POPULATION AND HUMAN SETTLEMENT CHARACTERISTICS OF POTOHAR REGION OF PUNJAB (PAKISTAN)

BY

NAJAF ALI

M.A., M.Sc., M.Phil (Pb. & NWFP)

DEPARTMENT OF GEOGRAPHY
URBAN AND REGIONAL PLANNING
UNIVERSITY OF PESHAWAR, PESHAWAR,
NWFP, PAKISTAN
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TO MY TEACHERS, PARENTS AND FAMILY

The annual average growth rate of the urban population of Potohar (4.3 percent) was slightly higher than that of the Punjab Province-of which it is a part, and equaled that of Pakistan (4.3 percent), as a whole, during 1951-98.
During all the ten censuses from 1901 to 1998, Rawalpindi district was the most urbanised area in the Potohar region followed by Islamabad, Wah, and Jhelum distracts.
The distribution pattern of urban localities in Potohar according to rank size rule is primate. Rawalpindi is the primate city which has shown a disproportional rate of urban growth during the last five decades. In 1998 this city accounted for 47.3 percent of Potohar's total urban population.
The distribution pattern in districts deviates from the regional pattern. The urban localities in the districts are located some what close to each other. It is projected that the number of large cities in Potohar will increase from four in 1998 to nine in 2011. The new entrants will be Chakwal, Attock, Gujar Khan, Dina, and Taxila.

Human Settlement
Density analysis indicates an uneven distribution of settlement in the region. Large variation was found in this respect in different parts of the region. In each region, sub-division, tehsil, and each size category, nearest neighbour analysis and Poisson distribution analysis indicated moderately clustered pattern of distribution. Poisson distribution also indicated a multi-clustered distribution of human settlement. Land form, hydrology, land use, and population density were found particularly more influential in determining distribution pattern, while the role of elevation, climate, history, nearness to major settlement, and are not very prominent. Transportation net work has practically no influence on the settlement distribution in the region.
Human settlement are not created by any single favourable factor. A combination of several factors creates these. As the areas in which favourble factors have assembled together are fund in a moderately clustered pattern, the distribution pattern of human settlement produced by these factors is also found moderately clustered.
The spatial structure of the Potohar region studied in terms of population, settlement and gradient density, and intensity of cultivated land from the focal point of Rawalpindi city indicates that the population density is the highest -13350 persons per km^2 in Rawalpindi and gradually declines with distance from the urban centre. The human settlement density and the intensity of cultivated land also decline with the distance from the city of Rawalpindi. This indicates a spatial relationship between population density, human settlement density and intensity of cultivated land around the Rawalpindi city. The correlation between these variables suggests that there is close relationship between them. The test of significance for these variables also shows strong affinity between human settlement density, gradient density and intensity of cultivated land around the Rawalpindi city.

Conclusions
In the light of the afore stated and other relevant findings the following conclusions are reached with respect to the study's hypotheses:

Hypothsis 1, that ... '*obtaining pattern of distribution, largely uneven, of population in Pothohar region is attributable to a host factors*-geographical, historical, demographic,

Population and Human Settlement characteristics of Potohar region of Punjab (Pakistan)

By
Najaf Ali Ph.D Scholar
Department of Geography, Urban & Regional Planning,
University of Peshawar.

Abstract

This study inquires into growth trend, distribution patterns, and characteristics of human population and settlements in the Potohar region of the Punjab Province Pakistan. The study attempts to explore and analyse the path taken by the human population and human settlement in the study area in the past-especially in post-1881 period, the determinants of their growth and distribution patterns, and the prospective scenario in these respects in the near future, and their implications for urban planning, human settlement, and overall development policy.

The study's hypotheses were:

- The obtaining pattern of distribution-largely, uneven, of population in Potohar Region is attributable to a host of factors—geographic, historical, cultural, environmental and socio-economic, among which the economic factor is the most important one.
- The location pattern of human settlement is primarily determined by geographical factor and governmental policy intervention.
- The urban centers have grown primarily by pull factors, reinforced by pro- urban biased governmental policies in the material provision of social services and economic infrastructure.

Population density/ growth

Potohar's rural population, which is 60 percent of its total population, is distributed over as many as 2798 villages, most of which are small, are widely scattered all over the region, and many of these are not accessible by vehicles. The urban population, accounting for 40 percent of the total in 1998 census, lives in 31 urban centers, and this population, too, is unevenly distributed. The major urban centers are the twin cities of Rawalpindi-Islamabad which accounted for 26 percent of the region's population recorded in the 1998 Census. Population density of the Potohar region is 322 persons per km^2 (1998). The corresponding figures for Punjab Province and Pakistan are 359 and 166 respectively. The district-wise density varies widely-Attock 186, Chakwal 166, Islamabad 889, Jhelum 261, Rawalpindi 636. During 1901-1998 the overall population of the region increased by 390 percent; the rural 225 percent, and the urban as much as 1940 percent (or almost 20 time). At the start of the last Century, in 1901, the region's total population was 1.52 million with only 0.14 million urban, while in 1998 the corresponding figures were 7.46 million and 2.98 million respectively.

Urbanisation

The number of urban centers as well as the level of urbanity registered gradual increase in the Potohar region throughout the post 1881 Census period. In 1881 there were only eight urban centers in the region, while in 1998 the number was 31.The urbanity level in 1901 was 9.6 percent, and the corresponding figure in 1998 was 40 percent.

and *socio-economic, among which the economic factor is the most important one'*. is not found categorically valid. Or, alternatively put, it is valid but subject to the qualification that these factors operate in group, interact on each other and none of these is strong enough to all alone determine or amend the distribution pattern of human settlement. Therefore, the universality of dominant role of economic factors is discounted by the study's findings, which suggest that economic factor itself is reinforced or shaped by other factors incorporated in the hypothesis. This implies that for formulation of regional development policies and plans all the afore-stated factors should be considered and incorporated in the planning decisions, as there is no fit –all situations set of criteria for development policy formulation.

Hypothesis II *'The location pattern of* human *settlement is primarily determined by geographic factors and governmental policy intervention'* need to be re-phrased as in its present form it cannot be clearly confirmed or rejected. One part of it relates to geographic /natural factor and one to governmental policy intervention. The two need be considered separately. In so far as the geographic/natural factor's role as primary determinant of location of human settlement is concerned, that is found valid by the present study. But that is subject to the set of reservations set out in the context of hypothesis 1.That is, this factor is an important one ,or even the most important in certain situations, but it is not the only determinant of location of human settlement.

Hypothesis 111 that ''*The urban centers have grown primarily by pull factors operating in the urban area reinforced by conscious governmental policies with pro-urban bias*'' is found valid in the light of findings of this study. While there has been a growing tendency for the social services and economic infrastructure to concentrate in and around urban localities-especially in the district headquarter towns –among which the twin cities of Rawalpindi-Islamabad, Wah, and Jhelum are prominent ones. The widely scattered rural habitats are faced with rapidly growing population, scarcity of or near absence of social services, and sluggish economy, which have been instrumental in pushing the people out of the rural areas. The pull factors operating in the urban areas are on the other hand getting stronger and stronger to attract rural urban migration from within Potohar and also from other places outside the region. The trend is expected to continue unabated resulting in rapid rise in urbanity level in the Potohar region.

Recommendations

The essence of findings and conclusions of this study is that it is highly imperative to infuse order and rationality in the matter of establishment and growth of human settlement-especially the urban ones. The haphazard and rapid urban sprawl, as is the case presently, has to be checked to control the fast emerging problems in urban areas, such as pollution, slums, deterioration in social services, etc. The urban as well as rural areas, both have to be made fit for human habitation, pollution free, and well provided with civic and other services. To achieve these goals the present study recommends adoption of regional planning approach in true letters and spirit, wider distribution of economic infrastructure, a fair provision of social services based on the principles of social justice and equity all over the region and a wider distribution of urban population – instead of its concentration in a few cities for long term sustainable development.

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ABBREVIATION

AB	-	Agriculture Bank
AK/NA	-	Azad Kashmir/Northern Area
BHU	-	Basic Health Unit
CB	-	Commercial Bank
CBR	-	Crude Birth Rate
CDA	-	Capital Development Authority
CIC	-	Cargayan-dero-iligan Corridor
C.M.H.	-	Combined Military Hospital
CNG	-	Compressed Natural Gas
DCRs	-	District Census Reports
DCO	-	District Coordination Officer
DDO	-	Deputy District Officer (Revenue)
ENE	-	East-North East
FCTI	-	Federal Capital Territory Islamabad
F-Test	-	Significant Correlation, F Calculated values for correlation between population, density gradient of calculated land ratio.
GBHPP	-	Ghazi Brotha Hydal Power Project
GDP	-	Gross Domestic Product
GHQ	-	General Headquarters
GOP	-	Government of Pakistan
GSP	-	Geology survey of Pakistan
G.T.ROAD	-	Grand Trank Road
Hd	-	Distance (Hd) between the urban centres
HED	-	Housing, Economic & Development
HQ	-	Head quarters
IRR	-	Index of Relative Representation
IUDs	-	Intra Uterine Device
MH	-	Military Hospital

ABBREVIATION

MNA	-	Member of National Assembly
MPA	-	Member of Provincial Assembly
M-2	-	Motor Way
NGO	-	Non Governmental Organisation
NHSP	-	National human Settlement Policy
NHA	-	National Highway Authority
NIPS	-	National Institute of Population Studies
NRB	-	National Reconstruction Bureau
Nth	-	Numbers (in Human Settlement)
NWFP	-	North Western Frontier Province
OGDC	-	Oil and Gas Development Corporation
PAF	-	Pakistan Air Force
PCRs	-	Provincial Census Reports
PGR	-	Pakistan Geographical Review
PGS	-	Population Growth Survey
PRSP	-	Poverty Reduction Social Programme
PTDC	-	Pakistan Tourism Development Corporation
PWD	-	Public Works Department
RHC	-	Rural Health Centre
TFR	-	Total Fertility Rate
TWI	-	Total Weight Index
UNESCO	-	United Nation Educational Scientific and Cultural Organisation
UNISEF	-	United Nation International Scientific Education Fund
UN	-	United Nation
VH	-	Veterinary Hospital
WASA	-	Water and Sanitation Authorities
WSW	-	West South West
WS	-	Water Supply

CHAPTER ONE

INTRODUCTION

1.1 OUTSET

The study of determinants and implications of growth and distributions patterns of human population and human settlement is emerging fast as an important field of study all over the world (Zelinsky Weliber, 1962). This subject is now a full-fledged area of studies falling in the domain of population geography and urban/regional planning. What determines the locational pattern of settlement, the distribution of population over the urbanity level, inter-settlement (rural-urban) flow of population, and what socio-economic and political implication are carried by the changing pace and pattern of population and *mauzas*/human settlement? These and other related questions have always attracted interest and inquisitiveness in the past (NIPS, 2001) but not as widely and intensely as during the past five to six decades in the developed as well as the developing countries (Nasreen Abbasi, 1987).

This field of study is growing governing recognition as well as importance in Pakistan. The regions now constituting Pakistan have registered not only a rapid growth in human population during the past hundred years, especially in the post 1950 era, but have also experienced a perceptible change in its rural-urban distribution (Nasreen Abbasi, 1987). The magnitude of change and the associated problems can be gauged by the fact that during 1901-1998 the total population increased by 4.0 percent annually, the corresponding figure for 1951-1998 being 4.8 percent (Population Census Organisation, 1901-98). The urbanity level in 1998 was 39.9 percent as compared with just 9.6 percent in 1901 and 17.7 percent in 1951 (Population Census Organisation, 1951, 1961-98). Such a massive growth in urban population, as also in overall-plus urban rural is unprecedented in the regions comprising Pakistan.

The urban population growth in Pakistan is brought in sharper focus by the growth in the number of urban centres. In 1901, their number was 112, which rose to 230 in 1951, and 515 in 1998 (Population Census Organisation, 1951-98). In 1998 the country had 56 urban centres with population exceeding one million persons as compared with the corresponding figure of 1 in the year 1901 and 9 in 1951 (Population Census Organisation, 1951-98).

The region total population increased 1.0 percent during 1901-51 (Census of India 1941) and 4.8 percent during 1951-98 (Population Census Organisation 1951-98). The urbanity level was 9.6 percent in 1901, 17.7 percent in 1951 and 39.9 percent in 1998, Potohar region had only 11 urban centres in 1901 while the urban centres 31 in 1998 census. In 1998, 4 urban centres with the population of over 1 million persons while the corresponding figures 11 in 1901 and 17 in 1951 respectively.

Thus, on the whole the Potohar regions population and *mauzas*/human settlement profiles underwent a marked change during the 20th century especially in its second half. In several respects, the changes have been more profound and visible than at national level and the trend is likely to continue in the foreseeable future (Population Census Organisation, 1998).

1.2 CONCEPTUAL THEORETICAL FRAMEWORK

Methodology is an orderly procedure of rules and methods applicable to any research work in any science. Two different approaches viz; theoretical and ideographic can be adopted to analyse the nature and patterns of *mauzas*/human settlement process and distribution (Edward A. Ackerman, 1958). In theoretical approach, patterns are analysed in a theoretical framework. Some already formulated theory or model, proved successful in other areas may be applied to analyse the pattern in Potohar. This normative approach is considered more scientific than other approaches (Santosh Gupta, 1993). The second approach to research is ideographic approach in which our main emphasis is not on generalizing the result, but to study each phenomenon as a unique one. But it does not prevent some generalizations being made about the factors which influence these patterns. The impact of local conditions and that of historical events is also important in this connection. In some cases *mauzas*/human settlement pattern is affected by one powerful influence at a particular period of time.

Here it is appropriate to mention that the first census in Potohar region took place in 17th February 1881(Census of India, 1911). In all twelve censuses have taken place since then. Five censuses have been conducted after Independence-in 1951, 1961, 1972, 1981 and 1998. This study has attempted to synthesize and analyse the results of these periodic censuses to present a broad overview of a number of population variables of Potohar including population density, growth, age and sex

composition, urbanisation, migration, origin of *mauzas*/human settlement, central place analysis of *mauzas*/human settlement, population potential, growth pole etc. Demographic and quantitative techniques such as classification and tabulation have been used to process the census data. In addition, cartographic techniques (F.J. Monkhouse and H.R Wilkson, 1963) have been also used to represent some of the demographic indicators on maps and photographs are also used where possible to record the actual conditions. In spite of limitations of time and resources the research has made an attempt at presentation of specific picture of the population and *mauzas*/human settlement characteristics situation in Potohar in a given physical and geographical perspective.

In the present research study, mainly the ideographic approach is adopted to analyse the pattern of *mauzas*/human settlement. For this purpose, it was not practicable to include all the settlement in the study area, due to shortage of time, volume of work and resources.

Only *mauzas*/human settlement having a population of 5,000 and above were selected from the census data of 1998, given in district census reports of Population Census Organisation, Statistics Division, Government of Pakistan, Islamabad. These numbers is 173 in the five districts of Potohar region. These 173 *mauzas*/human settlement were located on a map with a scale of 1:2,50,000. Each *mauzas*/human settlement was represented as a point irrespective of its population area or size. In case where a *mauza*/settlement covered a large area, point is placed in the geographic centre of that *mauzas*/human settlement to find-out the spatial variation in the *mauzas*/human settlement distribution.

Mauzas/Human settlement density was calculated for all districts and tehsils of the study area. To find out the general pattern and the distribution and to determine the degree of uniformity or clustering nearest neighbourhood, analysis/central place, potential population, accessibility and proposed growth pole were calculated on maps.

In analytical part of the thesis, distribution of *mauzas*/human settlement is also compared with different factors. These factors are divided into two categories viz; natural and human. In natural factors soil, landforms, drainage pattern and climate are taken into account. While in human factors history, land use, transportation and other anthropogenic factors are considered. Method of map overlapping supported by

quantitative technique is used to determine the relationship between these factors and the various attributes of *mauzas*/human settlement distribution.

1.3 THE PROBLEM

The pace of growth of human population its distribution patterns and similarly the growth and location patterns of *mauzas*/human settlement are influenced/shaped by a number of natural, social, economic and other factors. They also bring in their wake a number of social, economic and environmental changes and issues. A clear, close and comprehensive understanding of the causation and similarly of these phenomena is highly important for the students of population geography and urban/regional planning and more so far the urban regional planners. Does the demographic follow a pattern and can its future course. Similarly are the spatial distribution patterns of population and the location pattern of human settlement shaped by identifiable and definite set of forces and factors and with what social, economic, and administrative implication?

