five, per hundred hectares. Hence it is highly insignificant. The current fallow has declined from 5.89 per cent (in 1966-67) to 2.84 per cent in 1975-76. The decline in the fallow land shows better management of soil and improved agricultural practices.

In Hissar district, the fallow land is 6.42 per cent. The region shows the average of 2.81 per cent of total area.

MAP NO. 6-1

HARYANA LAND USE PATTERN 1969-72



The two districts (i.e. Hissar and Jind) show that the area under fallow land is more in comparison to the average of state, while the other five districts have this value below the average of the region. It is very clear that Hissar district dominates in this category and it has affected the average of the region.

Table 6.1 shows that there is a significant negative correlation between the net area sown and current fallow. It explains that the decline in current fallow is replaced by the increase in net area sown.

6.15 Net Area Sown

It includes the area under crops during the agricultural year in physical terms. Net area sown in Haryana has increased from 67.94 (in 1950-51) to 82.99 per cent in 1975-76. It shows that the area under plough has given rise to the increase of production of different crops.

In 1960-61, net area sown was 77.47 per cent and it increased to 80.99 in 1970-71 and finally it reached to 82.29 per cent in 1975-76 (Fig. No.6.2). While the former decade has witnessed an increase of 3.52 per cent and first of latter decade has witnessed the increase of 1.30 per cent.

In Jind district, the area under plough is maximum followed by Hissar, Mahendragarh, Rohtak, Gurgaon and Ambala. The five districts are above the average of net area sown of the region and only two districts (Ambala and Gurgaon) are below the

HARYANA TRENDS IN NET AREA SOWN 1960-61-1975-76

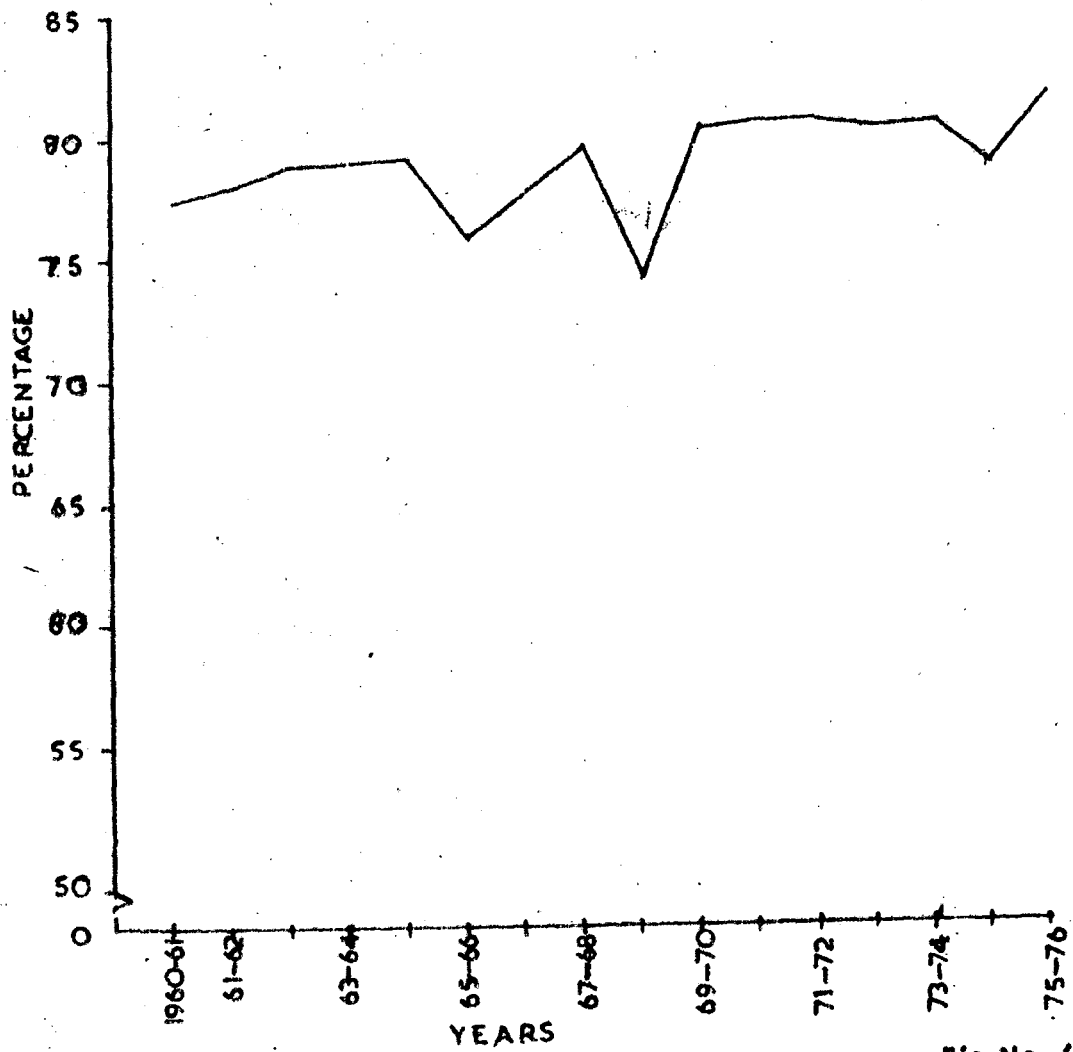


Fig. No. 62

average of the region.

The temporal variations in land use pattern of Haryana depict the significant changes which indicate the agricultural development of Haryana. It has shown the decline in the culturable waste land, decline in the fallow land and significant increase in the net area sown. The changes in these three categories reflect the effort towards a balanced land utilisation and meet the demands of Haryana's developing agriculture.

Agriculture

In this section, an attempt has been made to study the agricultural sector of the economy. However, the emphasis has been laid on the intensity of cropping, cropping pattern and the acreage response study of wheat and rice. In this section, both spatial and temporal variations have been observed. For the temporal variations, the region has been taken as one unit and the analysis have been made from 1960-61 to 1975-76, while for the spatial variations, trinium averages covering the year 1969-72 have been taken. Since this whole study is based on 1971 data, it was obvious to study agriculture for the same period, but in order to remove the abnormalities the trinium averages have been taken.

6.21 Intensity of Cropping

Intensity of cropping is defined as the gross cropped area as percentage of net area sown and it refers to the number

of crops grown on the same land area in any one agricultural year. Intensity of cropping in a region is the result of input factors as well as the physical environments which control the growth of crops on the earth surface. In the present study, agricultural intensity has been evaluated by a simple statistical method² and it has been tried to see its temporal and spatial variations.

In Haryana, intensity of cropping is increasing slowly and steadily and the region has become not only self dependent but it is producing surplus also. It is true that the efforts have been made to increase the net area sown, but much of the increase has taken place in the area sown more than once, which is reflected in the index of intensity of cropping.

During 1960-61, the index of intensity of cropping was 134.79 which increased to 150.41 in 1975-76 explaining the growth rate of 1.8 per cent accounting for 0.12 per cent per annum. From 1960-61 to 1966-67, it was almost constant between 134.79 to 134.36 but in 1967-68 it has increased to 146.56 and has reflected a radical change in the agricultural situation of the region (Fig. No.6.3). The index of intensity of cropping declined in 1968-69 due to the decline in the area sown more

2. Intensity of cropping: $\frac{\text{Gross Cropped Area} \times 100}{\text{Net Sown Area}}$

HARYANA TRENDS IN INTENSITY OF CROPPING 1960-61-1975-76

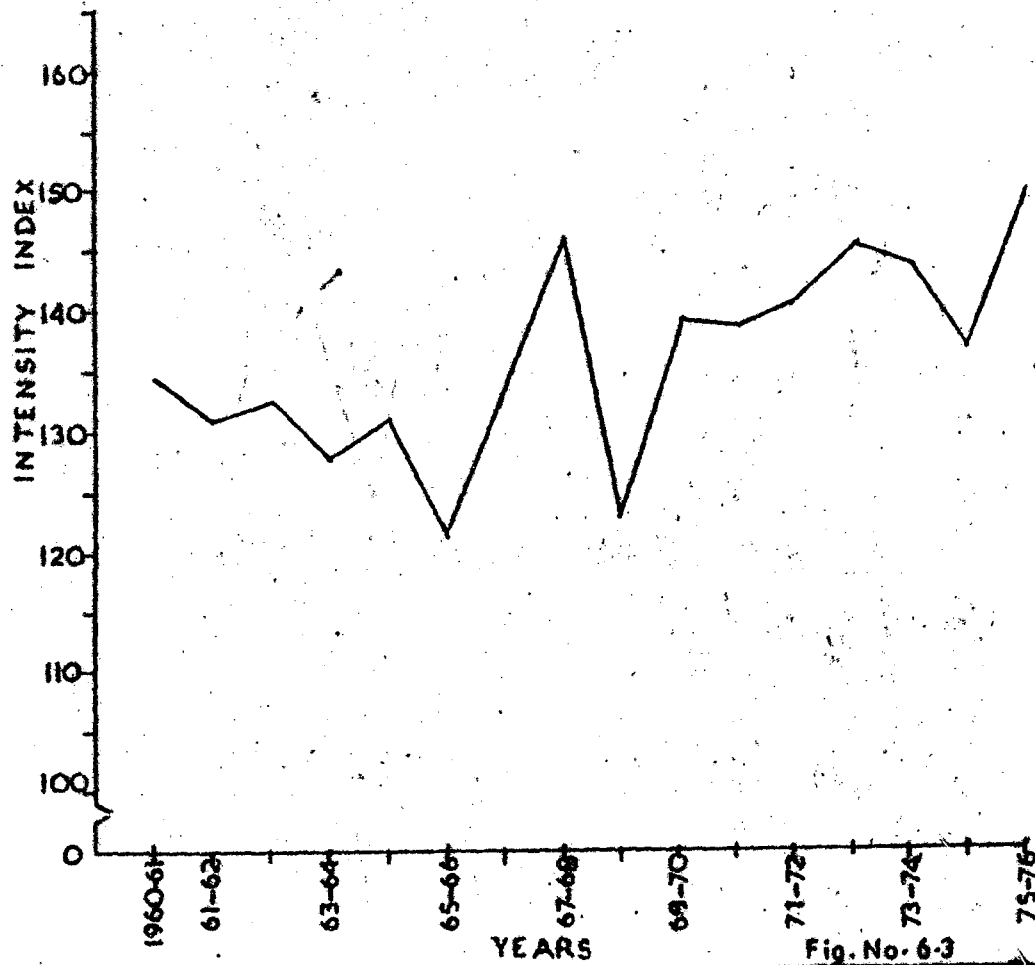
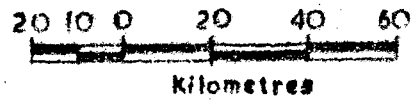
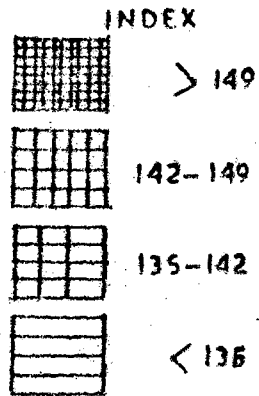
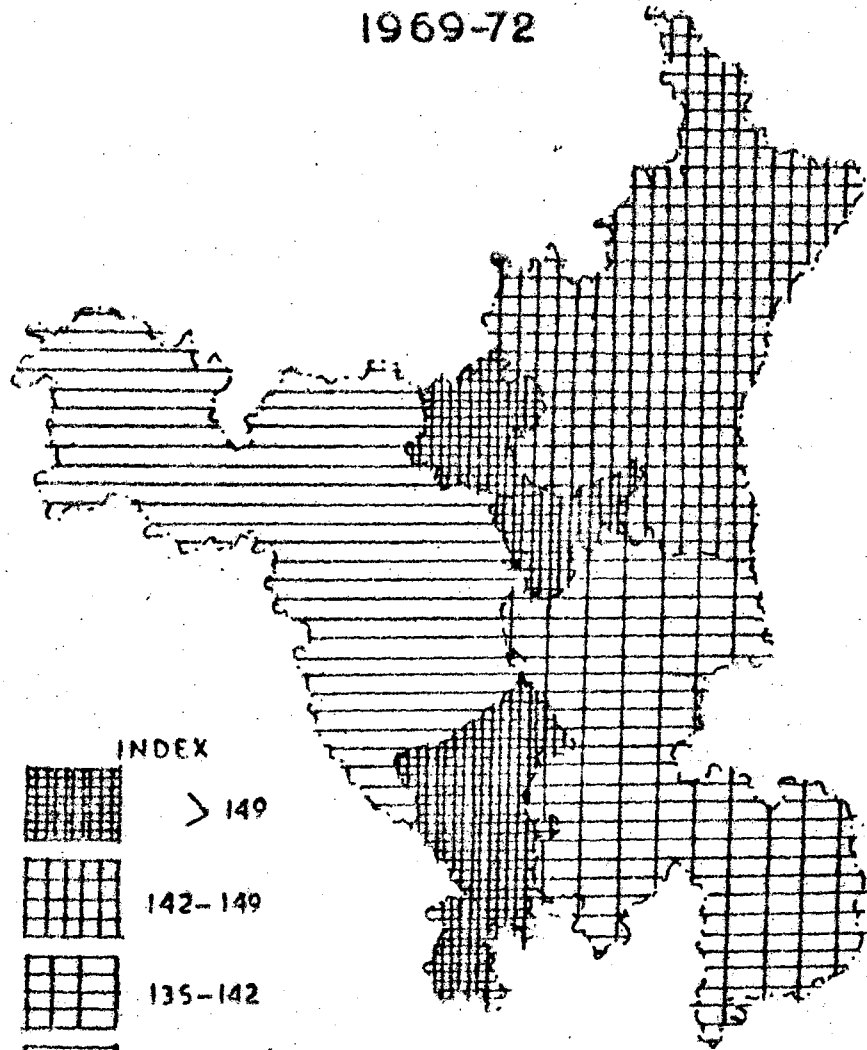


Fig. No. 6-3

MAP NO. 6-2

HARYANA INTENSITY OF CROPPING 1969-72



than once. It happened because of the low rainfall which was only 49 cms. for this year. In 1968-69 the index of intensity of cropping increased to 139.26 and finally it touched 150.41 in 1975-76. It explains that fifty per cent of gross cropped area is under double cropping which was only 34 per cent in 1960-61 (Appendix Table IX). This is a good indicator of the agricultural potential of the region.

The correlation coefficient (p.8, significant at 1 per cent level) between rainfall and intensity of cropping explains that there is a significant positive correlation between intensity of cropping and rainfall. It is evident from the fact that in those years in which the amount of rainfall is sufficient, the intensity index is also high.

The irrigation has also played an important role in the increase of intensity of cropping. The correlation coefficient (0.40) shows that there is positive significant (at 5% level of significance) correlation between the intensity of cropping and percentage of gross irrigated area to gross cropped area (Fig. No.6.14).

The spatial variations in the intensity of cropping depict that this index varies between 132.16 to 153.11 and

$$3. \quad r = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sqrt{\sum x^2 - \frac{(\sum x)^2}{n}}} \times \sqrt{\sum y^2 - \frac{(\sum y)^2}{n}}$$

HARYANA
Percentage of Gross Irrigated Area
to Gross Cropped Area
1960-61-1975-76

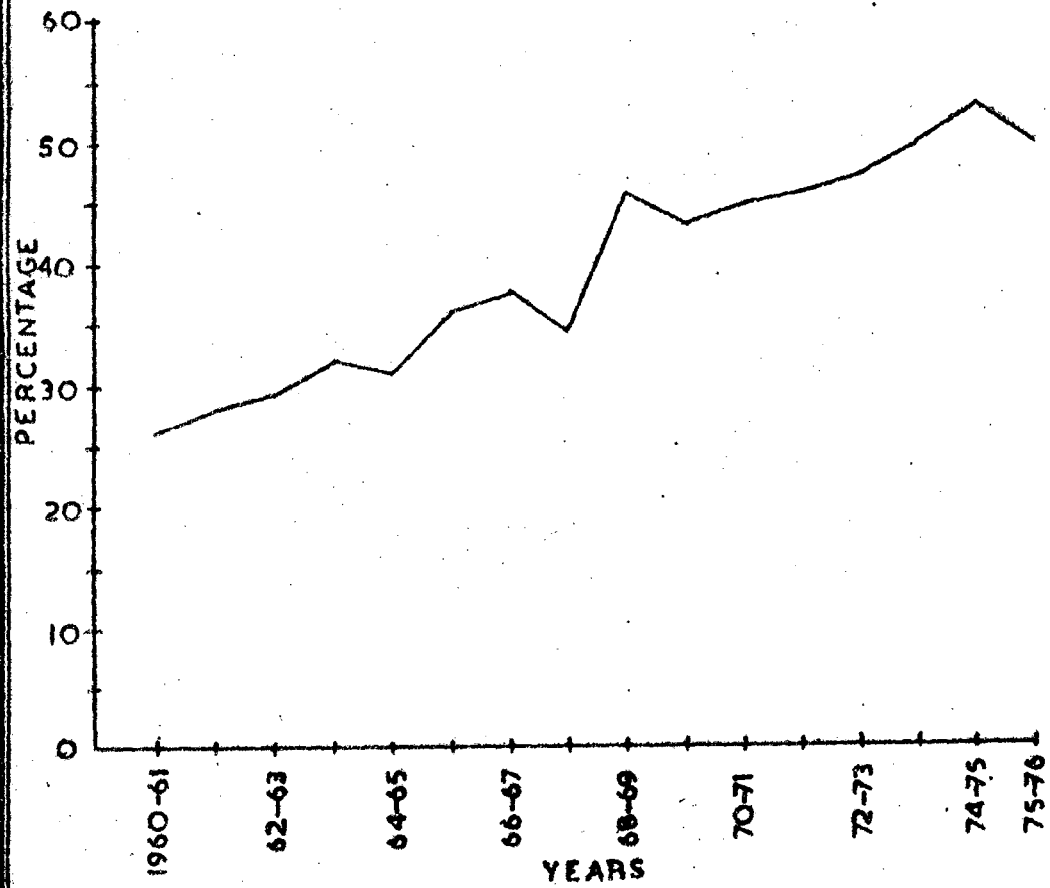
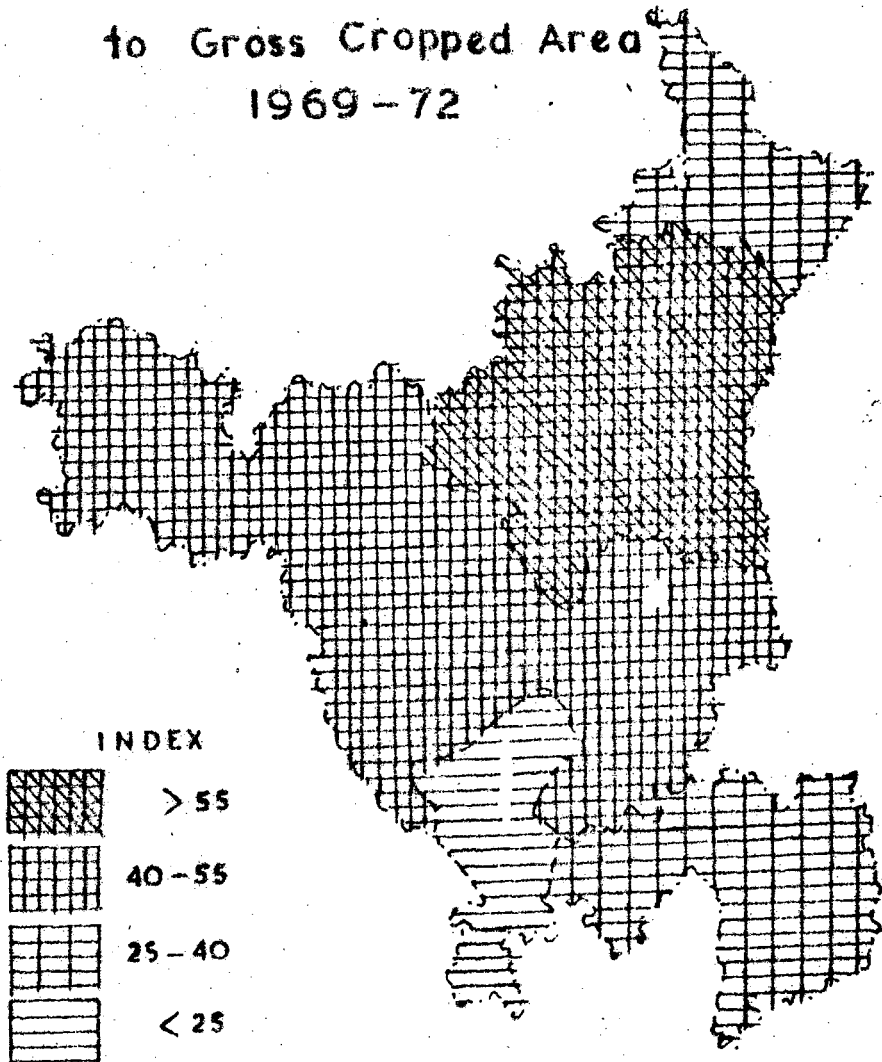


Fig. No. 6-4

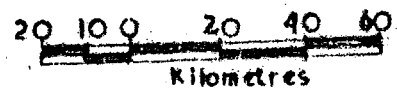
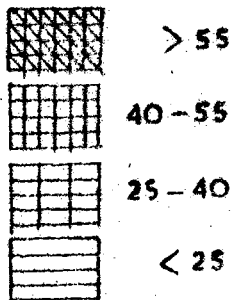
MAP NO. 6-3

HARYANA

Percentage of Gross Irrigated Area to Gross Cropped Area 1969-72



INDEX



Hissar district has recorded the lowest intensity whereas Mahendragarh has shown the highest. Though Haryana is a small region, the intra-regional variations do exist (Map No. 6.2).