In the context of Potohar region, a major issue the whys and whats of the great variation in the distribution of its *mauzas*/human settlement as well as population characteristics in its various parts. These problem areas and questions have not been adequately inquired into in so far as Potohar is concerned. These issues need the studied scientifically and comprehensively for not just their academic value but more importantly as the resulting information and insight would guide the urban/regional Geographer/planners in Potohar regions as well as other regions. The present study attempts to address in the geographical context of Potohar region.

1.4 STUDY OBJECTIVE

a) To determine the impact of Geographical factor on the growth of population, human settlement and their attributes.
b) To explore the historical, social, cultural and environmental factor's on population and various human settlement characteristics.
c) To find out the impact of various prevailing socio-economic conditions on population and human settlement, form and patterns.
d) To discover the impact of various development policies on the population and human settlement attributes.

1.5 CENTRAL RESEARCH QUESTION

The Central research question of this study is to find out: Why is so that there is a great variation in spatial distribution of various population characteristics and human settlement size in Potohar region? What are the factors responsible for these patterns and trends? How an optimum population distribution and settlement size can be achieved? The study will also try to make policy recommendation for redistribution of population and human settlement in accordance with the decentralization model as pointed out in human settlement policy of Pakistan.

1.6 HYPOTHESES

The major hypotheses of the present study are:

i. The existing pattern of distribution-largely uneven, of population in the Potohar region is attributable to a host of factors-geographical, historical, demographic, cultural, environmental and socio-economic among which the economic factor is the most important one.

ii. The location pattern of human settlement is primarily determined by geographical factors and governmental policy.

iii. The urban centres have grown primarily by pull factors reinforced by pro-urban biased governmental policies in the matter of provision of social services and economic infrastructure.

1.7 STUDY AREA

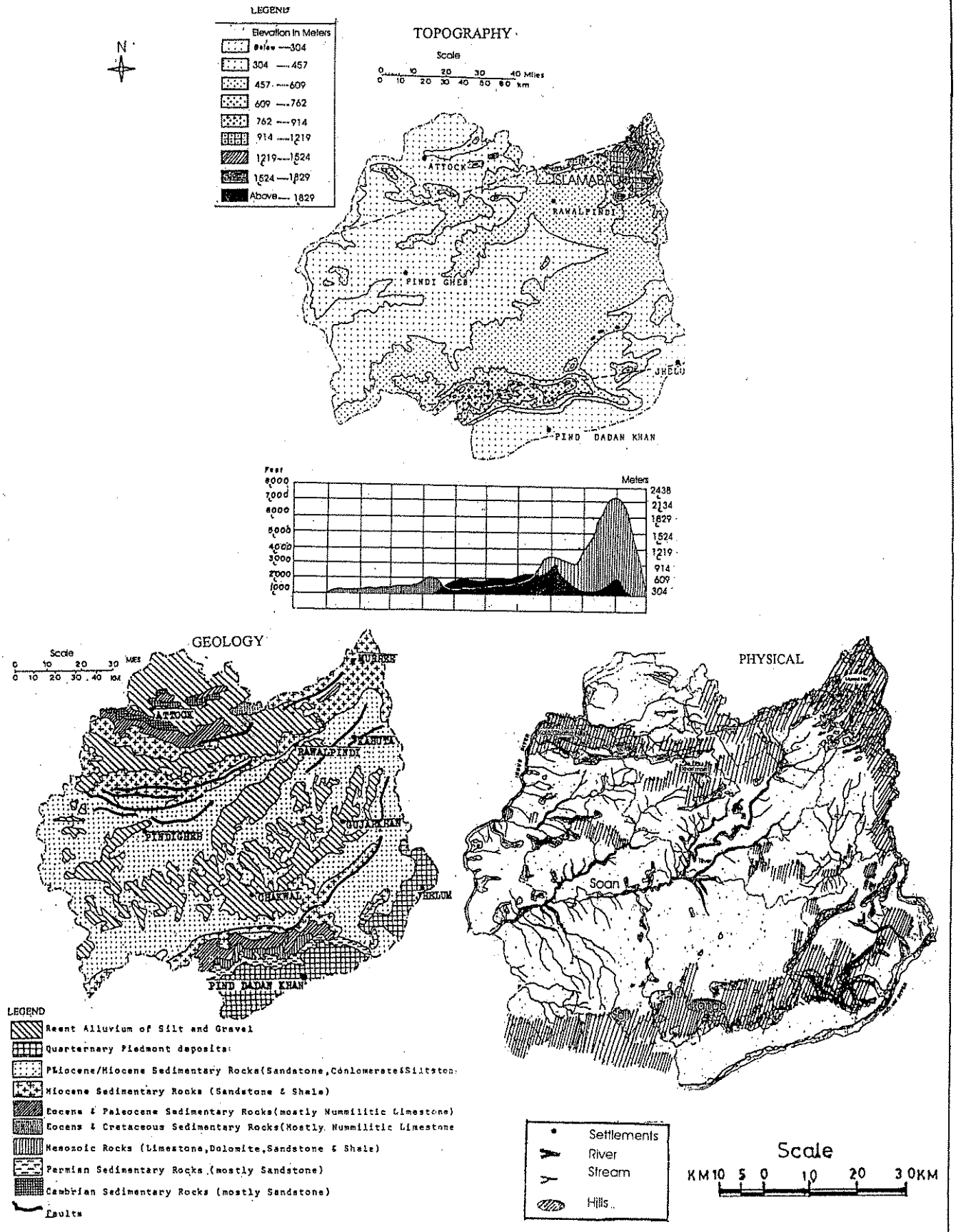
Potohar region, universe is located between 32°-30' to 34° North Latitudes and 71°-45' to 73°-45' East Longitude[1]. Total area of the region is 23,160sq/km.

Potohar is a physiographic region, bounded by salt range in the South, River Jhelum in the East, River Indus in the West and Murree Hills, Foot Hills of the Himalayas in the North is shown (Map-1.1). It extends beyond the administrative limits of Attock, Chakwal, Islamabad Jhelum, and Rawalpindi districts is shown (Map-1.2). The southern portion of Potohar occupies some area of Mianwali and Khushab Tehsil. However, in this study Potohar is defined as the area within the administrative boundaries of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi districts. Administrative units of the study area are given in Table-1.1.

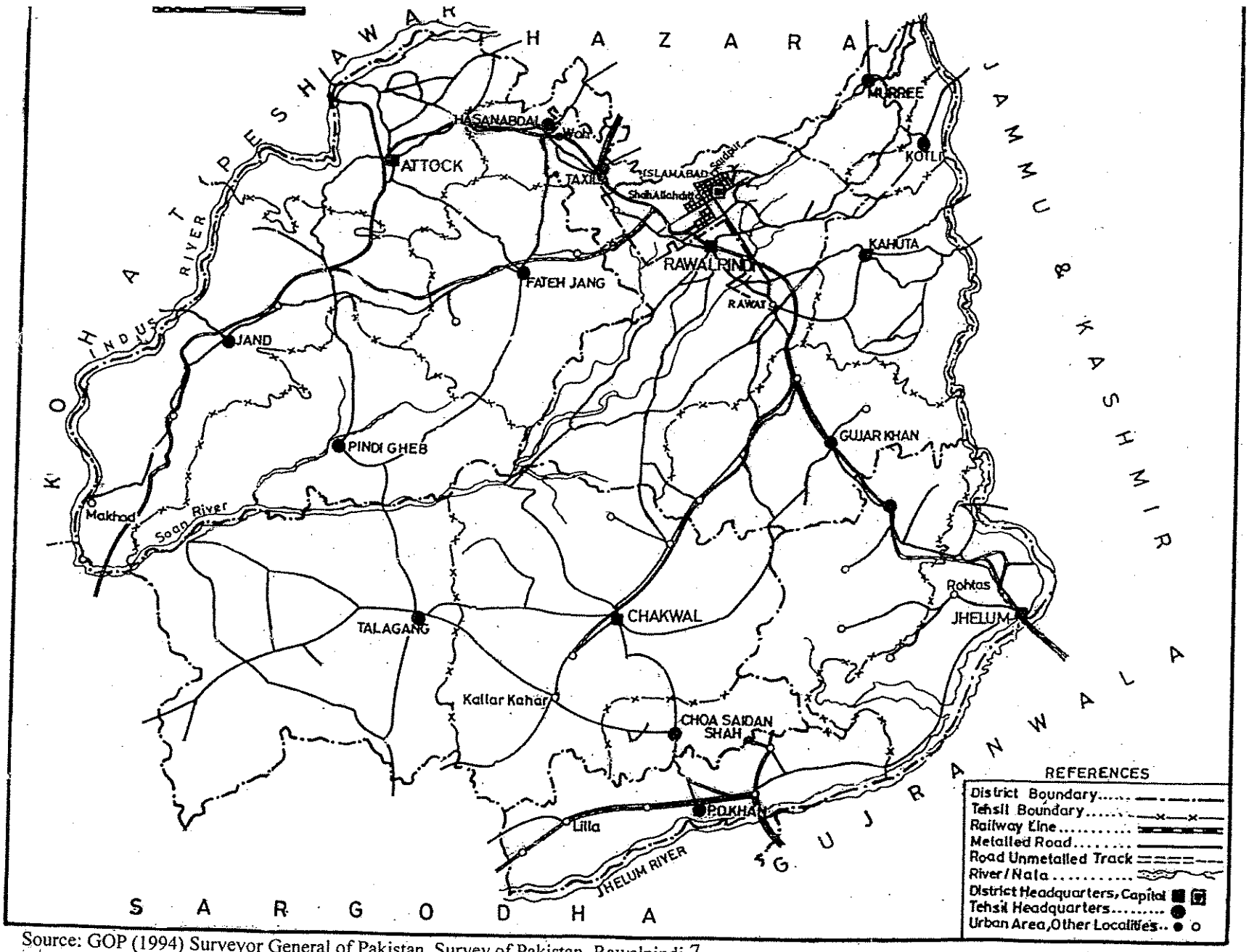
Footnote.-

[1] Surveyor General of Pakistan 1994 survey of Pakistan office Rawalpindi. (Rawalpindi Division Map Scale 1" = 4" or 1cm = 5cm).

MAP 1.1 POTOHAR REGION: PHYSIOGRAPHY



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.7

MAP 1.2 POTOHAR REGION: ADMINISTRATIVE SET UP

Table-1.1. Potohar Region: Administrative Unit and population in 1998.

Sr. No.	Name of Districts	Name of Tehsils	Area in (Sq. Km.)	Population 1998
1.	Attock		6,857	1,2,74,935
		Attock	1,350	5,00,770
		Fateh Jang	1,249	2,14,256
		Hasanabdal	350	1,35,857
		Jand	2,043	2,28,349
		Pindi Gheb	1,865	1,95,704
2.	Chakwal		6,524	1,0,83,725
		Chakwal	3,120	5,98,048
		Choa Saidan Shah	472	1,05,256
		Talagang	2,932	3,80,421
3.	Islamabad		906	8,05,235
		Islamabad	906	8,05,235
4.	Jhelum		3,587	9,36,957
		Jhelum	1,062	5,16,942
		Pind Dadan Khan	1,267	2,63,615
		Sohawa	1,258	1,56,400
5.	Rawalpindi		5,285	3,3,63,911
		Gujar Khan	1,457	4,94,010
		Kahuta	1,096	3,13,200
		Kotli Sattian	304	81,523
		Murree	434	1,76,426
		Rawalpindi	1,682	1,9,27,612
		Taxila	312	3,71,140
	POTOHAR		23,160	7,4,64,763

Source:-

G.O.P.,1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 39 & 40 Population Census Organisation, Islamabad.

1.8 REASONS FOR THE SELECTION OF POTOHAR REGION

The selection of Potohar region for this study was based on the following reasons.

1. Potohar region is one of the ancient regions in Punjab where human settlement of early civilization was found on which a limited research (M.K Elahi, 1975) has been carried out. Potohar region, geographically known as Potohar Plateau, differs from other areas of Pakistan in terms of its physical and socio-cultural environment human settlement forms, and other characteristics.

2. Potohar region has the largest and latest planned city-Islamabad the capital of Pakistan. The nature of the plan is most dynamic and experimental, from which we may learn lessons for future development of planned cities in Pakistan.

3. Potohar region enjoys the excellent location advantages because of which it is emerging as an important region of economic and political interests in the south Asia in particular and the world economy in general.

4. This region has experienced huge and continuous migration both push and pull factors as well as considerable intra-regional population mobility. This phenomenon makes it – besides other factors, ideal region for the study.

5. The mode of life of people of Potohar reflects a synthesis of various people who have been living in the study area. The main source of subsistence of the people of this area is farming and that too is based on rainfall. Unfortunately, the farming conditions have not improved during the last three decades, in spite of its growing importance, resulting from tremendous increase of population. Since times immemorial, the urban landscape withstood many changes from the ancient ruins of Taxila to the modern city of Islamabad. Indeed this period of history has been a long journey in its background. However, if one looks back to its rich past and forward to a bright future, across a hopeful present, Potohar is a unique piece of land in the country. The present research study, attempts to find out trend and pattern of various population attributes and human settlement from 1881 to 1998 and to project these trends for future. The analytical study of population characteristics of any region is the base line for socio-economic development programme and strategic planning, for defence and security and development purposes. The study with regard to this region has been undertaken, so that our policy planners, decisions makers and politicians may formulate future strategies to save this martial land from cultural deterioration and devise sound strategies to preserve, physical human and socio-cultural environment which, in itself requires, sound policies based of town planning for sustainability of the region socio-economic activities.

1.9 SCHEME OF STUDY

The thesis comprises eleven chapters including the present one. The subjects dealt with in the subsequent chapter are given in the list of contents. Its introductory

part will include a review of the past work, a discussion on the methodology and description of the study area.

It will be followed by a section tracing the origin of human settlement in the study area from ancient times to the present. It will also analyse the distribution and pattern of settlement in relation to their physical environment. The next parts will focus on the human settlement (Rural) examines their size, internal characteristics and general modern facilities in house types. Following this, there will be a chapter on the functional basis of central place hierarchy Rawalpindi-Islamabad.

In addition to overall human settlement patterns the study will also give a detailed structure of main centre twin city Islamabad-Rawalpindi, Wah and Jhelum and such (Potohar Region) urban complex examining its growth, morphology, transportation network, and functional characteristics. The density gradients in the region taking urban centre as the focal point, spatial activity pattern or spatial interaction (population potential) around urban centres will also be discussed in the study.

Both for policy and programme formulation, information on population distribution and density, growth trends, urbanisation, growth, sex composition, human settlement process/distribution and identification of overall inclination towards immigration and internal immigration in Potohar is needed for understanding the problems and processes of human settlement.

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PART ONE

REVIEW OF LITERATURE AND METHODOLOGY

CHAPTER TWO

REVIEW OF LITERATURE

2.1 INTRODUCTION

This chapter provides review of literature on selected aspects of population and human settlement in the study area, Potohar (Punjab) Pakistan. The review is set out largely according to the scheme of this study i.e. it splits in several sections each focussing a particular subject. The review of literature presented in this chapter will help develop a better understanding of the findings and conclusions of this study.

As far as possible author of the works reviewed are specifically cited; and a large number of them are cited along with their findings. In these cases, the authors are cited together. This clarification is considered necessary as the present chapter departs at a few points, from the traditional pattern of review of literature by including overviews of some aspects based on various works.

2.1.2 PRE-HISTORY

The oldest traces of human activity discovered so far in India-Pakistan belong to the stone Age. No hominid remains of the Early or Middle Stone Ages have so far been discovered, and there is yet little culture information relating to them. It is only with the Late Stone Age that evidence begains to the subcontinent, since there are clear indications that groups of Late Stone Age hunters long continued to flourish and had contact with later settled communities of agriculturalists. Late Stone Age sites, identified by assemblages of microliths, have been discovered in large numbers in many parts of the subcontinent, from Baluchistan, and from the former North-West Frontier Province in the north of Ceylon in the south. But as the vast majority of the finds were from surface sites, they long remained without more precise dates or cultural context. Only in recent years have a number of cave and dune sites been excavated from which radiocarbon samples and animal remains have been obtained. These excavations are as yet incompletely published, but they have already added a new dimension to the scholarly view of the origins of India civilization. It is likely that excavations in other regions will reveal equally early, if not even older, settlements of this type. The animal remains, as far as they are published, suggest that

these communities subsisted mainly by hunting and collecting, but domesticated species including cattle, buffalo, sheep, and goats are also present, at any rate in the later stages. It will be interesting to learn, as research progress, at what dates and in what order these species appear in the sections. The equipment of these people must have included the bow and arrow, and their arrows and harpoons may be inferred to have barbed with composite points using stone microliths. Burials have been excavated at a number of Late Stone Age sites, but only those from Langhnaj have been studied and published. The skeletons were considerably deformed, and it is difficult to draw conclusions regarding their ethnic type, but it has been started that they indicate traits characteristics of Mediterranoids and Veddoids.

2.1.3 INTRODUCTION

This section focuses pre-historic, human settlement availabilities; its main frame is on Potohar region followed by other region in Pakistan.

2.1.4 POTOHAR REGION SOAN CIVILISATION

The Soan Valley of the Potohar region near Rawalpindi and Islamabad has yielded some of the earliest relics of the Stone Age man in the sub-continent. Their antiquity is estimated at about 5,00,000 years (Geographical Study of Potohar, 1974). No human skeleton of such antiquity has yet been discovered in the area.

Towards the end of the last century B.C., the sub-continent was invaded by Scythians and Parthians, who conquered Taxila. They kept the Greek system of Government, favoured Buddhism, and constructed Buddhist monuments. In the first century A.D. the Kushans who had settled in Bactria and were influenced by Kellenism conquered the northern and north-western regions of the sub-continent (PTDC, 1984).

Historically as well as anthropologically on a rich heritage that dates from prehistory when the entire Potohar region by the Indus River, Jhelum River, Murree, Abbottabad, Haripur (Hazara) hills and the Salt Range. The artefacts, fossils and weapons related to the ancient Stone Age make curious yet equally persistent evidence of the pioneer good-gatherers crossing the valleys, canyons and ridges.

Potohar is in particular credited with preservation of rich palaeo-cuttures of about two millions years of durations on its surface deposits, which range from river gravels, conglomerates alluvial, belt to wind blown deposits.

(Wadia D.N, 1957) has identified and collected stone artefacts manufactured by man from the surface of these various deposits. Take for example, Soan River, the area between Rawat and Rawalpindi was more or less flat with undulating surface here and there.

Soan River drainage of water from Kashmir hills to Rawalpindi-basin a deep incision or water channel was formed, slowly and gradually over a period of about two million years, this small channel was converted into a big river like Soan. Some of the deposits which were created by uplift and flooding of earth mass in northern Pakistan were eroded and redeposited in Soan Valley. Together with river formation, rainfall helped to create patches of vegetation, which not only attracted animals, but also man. So the emergence of man in Potohar coincides with the exploitation of flora and fauna by him. By man, we mean hominid when he was walking erect, to make artefacts and tools of stone, wood, and hunted wild animals. The early stage of human development is also known as hunting-gathering state, hunting being supplement by gathering of wild fruit and edible plants etc.

This age is also known as Stone Age because of a wide use of stones as tools. At present there are two possible explanations. He comes either from Africa or Asia. Well preserved remains of Java-man are known to us from Asia (New Encyclopaedia Britannica, 1973). There are well over 100 remains of fossil man from East Africa, in particular from olduval Gorge. But there are gaps in our knowledge. Several jaws of Ramapithecus Punjabicus, hominoid not truly a human, but ape like creature. No cultural material like stone of wooden artefacts are associated with him.

For the sake of argument, we can say that there is a gap of about four millions years between Pamapithecus and true human, which appeared in Potohar, we have not found any human bones, emerge, we have been also to discover and locate sites or places where early man lived. He manufactured tools and artefacts in thousands, which are spread over an area of several kilometres. Sometimes used river pebbles locally that is he occupied a spot where river gravels were exposed. He was also selective and chose material like quartzite pebbles which have good fracturing qualities (Wadia D.N, 1957).

These sites can be found near Rawalpindi on either side of the G.T. Road between Soan camp and Gurha Shahan at some places evidence of fire is also, there

are charcoal or pebbles and artefacts with red colour are also visible. A number of activities can also be postulated for example animal bones of large bonids are associated with artefacts in one case near Adiala a camel jaw was unearthed with tools (The Muslim, 1987).

There is a good chance that human bones of such an antiquity will be found here. Hominid remains are known from Darra-i-Kur in Afghanistan. Teshik task Uzbekistan, SSR Bisitun in Iran and Shandirs (Wadia D.N, 1957).

Twenty-five sites yielded assemblages of artefacts in sites, sufficiently numerous to permit of classification with in a cultural or traditional sequence. Such in described artefacts were generally found in the basal gravel of the Potohar loess or in a gravel of third glacial age in the lower reaches of the Soan (Paterson T.T and Drummond H.J.H, 1962). These have been derived generally from the Dhok Pathan conglomerates and as de Terra has already pointed out one can almost predict sites, wherever this information underlies the peneplaini.

However, the stratigraphical descriptions of these cities have been compiled from the field notes of de-terra, de chardin and Paterson. Moreover, a few of the sections of Soan civilization have already been published but a few important sites are discussed (Paterson T.T and Drummond H.J.H, 1962).

Soan culture people kept to the rivers for purposes of fishing is debatable, but comparison with modern barbaric communities would support such and inference (Robertson F.A, 1887).

From the Indus, terraces come most of the lower and middle Soan tools, but a few derived implements were found in the later gravels along the Soan. Their scarcity, despite intensive search by all members of the expedition contrasts with the comparatively profile occurrences of upper Soan age along the river Soan, (Patterson T.T and Drummond H.J.H, 1962).

The earliest artefacts large massive flakes and simple pebble tools, are found heavily worn, in and on boulder conglomerate of the high depositional surface. It is possible that these artefacts were derived from lowever, pleistocene deposits but in accord with the conservative attitude deliberately adopted in this work great antiquity is not claimed for these tools and they are regarded as earliest middle pheistocene in age (Patterson T.T and Drummond H.J.H, 1962).

Artefacts generally found in basal gravel of the Potohar loess, have been derived generally from the Dhok Pathan (conglomerates and de-Terra).

Gariala during 2nd glacial times is believed to the east of the present river. They appear to have brought there during catastrophic flooding caused by bursting of glacial lakes in the high mountain tract, (Patterson T.T. and Drummond H.J.H, 1962).

2.1.5 HARAPPA CIVILISATION

Situated near the old bed of the river Ravi, its actual floor was built on the sleeper walls to allow free circulation of air, preventing accumulation of moisture. Another major centre of the Indus Valley Civilization was Harappa whose ruins lie 27.39 kms south-west of Sahiwal in the Punjab. The site at Harappa is bigger than Moenjodaro but much of the remains above ground were ravaged by brick-hunters using the material as ballast when the railway track between Lahore and Multan were laid. However, several cemeteries which escaped the attention of the later day vandals, have recently been excavated réveal the richness and sophistication of he Harapppan culture (New Encyclopaedia Britanica, 1973).

The citadel mound at Harappa was surrounded by a massive brick wall fortification. It had a state granary, a remarkable building in design. It is an old town pre-historic fame which lies about 18 kilometres from Sahiwal. Its history has been traced to 3,000 years B.C. In 1826 and 1830 two tourists Mason and Burns visited the place and found different mounds giving of old inhabitation. Later in 1853 and 1856 the place was visited by General Cunningham and his report was published in 1857 as:

The ruins of Harappa are the most extensive of all the old sites along the banks of the Ravi. The river Ravi has changed 10 kilometers away from other eminent of what was once a fortified citadel, abut he ancient city was then built beside a confluence of two braces of the Ravi.

On the north-east and south there is a continuous line of mounds about 10,677 metes in length. The highest mound is located to the north-west and 18 metres high above the surrounding while other mounds range from 12 to 15 metres. This all suggested the existence of a extensive city of great antiquity (Population Census Organisation, 1998).

Following the report of many others and excavation was carried out in 1920. Excavation show the Harappa was an important trade centre. The weights discovered out necklaces, girdles, gold plaques and other ornaments prove that the women perhaps even the men, adorned themselves artically (Population Census Organisation, 1998). The stone mostly semi-precious ones such as the carnelian and the lapis, are significant, and have an interesting bearing on what might have been trade relations with Mesopotamia, Persia, Tibet and even North Burma (Population Census Organisation, 1998).

Evidence shows that the cutting and carving of these ornaments were laborious and slow process, but no doubt in the timeliness stagnation of Harappa. Harappa pottery for the most part is plain, mass-produced and utilitarian, again almost without and apparent analogic elsewhere (Population Census Organisation, 1998).

2.1.6 GHANDHARA CIVILISATION

The region comprising northern Punjab, Peshawar valley and eastern Afghanistan was know as Gandhara in ancient history of sub-continent of India. The kingdom of Gandhara centered on Peshawar from the 8th century B.C. to the 11th century A.D. and enjoyed its high period first to the fifth centuries A.D. under the Kushan Kings. This was a time of great international contacts and Buddhist Gandhara was at the hub of Asia, trading with China, the Mediterranean and India, (Population Census Organisation, 1998).

The kingdom is remembered chiefly for its Buddhist art. Thousand figures of Buddha, seated and standing were beautifully made. Similarly thousands monasteries and stupas were built which made prominent features of Gandhara art and culture. Museums all over the world display the fine stone and stucco sculptures of Gandhara, works that reflect a society that was mature, prosperous, advance and gentle (Population Census Organisation, 1998).

The first capital of Gandhara Pushkalavati (Charsadda). Under the Kushans, the capital moved to Peshawar, and under the Hindu Shahi Kings from 9th to 11th century, the capital was at Hund, on the Indus (Muhammed Aslam, 1981). After Mehmood of Ghazni conquered the area an converted it to Islam in 1,026 A.D. the name Gandhara disappeared and only a few ruins of the civilization of great art remain.

2.1.6.1 SHAHBAZ GARHI

Shahbaz Garhi is 13 kilometres east of Mardan on the road to Swabi. It was one of the most important cities of Gandhara. Two Chinese pilgrims who visited here in 520 A.D. and 630 wrote of a thriving Buddhist centre surrounded by *stupas* and monasteries.

The Asoka inscriptions were written in the third century B.C. for the information and edification of travellers.

They are the most important and complete of Asoka's proclamations written about 230 years ago, they are also the oldest historically significant writings extant in the sub- continent (Population Census Organisation, 1998).

The Mauryan Emperor Ashoka, (272-231 B.C.) was one of the greatest monarchs the world has ever known, ruling over almost the whole of Indian sub-continent (Population Census Organisation, 1998). Tolerant of all religions, he may be a Buddhist himself. Asoka's inscriptions were written in the script best understood by the people of the locality in which they were place (Population Census Organisation, 1998).

2.1.6.2 JAMAL GHARI

Jamal Ghari is a well known archaeological site situated some 20 kilometres away to the north-east of Mardan city 122 meters above ground level. There is a beautiful monastery and main stupa, round shape surrounded by chapels closely packed together. According to (John Marshal, 1960), (Population Census Organisation, 1998) a famous archaeologist the circular *stupa* at Jamal Ghari, one of the earliest in Gandhara. the stupa meeting hall and monks quarters are some other important parts of this monastery. Another distinctive feature of this site the separate quarters meant probably for the learned scholars or monks.

2.1.6.3 CHANAKO DHERI

Next to Shahbaz Ghari is the site of Chanako Dheri which means the glazing mound. According to the Chinese pilgrim Hsuan Tsang who visited this valley in 630 A.D., a stupa existed at or near Chanako Dheri which had been constructed in the memory of the sons of Vishantra. The site comprises a hall, a lake and the base of *stupas*. The Japanese describe it as the place of the white elephant given away to Vishvantra in charity.

2.1.6.4 THE SWAT VALLEY

The valley of Swat ranging in altitude from 1,006-2,987 metres situated the northern tip of the Frontier Province and good to visit in all seasons. In stone-age people lived in Swat at least as early as 3,000 B.C. In 1,700 B.C. there arrived from Central Asia a wave of Aryans, forerunners of the Hindus and composers of the Rigveda, the oldest religious text of Hindus in the world. In 327 B.C. Alexander the Great invaded Swat. From the second century B.C. to ninth century (Usman Ali, 1987).

Mehmood of Ghazni conquered the valley in the 11th century. Mughals failed to add it to their dominations. In 1917 that the grandson of Akund of Swat Miangul Shahzada Abdul Wadood founded the stat of Swat (The Akund) of Swat rose to power in the 19th century and made his capital at Saidu Sharif. The British acknowledged Swat as a sovereign state in 1926. In 1969, Swat was fully absorbed into Pakistan.

2.1.6.5 THE CHITRAL VALLEY

The Kafir Kalash (Non-Muslim), people attract tourists from all over the world for which Chitral is most famous. Their faith is ancient imbued with elements of animals and nature worship and overseen by pantheon of strange gods (Population Census Organisation, 1998). They live in about 20 villages in the three are not in "*Purdah*" (The women mostly observe *Pardah* through the province some use *Burqah*/Veil while majority uses *chaddar* or shawl season) but wear instead extraordinary head-dress decorated with cowry shells and buttons and around their necks, countless strings of red beads set off by their blacks robes.

The wooden temples of Kalash are often elaborately carved, especially around the doors, pillars and ceilings. Kalash do not bury their dead. They lay above ground in frail wooden coffins which quickly break or fall apart, the elements.

2.1.6.6 MOEN-JO-DARO CIVILIZATION

Moen-jo-Daro (Mound of the Dead) is situated on the western bank of the Indus, about ten kilometres from Dokri railway station. It has been the cradle of a most remarkable and one of the earliest known civilizations of mankind. It has the pride of being the harbinger of a culture, which is not less then 4,000 year old. It was

a civilization based upon highly organized and wealthy ancient cities of the world and was certainly a metropolis of the first order (Population Census Organisation, 1998).

Moen-jo-Daro was first excavated in 1922 and later on due to the efforts of Sir Mortimer Wheeler, an archaeologist of world renown, in 1950. Moen-jo-Daro emerged from the dark recesses of the past as a site of concrete archaeological significance (Population Census Organisation, 1998).

The excavated remains of this buried city indicate that it was either the capital town or a metropolis of great importance with a large population, enjoying a well organized civic economic life. The main streets, 9 meters broad perpendicularly straight, are divided into block, each one hundred and twenty two metres long, from 61 meters to 91 meters in width (Population Census Organisation, 1998).

Each block was again divided by a series of lanes. The plan was austere and practical work of a master architect. Neither any deviation was allowed nor individual idiosyncrasy.

Whom these people who lived in this clean city of the Indus plain and how this great metropolis came to its tragic end, is yet another enigma. All that is discovered from the human skeletons excavated is that the inhabitants were one day ruthlessly murdered by some Indra, the Aryan war god, has been referred to as the fort destroyer it is surmised that the city was invaded by Aryans from the north (New Encyclopaedia Britanica, 1973).

The inhabitants were caught unaware in their homes, out in the streets and on the wells drawing water and were mercilessly slain. It is now generally accepted that the Indus cities were in fact those referred to in the 'Rigveda' and that they were destroyed by Aryan invaders about the 15the century B.C. The bones found at Moen-jo-Daro are of the people massacred at the time of fight. The city fell and the dust obliterated its memory (Population Census Organisation, 1998).

2.1.6.7 GABARBANDS (KHARAN)

The present inhabitants of Kharan attribute the erection of Gabarbands to he fire worshippers. These dams are terraced fields and legend says that the inhabitants who built them brought all the soil in bags, which they carried, on their backs from the desert to the south. These Gabarbands were built to the rainwater in the terraced plots and the seen at Quetta, Kalat and Karachi highway. The great archaeological

explorer Stain has described Gabarbands as masterpieces for conservation and utilization of rain or snow water (Population Census Organisation, 1998).

2.1.6.8 RUINS OF MEHR GARH (BOLAN)

The ruins of Mehr garh are approximately spread over an area of 2,071.9 square Kms. The ruins, which are believed to be more than 7,000 B.C. old, are not fully excavated. Many civilization in the area aware to have left in ruins by earthquakes (Population Census Organisation, 1998). During the excavation besides others items, a number of parts of human skeletons have been discovered. The other items discovered from the ruins include pottery, stone-made statues of men and wild creatures, a golf ball size shooting stones and a number of stiff (Population Census Organisation, 1998).