In Mahendragarh district only one per cent of gross cropped area is irrigated. In this district low value crops like bajra, jowar and gram which need less irrigation are grown and it has shown high intensity index.

6.22 Cropping Pattern

The important crops which are grown in Haryana are wheat, bajra, gram, rice, jowar, barley, sugarcane, rape-seed mustard and cotton. These crops account for 85.64 per cent of total cropped area (1975-76). Except these crops, the remaining area (14.36 per cent) is covered by pulses (urad, Moong, Masur etc.) groundnut, seasamum, linseed, potatoes, tobacco and by other vegetables.

Table: 6.2

HARYANA

- 112 -

Yield and percentage of area under different crops to gross cropped area
1960-61 - 1975-76 (yield kg. per hect.)

Sl. No.	Name of Crop	1960 - 61		1965-66		1970-71		1975-76		Percentage change in yield 1960-61 to 75-76	Percentage of change in area 60-61 to 75-76
		Yield	Area	Yield	Area	Yield	Area	Yield	Area		
1.	Rice	1129	3.38	1063	4.73	1697	5.43	2063	5.57	82.7	64.8
2.	Jowar	169	6.72	137	6.08	277	4.18	199	2.98	17.8	-55.7
3.	Bajra	293	17.47	267	19.13	939	17.74	585	18.45	99.7	- 5.6
4.	Wheat	1296	13.70	1282	16.63	2074	22.78	1980	22.49	52.8	64.2
5.	Barley	739	2.44	1316	2.89	1150	2.19	1258	3.25	70.2	54.6
6.	Maize	858	2.31	1205	2.15	1142	2.31	1211	2.54	41.1	10.00
7.	Gram	826	33.66	444	21.29	742	21.45	820	20.29	- 0.7	-39.7
8.	Sugarcane	3992	2.83	3961	4.44	4504	3.14	4223	2.88	8.3	0.18
9.	Rape and Must.	-	3.31	-	3.75	678	2.62	471	2.51	-	-24.2
10.	Cotton	242	2.02	268	4.80	339	3.90	315	4.68	30.2	13.17
11.	Others	-	12.16	-	14.11	-	14.26	-	14.36	-	-
Total		-	100.00	-	100.00	-	100.00	-	100.00	-	-

The table (No.6.2) shows that some crops like rice, wheat and cotton have recorded distinct increase in the area and as well as in the yield. The other type of crops like jowar and gram have shown decline in the area. There are also certain crops which do not show any trend and they follow the zig-zag pattern and these are mainly bajra, barley, maize, sugarcane, rapeseed and mustard.

It is clear from the table that the cropping pattern adopted in Haryana tends to be traditional. In the crop structure of the region, commercial crops do not find favour with one-fourth of the area is still devoted to low value crops like jowar, bajra and barley. However, the increase in area and yield in some crops like wheat and rice have resulted in the increase of total production.

Crops of Rabi Season

(i) Wheat

Wheat is the most important cereal in the diet of the people of Haryana. In 1975-76, the area under wheat cultivation was 1226 thousand hectares producing 79.4 thousand tonnes of wheat. Since 1960-61, the area under wheat is increasing. It was 13.70 per cent in 1960-61 and it has increased to 22.49 per cent in 1975-76 having an average growth rate of 4.2 per cent per annum. In the case of yield, the growth rate comes to 3.5 per cent per annum while the maximum increase took place during 1965-66 to 1970-71 (Appendix Table No.XI). For this period average

growth rate of yield comes to 15 per cent per annum.

Wheat has shown continuous increase except for the marginal decline in the year of 1966-67, 1973-74 and 1975-76 (Fig. No.6.5). This increase in the area has taken place due to the introduction of high yielding varieties of seeds, chemical fertilizers and the increase in the percentage of irrigated area and so many other factors. Simultaneously, the area under gram has declined (Fig. No.6.5). For this study Nerlovian adjustment model has been selected to see that what are the major factors which have played their important role in the increase in area. The following variables have been taken to see the increase in the area under wheat.

A_t = Area under wheat

A_{t-1} = Lagged area under wheat

I_t = Relative irrigated area of wheat with respect to gram

P_{t-1} = Lagged Relative Price of wheat with respect to gram

Y_{t-1} = Lagged Relative yield of wheat with respect to gram

R_t = Total annual rainfall in the year t in area under study

U_t = The error term

The equation is:-

$$A_t = a + b_1 A_{t-1} + b_2 I_t + b_3 P_{t-1} + b_4 Y_{t-1} + b_5 R_t + U_t$$

a = Intercept

b_1, b_2, b_3, b_4, b_5 = coefficient of the following variables.

HARYANA
Percentage of Area under Wheat, Barley
and Gram to Gross Cropped Area
1960-61-1975-76

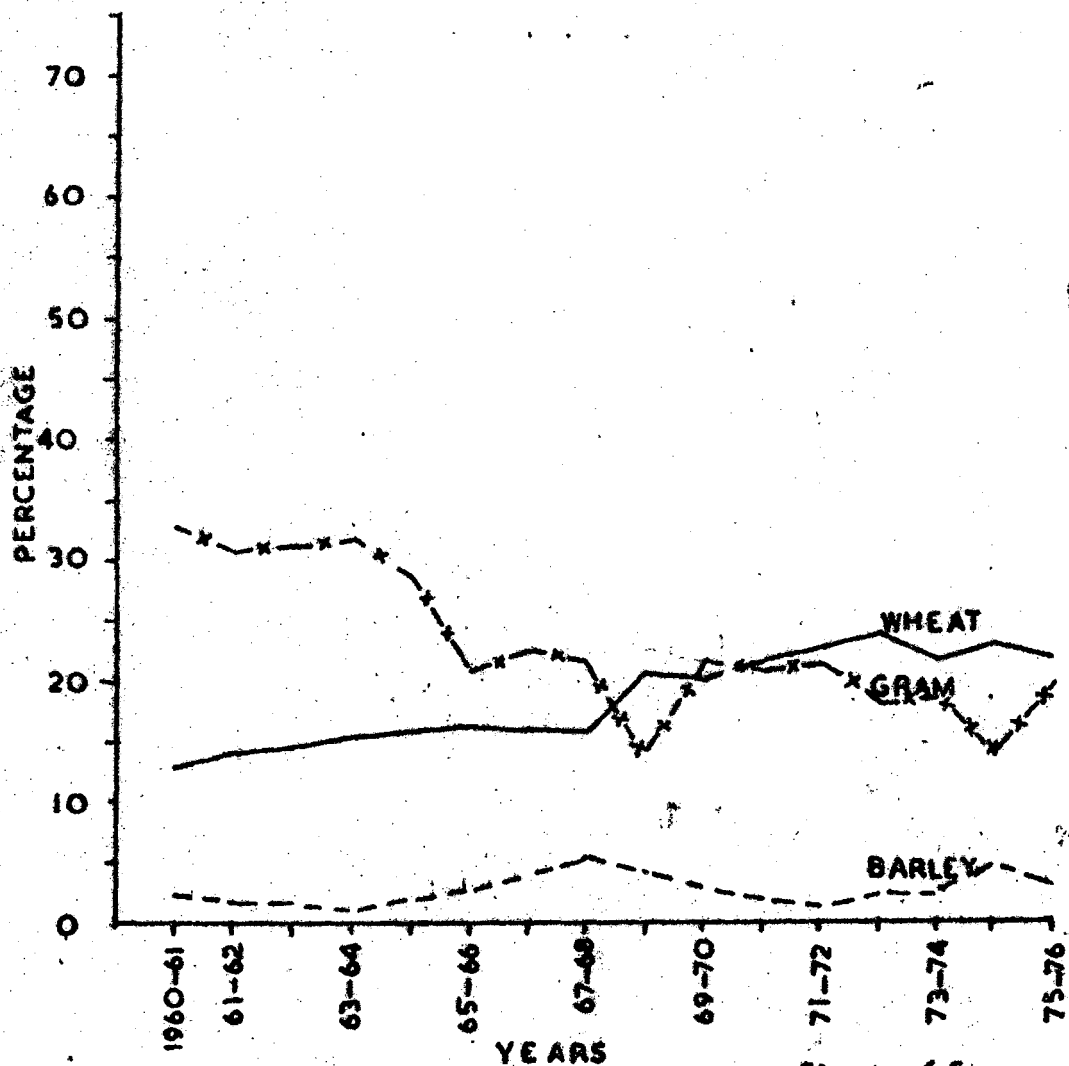


Fig.No. 6-6

Table 6.3

Correlation Matrix (Acreage Response
of Wheat) 1960-61 to 1975-76

		X ₁	X ₂	X ₃	X ₄	X ₅
Y	At	1.00				
X ₁	At-1	0.898 [@]	1.00			
X ₂	Yt-1	0.526 ^{@@}	0.720 [@]	1.00		
X ₃	It	0.974 [@]	0.898 [@]	0.587 ^{@@}	1.00	
X ₄	Rt-1	-0.566 ^{@@}	-0.785 [@]	-0.784 [@]	-0.588 ^{@@}	1.00
X ₅	Rt	-0.612 ^{@@}	-0.532 ^{@@}	-0.290	-0.664 [@]	0.366 1.00

@ Significant at 1 per cent level (0.66)

@@ Significant at 5 per cent level (0.50)

Table : 6.4

Result of Stepwise Regression Analysis

(Acreage Response of Wheat)

1960-61 - 1975-76

Step	Name of Reg.		Coeffi- cient	S.E.	+ Value	F Value	Inter- cept
	Variable	Variable					
I	X3	It	3.141	0.203	15.440@	238.40@	10.90
II	X3	It	3.271	0.253	12.90@		
	X2	Yt-1	-0.366	0.418	-0.87	117.45@	11.46
III	X3	It	2.641	0.443	5.96@		
	X2	Yt-1	-0.789	0.463	-1.70		
	X1	At-1	0.158	0.154	1.68	91.143@	9.36
IV	X3	It	2.822	0.519	5.44@		
	X2	Yt-1	-0.812	0.475	-1.709		
	X1	At-1	0.143	0.159	1.535		
	X5	Rt	0.016	0.022	0.718	8.255@@	65.47
V	X3	It	2.766	0.606	4.561@		
	X2	Yt-1	-0.752	0.575	-1.306		
	X1	At-1	0.270	0.208	1.298		
	X5	Rt	0.014	0.023	0.622		
	X4	Pt-1	0.629	2.950	0.213	7.280@@	47.39

@ Significant at 1 per cent level of significance

@@ Significance at 5 per cent level of significance

The above correlation matrix explains that irrigation is a major factor which has played important role in the acreage response of wheat with respect to gram. However, the yield is also an important factor but the price and rainfall are not supporting the increase in the area under wheat. Irrigation and yield are also highly correlated and it explains that increase in the yield is highly affected by the increase in the irrigation.

The above results show that relative irrigation (X_3) explains maximum proportion of acreage response of wheat followed by yield, lagged area under wheat, price and rainfall. However, it is very clear that irrigation is a dominating force for acreage response of wheat.

Again it has been found that among relative irrigation, relative lagged yield, relative irrigation and relative lagged price, relative irrigation is an important factor and other two are insignificant. Rainfall and relative lagged price are negatively related with area under wheat but both are insignificant.

Wheat cultivation in Haryana is widely distributed and it is grown in all the districts. Among the wheat producing districts, Karnal ranks first in percentage of area under wheat (37.83%) followed by Ambala, Rohtak, Gurgaon, Jind, Hissar and Mahendragarh.

The geographical factors which are responsible for high percentage of area under wheat is the facility of irrigation. In Ambala, wheat does not need much irrigation due to sufficient

rains (Table 3.2), due to sufficient rainfall in winter, while it is inadequate and undependable in remaining part of the Haryana.

(ii) Gram

It is also an important crop of the rabi season as it occupies 20.29 per cent (1975-76) of total cropped area.

It is true that the percentage of area under gram has declined from 25.53 per cent (1960-61) to 20.29 in 1975-76, but the large amount of variations have taken place during this period. As it is evident from the graph (fig. No.6.5) it declined to 21.29 per cent in 1965-66, again it reached to 14.24 per cent in 1968-69 but there was a tremendous increase in area, when reached to 21.94 per cent in 1969-70.

Gram is grown in all the districts but finds high concentration in Mahendragarh and Hissar districts. In these districts, it covers 32.28 and 29.64 per cent of gross cropped area. Here, the picture becomes very clear that in the western part gram cultivation is correlated with dry conditions and scarcity of rainfall, as gram can witness dry conditions, which wheat cannot. Geographically, gram is raised in those parts of Haryana, where dry conditions prevail and irrigation facilities are not available and this fact explains that large area under gram in Haryana with particular stress in Mahendragarh, Hissar and Jind (Appendix Table No.XII).

(iii) Barley

It is not an important rabi crop, since it occupies only 3.25 per cent (1975-76) of total cropped area. The temporal variations (fig. No.6.4) under Barley depict that proportion of area under barley declined from 2.44 (1960-61) to 1.34 per cent in 5.86 in 1963-64. Again, it increased to 5.86 till 1967-68 but it declined to 1.80 per cent in 1971-72 but however, no clear cut pattern has emerged.

Rohtak covers the largest area (7.55 per cent) and it has shown the maximum proportion of area under this crop followed by Mahendragarh and Gurgaon. The southern part of Haryana depicts more concentration of this crop.

(iv) Rape and Mustard

These are commercial crops raised in Haryana which cover an area of 65,000 hectares (2.51%) of land. The percentage of area under these crops varies between 1.63 (68-69) to 5.46 (1962-63) but, however, under the area under this crop has fluctuated each and every time and neither it has shown the significant increase nor the decline (Fig. No.6.6).

Rape and mustard are grown in all the districts of Haryana. However, the highest concentration is in Gurgaon and Hissar (Appendix Table No. XII) followed by Mahendragarh. So Hissar, Gurgaon and Mahendragarh districts make a contiguous belt where rabi rainfall is meagre and dry conditions prevail.

HARYANA
Percentage of Area under Cotton, Sugarcane
Rape & Mustard to Gross Cropped Area
1960-61—1975-76

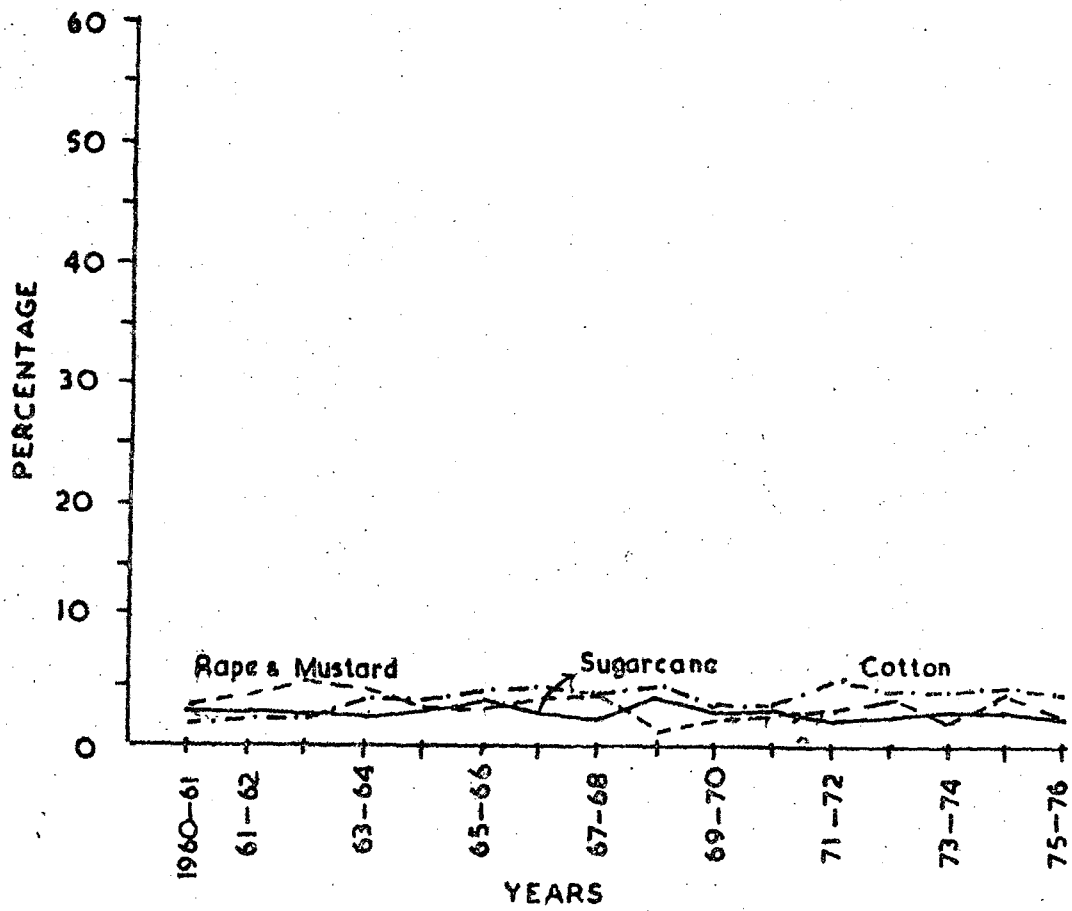


Fig. No. 6.6

2. Kharif Crops

Only six crops have been taken into consideration and these are rice, jowar, bajra, sugarcane and cotton.

(i) Rice

It was not an important crop in the crop structure of Haryana in 1950-51, since it was occupying only 2.16 per cent of total area but it has become an important crop because it reached to 5.57 per cent in 1975-76 (Fig. No.6.7).

It has been tried to see with the help of Nerlovian's⁴ model to see the Acreage response of rice:

Table: 6.5

Correlation Matrix (Acreage Response
of Rice) 1960-61 - 1975-76

Y	At	1.00					
X ₁	At-1	0.826@	1.00				
X ₂	Yt-1	-0.202	-0.051	1.00			
X ₃	It	0.918@	0.876@	-0.283	1.00		
X ₄	Pt-1	-0.189	-0.107	0.085	-0.127	1.00	
X ₅	Rt	-0.725@	-0.669@	0.041	-0.569@@	0.373	1.00

@@ Significant at 5 per cent level of significance.

@ Significant at 1 per cent level of significance.