The ruins of Mehrgarh have enormous archaeological importance, therefore government to support the excavation process. A museum has been set up at Sibi where a wide range of rare from the site of Mehrgarh are on display (Population Census Organisation, 1998).

2.1.7 POPULATION DENSITY AND GROWTH

This section is about population density and growth with special reference of Potohar region.

The population of Pakistan has grown from 16.5 million in 1901 to about 104 million in 1998 (Population Census Organisation, 1998). The crude birth rate stayed basically the same (46 percent in 1901 and 43.3 percent in 1981) during this time period, but the crude death rate plummeted from 44.4 to 11.8 thereby contributing to this growth (Population Census Organisation, 1998). For years politicians have known the problems with population growth, the government has invested money in promoting a small family norm, and the media has informed the public about these problems. Yet the growth rate increased from 3.06 percent in 1981 to 3.1 percent in 1998. One obstacle to reducing fertility in Pakistan is that men feel they must prove their virility by producing sons and the more sons the more virile a man is. In fact, husbands, especially uneducated husbands, do not allow their wives to use contraceptives (Population Census Organisation, 1998). According to many studies, many more women would use them than they presently do if their husbands would approve. The high growth rate for urban areas adds to the population problem. A

concerted effort must begin to raise the educational status of women. In addition, strong determination of and co-operation between government leaders and non-governmental organisations is needed to implement and maintain a substantial and intensive population/family planning education program. If population growth is not checked soon, which stem from it will only multiply. Some of these problems include discrimination, and collapse of the physical infrastructure (FPAP, 1989).

Between 1960 and the present, Pakistan has tried a number of strategies to bring down the birth rate. The various family planning programs, which were not as effective as had been hoped. (1) In 1965-69 the target-oriented approach concentrated on promoting IUDs (Intra Uterine Device) and using indigenous midwives, however at the end contraceptive use was only 6 percent. (2) In 1970-1973, the continuous motivation system employed male-female teams to visit eligible couples, deliver contraceptives, and encourage family planning; inadequate training and supervision and inadequate supplies of contraceptives resulted in an ineffective program. (3) The contraceptive inundation scheme (1971-1977) provided widespread access to contraceptives through shopkeepers, hospitals, clinics, and field workers, but only 22 percent of eligible women were aware of the services when polled. (4) The multi-sector approach (1980-1983) placed the Ministry of Planning and Development in charge of making family planning available. In 1983, the Government initiated the latest national population welfare program. As of July 1983 the crude birth rate (CBR) was 40.3, total fertility rate (TFR) was 5.9, and contraceptive prevalence only 7-10 percent of women (married) of reproductive age. Goals for 1988 are a CBR of 36.2, a TFR of 5.4, and contraceptive prevalence of 18.6 percent (Reynolds J, 1983).

There is less than adequate empirical evidence from which to draw firm conclusion on differential fertility in Potohar region. Reference is being made here to selected findings of differential fertility derived from census data and a number of survey/research studies (Rehman Rukhsana, 1979). Somewhat more attention has been given to rural-urban comparison permit only limited conclusions as to difference in level and particularly to rend over time.

Reporting on rural-urban fertility differentials for the population of Potohar region, Pakistan and India prior to 1950 (K. Davis, 1951) found a negative association between urbanisation and fertility. His general conclusion is that the cities manifest a lower fertility than the country. Data from the national impact survey of 1968-69 and

Population Growth Survey (P.G.S) for the year 1968-71 shows higher crude birth rate for rural areas than for urban areas. The result is in agreement with the finding of Davis.

(Duzas M.B, 1967) found some rural-urban fertility differentials as measured by the fertility ratio in Pakistan. However, this largely disappears when child-married women ratios are considered. Duzen's study, however, shows the absence of remarkable rural urban fertility differences in Pakistan during the period of 1951-61. From the examination of census data, it can be concluded that fertility is nearly uniform throughout the country (Rehman Rukhsana, 1979).

The rapid rate at which the population of Pakistan has been growing is the result of marked decline in the death rate coupled with a consistently high level of birth rate. The change in mortality level has therefore played a significant role in determining the present size of population. This phenomenon, however, is not peculiar to Pakistan alone as similar relatively faster decline in mortality than in fertility has occurred even in the developed countries at an initial stage in demographic transition (Rehman Rukhsana, 1979). In Pakistan, the drop in mortality has been almost simultaneous as the conditions bringing about such a change were common and similar. Based on evidence available from a number of studies and documents (Robinson, 1967) has drawn the conclusion that in Pakistan, mortality has been declining steadily since 1900 with an accelerated trend in the decade of fifties (Khan, 1962) draws s similar conclusion on the basis of vital registration data from the Punjab. Indirect estimates such as those described above suggest that the crude death rate was around 40 per thousand in the early part of this century but declined to the level of about 30 by 1950. Mortality declined at faster rates with a declined crude death rate from about 30 to 19 by 1960.

Pakistan is ranked the tenth most populous country in the world. It has experienced an average of about three percent annual growth rate in the last three decades (Rogers, 1990).

(Demko, 1970) recognises that land and people constitute the two significant elements of an area and, therefore, the relation between the two is of fundamental interest to all scholars concerned with population analysis (Glenn T.Trewartha, 1987) in his case for population geography suggested three types of density calculations

arithmetic nutritional and agricultural densities. The sample ratio between total population and the total land area and expressed in terms of persons per unit of area was designated as arithmetic or general density.

However, it can not be treated as measure of population pressure on land, because it merely spells out a simple quantitative relationship between man and land, both of which may be widely varying quality (R.C Chandan, 1992 & Sidhu, 1980).

Consequently, Trewarthas agricultural density was considered to be a better measure of the extent of population pressure upon the agricultural resource of agrarian countries. In computing the agricultural density only the agricultural population is related to the total cultivated area. Therefore, the agricultural density is expressed in term of agricultural population per unit of cultivated area (Glenn T.Trewartha, 1987).

Besides altitude and the drainage conditions in an area also affect the effectiveness of Swamps and Marshes, which are common in area suffering from poor drainage, forbid human settlement (Zelínsky, 1966).

It is now coincidence that the places in the world where people are poorest are also the places population is growing fastest. People in Africa, Asia, and Latin America are not dazed. They know that a lot of there problems are caused by population growth. They live in country where there is often no welfare, no social security, and little health care. They need a large family to scrape together a living and to make sure there is someone to take care of them when they get old. They need a lot of help to gather cooking fuel, haul water, grow their food, and tend their livestock. And because disease and malnutrition kill a lot of children before they grow up, parents may feel they need to have one or two "extra" children to make sure enough survive to support the family. In New York City, Paris or London will use as many resources and create as much pollution as 50 children living in developing countries (UNESCO, 2000).

Mortality rates are high in the case of males as compared to female due to certain biological factors with respect to sex differences, inspection of the mortality data compiled by the United Nations reveals that in almost all countries males have a higher mortality than females. The excess of male mortality in most countries appears at every age level, though in some cases women of child bearing age have higher mortality rate than men in the same age group (U.N, 1953).

Pakistan's population has increased from 34 million in 1951 to 150 million in mid 2003. This enormous addition of 116 million in 52 years is due to high population growth rates in the last thirty-five years. Continuing high population growth might take these figures to 230 million in the year 2020 (The Muslim, 2004). Together with poor human indicators like high infant mortality, low economic growth, and low literacy rates, all efforts our population may end in vain at the end of the day. Though population growth rate has come down to 1.9 percent in 2004, Pakistan still has alarmingly high rate of growth compared to other developing countries like Bangladesh, India and Sri Lanka (The Muslim, 2004).

Today every woman were to begin having only two children, the population would still reach 160 million before levelling off. But reducing fertility in Pakistan will prove difficult. One of the leading obstacles is the low status of women. Few women in Pakistan have advanced education or professional jobs. Only ¼ of those women without education or who are not working have any knowledge concerning contraception (Wexler DB, 1991). Family size and composition also fuel the high rate of fertility. On the average, women desire 5 children (the fact that women average more than 5 suggest an unmet need for contraception). And due to social, cultural and economic conditions, Pakistanis generally prefer male offspring. Islamic opposition to family planning has also contributed to the continued high rates of fertility. Finally, administrative and management weaknesses has hindered Pakistan's family planning program. In order to overcome these obstacles, Pakistan will have to enlist the commitment of political, religious (Wexler DB, 1991).

The average Pakistani woman has 6 or 7 children. Currently the population 110 million; this has grown from 32.5 million in 1945. Nearly half the nation is under age 15, which means that even if growth rates level of the population will continue to grow for another 20 years to about 160 million. Another reason that family planning is not widely accepted is a fear of government intervention similar to that of India's forced sterilisation in the 70's. The Division of Population under the Ministry of Planning has been made into a separate Ministry and its budget increased from $20 million. Also a new high profile multi-media campaign has been launched in 11 of Pakistan's largest cities to encourage family planning. A private distributor has started to market a new line of contraceptives called (Sethi and Anonymous, 1990).

2.1.8 URBANISATION

2.1.8.1 INTRODUCTION

This section reviews literature on urbanisation and distribution of urban settlement.

2.1.8.2 URBANISATION

The rapid growth in urban population has resulted in the formation of mega cities defined by United Nations as those cities with 8 millions or more inhabitants (U.N, 1991). In 1950, there were only two cities with a population of more than five million namely Tokyo and Shanghai. Ten years latter in 1960, the number increased to 5 Osaka and Calcutta added to the list and by 1990 the number had reached to 18 (Amir Khan, 1994).

Mega cities in industrially advanced countries like Japan grow relatively slowly due to the large population base. The mega city of Tokyo, for instance, will reach to 20.0 millions by 2005 the city of Osaka will reach to 9.6 million in 2005. In the developing countries, Shanghai, Bombay and Calcutta are expected to grow to 15 millions or more each by that time Beijing, Tianhin, Jakarta, Delhi, Soul and Dhaka are projected to exceed 12 million while Karachi and Metro-Manila will exceed 11 million (Amir Khan, 1994).

Due to the rapid development of these mega cities, the environment repercussions are profound. The demand for sewage disposal, transportation and general utilities increases (Amir Khan, 1994).

The growth of large towns is looked upon with concern in Pakistan, because it has created problems of employments, housing, transport, electric and water supply, sewerage and solid waste disposal and environmental pollution, rural, urban migration is taken to be the main contributor to urban growth (Fazle Karim Khan, 1992). As such, the planners and demographers are suggesting to control the rural-urban migration in order to curb the growth of large cities (Rukanuddin, 1990).

(King Leslie J. 1962), attempted to apply the Clark and Evans methodology of Nearest Neighbour Analysis, for the study of distribution pattern of urban settlement in selected areas of the United States. The author has followed the basic methodology for determining the settlement pattern but has not ascertained the authenticity of

results by the test of significance given by (Clark and F.C Evans, 1954), according to distance nearest neighbour as a measure of special relationship in population.

(Berry, Brain J.L, 1958), observed that any large area contains few large and many small cities. Such empirical regularities of city sizes have been observed many times and have posed a challenge to those who explain or interpret them. In this article, several explanatory schemes directly or indirectly related to the problem of repeated regularities of pattern of occurrence of city size have schemes together for comparison, namely the schemes of (G.K. Zipff, 1949), (W. Christaller, 1966) N. Rashevsky and H.A Simon. The good or bad points of rank size rule have also been discussed which provides a critical study of the rule. The study has been based on theoretical background presented by (B.J.L Berry, 1958). The author has classified the cities of Pakistan on this basis into three categories – lognormal cities, intermediate cities and primate cities. These three categories are not defined any where in the article. However this classification has limitation and cannot be applied equally to all regions because it takes into consideration a grouping of city sizes, which seldom conforms to a particular rule (B.J.L Berry, 1958). The study also deals with the rank size rule and the primary index. The methodology applied for the distribution of the city size according to rank size rule has also not been explained which push the reader, into perplexity.

(Davis Kingsley, 1972) has worked out the urban trends (India) on the basis of population. The book covers the growth of world urban and rural population changes in distribution of the world's population by size of place, size effects of city growth, the future rise of world's urbanisation the regional aspects of world urbanisation and economic level on urban change. The book provides good techniques for calculating the degree of urbanisation, size of urban localities where an average urban dweller lives, and the average size of urban localities. These techniques have been used in the present thesis which has shown significant result and finding.

(C. Harold, 1972-75), provides detailed study of various urban aspects like process of urbanisation, group of city system, functional classification of towns, central place theory, sphere of influence of towns, rural-urban fringes, location of industry in the city etc. However, the chapters relevant to the present study are the process of urbanisation, central place functions and central place theory, the ranking of towns and the delineation of sphere of influence, some problems associated with central

place theory and the distribution of towns. The book gives a good methodology for calculating the centrality of urban localities; the methodology of Christaller given in this book for the calculation of centrality has been used in the present thesis also. However, this book cannot be followed as a base for the directly related problems such as offered in the present thesis. But still it is a good source of various distribution theories and the ranking of towns.

(Helbock, 1975) tested the hypothesis, " the greater the degree of urbanisation in a district, the higher the likelihood that the district would contribute more than its expected numbers of migrants to one or more of the nation's major cities". Conversely stating he tested the hypothesis that rural districts provide fewer high city migrants than expected. The finding of the study support the theory that migration flows from relatively smaller to larger urban places, although it offers no insight into causative factors producing urban-to-urban migration.

(Shah, 1978) made an attempt to formulate a demographic theory of urbanisation through the use of an axiomatic model. Nine variables were used within the theoretical system. The variables population size, rate of population growth, relative urbanisation, age of population, proportion of population flow of immigration, agricultural labour force and manufacturing labour force. Eight basic and twenty derived hypotheses were formulated. Out of these hypotheses only three basic and eight derived hypotheses were accepted. In rejected hypotheses it was observed hat the two variable viz. population growth and medium level of education were not related statistically with the dependent variable i.e. flow of immigration main factors behind the changing pattern of urbanisation.

2.1.8.3 PAKISTAN URBANISATION

More than 2/3 population of Pakistan is rural numbering 89,315.88 thousand souls constituting 67.48 percent of the total population. There are 48,363 rural localities in Pakistan in all. The highest number of localities i.e. 10,946 are in the size group of 2,000-4,999 followed by 10,383 in the size group of 1,000-1,999 and 8,625 in the size group of 500-999. There are 3,691 localities having population 5,000 & above and 2,121 localities having no population.

The lowest are twelve cities with a population of mote than 4 Lac and their total population account for 18.77 percent of total population of Pakistan and 57.86

percent total urban population. The largest city of Pakistan is Karachi with a population of more than 93 Lacs which is 7.1 percent of urban population of Sindh. Lahore is the second largest city with a population of more than 54 Lacs followed by Faisalabad and Rawalpindi. The population of these four cities accounts for approx. 14 percent of total population of Pakistan period the fastest growing city was Islamabad and Quetta followed by Multan (Population Census Organisation, 1998).

(Qazi. S, Ahmad, 1967) made a quantitative analysis of distribution pattern of the settlement which was a new trend of study in the field of urban Geography in his research study of distribution of urban localities in Pakistan. The research provides a detailed methodology, which has been borrowed from (Clark and F.C. Evans, 1954). The technique can be applied for similar research work on any region having considerable number of urban localities.

(Davis Kingley, 1951) in his study of the population of India and Pakistan gave some estimates on life time migrants to different regions of Pakistan. The study was based on statistical tables on place of birth and enumeration contained in various censuses up to 1941. The conclusions drawn in the study about internal migration in pre-partition India were meagre and tentative.

The first systematic geographical analysis of urbanisation in post-partition Pakistan was carried out by (K.S. Ahmed, 1966). Based on census data for the 1941-61 periods, he identified two classes of urban centres-towns of 'minor variation' in growth (Ranging from 10 to 15 percent), and towns of 'accelerating growth' (more than 15 percent variation). The study concluded that the development plans from 1951 onwards started making a greater impact on urbanisation trends in Potohar region. Rapid industrial and commercial expansion and integrated development of new areas resulting from the influence of new canals were the main factors behind the changing pattern of urbanisation in 1960's.

2.1.8.4 URBANISATION IN SOUTH ASIA

In the context of the rapid industrialisation and urbanisation in South East Asia (Fransisco, 2000), highlighted the impact of industrialization, on social and natural environment in urban areas , the (Cagayan deoro-Iligan Corridor) would emerge as the bulk supplier of the industrial inputs and finished industrial products of Philippines and buyers abroad. One of the major agro-industrial centres of the

southern Philippines, with an increased capability in processing local agro-based resources into industrial inputs and an enhanced importance as a trade centre for gathering raw materials and unfinished goods, and for forwarding intermediate and finished products.

The sphere of urban command in Birbhaum district is expanding both in absolute and relative terms. The pace of urbanisation is rather slow compared to the growth rate in west Bengal. In 1991 the urban population in the district was only 8.28 percent of the total population against the states share of 27.48 percent. In spite of the fact that this district is one of the least urbanised in west Bengal, a gradual increase of the urban population to total population in absolute terms is noticeable, which calls for a close study of the urban area of Birbhum district. The parametric variation of population size and density and the qualitative difference between urban and rural settlement, while the attribute urban is basically attached with non-agricultural resource base, the term rural applies to forming settlement and other with primary resource base. However our findings show that there are significant departures from the general principal owning to administrative definitional rigidities. Where in the physical qualifications of size and density are frequently given the premium over the real socio-economic character of the population. Such anomalies are likely to be encountered more in case of small towns and large villages large towns of small villages urban designation of settlement (N. Prabati, 2000).

During the last few decades population of the world increased tremendously. This increase was more pronounced among the developing and under-developed countries. India, which stands second in the World next only to China in term of population, has just 2.4 percent of the total world area, where as its population is nearly 16.5 percent of the world population. These figures clearly indicate high pressure on the land. The future growth is also no less alarming by beginning of the 21st century the India's population figure will surpass the figure of 100 crores giving no respite to land, as land man ratio will further increase (Fazal Shahab, 2000).

(Druijven P.CJ, 2000) starts with some comments as perceived by Mc Gee e.a. critical remarks made on the assumptions and the relevancy of this general model with regard to Indian metropolis like Delhi. A second topic to be dealt with is the problematic delimitation of the urban fringe by different is dictators of urban and rural

change in terms of land-use, economic activities and demographic change. These changes analysed in term of the political economy approach and illustrated with some example from villages situated in Alipur Block. Specific attention paid to these impact of urbanisation on the options and restrictions of different categories in rural population in term of caste, class gender and environmental complications of urbanisation of the country side. India metropolitan city growth in the pre-independence period was largely determined by the requirements of the long period of colonial rule. After independence the big cities continued to grow rapidly as the investment was concentrated around them and some other selected cities. Many of these are also the capital cities of India, a population of more than one million each accounted for about one third of the total urban population of the country, as per 1991 census. If they are included in the class 1st centres (numbering about 300 in the total 3,696 towns), about 65 percent of the country's urban population would be concentrated them. After India embarked on the process of economic liberalisation much of the investments have concentrated around these cities. About 30 percent of the urban population in these metropolitan cities are living in slums (C. Ramachandraiah, 2000). The problems of growing air pollution and inadequate civil amenities have become endemic in India urban centres. The cities like Delhi, Calcutta, Bumbai figure among those with high levels of air pollution in the world.

2.1.9 MIGRATION

2.1.9.1 INTRODUCTION

This section deals with the migration pattern includes in-out migrants and duration of continuous residence.

2.1.9.2 MIGRATION IN PAKISTAN

In Pakistan rapid population growth has been accompanied by internal, migrants on especially from the countryside to large urban areas resulting in striking shifts in the location of population. Though social scientists have recognised the importance of migration studies in the country (Population Census Organisation, 1998), and interest in the field is growing, yet very little has been published in major international journals on the magnitude, direction, causes and impacts of internal migration in Pakistan (Population Census Organisation, 1998). A considerable amount of information does exist from various sample surveys, analyses of census

data and other scattered sources, but they typically lack any larger theoretical or conceptual frame of reference within which to compare or summarise their results. These scattered studies are briefly reviewed here. In a study of internal migration to urban areas, (Afzal, 1974) used the Census survival ratio to separate the effect of mortality, leaving balance of net migrants of age 10 and above in a particular urban area. The study was limited to the intercensal period 1951-61, and revealed that in 1961 some 95 percent of the population of Pakistan were non-migrants. Only about 5 percent of the persons born in Pakistan were not living in their districts of birth. In estimating internal migrants to different areas, (Khan, 1972) used the ratios of population totals of the whole Sub-continent in consecutive censuses (1901-61) to separate the contribution of natural increase from intercensal growth in a particular urban area. (Burki, 1973) in a study, contradicting the picture of static village life, reported that 47 per cent of the out-migrants went to cities, 35 percent to towns and 18 per cent to villages. He argued that the in-migrants from cities were returnees, whereas the movements between towns were genuine long-term moves based on changes in economic status or opportunity. In a latter work, Burki found that most of the migrants to smaller towns had been small farmers squeezed out by rising costs (Burki, 1974).

Two other studies by (Helbock, 1975 and Khan, 1980) concentrated on the use of models. (Helbock, 1975) used a gravity model to work out differential urban growth among Pakistan's 12 largest cities. It was based on the 1961 Census. The variation among cities ranged from 5 to 30 percent and appeared to be unrelated to the city size or the overall city growth rate. Helbock, 1975 concluded that urbanisation process was more complex than what had previously been realised. (Khan, 1980) compared population growth in censuses with the natural increase to present variation in time and space. The study based growth curves for rural areas in Potohar region Punjab, identified three population growth regions of slow, rapid, and very rapid population growth (Population Census Organisation, 1998). It was observed that these population growth patterns varied primarily in accordance with differences in internal migration and secondarily with those of natural increase.

(Kosinski and Elahi, 1980) included research findings on various aspects of population redistribution and development in Pakistan. Ahmad, 1980 gave an account of major trends and implications of the distribution of population in Pakistan during

the 1951-72 periods. With emphasis that the country was getting over-urbanised without concomitant/economic development (Ahmad, 1980). Ahsanullah assessed the contribution of industry in urban growth for Pakistan using the location quotient. High indices showed that manufacturing was an important sector for the area concerned, conversely, low indices represented lesser importance of industry as a field of urban employment (Ahsanullah, 1980).

(Khan and Karim, 1982) gave an account of intra-urban and international migration in Pakistan during the 1970's. The links between the emigrants from Pakistan and the on-going process of internal migration were discussed in the study. In the context of rapidly increasing urbanisation and resulting problems, (Lieberman 1982) emphasised the importance of agriculture to Pakistan's and prospects for improving level of income and social development, and for providing employment for a growing work force. He critically examined the various rural development policies adopted so far to reduce rural-urban migration and suggested [1]

(Ahmad, 1985) in a recent study on population redistribution in a Pakistan discussed the impact of the early refugee influx on the growth of population in the country. The study underscored the significance of natural increase as the single factor affecting the pattern of population growth since the early 1950's.

Small surveys of four cities (Lulliani Naeem and Mahbub, 1969), Faisalabad (Haq, 1977) Gujranwala Social Sciences Research Centre (1977) and Peshawar (Khan, 1977) also provide interesting information on some characteristics of migrants. The survey results for Lulliani revealed that in-migrants and out- migrants nearly balanced each other and most of the covered less than 80.47 Km. A majority of in-migrants came from smaller villages, while the out-migrants mostly went to larger places. Studies of Faisalabad and Gujranwala found that about half of the recent in-migrants to the two cities came from other urban areas indicating urban-to-urban migration. Peshawar's study, however, revealed that most of the migrants there were rural labourers or tenant farmers.

Footnote:-

1 Revival of Integrated Rural Development Programme (IRDP) & Commercial holding strategy.

Two special studies be mentioned as these are concerned with the economic impacts of migration on migrants. (Klitgaard, 1977) in a survey of fruit and vegetable hawkers of Karachi disclosed that they were primarily migrants who constituted a stable, economically viable group of professionals. Some were quite well off, but none was living in real poverty. Their education, skills and capital were limited, but they had carved out a successful 'niche' in the urban structure. (Hamdani, 1978) while examining a sample of street dwellers in Rawalpindi, found that this group of temporary urban residents was fairly homogeneous and comprised of former rural residents. They were young, single males who lived alone but maintained frequent contacts with their families at their places of origin. They were not the 'poorest of the poor' and their incomes were sufficient to meet their basic needs. They mostly indicated an intention to return eventually to their rural home.

Board of economic enquiry N.W.F.P. (Ahmed, 1977) attempted to find out the factors influencing migration urban areas in Pakistan. The study provides result of a sample survey of Peshawar city in N.W.F.P. The findings of the study shows that the higher education among the rural folk, and lack of suitable jobs for educated manpower in rural areas force the people to migrate from rural or relatively smaller city towards Peshawar. Migration towards this city is also affected by the business monopoly. The people belonging to certain case and occupational groups are more mobile than others. The reasons for which the respondents left their previous place of residence can be shifted into (i) economic (ii) non economic and (iii) a combination of the aforestated two economic reasons were specified by 68.44 percent of the respondents, non- economic reasons were mentioned by 7.44 percent and combination of these two by 24.12 percent of the respondents.

Social sciences research centre University of the Punjab, Lahore (Ahmed, 1977) made an attempt to identify the social and economic factors, which influence the people to migrate to a rapidly growing urban centre by carrying out a sample survey of migrants to the city of Gujranwala. The demographic social and economic characteristics of the migrants were also studied. It was found that more persons came from urban than rural areas and most of them came from other districts than the district of Gujranwala itself. A majority of the migrants gave inadequate income and unsatisfactory employment as reasons for their migration; other reasons were of secondary importance.

2.1.9.3 MIGRATION IN SOUTH ASIA

Equally significant are the socially rooted determinants of migration. These are certain social customs that generate specific type of migration. For instance, females move from the place of their parents residence to the place of residence of their spouses at the time of marriage. This is the type of migration, which owns nothing to desire of economic gains. It is due to this factor that in India the number of female migrants is considerably high. Indian population is considered at least mobile (Kingsley Davis, 1951).

Similarly, it is also widely recognised that migration potential is functionally related to the migration experience. That is to say those in-migrants to an area are more likely to move further in comparison the long-term residence of the area (Morrison, 1967).

2.1.9.4 GLOBAL MIGRATION

(E.S. Lee, 1966) Visualised the process of migration as the product of three different sets of factors relating to the place of origin. The destination and intervening obstacles as perceived by the individual. These sets of factors and obstacles will be subjective in natural and will very according to the life cycle, socio-economic and personality characteristics of individuals. According to him the people shall have perceived knowledge about the area of destination and their decision to migrate shall be guided by the advantages associated with the place of destination. He conceptualised a number of hypotheses concerning the volume of migration stream of migration and characteristics of migration (Jacksoan, 1969).

(Haq, 1971) tested four models to determine the predictive ability for estimating inter-state migration in the United State. Two population (which assumed that the volume of movement from each of the other state) models a distance model and a Population distance model were used in estimating the expected number of in migrants and out migrants. The data testing those models were obtained from three different census reports of the United States conducted by the bureau of census. The predictive power of the models was determined on the errors. The migration model, which gave the smallest variance and standard deviation of the differences in estimating the in migration and out migration of the states during each of the three periods, was considered the best model for

predictive purposes. The results of the study show that the two migration models were the most accurate in predicting interstate migration. The first "population" model met the stated criterion, and was the most accurate in estimating the out migration of the states during each of the three migration periods. The second "population" model (which assumed that the volume of movement from each state) was directly proportionate to the population of each state was the most accurate on the stated criterion in predicting the in migration state during each of the migration period.

The "distance" model (which assumed that the volume of interstate migration from each state was inversely proportionate to the distance each of the other state) gave the poorest estimate of interstate migration of all four migration models. The "population distance" model (which assumed that the volume of movement from each state was inversely proportionate to the distance to each of the other state and directly proportionate to the population of each state) gave the 2nd poorest estimate. Therefore, the predictive power of these two models was substantially less than that of two "population" models. Thus these findings were not entirely consistent with those of previous studies, which had shown that migration model based upon "population and distance" have high predictive value.

2.2 HUMAN SETTLEMENT

2.2.1 POTOHAR REGION HUMAN SETTLEMENT

The ancient history of the Potohar region had not been written before the arrival of Alexander the great. That is why it is very difficult to examine ancient historic path of the urban/rural settlement of this region. After the arrival of Alexander, we find a few settlements as given in historical records have not changed. However, from the limited literature as available on this subject, we can generally analyse the historical development of the settlement.

Archaeologists found evidence of man in this region during the ice age 4,00,000 years ago. Artefacts found at many sites in Soan valley indicates the existence of early man in the Potohar, but no evidence of settlement of that age has been found. Record of ancient history dates back to 500 B.C. and that is mainly concentrated on Taxila civilisation. Taxila used to be largest capital city in the ancient Potohar region.

(Dani, 1963) discovered many fossils of sheep, goat, etc, and a large number of caves situated in Katas Raj. Earlier in 1920, (D.N Wadia, 1957) identified and collected some stone art manufactured by man, from the surface of the various deposits. Implements discovered in the Soan River have led the scholars to conclude that there were very small settlement in the Potohar during the stone age. At the time dawn of history the region saw the flowering of the Indus valley civilisation. At that time, it is said that, the great part of the Potohar region was covered with forests and grazing land. Historically as well as anthropologically, it thrived on a rich heritage that dates from prehistory when the entire region was bordered on two sides by the Indus river and Jhelum River. Murree hills and Salt range became the abode of the earliest human societies in this part of the world (Hiven Thsan, 630 A.D).

In the Potohar, social life started about 2,000 years ago (Kroeber, 1948). In some cases, the people of the Potohar lived in caves and hard rocks provided them with shelters. Later on these prehistoric period people preferred to live on the hilly side area or where the water sources and roads/path were easily available (Kroeber, 1948).

The next period is establishment/development of settlement. This major period started with Greeks and Aryans tribes and introduction of Buddha religion. Some human settlements were already established in (ASOKA) Buddha religion. The major human settlement Taxila in Potohar region.

Potohar attracted pilgrims from China and Tibet. H. Suan Tsang recorded about 1,400 monasteries in the Region during his visit in 629 A.D. He pointed out that the settlement were establish. Top Mankiala, Sirkap and Julian located near Taxila District Rawalpindi were also important religious and social centres in that period (Hiven Thsang, 630 A.D.). Later on due to change of political centre, during Buddhist, Mughal (Muslims) Hindu, Ghakkar and modern period, diffusion of settlement might have taken place and they spread out over whole of the Potohar region.

Some important archaeological sites are also found near the Kallar Kahar settlement in district Chakwal that is itself also of historical importance. But the other important human settlement - Rawalpindi, Jhelum and Attock are very old in their origin now many years (Gazetter, Districts 1893-94 & 1930). Over all impact of the

history of the Potohar on the human settlement pattern is not very strong, because political, cultural and socio-economic changes that have occurred during these centuries have completely changed the arrangements of human settlement in the study area.

(Dani, 1963) gives three factors for this large development and concentration of cities between first and seventh centuries A.D.; improvement of agriculture; boosting of local industries and craft; and participation in international trade and commerce.

It is still not at all clear at what date settlement of agriculturalists or pastoralists first appeared east of the Indus system, but available evidence suggests that this development took place in pre-Harappan or pre-urban times (New Encyclopaedia Britannica, 1973). Nor is it clear indicates movements from the East, from the area of South China or Southeast Asia; or a primarily local and spontaneous development. Probably the truth includes elements of all three of these possibilities.

2.2.2 HUMAN SETTLEMENT IN NWFP

The region of human settlement in Swat Valley can be explained on the basic of its particular position in geography of Asia i.e. it is located near the main passes that link the sub-continent with Central Asia. Moreover, it is near the important routes between the East and West and had therefore been exceptionally exposed to the influence of currents from various parts of the world. The environmental condition of the valley was favourable in the past for the origin of settlement. Swat in the holy book of Hindu has been referred to as "Odyana" (Rahman, 1968) and (Ali Usman, 1992).

The first period started about 22,000 years ago, when man started living in the valleys hunter and gatherer, living in cave (Israr-Ud-Din, 1972).

The first known inhabitants of Swat Valley lived in the Ghaliga Cave in the proto-historic times between 2,400 and 2,100 B.C (Stacule, 1969).