4. The equation has been given in the acreage response of wheat.

HARYANA

Percentage of Area under Rice, Maize,
Jowar & Bajra to Gross Cropped Area
1960-61-1975-76

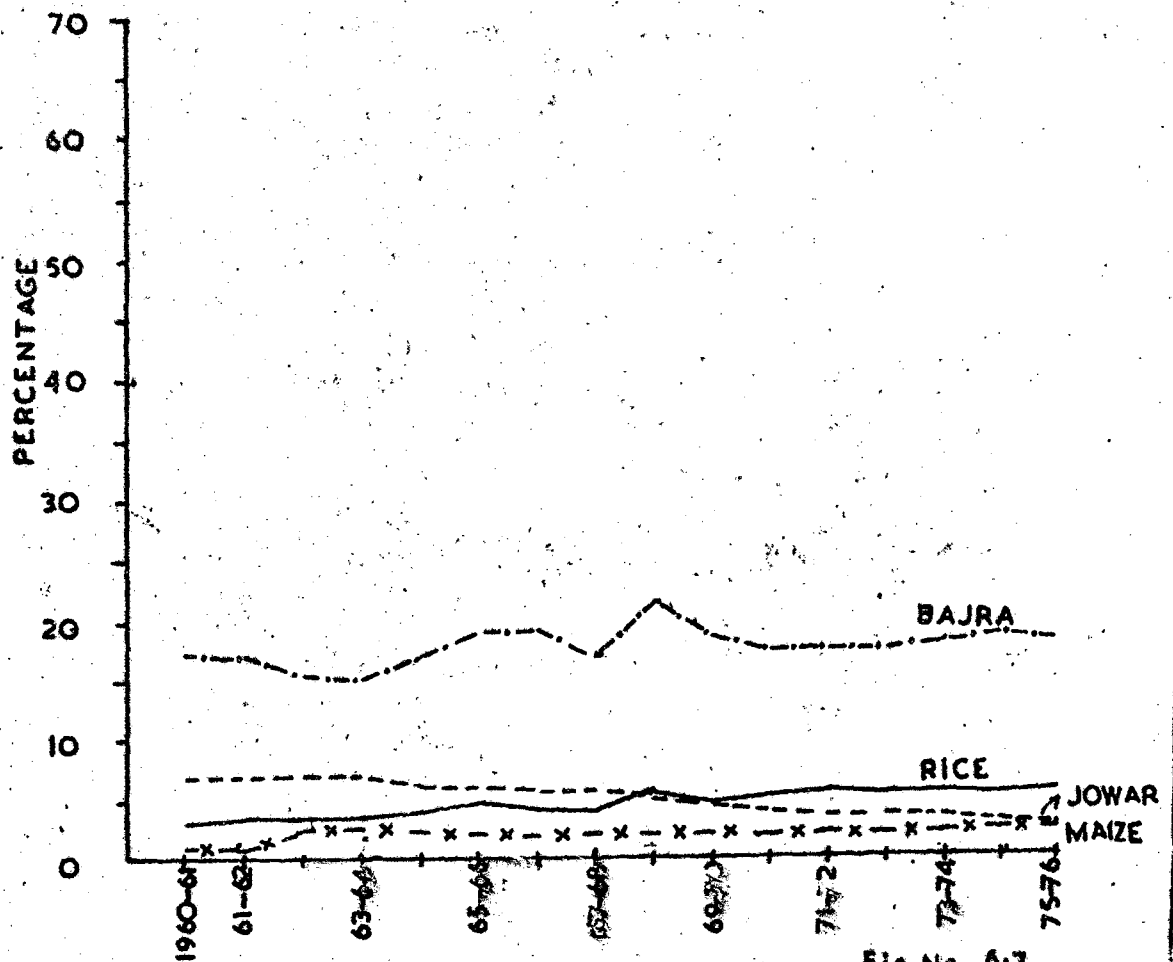


Fig. No. 6.7

Table: 6.6

Result of Stepwise Regression Analysis
(Acreage Response of Rice)
1960-61 - 1975-76

Step	Variable	Name of + variable	Reg. Coeff- icient	S.E.	t value	F value	Inter- cept
I	X3	It	0.541	0.065	8.374@	70.122	3.053
II	X3	It	0.440	0.064	6.895@		
	X5	Rt	-0.017	0.006	-2.766@@	56.815	4.460
III	X3	It	0.508	0.111	4.570@		
	X5	Rt	-0.020	0.607	-2.775@		
	X1	At-1	-0.150	0.199	-0.754	36.706	5.082
IV	X3	It	0.547	0.132	4.142@		
	X5	Rt	-0.020	0.007	-2.713@@		
	X1	At-1	-0.004	0.224	-0.910		
	X2	Yt-1	0.048	0.080	0.594	25.99	4.882
V	X3	It	0.550	0.139	3.965@		
	X5	Rt	-0.021	0.008	-2.492@@		
	X1	At-1	-0.217	0.238	-0.910		
	X2	Yt-1	0.046	0.084	0.554		
	X4	Pt-1	0.156	0.484	0.322	18.95	4.876

+ The name of the variables are same as given in the acreage response of wheat. The only difference is the competitive crop is Jowar.

@ Significant at 1 per cent level of significance.

@@ Significant at 5 per cent level of significance.

It has been found (fig. No.6.7) that as the area is increasing under the acreage of rice, the area under jowar is declining. So jowar is a competitive crop for rice.

The above table (Table No.6.4) shows that irrigation and lagged area under rice are the important factors for the acreage response of rice. However, the rainfall is negatively significant, which shows that rainfall is not playing any role in the increase in the area under rice.

The result of step wise regression explains that relative irrigation is a dominant variable which has given rise to the acreage response of rice in Haryana, while yield and price have also played their role but it is insignificant.

Rainfall has played its negative role in the acreage response of rice. It is clear that in the years of good rainfall, jowar is grown over a large area.

Although rice is grown in all the districts except Mahendragarh in Haryana, yet the highest concentration occurs in Karnal and Ambala where this crop has occupied 18.33 and 13.05 per cent of total cropped area.

(ii) Bajra

It is most significant kharif crop covering 691 ton hectares of land (1975-76) which comes to 18.45 per cent of total cropped area. The temporal variations in area under bajra reflect that in 1968-69 (Appendix Table XI) it covered 21.56 per cent of gross cropped area.

It is mainly grown in areas of low rainfall where irrigation facilities are not well distributed. Mahendragarh is an important example of this fact where 48.89 per cent (1969-72) of the cropped area is covered by this crop. Gurgaon and Hissar come at second and third rank (Appendix Table XII).

(iii) Jowar

It ranks third to bajra as regard to area under it. It covers 2.98 per cent (1975-76) of gross cropped area and it was 6.72 per cent in 1960-61. It shows that area under jowar is declining (fig. No.6.7) and it has been replaced by rice.

It is grown in all the districts but its main concentration is in Rohtak, Jind and Gurgaon districts (Appendix Table XII).

(iv) Maize

It is a high value crop, which does not find much favour with farmers in Haryana and it has covered only 2.54 per cent of gross cropped area. The percentage of area under this crop to gross cropped area is ranging between 1.89 to 2.60 per cent during 1960-61 to 1975-76. It reflects that not much of the variations have taken place.

It is grown in all the districts of Haryana and the variation is between 0.07 per cent (Mahendragarh district) to 12.12 per cent in Ambala district followed by Karnal. In Ambala high acreage under maize may be explained in terms of high kharif

rain, while in Karnal Provision of irrigation facilities is the main cause explaining high area under maize. A correlation between area under maize cultivation, rainfall and irrigation was found to be positive (significant at 1 per cent level) which means that maize is concentrated in areas of high ^{rainfall} and high irrigation facilities.

(v) Sugarcane

The temporal variations in the area under sugarcane cultivation reflect (Fig. No.6.8) that it is ranging between 2.27 (1971-72) to 4.44 per cent (1965-66) during 1960-61 to 1975-76. It is grown in all the districts but its concentration is in Ambala district followed by Rohtak.

(vi) Cotton

The cotton is grown throughout the region but its main concentration is in Hissar and Jind district but it is insignificant in southern part.

The cropping pattern of Haryana explains that there are so many temporal and spatial variations. The area under wheat and rice is increasing, while it is declining in jowar and gram and in other crops there are not much changes. Wheat and rice are very much important in the eastern plain area. Gram is an other crop which is important in southern part. Maize is highly concentrated in the north eastern hilly region and some parts of Karnal. Cotton and bajra are other important crops which are

significant in the western part.

6.23 Crop Combination Regions

The significance of characteristic crop combinations is now increasingly recognised in any study of agricultural geography. While individual distributional maps of isolated crops are as interesting as they are useful, it is equally and perhaps even more important to view the integrated assemblages⁵ of the various crops grown in any area.

A statistical approach of the study of crop association⁶ was made by Weaver and later on it was used by the various authors. This method requires a lot of calculations, so various new methods have been invented. For the simplicity and its flexibility of lower limit method, it has been widely used. However, in this study both the methods have been used.

Lower Limit Method

$$A = \frac{G}{3N}$$

Where

- G - Gross cropped area
- N - Number of crops having acreage more than or equal to $g/100$ i.e. one per cent.
- A - Lower limit acreage more than A will find place in crop combination region.

-
5. N.P. Ayyar, "Crop Regions of M.P. - A Study in Methodology," Geographical Review of India, vol.31, March 1969.
 6. J.C. Weaver, "Crop Combination Regions in the Middle West", Geographical Review of India, pp. 175-200, 1954.

Weaver's Method

$$KJ = \frac{\sum_{i=1}^J (x_i - P_i)^2}{J}$$

Where

- J - varies from 1 to N
- N - Number of crops having atleast 1 per cent acreage
- X_i - is the percentage of ith ranking crop
- K - in the following equation attains lowest value determines the crop combination

The results obtained with the help of these two methods (Appendix Table XII) explains that none of the district of Haryana is monoculture. There is not much difference in the crop combination regions obtained with the help of two different methods. Mahendragarh is bi-culture region in which bajra and gram are important crops. Gurgaon is a five crop region and wheat, bajra, jowar and rape and mustard (Map No.6.4).

For other five districts, the results are different in each method but they explain that there is not a concentration of a certain crops but large number of crops are grown in these areas. In these districts, the important number of crops vary from four to seven. It shows the diversification of different crops. So the south-west part shows high concentration, while the other parts do not explain the concentration of certain crops.

6.3 Industrial Structure of Haryana

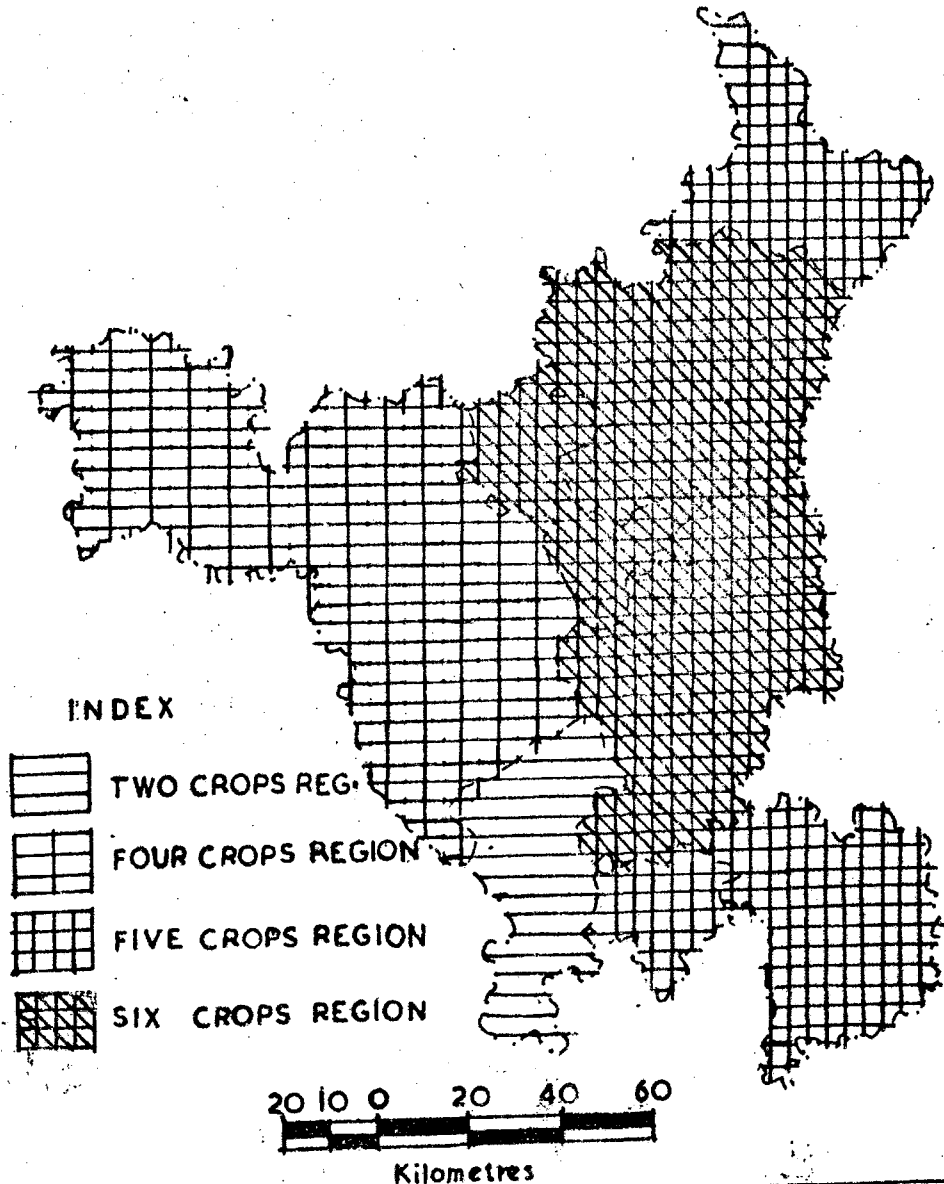
Industrialisation plays major role in the economic development of the countries. The gap in per capita income between the developed and developing countries is largely reflected in the disparity in the structure of their economies. The developed countries derive their major portion of their income from industries in the case of latter the production is confined predominantly to primary sector. Though, Haryana is an agricultural state but many foot loose industries have been established in Faridabad, Jagadhri, Yamunanagar, Ballabgarh, Bahadurgarh and Gurgaon with the establishment of different types of industries in various urban centres. Haryana has not become only self dependent in some selected industrial goods but it also sends out, many industrial commodities to other states.

In Haryana, primary sector (mainly agriculture) dominates the economy as 67.90 per cent of total workers are engaged in this sector and only 11.8 per cent of total workers are employed in the secondary sector. Out of this 11.8 per cent, 9.48 per cent earn their livelihood from the different type of industries.

In this section, an attempt has been made to study the industrial structure of Haryana. The data has been collected for the year 1971 and the spatial variations have been examined

MAP NO. 6-4

HARYANA CROP COMBINATION REGIONS 1969-72



in the number of units, their production and employment capacities since the data was available for those industries only in which the investment is more than Rs. one lakh and the industries with lower investment have not been taken into consideration.

There are 783 large, medium and small scale industries in Haryana. Out of 783 industries, 17.1 per cent are large and medium scale industries and 82.9 per cent are small scale industries. The data pertaining to employment and production for 69 units is not available, hence these are not considered for the present study (Appendix Table No. XII). Thus, there are only 711 (131 large and medium scale and 580 small scale) industries which have been finally taken up to see their distribution, production and employment.

Table : 6.7

Haryana

Cumulative Percentage of Number of Industrial Units, Production and Employment

S. No.	Name of Tehsil	Percentage of number of industries to total industries	Cumulative Percentage of total industries	Percentage of Production to Total Production	Cumulative percentage of production	Percentage of total employment	Cumulative percentage of employment.
1.	2	3	4	5	6	7	8
1.	Ballabgarh	30.38 ✓	30.38 ✓	52.55	52.55	44.71 ✓	44.71
2.	Sonepat	12.94 ✓	43.32 ✓	9.97 ✓	62.52	10.27 ✓	54.98
3.	Panipat	9.00 ✓	52.32	2.56 ✓	65.08	3.93 ✓	58.91
4.	Jhajjar	8.72 ✓	61.04	2.37	67.45	3.28 ✓	62.19
5.	Gurgaon	7.88 ✓	68.92 ✓	2.05	69.50	3.51	65.70
6.	Rohtak	5.63 ✓	74.55	2.22	71.72	3.07	68.77
7.	Karnal	4.93 ✓	79.48	1.35	73.07	2.27	71.04
8.	Thanesar	3.53 ✓	83.01	0.63	73.70	0.09	71.13
9.	Jagadhri	3.10 ✓	86.11	14.07 ✓	86.77	10.02	81.15
10.	Hissar	2.96 ✓	89.07	1.15	87.92	4.73	85.88
11.	Kaithal	2.95 ✓	92.02	0.10	88.02	0.88	86.76
12.	Ambala	1.82 ✓	93.84	0.97	88.99	1.17	83.93
13.	Bhiwani	1.26 ✓	95.10	3.66	92.65	5.23	93.16
14.	Rewari	0.84 ✓	95.94	0.21	92.86	0.40	93.56
15.	Sirsa	0.56	96.50	0.50	93.36	1.22	94.78
16.	Fatehbad	0.56	97.06	1.38	94.74	0.34	95.12

1.	2.	3.	4.	5.	6.	7.	8.
17.	Sohana	0.56	97.62	0.06	94.80	0.16	95.28
18.	Jind	0.56	98.18	0.11	94.91	0.31	95.59
19.	Ralwal	0.42	98.60	0.04	94.95	0.04	95.63
20.	Kalka	0.28	98.88	3.64	98.59	3.05	98.68
21.	Hansi	0.28	99.16	0.01	98.60	0.03	98.71
22.	Charkhi Dadri	0.28	99.44	1.15	99.85	1.09	99.80
23.	Gohana	0.14	99.58	0.18	99.93	0.07	99.87
24.	Narnaul	0.14	99.72	0.03	99.96	0.04	99.91
25.	Narwana	0.14	99.86	0.03	99.99	0.08	99.99
26.	Nuh	0.14	100.00	0.01	100.00	0.01	100.00

The above table gives the relation between, the number of units, their production and employment capacity. The first row of table reflects that the size of the industries located in Ballabgarh tehsil is quite large because 30.38 per cent of the total industries contribute to 52.55 per cent of total industrial production and 44.71 per cent of total employment. Jagadhri tehsil has also a concentration of industries as 3.10 per cent of total industrial units employ 10.02 per cent of total workers. Some other tehsils like Sonapat, Panipat, Jhajjar, Gurgaon and Rohtak etc. have the concentration of small size industries as is evident from their low employment capacity and low concentration of total industrial production.

6.31 Small Scale Industries

Out of 32 tehsils of Haryana, eight tehsils do not have even a single industrial unit in which the investment is more than one lakh.

23.45 per cent of the total small scale industries are concentrated in Ballabgarh tehsil which is industrial leading tehsil in Haryana since two of the industrial centres viz. Ballabgarh and Faridabad are situated in this tehsil. Sonapat, Jhajjar, Panipat and Gurgaon are also important because 43.79 per cent of total small scale industries are concentrated in these four tehsils. Two-third of total small scale industries are concentrated in only five tehsils and remaining one-third are located in nineteen other tehsils (Appendix Table No. XIII).

Table No. 6.3

HARYANA
Distribution of Small Scale Industries (with investment more than Rs. lakh) by their size of Production 1971

Sl. No.	Production size (lakh Rs. per annum)	Number of Industries	Percentage of total number of industries	Cumulative Percentage
1.	Less than 0.50	16	2.76	2.76
2.	0.50 - 0.99	34	5.86	8.62
3.	1.00 - 1.99	97	16.72	25.34
4.	2.00 - 4.99	154	26.55	51.89
5.	5.00 - 9.99	128	22.07	73.96
6.	10.00 - 20.00	95	16.38	90.34
7.	More than 20.00	56	9.66	100.00
	Total	580	100.00	100.00

Production

The above table clearly explains that 26.55 per cent of the total number of industries fall in production size between Rs. 2.00 to 4.99 lakh per annum meaning thereby that maximum number of industries belong to this category. However, 74 per cent of total industries are producing less than Rs.10 lakh per annum while remaining 26 per cent of total industries produce more than Rs.10 lakh per annum.

Three tehsils of Haryana viz., Ballabgarh, Sonapat and Gurgaon contribute more than 50 per cent of the total industrial production. Ballabgarh tehsil contributes the maximum (31.80 per cent) of the whole followed by Sonapat (12.44 per cent). However, Panipat, Karnal, Bhiwani, Rohtak, Fatehabad, Jhajjar and Jagadhri are also important tehsils which account for 39.84 per cent of total production while 12 tehsils are producing even less than one per cent of the total production (Appendix Table XIV).

Table:6.9

Haryana

Distribution of small scale industries by their employment size 1971

S. No.	Size of Employment	No. of industries	Percentage to total number of industries	Cumulative Percentage
1.	Less than 5	8	1.38	1.38
2.	5 - 9	106	18.28	19.66
3.	10 - 19	134	23.10	42.76
4.	20 - 49	195	33.61	76.37
5.	50 - 99	102	17.59	93.96
6.	100 - 200	24	4.14	98.10
	Total	580	100.00	100.00

Employment

The above table clearly depicts that among 33.61 per cent of total industries, the employment capacity, varies between 20 to 49 persons per industry. There are only eight small scale industries constituting 1.38 per cent of total small scale industries, which employ less than five persons. Almost three-fourth of the total small scale industries have an employment capacity of less than 50 workers per unit. There are eleven units which have an employment capacity of more than 200 persons per unit. Most of these industries are located in Ballabgarh, Jagadhri, Karnal, Panipat, Sonapat, Rohtak and Gurgaon (Appendix Table No. XIV).

The spatial variations in the distribution of small scale industries by their size of employment explains that 32.77 per cent of total workers employed small scale industries are located in Ballabgarh, Sonapat accommodates 13.66 per cent of total workers in small scale industries. The other important tehsils are Kalka, Ambala, Hissar, Fatehbad, Karnal, Panipat, Kaithal, Jhajjar, Rohtak and Gurgaon because 56.05 per cent of total workers engaged in small scale industries are concentrated.

6.32 Large and Medium Scale Industries

Spatially speaking, these industries are located at important urban centres like Faridabad, Jagadhri, Sonapat,

Panipat and Bhiwani etc. spread over 18 tehsils of the State. 61.07 per cent of total industries are concentrated in Ballabgarh tehsil alone and the main points of concentration are Faridabad and Ballabgarh. Sonapat and Jagadhri are also important where 13.73 per cent of total large and medium scale industries are located. The five tehsils viz., Ballabgarh, Sonapat, Panipat, Jhajjar and Gurgaon show that two-third of total industries are concentrated in these tehsils (Appendix, Table No.XIII). It shows that these industries are not equally distributed but they are concentrated at a few places.

Table No. 6.10

Haryana

Distribution of large and medium scale industries by their size of production 1971

S. No.	Size of production (Rs. lakh per annum)	No. of units	Percentage to total number of industries	Cumulative percentage
1.	Less than 50	51	38.64	38.64
2.	50 - 99	26	19.70	58.34
3.	100 - 199	20	15.15	73.49
4.	200 - 499	23	17.42	90.91
5.	500 - 1000	9	6.82	97.73
6.	More than 1000	3.	2.27	100.00
	Total	132	100.00	100.00

The above table shows that 58.34 per cent of large and medium scale industries contribute less than Rs.100 lakh per annum to total industrial production. Again, 32.57 per cent of total large and medium scale industries fall in the production size of Rs.100 to 499 lakh per annum and in this way 90.91 per cent of total large and medium scale industries fall in the size class of less than Rs.500 lakh per annum. In Haryana, there are only three industries which produce more than Rs.1000 lakh per annum and out of these three industries, two are located in Jagadhri and in one in Faridabad.

Among these large and medium scale industries, again Ballabgarh is the only tehsil which constitutes 57.23 per cent of the total industrial production. Jagadhri and Sonapat are other important tehsils which contribute 24.70 per cent of total production (Appendix Table no. XIII). In this it is very clear that these three tehsils (Ballabgarh, Jagadhri and Sonapat) produce 82 per cent out of total industrial production of the region while in these three tehsils 75 per cent of industries are located.

Employment

In Haryana, large and medium scale industries provide 75 per cent of employment of total industrial sector. In terms of units, there are only 131 large and medium scale industries, while there are 580 small scale industries but these 131 large and medium scale industries provide employment to three-fourth of total industrial sector.

Table No. 6.11

Haryana

Distribution of Large and Medium Scale Industries by
their size of employment, 1971

S. No.	Size of Employment (Number of persons)	No. of industries	Percentage to total number of industries	Cumulative percentage
1.	Less than 100	28	21.21	21.21
2.	100 - 199	34	25.75	46.96
3.	200 - 499	26	19.70	66.66
4.	500 - 999	24	18.18	84.84
5.	1000 - 2000	14	10.61	95.45
6.	More than 2000	6	4.55	100.00

The above table explains that two-third of the total large and medium scale industries have an employment capacity of less than 500 persons per unit. The remaining one-third of the total industrial provide employment to more than 500 persons per unit. There are only six industries (4.55 per cent) in which more than 2000 persons are employed. These six industries are located in Jagadhri, Kalka, Hissar, Bhiwani, Sonapat and Faridabad. It shows that there are very few industries in the region which have capacity for a large employment.

The spatial variations of employment pattern in large and medium scale industries show that 48.73 per cent of total

workers employed in large and medium scale industries is an other important tehsil which occupies the second rank and provides employment to 11.70 per cent of total workers (Appendix Table No.XIX) followed by Sonapat. So these three tehsils provide 69 per cent of total employment of large and medium scale industries.

The preceding discussion brings out that the industrial activity is highly localised in Haryana and their spatial distribution is highly skewed. There are points of concentration along with the national highways while a large space is still devoid of any industry.

The regional variations in the industrial sector explains that eastern plain region is highly developed because 92.66 per cent of total industries are located in this part. The western sandy region stands second and in this region. The western dunny region stands second and in this region 5.80 per cent of total industries are concentrated. The important industrial centres are Bhiwani, Hissar, Hansi and Fatehbad. In southern hilly region and north eastern Shiwalik foothills region, only 1.54 per cent of total industries are located. So, like the agricultural sector, industrial sector is also highly developed in the eastern plain region.

Concluding this chapter, the net area sown has increased tremendously with the help of best efforts culturable waste land has been converted into net area sown and this category has shown the significant decline. Except these two categories of

use, it has been found that the decline in fallow land and insignificant increase in area under forests.

The north eastern hilly region has shown the maximum proportion of area under forests as well as the land not available for cultivation and it has not been highly affected by the climatic conditions. In the case of a fallow land, the western part of the region has shown the maximum concentration.

Intensity of cropping has shown the growth rate of 0.12 per cent since 1960-61 but it picked up a radical change in the agricultural year of 1967-68. It has been found that the intensity of cropping is highly related with rainfall and irrigation. However, the north west part of the region has shown the low intensity index in comparison to north eastern part.

The cropping pattern of Haryana depicts that the wheat, rice, jowar, bajra, gram, barley, cotton, sugarcane, rape and mustard are important crops and they cover more than 85 per cent of the area. The area is increasing in wheat, rice and cotton, while the area has declined in gram and jowar. The low value crops have been replaced by the high value crops. For this change, the development in irrigation has played its major role.

Wheat and rice are grown in the eastern part, while gram, rape and cotton are grown in the western sandy region. Again the concentration of these crops is highly affected by the

facilities of irrigation. These irrigation facilities have given rise to the growth of so many crops, while a few crops are concentrated in western and south west part.

The industries of Haryana are concentrated at a few places and they are not decentralised. Ballabgarh tehsil is highly developed in this sector because half of the industrial production is produced in this tehsil. Again large and medium scale industries explain more concentration rather than small scale industries. Employment in the industries depict that three-fourth of the employment of this sector is concentrated in large and medium scale industries and remaining one-fourth in small scale industries. However, two third of industrial employment is concentrated in only three tehsils i.e. Ballabgarh, Jagadhri and Sonapat. All these three tehsils are concentrated in eastern plain region. The regional variations of industries depict that eastern plain region is highly developed followed by western sandy region, north eastern and south west region.

Chapter VII

SUMMARY AND CONCLUSION

Chapter VII

SUMMARY AND CONCLUSION

7.1 In the above discussion, based on the data collected from various secondary sources, an attempt has been made to have a look into the historical, physical, demographic, settlement and economic structure of Haryana.

7.2 It is understood from the historical records that the Haryana had flourishing agricultural economy during the ancient period. Aryans started cultivation in Sarasvati Valley, which was a fertile plain in those days. After 1000 A.D., Haryana witnessed a decline in economic prosperity and political instability retarded the development of the region. Thus Haryana remained the cockpit of battles and struggles during this period but it could retain the tempo of its cultural development and could preserve its cultural traits.

During the modern period (i.e. in the end of eighteenth century), Britishers were benefited by the political instability of the region and captured it along with the other parts of India. After independence (1947), it remained the part of Punjab and it was stagnating in its economic conditions till late 1966. On November 1, 1966, it was separated from Punjab and now it has become second richest state of India after Punjab.

7.3 Geologically, the region has been formed during the recent period, except northeastern foothills and Aravalli

outcrops. Physiographically, Haryana is divided into four sub-divisions i.e. sub montane region, eastern plain region, western dunny region and southern hilly region. The recent plain of the Khadar and Bangar are more fertile, but the fertility is low in south west and western part of the region. All the rivulets, which flow within the region are seasonal streams and cause a lot of damage to the economy of the region through frequent inundation. Among these rivulets, Sahibi is the most important, which has brought destruction recently. In the northern part of the region, the drainage density is high in comparison to southern part, while central zone has been recognised as a zone of undefined drainage.

Haryana is highly affected by continental type of climate in which the winters are very cold and summers are quite hot. Climatically, this region comes under the arid, semi-arid and sub-humid type of climate. Temperature variations have not shown much of the intra regional differences, but rainfall decreases from north to south and from east to west, which clearly explains the effect of Monsoon on it. This nature of climate has given rise to the vegetation of thorny bushes and some other trees like Neem, Shisham etc.

7.4 The salient features, emerging from the study of demographic and social aspects of Haryana are that the

density of population, the literacy and the proportion of urban population is low in western parts in comparison to the eastern plains. The northern part of the region depicts the smaller size of household, increasing in the south. The dependency ratio is declining from north east to north west and from southeastern part to the south western part of the region.

It has been found that 12 tehsils have shown the higher urban sex ratio (females per thousand males) in comparison to rural areas. However, all the tehsils, which have highly developed in industrial sector, have shown the lower urban sex ratio. It is a result of male immigration in urban areas. It is very clear from the other demographic variables that literacy, density, percentage of urban population and growth rate of population (1961-71) are high in the urban areas, while size of household is large and dependency ratio is high in rural areas.

The occupational characteristics of the region depict that in the eastern plain of the region, the concentration of workers engaged in secondary and tertiary sector is more in comparison to the western duny region. Again, it has been found that in those areas, where the literacy and density of population is high, the concentration of workers engaged in secondary sector is also high.

The western duny region and northern part of the region show a higher concentration of scheduled caste

population in comparison to south west and eastern plain. Again, the urban areas have shown a lower concentration of scheduled caste population than rural areas. It is because of the more mechanical jobs available in urban areas and it is difficult for these people to do such jobs. It is evident from the census report of 1931 that Jat, Rajput, Chamar, Ahir, Chuhra, Gujjar and Brahmin have been the major castes of Haryana.

The averages of various demographic, occupational and social variables explain that areas of high density reflect the higher proportion of literat~~ure~~ and urban population. In these areas, concentration of workers engaged in secondary and tertiary sector is more, while the concentration is low in primary sector. The values obtained for all these variables are decreasing in medium and low density areas. It has also been found that size of household is also large in low density areas.

The inter-relationship of demographic, social and occupational characteristics have shown that density of population is high in only those areas in which the literacy is high (Table: 4.3). Size of household explains its small size in the areas of low sex ratio. However, the scheduled caste population reflects more concentration in the areas of high concentration of primary activity.

7.5 The study of the rural settlement explains that the

the concentration of the population is more at a few places and it is not equally distributed in all the villages. The distribution of these villages is random in space but their randomness varies under the influence of various physical and cultural factors. The departure from random distribution towards uniformity is more in dunny region in comparison to other parts. However, the Gini's concentration ratio, (0.18) explains that rural settlements have low concentration. The study of the spacing of the villages reveals that the average spacing of the rural settlements is 2.71 per sq. km., while it varies between 1.01 to 4.23 per sq. km. The western dunny region of Haryana reflects high spacing index, while it is low in southern and very low in north eastern part of the region. However, the correlation analysis has proved that spacing index is high in only those areas, where the size of the settlements (population and area) is large and this index is negatively related with the density of population.

The study of the urban settlements, reflect that number of towns is decreasing with the increasing in the class size, except class VI (less than 5000 population) towns. On the other hand, concentration is increasing with the increase in the rank-size except class I towns.

The spatial distribution pattern of towns in Karnal, Rohtak and Gurgaon, shows that in these three districts, the distribution pattern is random and the departure from random

distribution is insignificant and the other four districts; viz. Ambala, Jind, Hissar and Mahendragarh reflect a significant departure towards uniform distribution. So, it is noticed that in two districts adjoining Delhi, the distribution is random but departure towards uniform distribution is increasing away from it.

The size-class distribution of the urban centres explain that class I towns are evenly spaced, while class III and Class IV draw a significant departure from random distribution to even distribution. The R value of 1.37 for all the towns of Haryana, clearly explain that the towns of Haryana are randomly distributed over the space, with a slight departure towards the uniformity. The Lorenz curve and Gini's concentration ratio (0.22) also suggest that towns of Haryana keep the low concentration, but these towns don't have regular relationship because they explain the 31.49 per cent of average discrepancy.

The economy of urban centres, concludes that half of the towns are monofunctional while one-fourth are bi-functional, and remaining are mainly diversified because only one town is tri-functional. Most of these monofunctional towns are service, trade and commerce towns. However, the changing pattern of urban economy depicts that these towns are shifting from monofunctional characteristics to bi-functional and from diversified activities to bi-functional.

7.6 With regard to the economy of Haryana and looking at the agricultural aspects, it has been found that the net area sown has increased tremendously and it has reflected the growth rate of 1.1 per cent per annum. With the, increase in level of technology, culturable waste land has been covered into net area sown and this category has shown the significant decline. Except these categories of land use pattern, a decline in fallow land and insignificant increase in area under forests have been observed. However, the north eastern part of the region has shown the maximum proportion of area under forests and land not available for cultivation. In the case of fallow land, the western dury region has shown the maximum concentration.

Intensity of cropping, has witnessed the growth rate of 0.12 per cent per annum, but the change in the index of intensity of cropping was radical in the agricultural year of 1967-68. It has been found that intensity index has high positive correlation with the rainfall and irrigation. However, these variations in irrigation and rainfall have given rise to low intensity index in western plain and high intensity index in eastern plain.

The cropping pattern of the region, gives the idea that the wheat, rice, jowar, bajra, gram, barley, cotton, sugarcane, rape and mustard are important crops. These crops

cover more than 85 per cent of the total area. The area has increased in wheat and rice and the area has declined in gram and jowar. The Nerlovian's model has proved that irrigation is a dominant factor, which has played its important role in these changes. Wheat and rice are mainly grown in the eastern and north eastern part of the region, while gram, rape and mustard are highly concentrated in western part. So these different crops are grown in Haryana and it has been found that except the district of Mahendragarh, crop combination is more than or equal to four crop region in all the other districts. It shows the diversification of different crops in the region.

The distribution pattern of industries show that these industries are concentrated at a few places like Faridabad, Jagadhri, Sonapat, Panipat etc. and they are not widely distributed but large and medium scale industries, reflect more concentration, rather than small scale industries. Ballabgarh tehsil is highly developed in this sector because, half of the industrial production is produced in this tehsil.

Employment in the industrial sector depicts that three fourth of the employment of this sector is concentrated in large and medium scale industries and one-fourth in small scale industries. However, two-third of industrial employment is concentrated in only three tehsils i.e. Ballabgarh, Jagadhri and Sonapat and all the three tehsils are concentrated

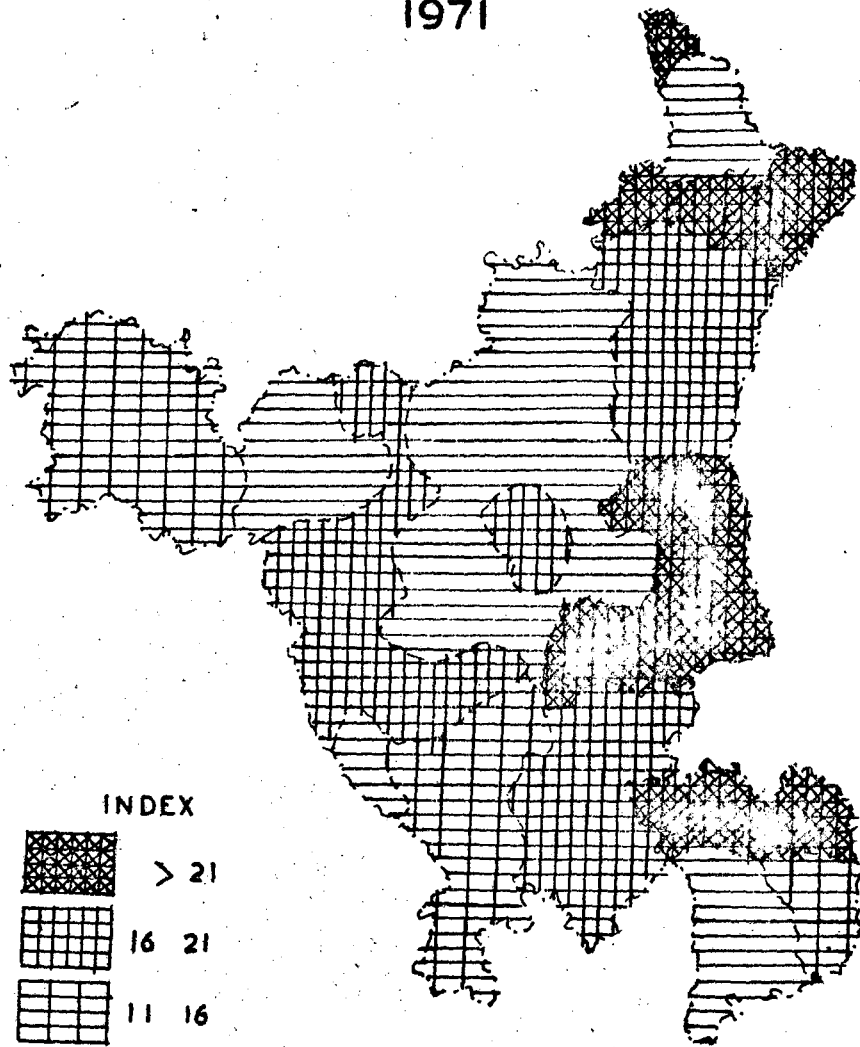
in eastern plain region. However, the regional variations in the location of industries depict that eastern plain region is highly developed followed by western dunny region, north eastern region and southern hilly region.

The spatial variations in the levels of regional development¹ explains that the index of levels of development varies between 8.2 to 27.8 (in Narwana and Ballabgarh tehsil). It has been found that extreme eastern part of the region depicts moderate to high level of development, while the central and south west part of the region is least developed. Again Narayangarh tehsil in Ambala district and Loharu tehsil in Hissar district also show low level of development. The superimposition of this map (Map No.7.1) with the other maps (like demographic, social, occupational and physical) explain the relationship. In eastern plain, where the amount of rainfall is more, transport facilities are more, proportion of urban population and literate population is more, the index of development is also high. The western dunny region, where the index of development is either low or moderate is also

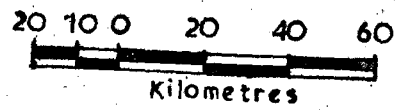
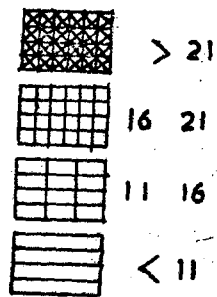
-
1. The index of levels of development has been calculated with the help seven variables viz., literacy, dependency ratio, percentage of workers engaged in secondary and tertiary sector, percentage of urban population, percentage of scheduled caste population and production of industries. Except two variables i.e. percentage of scheduled caste population and dependency ratio, all the variables have been taken positively, while these two variables have been considered negatively.

MAP NO. 7.1

HARYANA LEVELS OF DEVELOPMENT 1971



INDEX



influenced by these factors given above. However, it is clear that within this region, some areas like Bhiwani, Hissar are moderately developed due to the development in industrial sector.

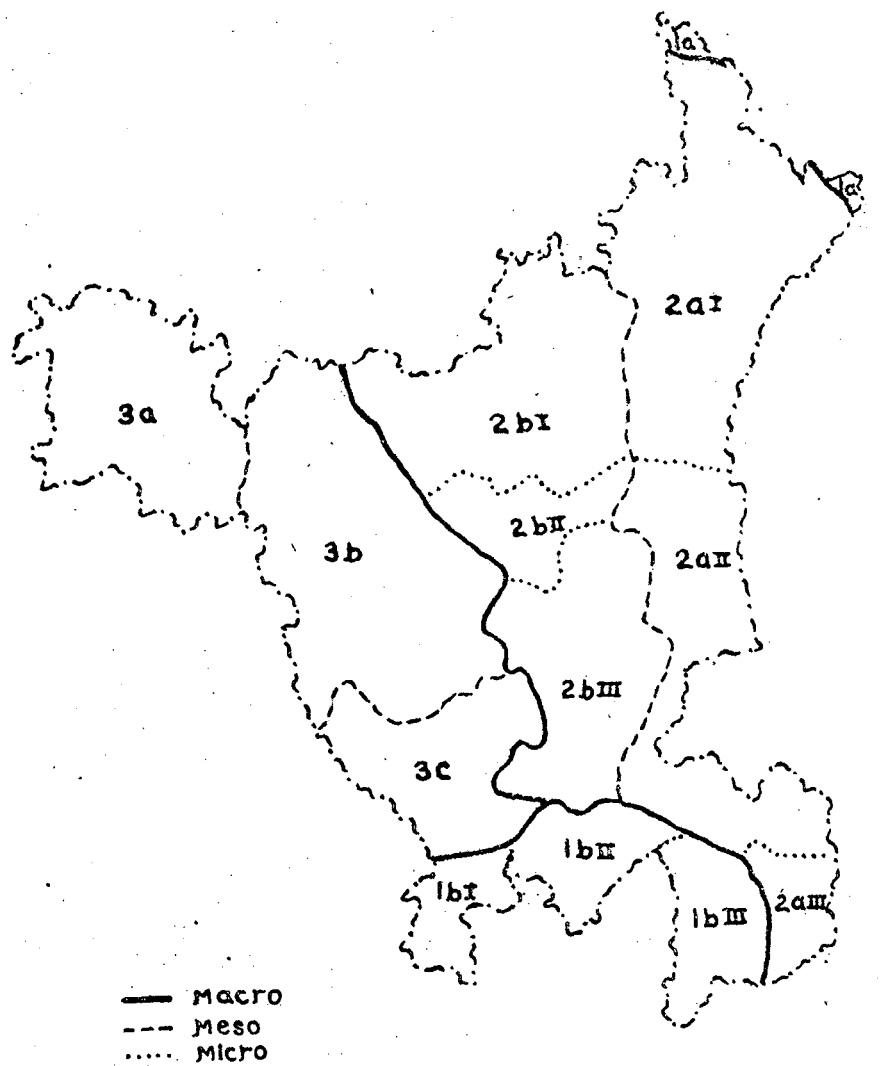
In the southern hilly region, Ferozpur Jhirka and Nuh tehsils are the least developed, while Narnaul and Mahendragarh tehsil show the low level of development. Lack of urbanization industrialization and the persistence of traditional methods of agriculture have kept this region at a low level of development.

7.8 On the basis of foregoing analysis of the various historical, physical, demographic, social, settlements and economic variables, a scheme of regionalisation at macro, meso and micro level has been worked out for Haryana (Map No. 7.2, Table 7.1), the main characteristics of which are discussed below.