(Israr-Ud-Din, 1966), described settlement pattern and house types of Chitral district. He emphasised that the pattern has resulted from man's interaction with nature as reflected by the differences in relief, altitude, slope, and scantiness of cultivable areas, inaccessibility and the pastoral nature of the economy. It is a

detailed study of settlement pattern in the state of Chitral and the author has established nicely the geographic control on the settlement pattern.

In Chitral, rural settlement spread from 1,136 meters elevation at Arundu, the lowest point in the region, to the 3,658 meter contour line at Baroghil. Most settlement is found on the alluvial fans, or on certain river terraces, wherever soil fertility coincides with easily available water. Villages are also located in the beds of abandoned river course, where similar conditions obtained. Besides the vast tracts of uninhabited areas due to adverse physical factors. There are many such habitable stretches scattered in the region, which are at present not settled, because of precarious conditions of water supply. Settlements are generally sited on the raised side of alluvial fans, which contain mostly infertile and stony lands. Thus, the fertile lands are spared for cultivation. Hill torrents and stream are also important determining factors, several being avoided because of their being prone to flooding. The banks of deeper and less dangerous stream are, on the other hand, favoured sites for settlement (Israr-Ud-Din, 1992).

2.2.3 HUMAN SETTLEMENT IN BALOCHISTAN

The Indo-Iranian borderlands form the eastern extension of the Iranian Plateau and, from many points of view, mirror the environment of the fertile crescent (an arc of agricultural extending from the Tigris-Euphrates to the Nile basin) in the Middle East. Across the plateau, lines of communication existed from very early times, and throughout the while area it is to be expected that settled life with agriculture and domestication of animals would have spread, once developed Balochistan, without undue delay (New Encyclopaedia Britannica, 1973). But for whatever reason, the eastern portions are still less well known than their western counterparts, and up till now the earliest radiocarbon date for a settlement in Balochistan is not much older than 3,500 B.C. (New Encyclopaedia Britannica, 1973). It is evident, however, that settlement of some kind had existed for a considerable period prior to that date, and it may be expected that further research will reveal sites of considerably greater antiquity (New Encyclopaedia Britannica, 1973).

2.2.4 HUMAN SETTLEMENT IN SOUTH ASIA

The most striking feature of India urbanisation lies in the process of accretion of the rural population in a few large urban areas resulting in a

disproportionate tertiary base. Depending on the varied physical conditions and socio-economic-political structure of any region, the urban institutions are generally of different and varied magnitudes, the explosive increase in population and the sprawl urban growth have social economic, demographic, ecological and political, implications.

Stone axes of a generally similar form have been found widely throughout the southern peninsula and may be taken of the spread of pastoralists throughout the region during the 2nd millennium B.C (New Encyclopaedia Britanica, 1973).

A third concentration of ground stone tools has been found in the hills of Assam India. These have as yet barely been located in actual settlement but in the few excavations of cultural deposits that have been made so far they are found to be associated with a crude cord impressed pottery, suggestive of the fabric of Chinese Neolithic wares (New Encyclopaedia Britanica, 1973). A number of the axes have been ground to a rectangular section against suggested of Chinese forms. But this culture is still undated and little more can said of its age or affinities (New Encyclopaedia Britanica, 1973).

Since the area is essentially agricultural in out look (India), the rural settlement forms predominate every where. The forming family ordinarily resides in a settlement and not in the midst of its fields. Therefore, the complete agglomeration of 500 to under 5,000 inhabitants rather than the isolated must be considered as the residential unit of the settlement (rural) population. A village M.D. (The districts of Mathra for the area of Jumna, India) is not just a collection of dwellings. It is compact agriculture area with defined boundaries, usually 50-1000 acres in extent (S.D Misra, 1962). The owner of the tract often, and the cultivators nearly always, live in a central hamlet, where small shops, industries stables and the cattle enclosures are also located in a most intimate contact. "The super imposed features of the cultural landscape, viz road, railways, canals and power lines are still young compared with the age long village, which has survived the vicissitudes of history. The former, therefore, have not yet affected the location of rural settlement through they may have contributed to their growth (Enayat Ahmad, 1948).

2.2.5 GLOBAL HUMAN SETTLEMENT

From the view point of migration mobility the natural attractiveness of big metropolises, suppressed in the past, has virtually no impact (Cermak Zdenek, 2000). If any thing, against the back ground of further decline in intensity of and effectiveness of migration one can observe certain minor deconcentration processes in the central European countries under observation. Some signs of suburbanisation process, connected with general development tendencies of settlement system, is just of deconcentration processes. The main barrier anticipated development of migration mobility and the decisive factor in the reversal of the migration balance in community size categories is clearly the unfavourable situation in the housing market (Cermak Zdenek, 2000).

The premise underlying the concept of functional inter-dependence is that the government settlement policy represents a complete misunderstanding at the interactions between the rural settlement planning practitioners such as (Martin, 1976) suggest that the recognition of a hierarchy of centres and hinterlands in the rural settlement pattern is an erroneous one which disregards of size contribute some service or facility to the surrounding rural area. For these unique functions a village will have a much wider catchment's area than its own residents and people in adjoining villages instead of going to progressively higher order land, probably, more distant centres for specialist services, many turn to neighbouring villages to one for electrical goods to another for furniture to a third for shoe repairs and so on (Martin, 1976-80).

Various planned and unplanned agents of change interact in many different ways to produce varying condition in rural settlement and communities. It is however, possible to formalise certain systematic results of rural change, which are a greater or lesser extent in rural settlement depending on their location, size and character and which represent problems for planners to solve. It should be recognised from the beginning that it is not automatic that we can or ever capable of resisting these changes (Peregrine, 1976).

Planned management of rural settlement concern both the assumptions that rural settlement occur as part of a hierarchy pattern and the ensuing planning objective that the operation of this hierarchy should be upheld by supporting points

within it. The original work on central places carried out by (W. Christaller, 1933) Translated (C. Baskin, 1966) and built on by (Losch, 1938-1939) and (Berry and Garrison, 1958) has been fully reviewed, the historical account.

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CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This chapter describes the research framework and methodology of the present study. The chapter is split into three sections so as to place its subject matter in a logical and comprehendible sequence. Sections 3.1 and 3.2 are devoted to introductory details, and statement of broad conceptual methodological approach. Variables incorporated in the study etc. The specific methodology followed for data collection - primary and secondary, the sampling procedure, the analytical techniques, are presented in sections 3.2 onwards.

3.2 RESEARCH METHODOLOGY

The major source of population data of this research will be periodic population censuses from 1981-1998. In all, twelve censuses have taken place since 1881. Five of them have been conducted after independence in 1951, 1961, 1972, 1981 and 1998. To synthesize and analyse the results of these periodic censuses to present a broad overview will be developed of a number of population variables including *mauzas*/human settlement process and pattern, historical development important settlement, type of settlement, urbanisation, migration stream, age structure, and sex composition, *mauzas*/human settlement and other socio-economic variable. Various demographic, cartographic and quantitative techniques such as classification and tabulation will be used to process the data.

In this research, study mainly the ideographic approach will be adopted to analyse the pattern of population and *mauzas*/human settlement. Since it is not practicable or necessary, to cover all settlement in the study area, due to shortage of time and resources, settlement having population of 5,000 and above as in 1998 Census, will be included in the analysis.

To accomplish this job first the *mauzas*/human settlement having a population 5,000 and above will be listed from the 1998 District Census Report. Then these *mauzas*/human settlement will be located on a map of scale 1:2,50,000. Each *mauzas*/human settlement represented with a point irrespective of its area or size will be placed in the geographic center of that human settlement, to find out the spatial variation in the *mauzas*/human settlement distribution. *Mauzas*/human settlement

density will also be calculated. To find out the general pattern, distribution and to determine the degree of uniformity or clustering the nearest neighbour analysis/central place will be carried out to find out the relationship between population and level of services available in *mauzas*/human settlement.

In order to collect the primary data, the field visit to each *mauzas*/human settlement will be made which will from the foundation of this research.

3.2.1 INTRODUCTION

The present study is based on primary data - collected through a survey, as well as, secondary data. The particular sources of these data have already been partly alluded to in the preceding sections in this chapter. What follows a step by step description is given the methodological approach, beginning with the methodology used for primary data through the survey of selected settlement in the Potohar region. The details of the whole process are shown in the research model (Fig-3.1).

3.2.2 SURVEY OF HUMAN SETTLEMENT

There are 2,798 *mauzas*/human settlement in the Potohar region. In terms of population these range from a few hundred to over one million persons and are widely scattered over a vast area. After considering the relevant aspects - of the study, the data need, the spread of the *mauzas*/settlement etc., it was decided to survey only the settlement having a population of 5,000 persons or more. The number of the target settlement was found to be 173. All of these 173 settlement were covered the survey. The district wise distribution of the surveyed settlement; also alternatively called sample settlement, is given in Table-3.1.

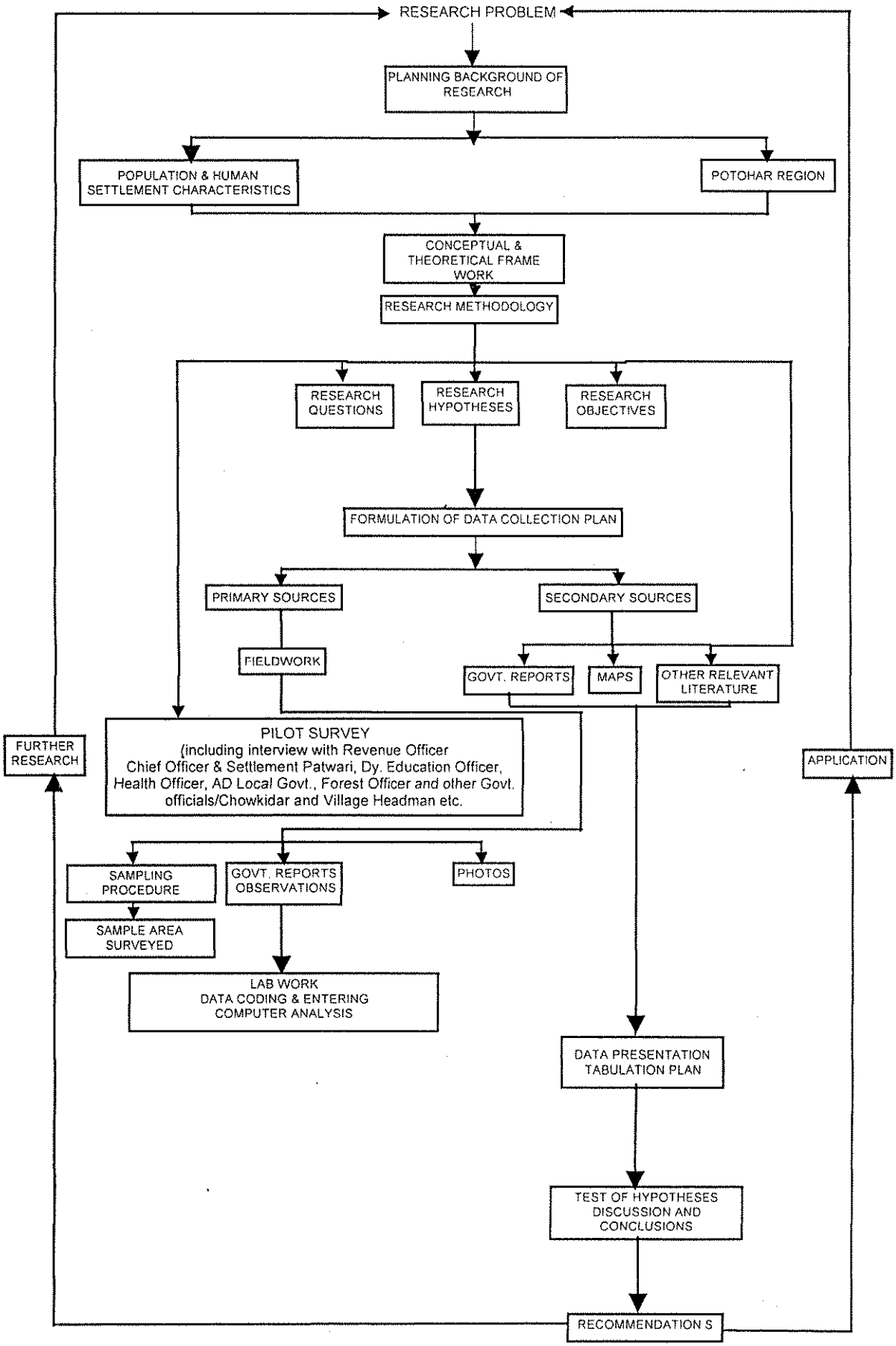
Table-3.1: Distribution of surveyed settlement

Name of Districts	Sampled (Settlement)	Population in 1998	
		Total	Average
Attock	55	6,09,747	11,086
Chakwal	43	4,62,481	10,755
Islamabad	15	6,70,780	44,719
Jhelum	19	3,66,237	19,276
Rawalpindi	41	2,1,69,084	52,904
Potohar	173	4,2,78,329	24,730

Source:-

G.O.P. 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 39 & 40 Population Census Organisation, Islamabad.

FIG 3.1 RESEARCH MODEL OF THE SAMPLE AREA SETTLEMENT CASE STUDY



Source:- After Khan A. 1991 unpublished Ph.d Thesis, Institute of Planning Studies, University of Notingham, UK.

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3.2.3 CLASSIFICATION OF SURVEYED SETTLEMENT

The 173 settlement selected for this study were classified into six, categories according to the population size. Their distribution is given in table-3.2.

Table-3.2: Distribution of surveyed Human Settlement by Population size

Categories	Surveyed settlement	
	Number	Percent
I. Metropolitan	2	1.1
II. Large Cities	2	1.1
III. Cities	4	2.3
IV. Large Towns	11	6.4
V. Intermediate Towns	38	22.0
VI. Small Towns	116	67.0
Total All Categories	173	100

Source:-
G.O.P. 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 39 & 40 Population Census Organisation, Islamabad.

3.2.4 RESEARCH INSTRUMENT

The survey of the selected 173 settlement was conducted during 1999-2000. The target data was collected through a questionnaire designed specifically for purpose which is given in (Appendix-3.I).

3.2.5 RESPONDENTS IN SETTLEMENT SURVEY

The chief respondents in the settlement survey were *numberdar/chowekeder* the villages headman who serves as a liaison officer between the government and the villagers; councillors; *patwari* - a government official who keeps land revenue record; school teacher; officers of the government departments; and other informed persons.

3.2.6 DATA COLLECTION PROCEDURE

The required data was collected using the questionnaire by the research scholar himself. Data was collected by interviewing the respondents cited in the preceding section, by consulting the relevant records pertaining the surveyed settlement and also through personal observation of the research scholars.

3.2.7 SOURCES OF SECONDARY DATA

i) Population growth/composition. The main sources are the censuses reports at district, provincial and the national level for the censuses conducted in 1881-1998.

ii) Migrations: The main source of migration data on Potohar was the information on place of birth recorded in the successive censuses. However, no data on out-migration was available in 1981's census reports. Such data was in fact collected during the census, but was not tabulated by the census organisation. Access was made to this data, which was available on original computer tapes. From these tapes, the required data on migration was extracted and analysed.

iii) Information on immigration was compiled on the basis of the places of origin of enumerated persons in each district of Potohar. Out-migration data was extracted from census reports of each district of Pakistan, which gives information on the place of origin of population. The 1972 census excluded this question but it was included in the housing, economic & demographic survey (HED Survey 1973) which was incorporated to complete the whole sequence in order.

iv) As in 1972 census HED survey 1973, data was available on the basis of provinces. From this data, only in-migration data was compiled. Information for 1981-98 migration data was obtained from the original computer tapes of the census organisation, computer bureau of Pakistan, Islamabad.

v) Besides, the data has been collected from various governments departments including revenue, health, education, and public health engineering. Project office local govt. Office, national institute population study , main library establishment division, library, national documentation centre cabinet secretariat, Islamabad, Pakistan institute of development economic, main library of the , Peshawar university and east west centre of

population Institute Asia pacific, Bangkok, ministry of environment, meteorology department, capital development authority Islamabad, military land and record, M/O defence, Pakistan telecommunication Ltd, Islamabad survey general office, Rawalpindi district, district education offices , district health offices, district forests offices.

vi) The study also drawn on articles, books and reports which are cited at appropriate places in the thesis.