• As the table indicates, Haryana has been divided into three macro, seven meso and nine micro regions. The macro - regions are identified on the basis of broad physical divisions. While the meso and micro regions are identified on the basis of the differential economic and demographic frames respectively.

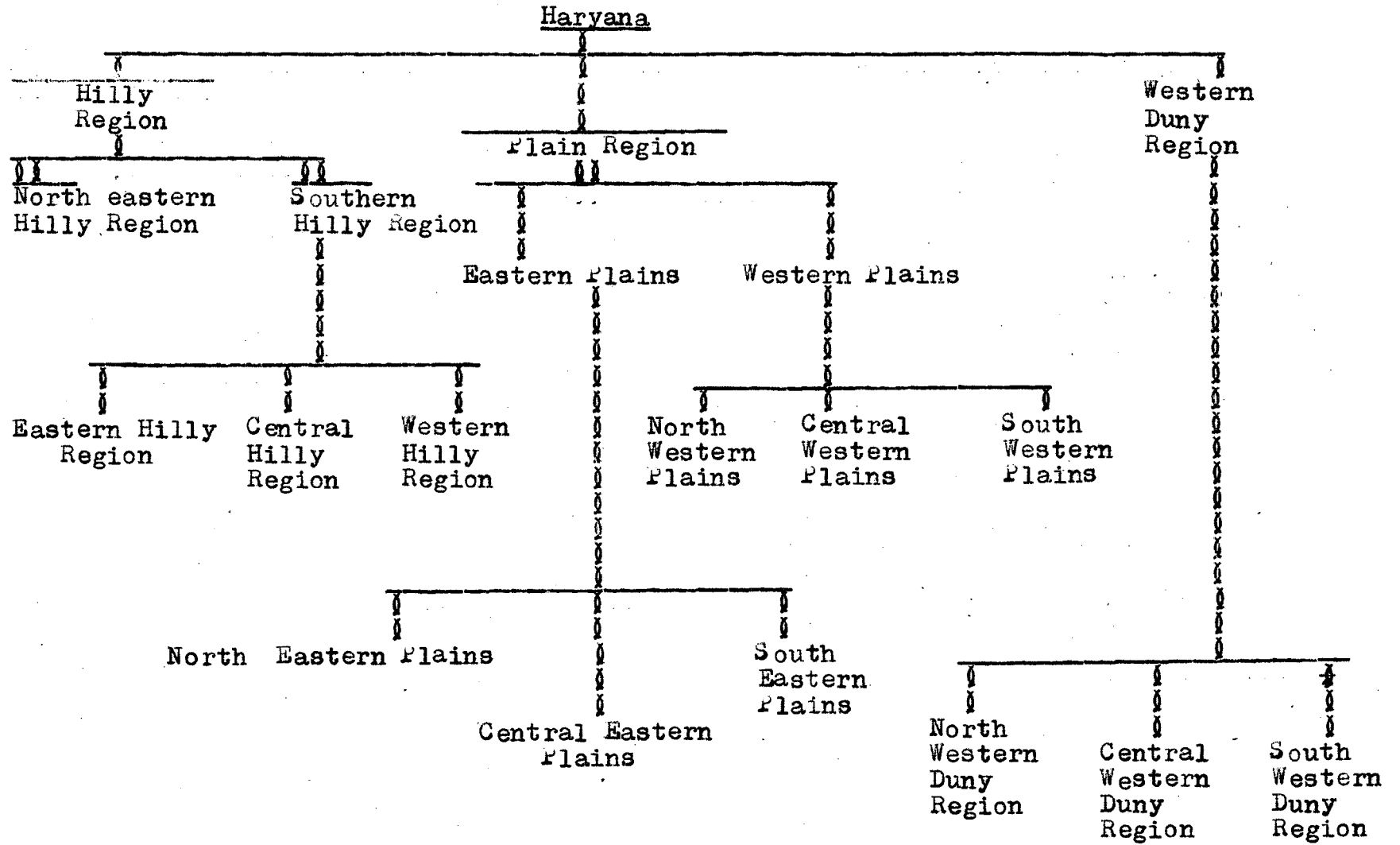
MAP NO. 7.2

HARYANA REGIONAL STRUCTURE



20 10 0 20 40 60
kilometres

Table: 7.1



1a Hilly Region

It covers the area of Siwalik hills and southern Aravalli region. Siwalik region includes the tehsils of Jagadhri and Kalka, while southern hilly region includes the area of Narnaul, Rewari, Ferozpur Jhirkha and part of Mahendragarh and Gurgaon tehsils. Though physically both the hilly regions depict the same characteristics, they differ in geological, floral, socio-economic and demographic characteristics considerably.

1a North Eastern Hilly Region

This region is a part of Siwalik foothills and it includes the parts of Jagadhari and Kalka tehsils, and is located in the north eastern part of Haryana. Since the amount of rainfall received in this region is high, the area under forest cover is also fairly high (around 11%) compare to the area under Haryana as a whole (2.3%). Chos or the seasonal rainfed streams flowing with great speed during the rainy season and causing the large scale aenudation form an important element of the drainage system and pedology in this area. The density of population, literacy, propotion of urban population is high and the spacing of settlements is fairly low. There has been an attempt by the state to boost up the economy of the region by establishing Hindustan Machine Tools Ltd., which has improved the percentage of workers engaged in secondary and tertiary activities.

1b Southern Hilly Region

It is situated in the southern part of Haryana. Most of the region is covered by the Aravalli Range. It covers the tehsils of Narnaul, Rewari, Nuh, Ferozpur Jhirka and part of Gurgaon tehsil and in this region, Sahibi and Dohan are important seasonal streams. The main crops are jowar, bajra, gram and wheat. This region is backward in industrial sector, while the tehsils of Nuh and Ferozpur Jhirka show the absence of industries, on the basis of various demographic, social and economic characteristics it has been further sub-divided into three micro regions.

1bI Western Hilly Region

1bII Central Hilly Region.

1bIII Eastern Hilly Region.

1bI Western Hilly Region

It is situated in the extreme south west part of Haryana and covers mainly the tehsils of Narnaul and Southern Mahendragarh. Only 0.14 per cent of total industries of Haryana^{are} located in this region and all are small scale industries. Gram, jowar and bajra are important crops which are grown in the semi arid conditions. Seventy per cent of the total workers are engaged in primary activity. The average density of population is 200 persons per sq. km. and the sex ratio is 929 female per thousand male which show the outmigration of male population. The literacy rate is only 11 per cent.

1bII Central Hilly Region

It is a transitional region between western hilly region and eastern hilly region. It covers mainly the tehsil of Rewari and part of Gurgaon tehsil. It is more industrialized in comparison to its surrounding micro regions but most of the industries are small scale industries. Among small scale industries, metal-works industries are important and this industry is a cottage industry of the region. The density of population is 270 persons per sq. km., the literacy rate is 30 per cent proportion of scheduled caste population is 20 per cent and only 14 per cent of total population is urban population.

1bIII Eastern Hilly Region

It comprises the tehsils of Nuh and Ferozpur Jhirka. It is one of the backward region of Haryana. The density of population is 225 persons per sq. km., sex ratio is 862, literacy rate is only 15 per cent and proportion of urban population is only 3 per cent. Since there are only two small towns in this region which are mainly agricultural towns they reflect the low level of urbanization. In this region eighty per cent of workers are engaged in primary activity.

2 Plain Region

It is situated in the eastern part of Haryana where large amount of alluvium soil has been deposited. It is

highly developed in all the sectors of the economy. In this region ninety five per cent of total industries are located. The density of population, literacy and the percentage of urban population is more in comparison to other two macro regions. However, looking at the spatial variations of the above mentioned attributes, this region has been subdivided into two meso regions.

2a Eastern Plains

2b Western Plains.

2a Eastern Plains

In this region, important industrial centres like Faridabad, Ballabgarh, Sonapat, Panipat and Bahadurgarh are located. The density of population is more than 242 persons per km², the literacy is more than 25 per cent, proportion of urban population is more than 10 per cent and the size of household is small. Wheat and rice are important crops. Within this region, large variations have been observed. The areas around Delhi are highly industrialized and urbanized, while away from it agriculture is the main activity and it is highly developed. The occupational structure has affected the other demographic and social structure of the region and this region has been further sub-divided into three micro regions.

2aI North Eastern Plains

2aII Central Eastern Plains

2aIII South Eastern Plains

2aI North Eastern Plains

This region covers mainly the tehsils of Ambala, Karnal, Thanesar, Narayangarh and southern part of Jagadhri tehsil. Fifty five per cent of workers are engaged in primary activity and rice and wheat are important crops, while rice has got its main concentration in comparison to other parts of Haryana. It is a six crop region and it shows the diversification of so many crops. The density of population is 270 persons per sq. km., literacy rate is 26 per cent, more than 15 per cent of population is urban and size of household is small. The spacing index of the settlement is 1.9 per sq. km. However, the literacy rate, density of population and proportion of urban population is low in comparison to central eastern plains.

2bII Central Eastern Plains

It includes the tehsils of Sonapat, Gurgaon, Ballabgarh and part of Jhajjar tehsil. More than 50 per cent of the industries of Haryana are located in this region. Delhi Metropolis has affected mainly in the development of industries and this development has affected the socio-economic and demographic structure of the region in comparison to surroundings. The density of population is very high (more than 290 persons per sq. km.), literacy is also very high (more than 30 per cent), and the proportion of urban population is 20 per cent. This region has shown high level of development in comparison to

other two micro regions of eastern plains.

2aIII South Eastern Plains 7

It is mainly agricultural region and covers the tehsil of Palwal. The fertile soil deposited by Yamuna and more irrigational facilities are responsible for the agricultural development. Seventy per cent of the workers are engaged in primary activity. The sex ratio (846 female\$ per thousand male\$) and dependency ratio (2.78) also moderately high. However, the concentration of scheduled caste population is very high because twenty five per cent of total population is scheduled caste population.

2b Western Plains

It is a transitional region between eastern khadar land and western dunny region. It covers the tehsils of Narwana, Jind, Safidon, Kaithal, Guhla and part of Jhajjar tehsil. The concentration of old alluvium is more and it is less fertile. Agriculture is the main activity of the people because only a few industries are located in Jind and Rohtak tehsils. Based on various socio-economic and demographic characteristics, it has been divided into three micro regions.

2bI . North Western Plains

2bII Central Western Plains

2bIII South Western Plains

2bI Upper Western Plains

It is situated in ~~the~~ central northern part of the region. Eighty per cent of the total workers are engaged in primary activity which shows the predominance of primary activity. The spacing index of the settlement is 3.20 per km². The density of population is moderately high (more than 200 persons per km²), literacy rate is 17 per cent, proportion of urban population is only 8 per cent, 20 per cent of total population is scheduled caste and size of household is very high (6.6 persons per household).

2bII Central Western Plains

It covers mainly the tehsils of Jind and Safidon. It has a population density of 266 persons per sq. km., literacy rate of 21 per cent and urban population 16 per cent of the total population. Sex ratio is 863 female per thousand of male. The demographic and socio-economic characteristics of this region show a transitional stage between the North and the South Western Plains.

2b III Southern western plains

This region covers the tehsils of Rohtak, Gohana and part of Jhajjar. The region shows a general absence of industries except in Rohtak. Sixty six per cent of total workers are engaged in primary activity. Wheat, sugarcane, gram and jowar are important crops. The spacing index of settlements is 3.0 per sq. km. and it shows the low density of settlements.

The density of population is 220 persons per sq. km., sex ratio is 890 female per thousand male, and literacy rate is 27 per cent.

3. Western Dunny Region

It is situated in the western part of Haryana covering the tehsils of Sirsa, Dabwali, Hissar, Bhiwani, Loharu and part of Mahendragarh and Fatehbad tehsils. Most of the region was a part of Hissar Sarkar during Akbar's period. On the basis of certain demographic and economic characteristics this region has been divided into three sub-divisions.

3a North Western Dunny Region

It is situated in the extreme north west of region and Dabwali and Sirsa tehsils- come under this region. The spacing index of the settlements is more than 3.80 per sq. km. The main activity of the people is agriculture because seventy seven per cent of the workers are engaged ⁱⁿ primary sector of economy. The density of population is only 122 persons per sq. km., the sex ratio is 865 female per thousand male dependency ratio is 2.41 and the literacy rate is 23 per cent, only 15 per cent of the total population is urban.

3b Central Western Dunny Region

It is situated in the centre of dunny region and comprises the tehsils of Hissar, Hansi, Bhiwani and part of Fatehbad with the development in industrial sector of this region has developed and now 4.5 per cent of total industries of Haryana are concentrated in this region. Twenty seven per cent of

total workers are engaged in secondary and tertiary sector.

The density of population is 176 persons per sq. km., the sex ratio is 868 females per thousand of males, dependency ratio is 2.65 and 17 per cent of total population is urban. Hissar and Bhiwani are two main industrial centres of this region.

3c South Western Dunny Region

It covers the tehsils of Loharu, Dadri and northern part of Mahendragarh tehsil. The dry conditions put a constraint on the agricultural development in this area. The main crops are jowar, bajra and gram. The density of population is 156 persons per sq. km., literacy is 23 per cent, sex ratio is 867 females per thousand of males. The proportion of urban population is very low because 8 per cent of total population is urban. Apart from this, seventy nine per cent of total workers are engaged in primary activity. Low urban population, high proportion of workers engaged in agricultural activities and the production of low value crops, all indicate towards low level of development in this region.

7.9 Taking Haryana as a whole, one observes marked variations in the levels of development in different parts of Haryana. The eastern region is more developed specially the south eastern section of it, which includes the tehsils of Ballabgarh, Gurgaon and Sonapat. These tehsils have attained a stimulus growth because of their proximities to the expanding metropolis city of Delhi. The western section shows medium to low level of development partly because of the presence of dunes, climatic conditions, and partly because of low level of agriculture and general absence of industries. This region can be brought at par with the east provided of assured supply of water is made available for agriculture and efforts are made to develop industries and other infrastructural facilities. This will reduce the inter-regional disparities and will help in the balanced regional development of the Haryana.

APPENDIX TABLES

APPENDIX TABLE: I

HARYANADEMOGRAPHIC CHARACTERISTICS1971

Sl. No.	Name of Tehsil	Density of Population Persons/Sq. Km.			Sex - Ratio (Females/Tn. of males)			Dependency Ratio		
		R	U	T	R	U	T	R	U	T
1.	Kalka	255	6214	319	867	857	817	2.26	2.65	2.33
2.	N. Garh	169	4941	172	861	930	867	2.65	3.20	2.69
3.	Ambala	250	4140	420	864	905	882	2.81	2.89	2.85
4.	Jagadhari	208	2702	297	846	826	839	2.48	2.54	2.50
5.	Guhla	161	1463	171	864	855	865	2.49	2.86	2.51
6.	Kaithal	214	4606	239	843	852	844	2.65	2.85	2.68
7.	Thanesar	213	2474	257	870	826	862	2.74	2.82	2.76
8.	Karnal	210	4643	260	851	869	855	2.69	2.69	2.69
9.	Panipat	224	11323	294	844	877	883	2.78	2.73	2.77
10.	Gohana	227	6625	245	871	893	873	3.08	3.30	2.81
11.	Sonepat	301	2326	354	855	848	855	3.07	2.91	3.05
12.	Rohtak	281	10699	372	887	863	881	3.31	3.15	3.27
13.	Jhajjar	223	6295	249	913	875	909	3.46	3.11	3.43
14.	Rewari	229	4551	268	924	889	918	3.52	3.22	3.47
15.	Gurgaon	215	3325	277	887	886	885	3.28	2.95	3.20
16.	Ballabgarh	277	4770	431	776	753	767	2.32	2.02	2.20
17.	Palwal	236	6209	284	843	854	846	2.71	3.12	2.78
18.	Nuh	217	834	220	866	822	865	2.66	3.24	2.67
19.	F. Jhirka	222	2328	231	890	885	890	2.71	2.93	2.73
20.	Dadri	166	4320	179	887	851	885	2.50	2.86	2.53
21.	M. Garh	167	1520	182	912	901	910	3.14	3.41	3.16
22.	Narnaul	221	4742	255	915	874	909	3.18	3.14	3.17
23.	Dabwali	94	4929	113	865	867	866	2.33	2.69	2.39
24.	Sirsa	114	9422	131	867	840	864	2.39	2.75	2.43
25.	Fatehbad	136	2184	144	867	874	868	2.37	2.82	2.40
26.	Hissar	147	3157	188	864	801	850	2.45	2.65	2.50
27.	Hansi	174	4532	193	878	899	880	2.74	3.12	2.78
28.	Bhiwani	110	6700	149	880	830	867	2.80	2.79	2.80
29.	Loharu	89	2154	98	895	901	896	2.40	2.58	2.43
30.	Narwana	197	4808	215	852	842	851	2.61	2.79	2.63
31.	Jind	213	3890	265	873	833	865	2.85	2.96	2.88
32.	Safidon	240	1853	267	865	900	862	2.78	3.08	2.82

APPENDIX TABLE: I

HARYANA

DEMOGRAPHIC CHARACTERISTICS

1971

- 161 -

Sl. No.	Name of Tehsil	Percentage of Literate Population to Total Population			Size of Household (Persons/household)			Percentage of S.C. Population to total population			Percentage of rural pop. to total pop.	Percentage of urban population to total population
		R	U	T	R	U	T	R	U	T		
1.	Kalka	29.68	59.84	36.04	5.34	4.52	5.15	20.37	13.34	18.89	71.91	21.09
2.	N. Garh	22.74	49.02	24.86	6.24	5.23	6.19	24.20	19.29	23.80	91.93	8.08
3.	Ambala	30.33	56.83	41.75	6.10	4.87	5.50	30.53	10.04	21.70	56.88	43.12
4.	Jagadhari	28.02	54.93	33.91	6.57	4.96	5.95	30.72	7.54	23.22	67.63	32.37
5.	Guhla	16.13	48.02	18.18	6.42	5.57	6.36	21.31	6.97	20.39	92.03	7.93
6.	Kaithal	14.51	47.10	18.03	6.47	5.83	6.40	22.04	9.30	20.66	89.19	10.81
7.	Thanesar	23.33	54.49	27.61	6.82	5.37	6.50	22.44	9.29	20.00	81.46	18.54
8.	Karnal	20.08	54.00	27.51	5.76	5.55	5.66	20.65	10.79	18.67	79.83	20.17
9.	Panipat	21.44	51.95	28.84	5.90	5.21	5.72	19.36	6.62	17.24	75.74	24.26
10.	Gohana	22.69	46.94	24.58	6.94	5.79	6.90	20.01	14.19	19.56	92.23	7.77
11.	Sonepat	27.68	52.51	31.96	6.62	5.26	5.89	17.05	9.53	15.76	82.76	17.24
12.	Rohtak	28.60	56.28	28.61	6.83	5.65	6.50	19.34	10.88	17.22	74.94	25.06
13.	Jhajjar	29.39	46.76	29.40	7.05	5.85	6.88	17.51	12.55	17.51	89.13	10.87
14.	Rewari	28.74	51.34	28.75	6.58	5.87	6.46	20.37	10.50	20.39	85.53	14.47
15.	Gurgaon	28.31	56.46	35.10	6.82	5.36	6.40	19.43	11.08	17.42	75.89	24.11
16.	Ballabgarh	26.66	55.64	37.67	5.67	4.48	5.16	18.45	7.64	14.35	62.02	37.98
17.	Palwal	20.61	42.83	24.55	6.56	5.75	6.40	21.90	17.56	25.69	82.29	17.71
18.	Nuh	15.44	49.45	16.14	6.74	6.14	6.85	11.83	17.78	11.96	97.95	2.05
19.	F. Jhirka	12.10	41.69	13.36	6.41	5.61	6.62	8.65	13.62	8.86	95.76	4.24
20.	Dadri	24.22	43.51	25.68	7.05	5.71	6.93	15.66	14.51	15.58	92.50	7.50
21.	M. Garh	24.07	38.30	25.38	6.69	5.82	6.62	15.21	15.03	15.20	90.81	9.19
22.	Narnaul	24.03	44.69	26.90	6.65	5.81	6.52	14.50	11.13	14.11	86.08	13.92
23.	Dabwali	16.31	44.35	23.52	6.61	5.80	6.46	29.22	22.12	28.04	83.22	16.78
24.	Sirsa	19.30	49.19	23.24	6.45	5.78	6.38	24.25	12.44	22.70	86.81	13.19
25.	Fatehbad	17.29	42.66	18.96	6.62	5.57	5.78	22.69	11.47	21.96	93.43	6.57
26.	Hissar	18.65	49.44	25.82	6.55	5.31	6.88	24.80	13.51	22.18	76.74	23.26
27.	Hansi	18.57	47.07	21.97	6.67	5.89	6.56	21.63	11.59	20.61	89.81	10.19
28.	Bhiwani	19.79	42.65	25.84	6.84	5.42	6.40	20.04	13.95	18.10	73.53	26.47
29.	Loharu	19.25	31.85	20.49	7.13	5.73	6.98	16.23	27.54	17.34	90.23	9.77
30.	Narwana	12.66	35.89	14.68	6.88	6.03	6.78	21.41	12.32	20.63	91.34	8.36
31.	Jind	17.20	46.74	23.35	6.84	5.60	6.54	19.03	10.86	17.33	79.18	20.82
32.	Safidon	17.43	41.44	20.18	6.63	5.80	6.52	19.13	9.93	18.07	88.45	11.55