3.3 METHODS OF DATA ANALYSIS

The data thus collected has been tabulated systematically for acquiring certain results. Besides, the results have also been drawn by the application of various mathematical equations. Some of these are listed below:-

- Gross Density of Population

$Pg = PT/A$

Where Pg is population growth,

Pt = Total Population

A = Area of Population

Source:- Monkhouse & Wilkinson, 1963 Maps & Diagrams, University Paper backs, London: Methunen Publishers, p. 294.

- Percent Variation of Population

$PV = P_2 - P_1$

OR

Mathematically it is expressed as

$$PV = \frac{P_2 - P_1}{P_1} \times 10$$

Where PV is the population variation

P_1 is the population of the base census year

P_2 is the population of the next census year

(The calculated values can be expressed in percentage by dividing the equation $P_2 - P_1$ by P_1 & multiplying it by 100).

Source:- Shyrock & Siegel, 1973 'The Methods and Material of Demography' department of Commerce Publications Social and Economic Statistics Administrations Bureau of the Census Vol. 2, p. 107.

- The growth rates are calculated by the following formula

i) $$1+r = n\sqrt{\frac{P_2}{P_1}}$$

or

Logarithmic form

ii) $$\log(1+r) = \frac{\log (P_2 - \log P_1)}{n}$$

$$\log (1+r) = \log n \frac{P_2}{P_1}$$

$$= \log n + \frac{P_2}{P_1}$$

$$= \log n + \log P_2 - \log P_1$$

$$= \log P_2 - \log (1+r)$$

$$\frac{\log P_1}{n} = \frac{\log P_2}{1+r}$$

where r is the growth rate to be calculated,

n represents the number of years,

P_2 Present Population,

P_1 Previous Population.

Source:- Haupt & Thomas 1980 'Population Hand Book' International Edition 'Population Reference Bureau' Inc. Washington D.C, p. 55-56.

$$Ca = \frac{Ps}{n}$$

- Average Size of Urban Settlement Mathematically

where ca is the average size of urban settlement

ps is the population of urban settlement

n is the total number of urban settlement

Source:- Haupt and Thomas , 1980 'Population Hand Book' International Edition 'Population Reference Bureau' Inc. Washington D.C, p. 53-54.

- Population projection:

$$\frac{Pn}{Po} = \frac{(1+r)^n \text{ or } Pn = Po\ (1+r)^n}{100}$$

Or

Where P is the projected population

Log Pn = (log Po) + log (1+r)

Pn population to be estimated

Po population of the baseyed

r Annual rate of growth

n number of exact year between Po & Pn

Source:- Haupt and Thomas 1980 'Population Hand Book' International Edition 'Population Reference Bureau' Inc. Washington D.C, p. 53 - 54.

- Size of an urban settlement where an average urban dweller

$$\overline{Cc} = \frac{\sum ci^2}{\sum ci^2}$$

lives .

where Cc is the size of urban settlement,

ci is the population of the urban settlement of size.

Source:- Davis K, 1972 World 1950-70 Urbanisation 'Analysis of Trends Relationship and Development' University of California Series No. 9, p. 29.

- Degree/Level off urbanisation

The equation is mathematical as,

$$Lu(percent) = \frac{P_u}{P_u + P_r} \times 100$$

Where Lu is the urban ratio

Pu is the urban population

Pr is the rural population

Source:- Davis K, 1972 World 1950-70 Urbanisation 'Analysis of Trends Relationship and Development' University of California Series No. 9, p. 47.

$$Pr = \frac{P1}{rq} \quad \text{——————} \quad I$$

- Rank Size Rule applied of Urban Sett

Where Pr is the population size of city of rank,

r descending array of town,

pı population of the largest settlement.

$$\log Pr : \text{Log } P1 - q \log r \quad \text{——————} \quad II$$

Logarithmic form:

The Constant 'q' in the equation I and equation II is calculated by the application two equations

i. $\text{Log } Pr = n\log P1 - q \Sigma \log r$

ii. $\text{Log pr } \Sigma \log r = \Sigma \log pl \ . \Sigma \log r - q \Sigma \log r$

Where P is the population size of the settlement

r rank P_1 population of the primate city

q is the constant

Relationship between population size and the centrality of

$$R = \frac{x - \bar{x} - y - \bar{y}}{\sqrt{(x-x)-(y-y)^2}}$$

urban settlement Co-efficient of correlation.

where 'x' centrality value

'y' population

Source:- Grner, 1967 and P. Heggett, 1972'Models of Urban Geography ed, and Settlement Location' 'London' Methuen & Co. Ltd, p. 326.

- Primacy Ratio

$$P1 = \frac{P1}{P2}$$

Two-city primacy index mathematically it is expressed as

Where P_1 is the two city primacy index

P_1 is the population of the primate city,

P_2 is the population of the urban settlement next to the primacy city in population size.

Source:- S. Ahmed, 1977 'Distribution of City Sizes in Pakistan' Pakistan Geographical Review Vol. 22, p. 73.

- The centrality of urban settlement

Formula use for calculating the centrality values is as follows:

$Zz = Tz - E\ Tg/Eg$

TZ is the number of telephones

EZ is the population of the central place

Tg is the number of telephones in the region

Eg is the population of the region

ZZ is the relative concentration of telephones in the central place.

Source:- Christaller W, 1933 & C. W.Baskin, 1966 Central Places in Southern Germany, trans. Cliffs, C. Baskin 1966, Englewood New Jersey U.S.A.

- The distribution of urban settlement $R = r\ A / r\ E$

Where R defined as the ratio of observed mean distance

ra expected

rE mean distance

CALCULATION OF r A

N Number of urban centres

r Distance from the Town to its nearest neighbour

rA mean of series of distance to nearest neighbour

Σ r sum of all the distance measured

Since N equals to the number of urban centres and r to the distance from each urban centre to its nearest neighbour, them the mean observed distance may be calculated as follow

$$\frac{r\Lambda\Sigma r}{N}$$

Calculation of rE. rE or the mean distance the nearest neighbour expected in an infinitely large random distribution of density who is calculated by the following formulas

$$R\ E\ 1/2\ P$$

Where P is the density of urban centres per unit area,

P is calculated by dividing the number of urban centres by the total are of the region or the districts calculation of R.

R-the ratio of mean observed distance to expected mean distance is calculated in the formula

$$R = r\Lambda / rE$$

Source:- H.L Browning, 1970 & 72 and Jack P.Gibbs, 1961 Urban research Methods, D.V Nostrand Co., Inc. New York, pp. 441, 453-459

- Test of significance $C = r\Lambda - r\ E / \eth\ r\ E$

Where 'c' is the standard vitiations of the normal curve

$\eth rE$ Standard error of mean distance to nearest neighbour in randomly distributed urban centres,

P is $\frac{26136}{\sqrt{NP}}$

the value of $\eth rE$ for the density of urban centres

N is the number of urban centres

Source:- Clark and Evans, 1954 'Distance To Nearest Neighbour as a Measure of Spatial Relationships in Population Ecology 35', pp. 487-488.

- Methodology for determining degree & concentration

Determine the approximate distance (Hd) between the urban centres by the following formula:

$$Hd = 1.11 \sqrt{\frac{A}{N}}$$

Where 'A' is the area (in sq.km)

N is the number of urban settlement

rA actual distance mean %age of Hd percent deviation of actual values from the hypothetical distances.

Source:- Clark and Evans, 1954 'Distance To Nearest Neighbour as a Measure of Spatial Relationships in Population Ecology 35', pp. 447-448.

- The Nearest neighbour index denoted by "R"

R = Dobs/D ran

D ran is obtained from this formula

Dran = 2 1/(N/A)

Where N is the total number of points and A is the given area

R = $\overline{D}$obs / 1 / N / A

therefore,

Which may be simplified

R = $\overline{D}$obs / 1 / N / A

Source:- John Clark and Evens, 1954'Distance To Nearest Neighbour as a Measure of Spatial Relationships in Population Ecology 35', p. 446.

- Product Moment Correlation Co-efficient is expressed by the formula:

$$r = I/n \; E(a - a)(b-b) / Qa.Qb$$

Where r is denoted correlation coefficient, a & b are two variables while na & be is obtained by the division of the number of pairs n. Qa & Qb are the standard deviations. We will find the sum of variations from a & b dividing by the number of pairs n. then this correlation coefficient ration a & b divided by the product of the two standard deviation,

Source:- R.Hammond and P.S.Mc Cullagh, 1947 'Quantitative Technique in Geography' An Introduction Claredon Press Oxford 2nd Edition, p. 219.

- Read and land ratio or Road density

Road density = Actual length of raod

Area in Sq. Km.

Source:- R. Hammond and P.S.Mc Cullagh, 1947 'Quantitative Technique in Geography' An Introduction Claredon Press Oxford 2nd Edition, p. 238.

- Gradient/slope of the population density has been worked out with the help of regression coefficient expressed by the formula:

$$y = a + b\,x$$

where y = the sum of populating densities

x = the sum of distances

a = constant

b = gradient or slop

Source:- Sher Muhammad, 1982 'Introduction To Statistical Theory' Ilmi Kitab Khana, Kabir Street, Urdu Bazar Lahore (Pakistan), Part II, pp. 197-207.

- Fixed base method has compared the population density the

$$Xn = \frac{Pn}{PI} \times 100$$

central zone by using the following formula

Where Xn = Gradient

Pi = Population density of the Central Zone

Pn = Population density of nth Zone

The chain base method compares the density of each circular zone with its respective inner zone e.g. Zone.

It is calculated as

$$Xn = \frac{Pn}{PI} \times 100$$

Where Pn, is the populating density of the nth Zone,

Px is the population density of Zone that falls inside the nth Zone.

F, Test Calculated Values for correlation between population density gradient of calculated land ratio,

- The population potential PJ of a human settlement, "J" is calculated by the following formula.

$$E^{N} \frac{Mi}{di_{j}}$$

where M_i is the population potential at the jth place (human settlement).

pi is the total population at the ith place (i=1(i=1,2,3,4.....N) and dij is the distance between *mauzas*/human settlement 'i' and jth place.

The population potential p_j of a *mauzas*/human settlement can also be calculated by the following formula which is an adoption of the above formula:

$$Pj = \sum_{i=1}^{n} \frac{(Pi)}{(ri)}$$

OR

$$Pj = \frac{Pi}{ri} + \frac{P_2}{r_2} + \frac{P_3}{r_3} \ldots\ldots \frac{P_n}{r_n}$$

Source:- Preston E.James, 1954 and John I.Clark, 1969'The Geographical Study of Population and Clarence F, Jones (ed) 'American Geography Inventory & Prospect Association of American Geographers' Syracuse University press, p. 10.

- Formula used for the calculations of net change, natural change percentage, due to migration and %age of natural growth

1) Net Change : Net Change Growth total change = Population of 1998 – Population of 1981

2) Natural Change

Natural Change–Net Change / total change – In migration + out migrant

3) Percentage of growth due to migration percentage change to natural change = net migration / Net change * 100

4) Percentage of Natural growth percentage of net change to natural change = 100– growth due to migration.

Source:- Colin Newell, 1988 'Method and Models in Demography (Migration)' Belhavan press, London, Chapter 7, pp. 82-83.

- Road transport intensity under (RT 11) is computed by the formula

$$R\ 11 = M1 / P1$$

Where R_{11} Road intensity index

M_1 Total road length (Km) in region

P_1 Total population of region '1' in 100 Km.

Source:- Kansky K.J, 1963 'Structure of Transport Network Relationship Between network Geometry and Regional Characteristics' University of Chicago, Department of Geography Research Paper, No. 84.

3.4 DATA REPRESENTATION

The analysed data has been presented in tables and wherever necessary in the form of maps, research model, charts photographs and diagrams.

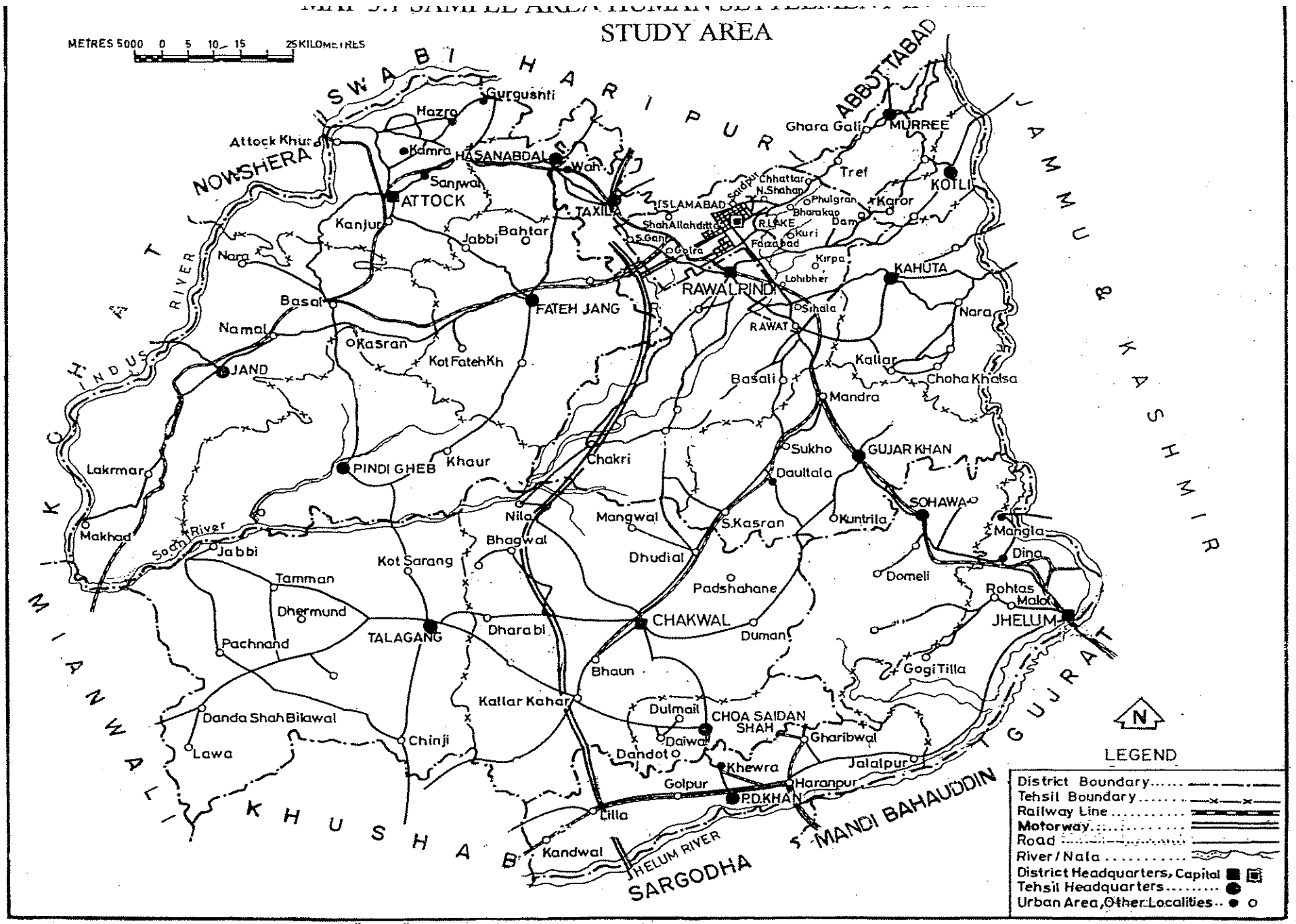
3.5 MAPS OF THE SURVEYED MAUZAS/HUMAN SETTLEMENT

As described in section 3.3.2 of chapter 3 the survey of 173 settlement was conducted in the Potohar region for collection of the data required for the study. The surveyed settlement is listed in table 3.2 given in a chapter. The location of this settlement is shown in the maps (3.1 to 3.19).

3.6 SAMPLING PROCEDURE

The universe of primary data collection from the research study totally based on the field survey consisted of entire Potohar Region in Punjab (Pakistan). The study area consist of five districts namely Attock, Chakwal, Islamabad, Jhelum and Rawalpindi and further divided into 18 sub-divisions/tehsils. The regional area is divided for the sampling design however, the urban/rural area was divided into 18 strata each equivalent to an administrative tehsil which were grouped together to form six separate strata, according to population size 1998. The contiguous tehsils within a stratum were grouped to form sub-strata of size equal to an approximate population 5,000 & above. In all 18 strata were formed for use of sample area by the sample field survey 1999-2000. One group of tehsils selected at random from population by categories/class from each stratum and one tehsil was selected at random from each selected group of tehsils. A contiguous area (cluster of *mauzas*/villages/settlement) 5,000 & above population was chosen from each sample tehsil at random which formed the sample area. Thus the rural area sample conforms to a multi-stage stratified cluster sample design (Karol J. Krotki and Sultan S. Hashmi, 1975).