APPENDIX TABLE: II

HARYANA

GROWTH OF POPULATION

1901 - 1971

S. No.	Name of District	Population 1901	Population 1911	Percentage decadal variation	Relative change 1901-11	Population 1921	Percentage decadal variation	Relative change 1911-21	Population 1931	Percentage decadal variation	Relative change 1921-31	Population 1941
1.	Ambala	613940	514925	-16.13	-	506623	-1.61	14.52	552768	9.11	10.72	630859
2.	Karnal	870723	788236	- 9.48	-	815967	3.52	13.00	838700	2.79	-0.73	978868
3.	Rohtak	858184	740319	-13.73	-	798105	7.81	21.54	833837	4.48	-3.33	987065
4.	Gurgaon	877728	765384	-12.80	-	712946	-6.85	19.65	779325	9.31	16.16	895940
5.	M. Garh	-	-	-	-	-	-	-	-	-	-	-
6.	Hissar	783317	809714	3.37	-	822724	1.61	-1.76	904754	9.97	8.36	1012643
7.	Jind	-	-	-	-	-	-	-	-	-	-	-
	Haryana	4623079	4174690	- 9.70	-	4255905	1.95	11.65	4559931	7.14	5.19	5272845

APPENDIX TABLE : II

HARYANA

GROWTH OF POPULATION

1901-1971

S. No.	Name of District	Percentage decadal variation	Relative change 1931-41	Population 1951	Percentage Decadal variation.	Relative change 1941-51	Population 1961	Percentage decadal variation	Relative change 1951-61	Population 1971	Percentage decadal variation	Relative change 1961-71
1.	Ambala	14.13	5.02	678175	7.5	-6.63	885785	30.61	23.11	1098405	24.00	-5.29
2.	Karnal	16.71	13.92	1077381	10.06	-5.65	1490430	38.34	28.28	1981303	32.93	-5.41
3.	Rohtak	18.38	13.90	1122046	13.67	-4.71	1420391	26.59	12.92	1785534	25.71	-0.88
4.	Gurgaon	14.96	5.65	967664	8.01	-6.95	1240706	28.22	20.21	1707369	37.61	8.39
5.	M. Garh	-	-	439271	-	-	543448	23.72	-	691639	27.27	3.55
6.	Hissar	11.92	1.95	1049448	3.63	-8.29	1544910	47.21	43.58	2132948	38.06	-8.15
7.	Jind	-	-	339629	-	-	464873	36.88	-	639610	37.59	0.71
	Haryana	15.63	7.49	5373614	7.60	-8.03	7590543	33.79	25.19	10036808	32.23	-0.46

Source: General Population Table of Haryana 1971

APPENDIX TABLE: III

HARYANAOCCUPATIONAL STRUCTURE

1971

Sl. No.	Name of Tehsil	Percentage of workers engaged in primary sector	Percentage of workers engaged in secondary sector	Percentage of workers engaged in Tertiary sector
1.	Kalka	38.00	27.00	35.00
2.	Narayangarh	72.39	8.26	19.35
3.	Ambala	40.60	15.29	44.11
4.	Jagadhri	52.38	19.62	28.00
5.	Guhla	82.85	6.06	11.09
6.	Kaithal	77.38	8.24	14.38
7.	Thanesar	69.86	10.14	20.00
8.	Karnal	66.93	9.85	23.22
9.	Panipat	58.52	18.61	22.87
10.	Gohana	75.40	8.89	15.71
11.	Sonepat	59.04	15.43	25.53
12.	Rohtak	52.93	13.55	33.52
13.	Jhajjar	71.30	9.64	19.06
14.	Rewari	64.36	10.89	24.75
15.	Gurgaon	53.38	12.61	34.01
16.	Ballabgarh	30.49	42.37	17.14
17.	Palwal	69.25	10.47	20.28
18.	Nuh	80.69	5.94	13.37
19.	Ferozpur Jhirka	79.78	4.32	15.90
20.	Dadri	77.56	6.48	15.96
21.	Mahendragarh	75.61	5.38	19.01
22.	Narnaul	69.57	8.09	22.34
23.	Dabwali	76.55	6.84	16.61
24.	Sirsa	76.85	6.84	16.31
25.	Fatehbad	83.56	5.93	10.51
26.	Hissar	66.03	10.98	22.99
27.	Hansi	78.30	7.60	14.10
28.	Bhiwani	64.25	16.61	19.14
29.	Loharu	85.49	3.12	11.39
30.	Narwana	80.78	7.19	12.03
31.	Jind	67.90	10.65	21.66
32.	Safidon	77.40	8.30	14.30

APPENDIX TABLE : IV

HARYANA

CONCENTRATION OF RURAL SETTLEMENTS

1971

Sl.No.	Name of Tehsil	Density of rural settlements per sq. km.	No. of rural settlements	Area of Tehsil	(X) Percentage of rural settlements in a Tehsil to total settlements	(Y) Percentage of Tehsil area to Total area.	Cumulative Percentage		XiYi+1	Xi+1Yi
							Xi	Yi		
1.	Kalka	0.5308	138	260.0	2.14	0.60	2.14	0.60	15.15	3.37
2.	Jagadhri	0.5086	224	2819.5	3.48	6.48	5.62	7.08	55.98	58.13
3.	Ambala	0.3646	167	1253.4	2.59	2.88	8.21	9.96	100.33	129.58
4.	Thanesar	0.3145	309	982.5	4.80	2.26	13.01	12.22	201.00	237.68
5.	Rewari	0.2954	415	1404.8	6.44	3.23	19.45	15.45	364.10	397.68
6.	Ferozpur Jhirka	0.2844	405	1424.1	6.29	3.27	25.74	18.72	529.73	548.68
7.	Narayangarh	0.2837	230	810.8	3.57	1.86	29.31	20.58	679.11	704.45
8.	Nuh	0.2809	317	1128.7	4.92	2.59	34.23	23.17	874.92	886.95
9.	Ballabgarh	0.2504	261	1042.3	4.05	2.39	38.28	25.56	1041.98	1047.19
10.	Narnaul	0.2390	173	723.7	2.69	1.66	40.97	27.22	1204.52	1206.12
11.	Sonepat	0.2269	215	947.4	3.34	2.18	44.31	29.40	1417.92	1409.44
12.	Gurgaon	0.2069	234	1131.0	3.63	2.60	47.94	32.00	1649.14	1639.36
13.	Palwal	0.2027	212	1045.9	3.29	2.40	51.23	34.40	1879.12	1863.79
14.	Kamal	0.1916	190	991.6	2.95	2.28	54.18	36.68	2257.68	2214.37
15.	Guhla	0.1835	399	2174.7	6.19	4.99	60.37	41.67	2658.09	2623.54
16.	Safidon	0.1623	167	1028.8	2.59	2.36	62.96	44.03	2827.53	2813.08
17.	Mahendragarh	0.1564	60	383.7	0.93	0.88	63.89	44.91	3020.08	2973.94
18.	Panipat	0.1457	150	1029.2	2.33	2.36	66.22	47.27	3316.30	3255.01
19.	Jhajjar	0.1388	170	1224.9	2.64	2.81	68.86	50.08	3448.51	3674.87
20.	Rohtak	0.1307	231	2097.9	4.52	4.82	73.38	54.90	4164.32	4118.05
21.	Rohtak	0.1306	105	804.0	1.63	1.85	75.01	56.75	4356.58	4320.38
22.	Dadri	0.1245	72	578.4	1.12	1.33	76.13	58.08	4775.14	4581.35
23.	Kaithal	0.1221	177	1449.9	2.75	3.33	78.88	61.41	5223.43	5049.13
24.	Rohtak	0.1026	215	2094.6	3.34	4.81	82.22	66.22	5695.38	5576.39
25.	Narwana	0.0964	128	1327.5	1.99	3.05	84.21	69.27	6119.54	5978.69
26.	Gohana	0.0911	135	1481.7	2.10	3.40	86.31	72.67	6272.15	6406.59
27.	Hissar	0.0833	119	1428.6	1.85	3.28	88.16	75.95	7224.71	6945.63
28.	Sirsa	0.0812	212	2611.7	3.29	6.00	91.45	81.95	7992.73	7722.15
29.	Fatehbad	0.0754	179	2374.2	2.78	5.45	94.23	87.40	8660.68	8432.35
30.	Bhiwani	0.0738	175	1965.7	2.25	4.51	96.48	91.91	9186.83	8999.83
31.	Dabwali	0.0645	93	1440.8	1.44	3.31	97.92	95.22	9792.00	9522.00
32.	Hansi	0.0644	134	2080.2	2.08	4.78	100.00	100.00	-	-
Total:			6441	43542.2	100.00	100.00			99780.53	104509.77

APPENDIX TABLE : V

HARYANACHARACTERISTICS OF RURAL SETTLEMENTS

- 166 -

Sl. No.	Name of Tehsil	Area (Rural) (in sq. km.)	No. of inhibited rural settlements.	1971		Average size of village (sq. km.)	Spacing Index (per sq. km.)
				Total rural population	Average size of village (population).		
1.	Kalka	260.0	138	66264	480	1.8841	1.47
2.	Narayangarh	1128.7	317	180649	570	3.5605	2.02
3.	Ambala	982.5	309	245554	795	3.1796	1.91
4.	Jagadhari	1253.4	457	261203	572	2.7427	1.07
5.	Guhla	1028.8	167	165603	992	6.1605	2.66
6.	Kaithal	2094.6	215	448198	2085	9.7423	3.35
7.	Thanesar	1404.8	415	299853	723	3.3851	1.97
8.	Karnal	2174.7	399	455866	1143	5.4505	2.51
9.	Panipat	1224.9	170	87981	518	7.2053	2.88
10.	Gohana	1428.6	119	324218	2724	12.0050	3.72
11.	Sonepat	1131.0	234	339914	1453	4.8333	2.36
12.	Rohtak	1327.5	128	373157	2915	10.3711	3.46
13.	Jhajjar	2097.9	291	468313	1609	7.2093	2.88
14.	Rewari	1424.1	405	326353	806	3.5163	2.01
15.	Gurgaon	1045.9	212	224736	1060	4.9325	2.39
16.	Ballabhgarh	723.7	173	200559	459	4.1832	2.19
17.	Palwal	991.6	190	234036	1232	5.2189	2.45
18.	Nuh	1042.3	261	225933	866	3.9935	2.15
19.	Ferozepur	810.8	230	179768	782	3.5252	2.02
20.	Dadri	1449.9	177	240222	1357	8.1915	3.08
21.	M. Garh	1029.2	150	171601	1144	6.8613	2.81
22.	Narnaul	947.4	215	209149	973	4.4065	2.25
23.	Dabwali	1440.8	93	136146	1464	15.4925	4.23
24.	Sirsa	2819.5	224	321198	1434	12.5871	3.81
25.	Fatehabad	2374.2	179	321752	1797	13.2637	3.91
26.	Hissar	2611.7	212	383038	1807	12.3193	3.77
27.	Hansi	2080.2	134	362412	2705	15.5239	4.23
28.	Bhiwani	1965.7	145	217040	1497	13.5566	3.95
29.	Loharu	578.4	72	515347	716	8.0333	3.05
30.	Narwana	1481.7	135	291594	2160	10.9756	3.56
31.	Jind	804.0	105	171323	1632	7.6571	2.97
32.	Safidon	383.7	60	91984	1533	6.3950	2.71

APPENDIX TABLE: VI

HARYANA

CONCENTRATION OF URBAN SETTLEMENTS

Sl. No.	Name of Tehsil	No. of Towns	Area in sq. kms.	(X) Percentage of towns in a Tehsil to Total Towns	1971		O RDER		Cumulative Percentage		Xi	Yi + 1	Xi + 1	Yi
					(Y) Percentage of area of a Tehsil to Total area	X	Y	Xi	Yi					
1.	Kalka	1	262.9	1.54	0.60	1.54	6.43	1.54	6.43	19.17	49.44			
2.	Narayangarh	2	1145.5	3.08	2.60	6.15	6.02	7.69	12.45	137.50	114.91			
3.	Ambala	2	1027.5	3.08	2.33	1.54	5.43	9.23	17.88	211.18	247.45			
4.	Jagadhri	5	1299.7	7.69	2.95	4.61	5.0	13.84	22.88	382.95	422.13			
5.	Guhla	1	1036.6	1.54	2.35	4.61	4.79	18.45	27.67	598.89	595.73			
6.	Kaithal	2	2106.4	3.08	4.79	3.08	4.79	21.53	32.46	698.86	748.45			
7.	Thanesar	4	1432.4	1.14	3.25	1.54	4.74	23.07	37.20	962.02	972.78			
8.	Karnal	3	2199.5	4.61	5.00	3.08	4.50	26.15	41.70	1178.84	1218.89			
9.	Panipat	1	1232.7	1.54	2.80	3.08	3.38	29.23	45.08	1414.44	1387.11			
10.	Gohana	2	1432.7	3.08	3.25	1.54	3.31	30.77	48.39	1589.89	1637.66			
11.	Sonepat	2	1161.4	3.08	2.63	3.08	3.28	33.85	51.67	1859.38	2066.28			
12.	Rohtak	1	1339.2	1.54	3.04	6.14	3.26	39.99	54.93	2326.61	2365.83			
13.	Jhajjar	3	2107.0	4.61	4.79	3.08	3.25	43.07	54.18	2649.79	2863.03			
14.	Rewari	4	1437.0	6.14	3.26	6.14	3.25	49.21	61.43	3172.07	3117.57			
15.	Gurgaon	3	1067.4	4.61	2.43	1.54	3.03	50.75	64.46	3421.05	3749.51			
16.	Ballabgarh	3	749.5	4.61	1.71	7.69	2.95	58.44	67.41	4103.07	4043.25			
17.	Palwal	2	999.7	3.08	2.28	1.54	2.80	59.98	70.21	4368.94	4427.44			
18.	Nuh	1	1048.0	1.54	2.39	3.08	2.63	63.06	72.84	4757.24	4817.63			
19.	Ferozpur Jhirka	1	814.2	1.54	1.86	3.08	2.60	66.14	75.44	5150.32	5337.38			
20.	Dadri	1	1454.4	1.54	3.31	4.61	2.43	70.75	77.87	5678.39	5629.22			
21.	Mahendragarh	2	1046.6	3.08	2.37	1.54	2.39	72.29	80.26	5973.32	6048.39			
22.	Narnaul	2	954.5	3.08	2.17	3.08	2.37	75.36	82.63	6404.09	6355.07			
23.	Dabwali	2	1446.4	3.08	3.28	1.54	2.35	76.91	84.98	6715.01	6797.55			
24.	Sirsa	1	2824.7	1.54	6.43	3.08	2.33	79.99	87.31	7166.30	7252.84			
25.	Fatehbad	1	2384.6	1.54	5.43	3.08	2.28	83.07	89.59	7622.50	7718.17			
26.	Hissar	4	2648.5	6.15	6.02	3.08	2.17	86.15	91.76	8065.36	8187.74			
27.	Hansi	1	2089.3	1.54	4.74	3.08	1.86	89.23	93.62	8353.71	8497.88			
28.	Bhiwani	2	1977.4	3.077	4.50	1.54	1.85	90.77	95.47	8821.02	9105.92			
29.	Loharu	1	581.0	1.54	1.33	4.61	1.71	95.38	97.18	9395.88	9418.68			
30.	Narwana	2	1487.5	3.08	3.38	1.54	1.33	96.92	98.51	9584.14	9699.29			
31.	Jind	2	815.6	3.08	1.85	1.54	1.33	98.46	99.40	9846.00	9940.00			
32.	Safidon	1	390.2	1.54	0.89	1.54	0.89	100.00	100.00	-	-			
Total:		65	44222.0	100.00	100.00	100.00	100.00			132623.84	134833.62			

158

APPENDIX TABLE: VII
HARYANA

TOWNS ACCORDING TO RANK SIZE RULE

1971

Sl.No.	Name of town	Class of Town	Reciprocal I/R	Actual Pop. (PA)	Expected Pop. (PE)	PE-PA d	$\frac{PE-PA}{PE} \times 100$	$\frac{PE-PA}{PA} \times 100$
1.	Rohtak	I	1.0000	124755	374689	249934	66.70	200.34
2.	Ambala Cantt	I	0.5000	102493	187345	84852	45.29	82.79
3.	Karnal	II	0.3333	92784	124896	32112	25.71	34.61
4.	Hissar	II	0.2500	89437	93672	4235	4.52	4.74
5.	Panipat	II	0.2000	87981	74937	-13044	-17.00	-14.82
6.	Faridabad	II	0.1666	85762	62448	-39134	-62.66	-27.18
7.	Ambala City	II	0.1428	83633	53527	-23421	-43.75	-28.00
8.	Bhiwani	II	0.1250	73086	46836	-26246	-56.04	-35.91
9.	Yamunanagar	II	0.1111	72594	41632	-30962	-74.37	-42.65
10.	Sonepat	II	0.1000	62393	37469	-24924	-66.51	-39.94
11.	Gurgaon	II	0.0909	57151	34062	-23089	-67.78	-40.39
12.	Sirsa	III	0.0833	48808	31224	-17584	-56.31	-36.02
13.	Kaithal	III	0.0706	45199	28822	-16317	-56.49	-36.10
14.	Rewari	III	0.0714	43885	26763	-17122	-63.97	-39.01
15.	Hansi	III	0.0666	41108	24979	-16129	-64.57	-39.24
16.	Jind	III	0.0625	38168	23418	-14750	-62.98	-36.81
17.	Palwal	III	0.0588	36207	22040	-14167	-64.27	-39.13
18.	Jagadhri	III	0.0555	35094	20816	-14287	-68.59	-40.69
19.	Narnaul	III	0.0526	31875	19720	-12155	-61.63	-38.13
20.	Thanesar	III	0.0500	29555	18734	-10821	-57.76	-36.61
21.	Bahadurgarh	III	0.0476	25812	17842	-7970	-44.66	-30.88
22.	Fatehabad	III	0.0454	22630	17031	-5599	-32.87	-24.74
23.	Shahabad	III	0.0438	21500	16290	-5210	-31.98	-24.00
24.	Narwana	III	0.0416	21319	15612	-5707	-36.55	-26.77
25.	Mandi Dabwali	III	0.0400	20921	14987	-5934	-59.61	-28.00
26.	Faridabad Old	IV	0.0384	19644	14411	-5233	-36.31	-26.64
27.	Charkhi Dadri	IV	0.0370	19484	13877	-5607	-40.96	-28.78
28.	Jhajjar	IV	0.0357	18947	13381	-5666	-41.59	-29.38
29.	Kalka	IV	0.0344	17711	12920	-4791	-37.08	-27.00
30.	Ballabgarh	IV	0.0333	17411	12489	-4922	-39.41	-28.00
31.	Tohana	IV	0.0322	16789	12086	-4703	-38.91	-28.01
32.	Gohana	IV	0.0312	16754	11709	-5045	-43.08	-30.11
33.	Hodel	IV	0.0303	14144	11354	-2790	-24.54	-19.72
34.	Ghronda	IV	0.0294	13045	11020	-2025	-18.37	-15.52
35.	Beri	IV	0.0285	12336	10705	-1631	-15.23	-13.22

cont...

APPENDIX TABLE: VII
HARYANA
TOWNS ACCORDING TO BANK SIZE RULE
1971

Sl.No.	Name of Town	Class of Town	Reciprocal I/R	Actual Pop. (PA)	Expected Pop. (PE)	PE-PA d	$\frac{PE-PA}{PE} \times 100$	$\frac{PE-PA}{PA} \times 100$
36.	Sofidon	IV	0.0277	12010	10408	-1602	-15.39	-13.33
37.	Mehendragarh	IV	0.0270	11496	10127	-1369	-13.51	-11.90
38.	Pehowa	IV	0.0263	11366	9860	-1506	-15.27	-13.25
39.	Ladwa	IV	0.0256	10666	9607	-1059	-11.02	- 9.92
40.	Maham	IV	0.0250	10541	9367	-1174	-12.53	-11.13
41.	Nilokheri	V	0.0243	9357	9138	- 219	- 2.39	- 2.34
42.	Pundri	V	0.0238	9107	8921	- 186	- 2.08	- 2.04
43.	Sadura	V	0.0232	8971	8713	- 258	- 2.96	- 2.87
44.	Sohna	V	0.0227	8775	8515	- 260	- 3.05	- 2.96
45.	Ganaur	V	0.0222	8399	8326	- 76	- 0.91	- 0.90
46.	Ferozpur Jhirka	V	0.0217	7962	8145	183	2.24	2.29
47.	Jagadhri Rail-way colony	V	0.0212	7332	7972	640	8.02	8.72
48.	Julana	V	0.0208	6890	7806	916	11.73	13.29
49.	Naryangarh	V	0.0204	6880	7646	766	10.01	11.13
50.	Radaur	V	0.0200	6539	7493	954	12.73	14.58
51.	Bawal	V	0.0196	6529	7346	817	11.12	12.51
52.	Kalawali	V	0.0192	6521	7205	674	9.35	10.32
53.	Uchana	V	0.0188	6329	7069	740	10.46	11.69
54.	Pataudi	V	0.0185	6045	6938	893	12.87	14.77
55.	Ukhanmandi	V	0.0181	5981	6812	831	12.19	13.89
56.	Kanina	V	0.0178	5875	6690	915	12.18	13.87
57.	Loharu	V	0.0175	5579	6573	994	15.12	17.81
58.	Forukhnagal	V	0.0172	5487	6460	973	15.06	17.73
59.	Chhrauli	V	0.0169	5382	6350	968	15.24	17.98
60.	Tosham	V	0.0166	5039	6244	1205	19.29	23.91
61.	Nuh	VI	0.0163	4730	6142	1412	22.98	29.85
62.	Buria	VI	0.0161	4645	6043	1398	23.12	30.09
63.	Jakhalmadi	VI	0.0158	3919	5947	2028	34.10	51.74
64.	Hailymandi	VI	0.0156	2252	5854	3572	61.01	158.61
65.	Ateli	VI	0.0153	1937	5764	3827	66.39	197.57
Total			4.7318	1772959	1766220	790324	2098.22	2047.25
Mean			0.0727	27276	27172.61	12158.83	32.28	31.49

APPENDIX TABLE: VIII

HARYANA,

OCCUPATIONAL STRUCTURE AND FUNCTIONAL CLASSIFICATION OF TOWNS

1961 and 1971

Sl.No.	Name of Town	Class of Town (1971)	Percentage of Primary workers		Percentage of Secondary workers		Percentage of Tertiary workers		Function	1970-1971
			1961	1971	1961	1971	1961	1971		
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1.	Rohtak	I	8.09	4.67	24.40	19.39	67.51	75.94	Div.	Oth
2.	Ambala Cantt	I	8.32	5.00	11.35	25.98	74.33	69.02	30th	2ct
3.	Karnal	II	13.12	12.76	26.78	19.84	60.10	67.40	MQLF	Oth
4.	Hissar	II	12.10	9.12	30.60	25.72	57.30	65.18	MQLF, Ct.	Oth
5.	Panipat	II	8.76	9.47	39.93	35.52	51.31	55.02	Hi	2th
6.	Faridabad Town	II	0.60	0.54	65.44	61.31	33.96	38.25	3 Man	3 Man
7.	Ambala City	II	4.95	4.53	25.50	19.37	69.55	76.11	Oth	Oth
8.	Bhiwani	II	13.21	9.92	41.28	45.74	45.51	44.25	2 Man	1f, 2ct
9.	Yamuna Ngr.	II	1.88	2.97	53.13	48.77	44.99	53.26	Dive.	2 Man
10.	Sonepat	II	8.80	8.45	35.83	31.78	55.37	59.76	Man.	MQ, Man
11.	Gurgaon	II	2.35	3.55	25.92	19.36	71.63	77.11	TSC.Oth	20th
12.	Sirsa	III	11.65	9.50	25.43	21.64	62.92	68.87	Div.	T.C.
13.	Kaithal	III	15.52	13.92	29.18	21.91	55.30	64.18	Div.	Div.
14.	Rewari	III	8.64	4.25	33.01	22.62	58.35	73.12	Hi	Div.
15.	Hansi	III	16.44	18.76	27.05	22.52	56.51	59.18	Div.	Ct.
16.	Jind	III	13.38	10.33	24.71	16.70	61.91	72.96	TSC	2Ct.
17.	Palwal	III	16.37	16.63	25.79	22.40	54.84	61.00	Div.	Div.
18.	Jagadhri	III	6.24	7.26	48.45	47.15	44.31	45.58	3 Man.	Hi, 2Man
19.	Narnaul	III	14.41	19.52	19.78	17.44	65.81	63.24	Div.	Div.
20.	Thanesar	III	10.52	11.16	21.93	17.57	57.48	71.37	Oth	2ct, oth
21.	Bahadurgarh	III	21.71	10.38	24.61	28.88	53.68	60.73	Div.	Div.
22.	Fatehbad	III	5.09	18.55	20.71	20.83	74.20	60.61	Div.	Ct.
23.	Shahabad	III	15.32	17.75	27.09	20.12	57.64	62.59	D.V.	3MQ
24.	Narwana	III	37.99	23.04	18.50	19.34	43.51	57.61	Ag.	if
25.	Mandi Dab	III	3.32	3.13	25.09	24.28	71.59	70.89	Tc.	Tc.
26.	Farida Bad	IV	29.48	16.55	23.35	44.64	47.17	38.80	Div.	2MQ, Man
27.	Charkhi Dadri	IV	17.88	12.31	31.89	27.51	50.23	60.18	Ct.	Dive.
28.	Jhajjar	IV	29.21	26.82	24.47	17.90	46.32	55.19	Hi	Dive
29.	Kalka	IV	2.45	2.31	9.87	15.29	87.58	82.39	3TSC	2TSC
30.	Ballabgarh	IV	11.09	5.09	35.65	48.89	53.26	46.01	2Hi	2 Man.
31.	Tohana	IV	24.59	20.35	39.29	19.43	36.12	60.24	Div.	2Tc
32.	Gohana	IV	11.92	18.21	24.83	16.76	63.25	65.03	Div.	Div.
33.	Hodal	IV	34.92	26.22	22.71	23.74	42.37	50.03	Ag.	Ct.
34.	Gharunda	IV	38.46	38.81	21.22	19.31	45.32	41.88	Div.	Ag, Ct.
35.	Beri	IV	49.00	58.59	19.15	10.69	31.85	30.70	2 Ag.	2 Ag.
36.	Safidon	IV	25.86	25.77	21.51	19.19	42.63	55.64	Div.	Hi, Ct.
37.	Mahendragarh	IV	18.95	16.78	19.62	14.17	63.23	69.06	Div.	Oth.
38.	Pehowa	IV	23.29	16.22	26.72	22.25	49.99	61.53	Div.	2 Ct.
39.	Ladwa	IV	11.06	11.16	34.25	17.57	54.69	71.97	Div	Div.
40.	Maham	IV	36.35	35.76	16.54	14.51	47.11	49.73	Ag.	Ag.
41.	Nilokheri	V	9.39	12.29	36.83	22.84	53.88	64.87	Man.Ct.,Oth	Ct;Oth.
42.	Pundri	V	54.69	56.14	14.23	12.48	71.08	31.39	2 Ag	2 Ag

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
43.	Sadawa	V	22.85	31.28	26.58	18.48	49.57	50.21	Hi	Hi, 2oth
44.	Sohna	V	22.87	17.23	25.00	21.83	52.13	60.94	Div	Div
45.	Ganaur	V	-	15.16	-	24.21	-	55.62	-	Div
46.	Ferozepur	V	31.84	30.61	21.24	18.51	66.92	50.87	MQLE	3 Lf
47.	T.W.R.C.	V	-	0.05	-	3.62	-	96.32	-	3 TSC
48.	Tulana	V	46.50	33.85	17.96	17.76	35.54	48.40	Ag, Hi	Div.
49.	N. Garh	V	-	22.14	-	16.84	-	61.02	-	2 Hi, Oh
50.	Radaur	V	19.53	26.17	33.50	23.08	46.97	50.04	3 Hi	Div.
51.	Bawal	V	51.48	45.99	13.66	15.53	34.68	38.49	3 Ag.	Ag, Hi
52.	Kalanwali	V	4.68	45.97	22.22	24.19	73.10	69.84	TC	2 Hi, TC
53.	Uchana	V	39.00	37.56	18.93	14.25	42.07	48.19	Ag.Hi	Ag.
54.	Pataudi	V	23.17	46.29	17.97	11.11	58.46	42.61	Oth.	Ag.
55.	Uklanmandi	V	2.64	12.57	18.32	16.46	79.04	70.97	2TC	2TC
56.	Kanina	V	53.24	54.82	10.36	8.17	36.40	37.01	2 Ag.	Ag. Mg.
57.	Loharu	V	47.93	42.33	11.53	10.92	40.54	46.77	2 Ag.	Div.
58.	Farukh Nagar	V	26.29	33.46	29.40	20.17	44.71	46.37	3Hi	Ag, Hi
59.	Chachrauli	V	14.83	17.20	28.14	21.56	57.03	61.25	3 Ag	Lf.
60.	Tosham	V	-	34.78	-	19.81	-	45.41	-	Ag, CT
61.	Nuh	VI	19.34	16.43	22.45	16.15	58.21	68.43	Hi	Hi
62.	Buria	VI	31.79	20.32	28.67	21.99	39.54	57.68	3MSLf	Oth
63.	Jakhalmadi	VI	4.93	7.30	18.58	14.50	76.49	78.21	2TC	3TC
64.	Hailymandi	VI	4.06	5.64	25.45	21.43	70.49	72.93	2 CT	Hi, 2TC
65.	Ateli	VI	1.40	3.26	26.15	19.09	72.45	77.66	2 Hi, TC	2MQ, 2Hi, 2TC

Index

Ag	=	Agriculture	2	=	Moderate Specialization
Lf	=	Livestock, Forestry, fishing etc.	3	=	High Specialization
MQ	=	Mining and Quarrying			
Hi	=	Household Industry			
Man	=	Manufacturing other than household			
Ct	=	Construction.			
TC	=	Trade and Commerce			
TSC	=	Transport Storage and Communication			
Oth	=	Other Services			
Div	=	Diversified			

APPENDIX TABLE : IX

HARYANA

LAND USE PATTERN, INTENSITY OF CROPPING, IRRIGATION AND RAINFALL

Year	1 Total area accor- ding to vi- llage Record Papers (Th. Hec.)	2 Land under forests	3 Land put to non-agri- cultural uses	Percentage of area to total area of the state						9 Total (6+7+8)
				4 Barren and uncul- tivated land	5 Total of 3+4	6 Perma- nent Pastures and other grazing lands.	7. Land under Misc. trees and groves	8 Cultu- ral Waste		
1960-61	4389	1.46	-	-	11.76	-	-	-	5.06	
61-62	4392	1.48	-	-	9.63	-	-	-	6.38	
62-63	4396	1.46	-	-	9.62	-	-	-	5.78	
63-64	4400	1.43	-	-	9.89	-	-	-	5.00	
64-65	4399	1.84	-	-	9.87	-	-	-	4.61	
65-66	4399	1.95	-	-	11.05	-	-	-	3.30	
66-67	4399	2.07	5.84	5.27	11.12	1.05	0.09	1.98	3.11	
67-68	4399	2.11	5.68	5.18	10.87	1.11	0.09	1.93	3.14	
68-69	4399	2.09	6.27	4.68	10.96	1.30	0.11	1.36	2.77	
69-70	4402	2.20	6.11	4.98	11.09	1.29	0.09	1.07	2.45	
70-71	4402	2.25	7.02	4.11	11.13	1.23	0.07	0.93	2.23	
71-72	4402	2.50	6.68	4.23	10.90	1.07	0.05	0.84	1.95	
72-73	4404	2.66	6.93	4.02	10.95	1.04	0.05	0.77	1.86	
73-74	4404	2.70	7.40	3.11	10.51	0.84	0.05	1.36	2.25	
74-75	4404	2.43	8.13	2.70	10.83	1.00	(a)	0.93	1.93	
75-76	4404	2.36	8.49	2.25	10.74	1.00	(a)	0.77	1.77	

- = Data not available
(a) = less than 500 hectares
GIA = Gross Irrigated Area
GCA = Gross Cropped Area.
NSA = Net Sown Area

Year	1960 - 61		to		1975 -76		16 Rainfall (cms.)
	10 Fellow land other than current fallow	11 Current fallow	12 Total 10+11	13 Net Area sown	14 Intensity Index (G.C.A.x100) N.S.A.	15 Percentage of G.I.A. To G.C.A.	
1960-61	-	-	4.26	77.47	134.79	26.29	82
61-62	-	-	4.39	78.12	131.16	28.08	75
62-63	-	-	4.03	79.12	132.66	29.41	85
63-64	-	-	4.50	79.18	127.93	32.08	73
64-65	-	-	4.36	79.31	131.18	31.13	86
65-66	-	-	7.66	76.04	121.85	36.38	45
66-67	-	5.89	5.89	77.81	134.36	37.74	54
67-68	-	4.00	4.00	79.88	146.56	34.56	80
68-69	0.002	9.75	9.77	74.40	123.83	45.99	59
69-70	-	3.66	3.66	80.60	139.26	43.67	58
70-71	0.20	3.41	3.41	80.99	139.05	44.98	62
71-72	(a)	3.61	3.61	81.03	141.52	46.03	71
72-73	(a)	3.82	3.82	80.76	145.94	47.74	52
73-74	(a)	3.66	3.66	80.97	144.42	50.17	54
74-75	-	4.90	4.90	79.90	137.60	53.61	42
75-76	-	2.84	2.84	82.29	150.41	50.30	53

APPENDIX TABLE: X

HARYANA

LAND USE PATTERN*, INTENSITY OF CROPPING, IRRIGATION AND RAINFALL
(1969-1972)

Sl. No.	Name of Dist.	Total Area (Th. Hect.)	Forests	Land put to non-ag. uses	Barren and uncultivated land	Total uncultivated land	Permannt Pastures and other grazing land	Land under mis. trees and groves not included in N.A.S.	Cul-turable waste	Total
1.	Hissar	1396	0.62	3.20	5.30	8.50	-	-	0.12	0.12
2.	Rohtak	604	2.37	7.67	1.10	8.77	0.50	-	3.15	3.65
3.	Gurgaon	612	2.78	12.36	3.27	15.63	1.63	-	1.63	1.63
4.	Karnal	803	1.37	5.65	6.64	12.29	2.57	0.25	1.66	4.48
5.	Ambala	374	11.59	14.44	3.66	18.09	1.07	0.53	1.16	2.69
6.	Jind	269	1.36	0.62	8.06	8.71	-	-	0.74	0.74
7.	Mahendragarh	344	1.16	6.69	2.03	8.72	4.36	-	0.39	4.75
	Haryana	-	3.04	7.23	4.29	11.53	1.45	0.12	1.03	2.55

* = Values are in percentage

G.I.A. = Gross Irrigated Area

G.C.A. = Gross Cropped Area

APPENDIX TABLE : X

HARYANA

LAND USE PATTERN*, INTENSITY OF CROPPING, IRRIGATION AND RAINFALL

(1969-72)

Sl. No.	Name of Dist.	Fallow land other than current	Current Fallow	Total	Net Area sown	Intensity Index	% of G.I.A. to G.C.A.	Rainfall (Cms.)
1.	Hissar	-	6.42	6.42	84.34	132.16	49.80	39
2.	Rohtak	-	2.32	2.32	82.34	141.95	40.50	56
3.	Gurgaon	-	2.01	2.01	77.94	135.22	25.42	65
4.	Karnal	-	1.37	1.33	80.61	144.43	70.80	56
5.	Ambala	-	2.59	2.59	64.62	142.75	25.79	115
6.	Jind	-	3.72	3.72	85.50	153.04	62.78	66
7.	Mahendragarh	-	1.26	1.26	84.11	153.11	9.02	51
	Haryana	-	2.81	2.81	79.02	143.23	40.58	64

APPENDIX TABLE: XI

HARYANA

CROPPING PATTERN

PERCENTAGE OF AREA UNDER DIFFERENT CROPS TO GROSS CROPPED AREA

1960-61 TO 1975-76

Year	Rice	Jowar	Bajra	Wheat	Barley	Maize	Sugarcane	Rape and Must.	Cotton	Gram
1960-61	3.38	6.72	17.47	13.70	2.44	2.31	2.83	3.31	2.02	33.66
61-62	3.62	6.75	17.17	14.40	2.00	1.95	3.04	4.35	2.42	31.00
62-63	3.57	6.93	15.45	14.52	1.62	2.40	2.79	5.46	2.55	31.27
63-64	3.54	6.70	15.18	15.45	1.34	2.60	2.55	5.02	3.96	31.81
64-65	4.04	6.33	17.28	15.79	2.20	2.03	3.14	3.36	3.81	28.81
65-66	4.73	6.08	19.13	16.63	2.89	2.15	4.44	3.75	4.80	21.29
66-67	4.17	5.87	19.41	16.15	3.95	1.89	2.63	4.30	5.23	23.09
67-68	4.21	5.69	17.18	16.33	5.86	2.23	2.35	4.78	4.68	22.52
68-69	5.65	5.13	21.56	22.16	4.07	2.17	3.95	1.63	5.23	14.24
69-70	4.87	4.68	18.84	20.59	2.95	2.25	3.43	2.43	3.92	21.94
70-71	5.43	4.18	17.74	22.78	2.19	2.31	3.14	2.62	3.90	21.45
71-72	5.76	3.84	17.47	23.32	1.80	2.26	2.27	3.23	5.78	22.17
72-73	5.62	3.64	17.43	24.49	2.77	2.16	2.42	4.07	4.97	18.69
73-74	5.66	3.61	18.56	22.84	2.99	2.30	2.90	3.28	4.88	19.30
74-75	5.69	3.33	18.98	23.08	4.67	2.56	3.33	4.08	5.09	14.55
75-76	5.57	2.98	18.45	22.49	3.25	2.54	2.88	2.51	4.68	20.29

APPENDIX TABLE XII

HARYANA

RANKING, PERCENTAGE OF AREA UNDER DIFFERENT CROPS AND CROP COMBINATION REGIONS

1969-1972

S.No.	Name of Crops	Hissar		Rohtak		Gurgaon		Karnal		Ambala		Jind		Mahendargarh	
		Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%
1.	Rice	7.	1.18	7	2.08	9	0.34	2	18.83	2	13.05	7	3.01	-	-
2.	Jowar	6	1.87	4.	11.67	4.	6.56	7	1.99	13.	0.20	4	8.10	6	2.05
3.	Bajra	2	21.95	3	15.47	2	21.98	5	4.18	9	1.71	3	19.83	1	42.89
4.	Maize	10	0.26	10	1.01	8	0.81	4	5.58	3	12.12	10	0.74	8	0.07
5.	Wheat	3	13.32	1	27.88	1	23.95	1	37.83	1	28.90	2	21.22	3	4.72
6.	Barley	9	0.88	5	7.55	6	2.25	11	0.28	11	0.75	9	1.31	5	2.82
7.	Gram	1	29.64	2	21.16	3	18.96	3	9.13	4	11.10	1	25.37	2	32.28
8.	Rape and Must.	5	3.56	8	1.56	5	4.82	8	1.80	10	1.16	8	1.79	4	2.96
9.	Sugarcane	8	1.09	6	5.95	7	2.05	6	3.82	5	6.58	6	3.98	7	0.43
10.	Cotton	4	10.66	9	1.50	10	0.28	9	1.48	12	0.61	5	4.40	9	0.05
11.	Mash	12	0.01	12	0.01	12	0.04	12	0.18	8	1.80	12	0.02	-	-
12.	Masar	11	0.08	11	0.46	11	0.21	10	1.25	7	2.69	11	0.82	-	-
13.	G. Nut	12	0.01	-	-	13	0.01	13	0.03	6	3.04	-	-	-	-

Crop Combination Region*

Four Crop Six Crop Five Crop Six Crop Five Crop Six Crop Two Crop (Bi-culture)

Crop combination region**

Five Crop Five Crop Five Crop Five Crop Seven Crop Seven-Crop Two-Crop

* Based on lower limit method ($A = \frac{G}{3N}$)

A = It is the lower limit acreage and all crops having acreage more than A will find place in crop combination.

G = Grossed Cropped Area.

N = Number of crops having acreage more than or equal to $\left(\frac{G}{100}\right)$ 1 percent.

** Based on weaver method

where
$$KJ = \sum_{i=1}^J \frac{(X_i - P_j)^2}{J}$$

Σ = Summation Sign

J = Varies from 1 to N

N = Number of crops having at least one percent acreage.

X_i = is the percentage of ith ranking crop

K = in the following equation affains lowest value determines the crop combination.

178

APPENDIX TABLE: XIII
HARYANA
NUMBER OF INDUSTRIAL UNITS
1971

Sr. No.	Name of Tehsil	I Large and medium scale industries.	II Data not available for large and medium scale industries	III Large & medium scale indst. for study	IV III as percent of Σ III	V. Small scale industries	VI Data not available for small scale indst.	VII Small scale industries for study	VIII VII as percent of Σ VII	IX Large, medium and small scale indst. for study	X IX as percent of Σ IX.
1.	Ambala	2	-	2	1.53	11	-	11	1.90	13	1.82
2.	Jagadhri	8	1	7	5.34	15	-	15	2.59	22	3.10
3.	Narayangarh	-	-	-	-	-	-	-	-	-	-
4.	Kalka	2	-	2	1.53	-	-	-	-	02	0.28
5.	Hissar	2	-	2	1.53	19	1	18	3.27	21	2.96
6.	Bhiwani	4	-	4	3.05	5	-	5	0.86	9	1.26
7.	Sirsa	3	-	3	2.29	1	-	1	0.17	4	0.56
8.	Hansi	-	-	-	-	2	-	2	0.34	2	0.28
9.	Fatehabad	-	-	-	-	4	-	4	0.69	4	0.56
10.	Loharu	-	-	-	-	-	-	-	-	-	-
11.	Dabwali	-	-	-	-	-	-	-	-	-	-
12.	Karnal	3	-	3	2.29	33	1	32	5.53	35	4.93
13.	Thanesar	3	1	2	1.53	23	-	23	3.97	25	3.55
14.	Panipat	5	-	5	3.82	62	3	59	10.18	64	9.00
15.	Guhla	1	-	1	0.76	-	-	-	-	1	0.14
16.	Kaithal	-	-	-	-	22	1	21	3.62	21	2.95
17.	Sonepat	11	-	11	8.39	83	2	81	13.96	92	12.94
18.	Jhajjar	2	-	2	1.53	75	15	60	10.34	62	8.72
19.	Gohana	-	-	-	-	4	-	4	0.69	4	0.56
20.	Rohtak	2	-	2	1.53	47	9	38	6.55	40	5.63
21.	Charkhi Dadri	1	-	1	0.76	1	-	1	0.17	2	0.28
22.	Narnaul	-	-	-	-	1	-	1	0.17	-	-
23.	Mahendragarh	-	-	-	-	-	-	-	-	-	-
24.	Jind	1	-	1	0.76	6	3	3	0.52	4	0.56
25.	Narwana	-	-	-	-	1	-	1	0.17	1	0.14
26.	Safidon	-	-	-	-	-	-	-	-	-	-
27.	Rewari	1	-	1	0.76	5	-	5	0.86	6	0.84
28.	Ballabgarh	81	1	80	61.07	165	29	136	23.45	216	30.38
29.	Gurgaon	2	-	2	1.53	59	5	54	9.31	56	7.88
30.	Nuh	-	-	-	-	1	-	1	0.17	1	0.14
31.	Ferozpur Jhirka	-	-	-	-	-	-	-	-	-	-
32.	Palwal	-	-	-	-	3	-	3	0.52	3	0.42
Total		134	3	131	100.00	649	69	580	100.00	711	100.00

APPENDIX TABLE XIV

HARYANA

(Employment = Number of Persons)

EMPLOYMENT IN INDUSTRIES

1971

- 179 -

S.No.	Name of Tehsil	I Employment in large and medium scale industries.	II I as percent of Σ I	III Employ- ment in small scale indus- tries	IV III as percent of Σ III	V Total employ- ment in indus- tries	VI V as percent of Σ V.
1.	Ambala	565	0.87	457	2.08	1022	1.17
2.	Jagadhri	7643	11.70	1097	5.00	8740	10.02
3.	Naryangarh	-	-	-	-	-	-
4.	Kalka	2659	4.07	-	-	2659	3.05
5.	Hissar	3557	5.45	574	2.61	4131	4.73
6.	Bhiwani	4496	6.88	69	0.31	4565	5.23
7.	Sirsa	1051	1.61	17	0.08	1068	1.22
8.	Hansi	-	-	22	0.10	22	0.03
9.	Fatehbad	-	-	301	1.37	301	0.34
10.	Loharu	-	-	-	-	-	-
11.	Dabwali	-	-	-	-	-	-
12.	Karnal	745	1.14	1235	5.62	1980	2.27
13.	Thanesar	55	0.08	26	0.12	81	0.09
14.	Panipat	1270	1.94	2159	9.83	3429	3.93
15.	Guhla	60	0.09	-	-	60	0.07
16.	Kaithal	-	-	771	3.51	771	0.88
17.	Sonepat	5964	9.13	3000	13.66	8964	10.27
18.	Jhajjar	1475	2.26	1391	6.33	2866	3.28
19.	Gohana	-	-	136	0.62	136	0.16
20.	Rohtak	1609	2.46	1068	4.86	2677	3.07
21.	Charkhi Dadri	942	1.44	7	0.03	949	1.09
22.	Narnaul	-	-	35	0.16	35	0.04
23.	Mahendragarh	-	-	-	-	-	-
24.	Jind	224	0.34	43	0.20	267	0.31
25.	Narwana	-	-	70	0.32	70	0.08
26.	Sofidon	-	-	-	-	-	-
27.	Rewari	267	0.41	83	0.38	350	0.40
28.	Ballabgarh	31826	48.73	7196	32.77	39022	44.71
29.	Gurgaon	900	1.38	2164	9.85	3064	3.51
30.	Nuh	-	-	5	0.02	5	0.01
31.	Ferozpur Jhirka	-	-	-	-	-	-
32.	Palwal	-	-	35	0.16	35	0.04
Total:		65308	100.00	21961	100.00	87269	100.00

APPENDIX TABLE XV
HARYANA
PRODUCTION OF INDUSTRIES
 1971
 (Production in lakh Rs.
 per annum)

Sl. No.	Name of Tehsil	I Production of large & medium scale industries	II I as percent of $\sum I$	III Production of small scale industries.	IV III as percent of $\sum III$	V Total Industrial Production.	VI V as percent of $\sum V$.
1.	Ambala	205.80	0.84	86.50	1.56	292.30	0.97
2.	Jagadhri	3748.75	15.30	178.09	3.22	3926.84	13.07
3.	Naryangarh	-	-	-	-	-	-
4.	Kalka	1093.13	4.46	-	-	1093.13	3.64
5.	Hissar	161.60	0.66	183.82	3.32	345.42	1.15
6.	Bhiwani	1051.28	4.29	47.00	0.85	1098.28	3.66
7.	Sirsa	149.52	0.61	0.30	0.01	149.82	0.50
8.	Hansi	-	-	3.18	0.06	3.18	0.51
9.	Fatehbad	-	-	419.03	7.57	419.03	1.39
10.	Loharu	-	-	-	-	-	-
11.	Dabwali	-	-	-	-	-	-
12.	Karnal	133.52	0.54	270.93	4.89	404.45	1.35
13.	Thanesar	8.10	0.03	181.99	3.29	190.09	0.63
14.	Panipat	253.88	1.04	515.13	9.31	769.01	2.56
15.	Guhla	55.22	0.23	-	-	55.22	0.18
16.	Kaithal	-	-	30.98	0.56	30.98	0.10
17.	Sonepat	2304.51	9.40	688.55	12.44	2993.06	9.96
18.	Jhajjar	328.44	1.34	381.46	6.89	709.90	2.37
19.	Gohana	-	-	18.90	0.34	18.90	0.06
20.	Rohtak	408.55	1.67	256.64	4.64	665.19	2.22
21.	Charkhi Dadri	344.79	1.41	1.30	0.02	346.09	1.15
22.	Narnaul	-	-	9.00	0.16	9.00	0.03
23.	Mahendragarh	-	-	-	-	-	-
24.	Jind	29.79	0.12	4.50	0.08	34.29	0.11
25.	Narwana	-	-	9.00	0.16	9.00	0.03
26.	Safidon	-	-	-	-	-	-
27.	Rewari	50.00	0.20	13.79	0.25	63.79	0.21
28.	Ballabgarh	14027.43	53.23	1760.38	31.80	15787.81	52.55
29.	Gurgaon	154.00	0.63	462.14	8.35	616.14	2.05
30.	Nuh	-	-	1.33	0.02	1.33	0.004
31.	Ferozpur Jhirka	-	-	-	-	-	-
32.	Palwal	-	-	11.88	0.21	11.88	0.04
Total:		24508.31	100.00	5535.82	100.00	30044.13	100.00

APPENDIX TABLE XVI

HARYANA

Distribution of Small Scale Industries (Investment more than
a Rs. lakh) by their size of Production (In terms of Rs. in lakhs)

S.No.	Name of Tehsil	1971							Total
		< 0.50	0.50 -0.99	1.00 -1.99	2.00 -4.99	5.00 -9.99	10.00 -20.00	> 20	
1.	Ambala	-	-	-	5	4	1	1	11
2.	Jagadhri	-	-	1	1	6	6	1	15
3.	Naryangarh	-	-	-	-	-	-	-	-
4.	Kalka	-	-	-	-	-	-	-	-
5.	Hissar	1	2	2	6	4	2	2	19
6.	Bhiwani	-	-	-	2	2	-	1	5
7.	Sirsa	1	-	-	-	-	-	-	1
8.	Hansi	-	1	-	1	-	-	-	2
9.	Fatehbad	1	-	-	-	-	-	3	4
10.	Loharu	-	-	-	-	-	-	-	-
11.	Dabwali	-	-	-	-	-	-	-	-
12.	Karnal	-	4	8	6	6	5	3	32
13.	Thanesar	-	-	4	4	7	8	-	23
14.	Panipat	1	2	13	22	12	5	4	59
15.	Guhla	-	-	-	-	-	-	-	-
16.	Kaithal	-	7	10	4	-	-	-	21
17.	Sonepat	4	4	16	22	14	11	10	81
18.	Jhajjar	2	6	10	18	11	10	3	60
19.	Gohana	-	-	4	2	-	1	-	4
20.	Rohtak	3	3	8	11	7	3	3	38
21.	Charkhi Dadri	-	-	1	-	-	-	-	1
22.	Narnaul	-	-	-	-	1	-	-	1
23.	Mahendragarh	-	-	-	-	-	-	-	-
24.	Jind	-	-	2	4	-	-	-	3
25.	Narwana	-	-	-	-	1	-	-	1
26.	Safidon	-	-	-	-	-	-	-	-
27.	Rewari	-	1	1	2	1	-	-	5
28.	Ballabgarh	3	2	11	30	32	36	22	136
29.	Gurgaon	-	2	8	15	19	7	3	54
30.	Nuh	-	-	1	-	-	-	-	1
31.	Ferozpur Jhirka	-	-	-	-	-	-	-	-
32.	Palwal	-	-	-	2	1	-	-	3
Total		16	34	97	154	128	95	56	580

APPENDIX TABLE XVII

HARYANA

Distribution of Small Scale Industries (Investment more than Rs. lakh)
by their size of Employment (Number of Persons)

- 182 -

1971

S.No.	Name of Tehsil	< 5	5-9	10-19	20-40	50-99	100-200	> 200	Total
1.	Ambala	-	-	2	7	1	1	-	11
2.	Jagadhri	-	1	-	6	4	3	1	15
3.	Naryangarh	-	-	-	-	-	-	-	-
4.	Kalka	-	-	-	-	-	-	-	-
5.	Hissar	-	1	6	9	3	-	-	19
6.	Bhiwani	-	2	2	1	-	-	-	5
7.	Sirsa	-	-	1	-	-	-	-	1
8.	Hansi	-	-	1	1	-	-	-	2
9.	Fatehbad	-	1	-	-	3	-	-	4
10.	Loharu	-	-	-	-	-	-	-	-
11.	Dabwali	-	-	-	-	-	-	-	-
12.	Karnal	1	13	9	3	5	-	1	32
13.	Thanesar	-	4	5	11	3	-	-	23
14.	Panipat	1	8	17	24	5	2	2	59
15.	Guhla	-	-	-	-	-	-	-	-
16.	Kaithal	-	-	4	12	5	-	-	21
17.	Sonepat	3	23	15	23	11	4	2	81
18.	Jhajjar	-	12	26	17	5	-	-	60
19.	Gohana	-	1	-	1	2	-	-	4
20.	Rohtak	2	15	5	13	1	1	1	38
21.	Charkhi Dadri	-	1	-	-	-	-	-	1
22.	Naruanul	-	-	-	1	-	-	-	1
23.	Mahendragarh	-	-	-	-	-	-	-	-
24.	Jind	-	1	1	1	-	-	-	3
25.	Narwana	-	-	-	-	1	-	-	1
26.	Safidon	-	-	-	-	-	-	-	-
27.	Rewari	-	4	-	-	1	-	-	5
28.	Ballabgarh	-	5	28	45	44	11	3	136
29.	Gurgaon	1	13	9	20	8	2	1	54
30.	Nuh	-	1	-	-	-	-	-	1
31.	Ferozpur Jhirka	-	-	-	-	-	-	-	-
32.	Palwal	-	-	3	-	-	-	-	3
Total:		8	106	134	195	102	24	11	580

APPENDIX TABLE: XVIII
HARYANA.

Distribution of large and medium scale industries by their size of
Production (Production in lakh Rs.
per annum)

- 183 -

Sl. No.	Name of Tehsil	1971					Total	
		< 50	50-99	100-199	200-499	500-1000		> 1000
1.	Ambala	1	-	1	-	-	-	2
2.	Jagadhri	2	2	-	1	1	2	8
3.	Naryangarh	-	-	-	-	-	-	-
4.	Kalka	-	-	-	1	1	-	2
5.	Hissar	-	-	1	-	1	-	2
6.	Bhiwani	-	1	1	1	1	-	4
7.	Sirsa	1	2	-	-	-	-	3
8.	Hansi	-	-	-	-	-	-	-
9.	Fatehbad	-	-	-	-	-	-	-
10.	Loharu	-	-	-	-	-	-	-
11.	Dabwali	-	-	-	-	-	-	-
12.	Karnal	2	-	-	-	-	-	3
13.	Thanesar	2	-	-	-	-	-	2
14.	Panipat	4	-	-	1	-	-	5
15.	Guhla	-	1	-	-	-	-	1
16.	Kaithal	-	-	-	-	-	-	-
17.	Sonepat	5	2	1	1	2	-	11
18.	Jhajjar	-	-	1	1	-	-	2
19.	Gohana	-	-	-	-	-	-	-
20.	Rohtak	-	-	1	1	-	-	2
21.	Charkhi Dadri	-	-	-	1	-	-	1
22.	Narnaul	-	-	-	-	-	-	-
23.	Mahendragarh	-	-	-	-	-	-	-
24.	Jind	-	-	-	-	-	-	1
25.	Narwana	-	-	-	-	-	-	-
26.	Safidon	-	-	-	-	-	-	-
27.	Rewari	-	1	-	-	-	-	1
28.	Ballabgarh	32	17	13	15	2	1	80
29.	Gurgaon	1	-	1	-	-	-	2
30.	Nuh	-	-	-	-	-	-	-
31.	Ferozpur Jhirkha	-	-	-	-	-	-	-
32.	Palwal	-	-	-	-	-	-	-
Total:		51	26	20	23	9	3	132

APPENDIX TABLE XIX

HARYANA

Distribution of large and medium scale industries by their
size of Employment (Number of Persons)
1971

- 184 -

Sl.No.	Name of Tehsil	<100	100-199	200-499	500-999	1000-2000	>2000	Total
1.	Ambala	-	1	1	-	-	-	2
2.	Jagadhri	1	1	2	1	2	1	8
3.	Narayangarh	-	-	-	-	-	-	-
4.	Kalka	-	-	-	-	1	1	2
5.	Hissar	-	-	1	-	-	1	2
6.	Bhiwani	-	1	1	-	1	1	4
7.	Sirsa	2	-	-	1	-	-	3
8.	Hansi	-	-	-	-	-	-	-
9.	Fatehbad	-	-	-	-	-	-	-
10.	Loharu	-	-	-	-	-	-	-
11.	Dabwali	-	-	-	-	-	-	-
12.	Karnal	2	-	-	1	-	-	3
13.	Thanesar	2	-	-	-	-	-	2
14.	Panipat	3	1	-	1	-	-	5
15.	Guhla	1	-	-	-	-	-	1
16.	Kaithal	-	-	-	-	-	-	-
17.	Sonepat	3	3	3	-	1	1	11
18.	Jhajjar	-	-	-	2	-	-	2
19.	Gohana	-	-	-	-	-	-	-
20.	Rohtak	-	-	-	1	1	-	2
21.	Charkhi Dadri	-	-	-	1	-	-	1
22.	Narnaul	-	-	-	-	-	-	-
23.	Mahendragarh	-	-	-	-	-	-	-
24.	Jind	-	-	1	-	-	-	1
25.	Narwana	-	-	-	-	-	-	-
26.	Safidon	-	-	-	-	-	-	-
27.	Rewari	-	-	1	-	-	-	1
28.	Ballabgarh	14	26	16	15	8	1	80
29.	Gurgaon	-	1	-	1	-	-	2
30.	Nuh	-	-	-	-	-	-	-
31.	Ferozpur Jhirka	-	-	-	-	-	-	-
32.	Palwal	-	-	-	-	-	-	-
Total		28	34	26	24	14	6	132

• BIBLIOGRAPHY

BIBLIOGRAPHY

1. Abul Fazal, Ain-i-Akbari, Translated by H.S. Jarret, vol.II, Calcutta, 1872.
2. Aslam Mahmood, Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi p. 167.
3. Barrey, R.G. and Chorley, R.J., Atmosphere, Weather and Climate, The English Language Book Society and Methun and Co.Ltd., 1972, pp. 347.
4. Behl, R.K., "Influence of Irrigation on Cropping Pattern in Haryana", The Geographical Teacher, vol. viii, 1973, pp. 232-239.
5. Bhattacharya, Anina, "Region-Regionalism - Regionalization", Indian Geographical Review, vol.36, 1974, pp. 131-154.
6. Dubey, R.N., and Negi, B.S., Economic Geography of India, 1968, pp. 680-687.
7. Duggal, S.L. and Malik, "A Classification of Agricultural Markets in Haryana" Geographical Observer, vol.10, 1974, pp.73-78
8. Gupta, S.L., "Faridabad: A Study in Industrial Growth", The Indian Geographical Journal, vol.42, 1967, pp. 22-28.
9. Hagget, Peter, Locational Analyses in Human Geography, Edward Arnold, 1971, pp. 87-92 and 231-33.
10. Haryana District Gazetteers Karnal, Haryana Gazetteers Organization, Revenue Department, Chandigarh, 1970, p. 645.
11. Haryana District Gazetteers, Rohtak, Haryana Gazetteers Organization, Revenue Department, Chandigarh, 1970, p. 473.
12. Malik, Arjan Dass, "The ^{ETHNOLOGY} Ethnology of the World Haryana", Haryana Review, vol.VIII, No.10, 1974, pp. 18.
13. Mann, R.S., "Rural Settlement Size in Hansi", The Deccan Geographer, vol.xii, 1974, pp.27-38.

14. Mukherji, A.B., "Spacing of villages in Upper Ganga-Yamuna Doab", Geographical Review of India, vol.36, 1974, pp. 155.
15. Muni Lal, Haryana on High Road of Prosperity, Vikas Publishing House, 1974, p. 144.
16. Nangia, S., Delhi Metropolitan Region. A Study in Settlement Geography, K.B. Publication, New Delhi, pp. 67-79.
17. Nelson, H.J., "A Service Classification of American Cities", Economic Geography, New Delhi, 1976, pp. 67-69.
18. Sharma, S.C., "The Description of Rivers in Rigved", The Geographical Observer, vol.x, 1974, pp. 79-86.
19. Singh Jasbir, An Agricultural Geography of Haryana, Vishal Publication, 1970, pp. 80.
20. _____, "Irrigation Facilities in Haryana, The Geog. Review of India, vol.xxxvi, 1974, pp. 102-113.
21. _____, "Regionalism in the Cropping Pattern and the Changing Cropping Pattern", Geographical Outlook, vol. i, 1970, p. 21-29.
22. _____, "Spatio-Temporal Developments in Land Use Efficiency in Haryana" by Assessment Circles, 1951-56 to 1961-66). Geographical Review of India, vol.34|1972 pp. 314-26.
23. _____, "Seasonality Regionalism in the Agricultural Meteorology of Hissar District," Haryana, Geographical Review of India, vol.33, 1971, pp. 147-174
24. _____, "Regional Imbalances and Temporal Developments in Irrigation Facilities in Haryana," Geographical Review of India, vol.36, 1974, pp. 102-113.

25. Singh, Jasbir, "Land Use Efficiency in Haryana", Geographical Review of India, vol.xxxiv, 1972, pp. 314-27.
26. Singh, P.R., "A Comparative analysis of the growth and functional characteristics of towns of Ganga-Yamuna Doab", The Indian Geographical Journal, vol.xiv, January, 1970.
27. Singh, R.L., India-A Regional Geography, National Geographical Society of India, Varanasi-5, 1971, pp.83-123.
28. Spate, O.H.K. and Learmouth, India and Pakistan, Methuen and Co. Ltd., II, New Fatter Lane, London, 1967, pp. 534-541.
29. Techno-Economic Survey of Haryana, National Council of Applied Economic Research, 1970.
30. Thani, Y.R., Haryana, Raj Pal and Sons, Delhi, 1970, p.116.
31. The Punjab Notes and Queries, No.547, vol.I, p.67.
32. Wadia, D.N., Geology of India, London, C.I.B.S. and Mac Millan, 1970.
33. Yadav, K.C., Haryana - The Land and the People, Glimpses of Haryana ed. by Budha Prakash, Kurukshetra, 1967, pp.2, p. 17a.

CENSUS REPORTS

1. Census of India, 1971, Series VI, Haryana, Part VIA, Town Directory, Haryana.
2. Census of India, 1971, Series VI, Haryana, Part II-A, General Population Tables.
3. Census of India, 1961, Vol.xiii, Punjab, Part IIB(i) General Economic Tables.