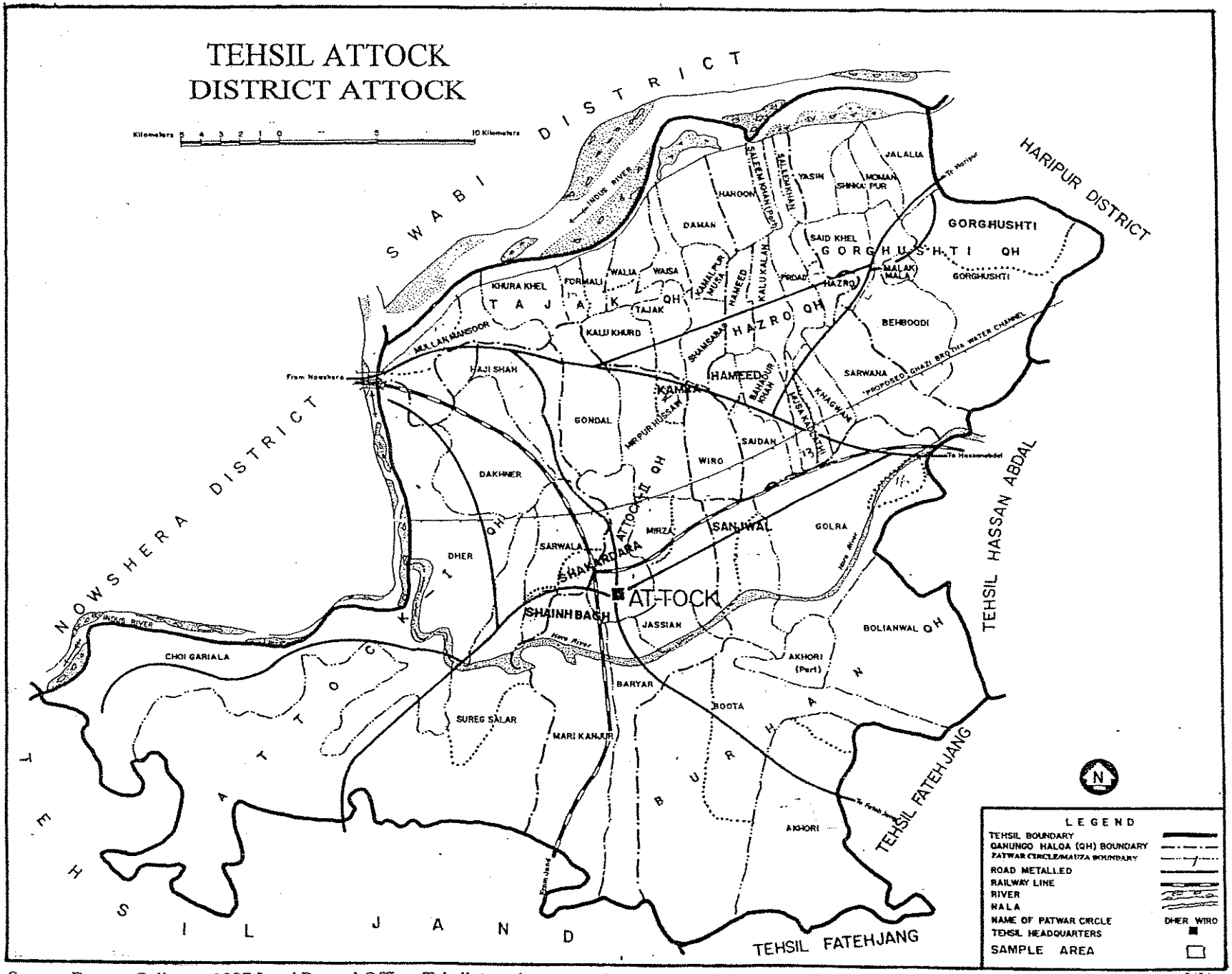
In the urban area (cities/towns) of each administrative tehsil were grouped to six strata. The urban human settlement (cities/towns) consists of urban centres of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi. One urban human settlement was selected from each stratum proportional allocation to its population size. The urban human settlement was selected randomly with approximately population 5,000 & above persons from each area in the Potohar region. In the study a few settlement area in Potohar Region are difficult to reach especially in Kotli Sattian, Kahuta and



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

MAP 3.1 SAMPLE AREA HUMAN SETTLEMENT IN THE

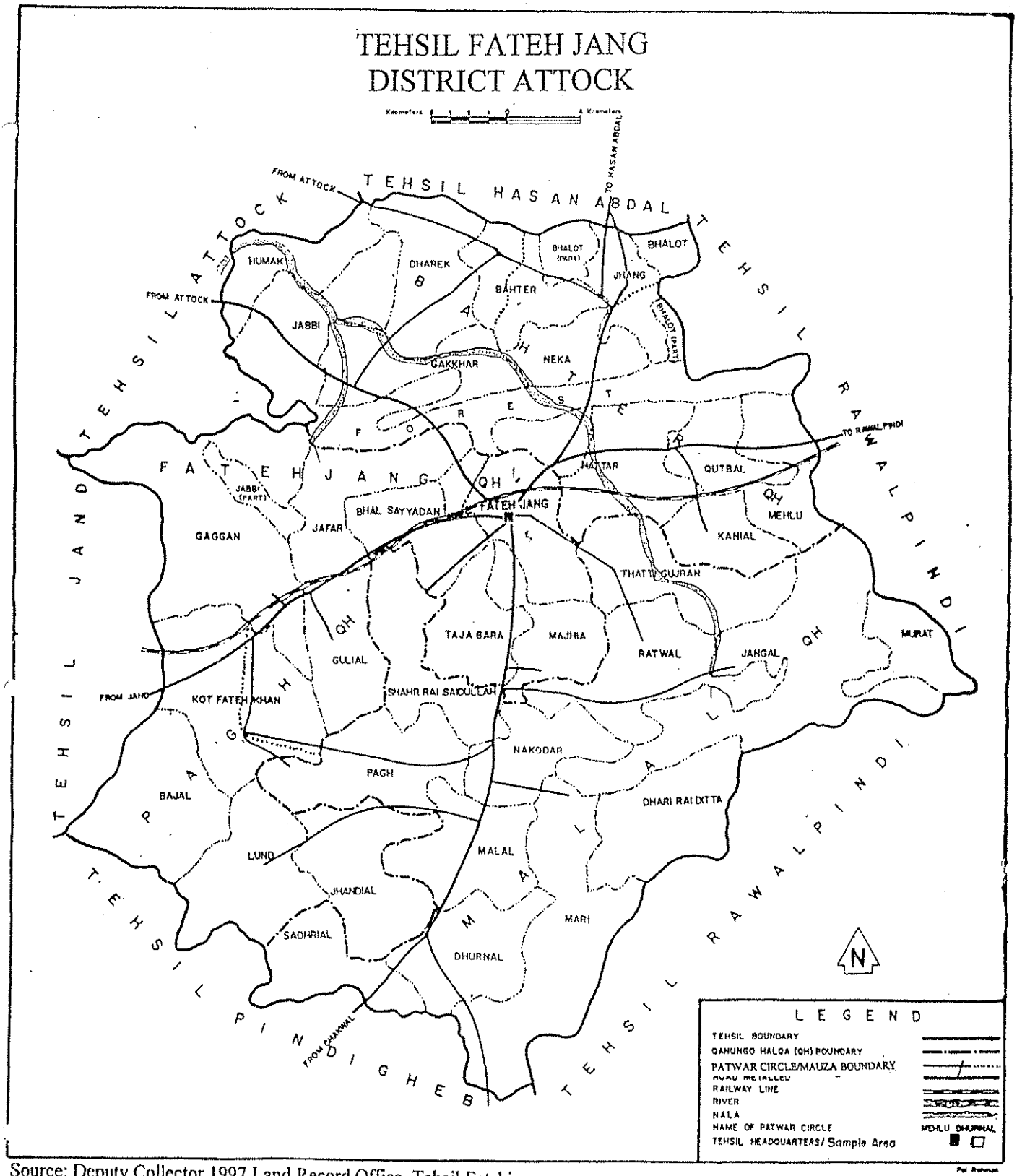
MAP 3.2 SAMPLE AREA



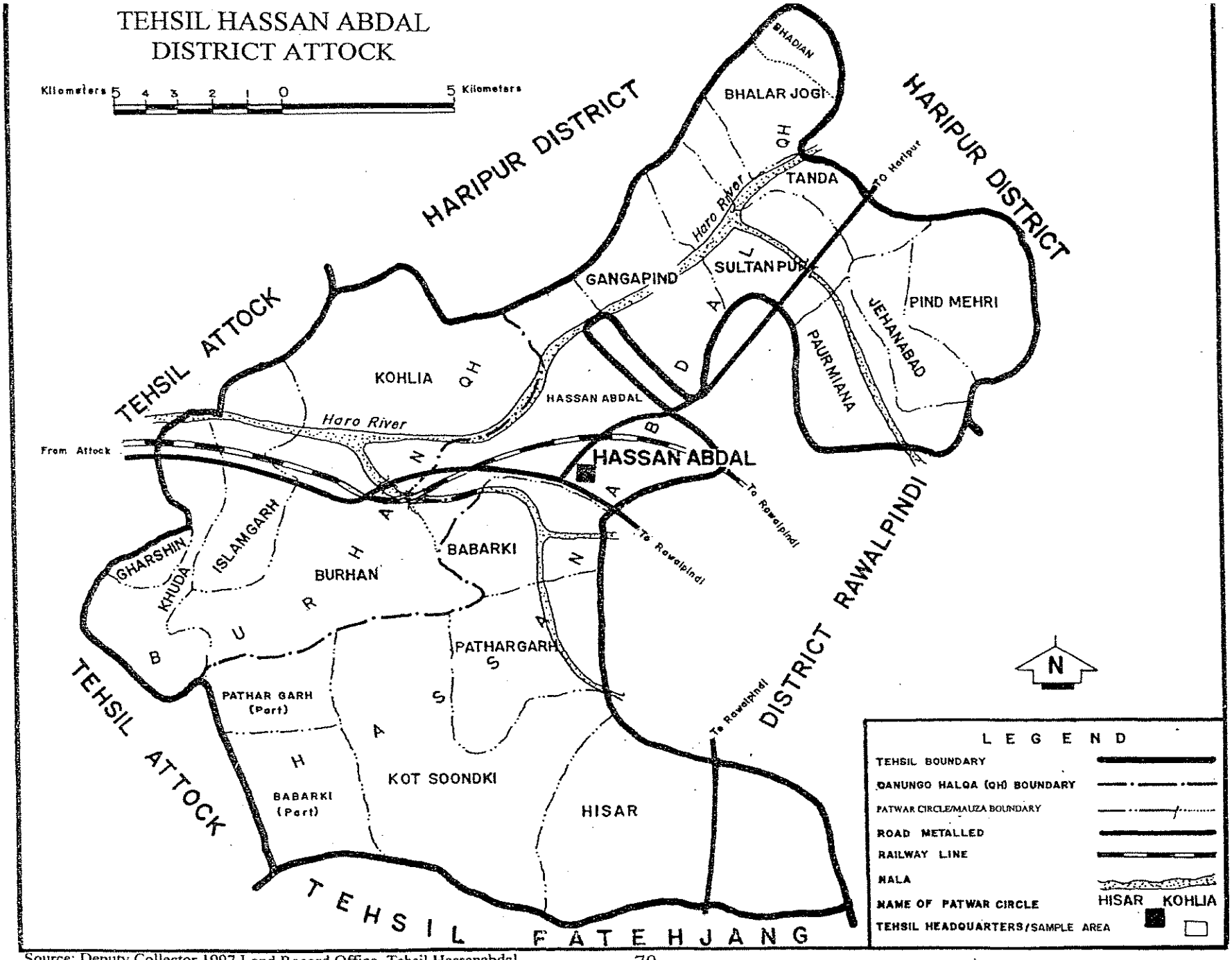
Source: Deputy Collector 1997 Land Record Office, Tehsil Attock

MAP 3.2 SAMPLE AREA

MAP 3.3 SAMPLE AREA



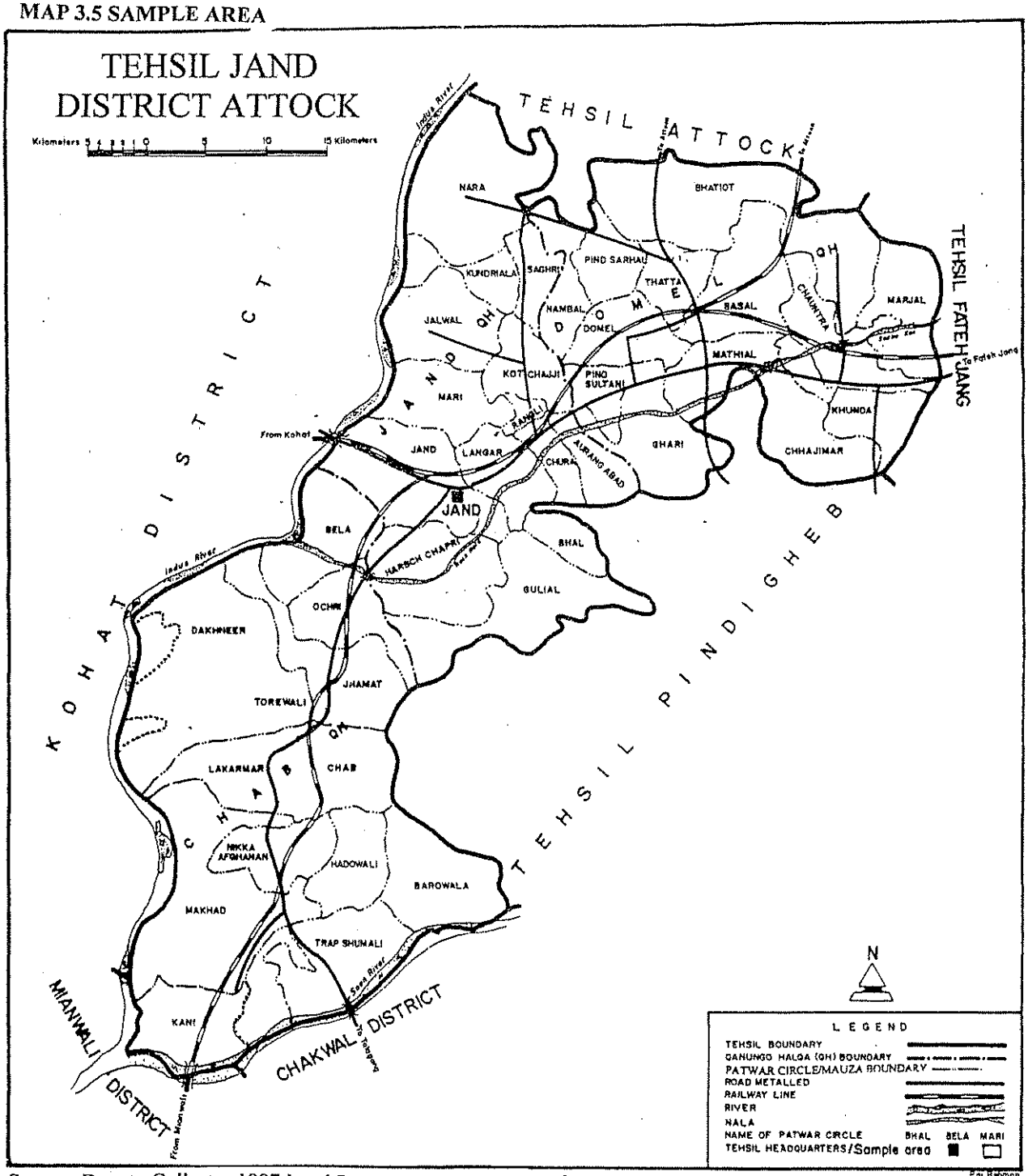
Source: Deputy Collector 1997 Land Record Office, Tehsil Fatehjang



Source: Deputy Collector 1997 Land Record Office, Tehsil Hassanabdal

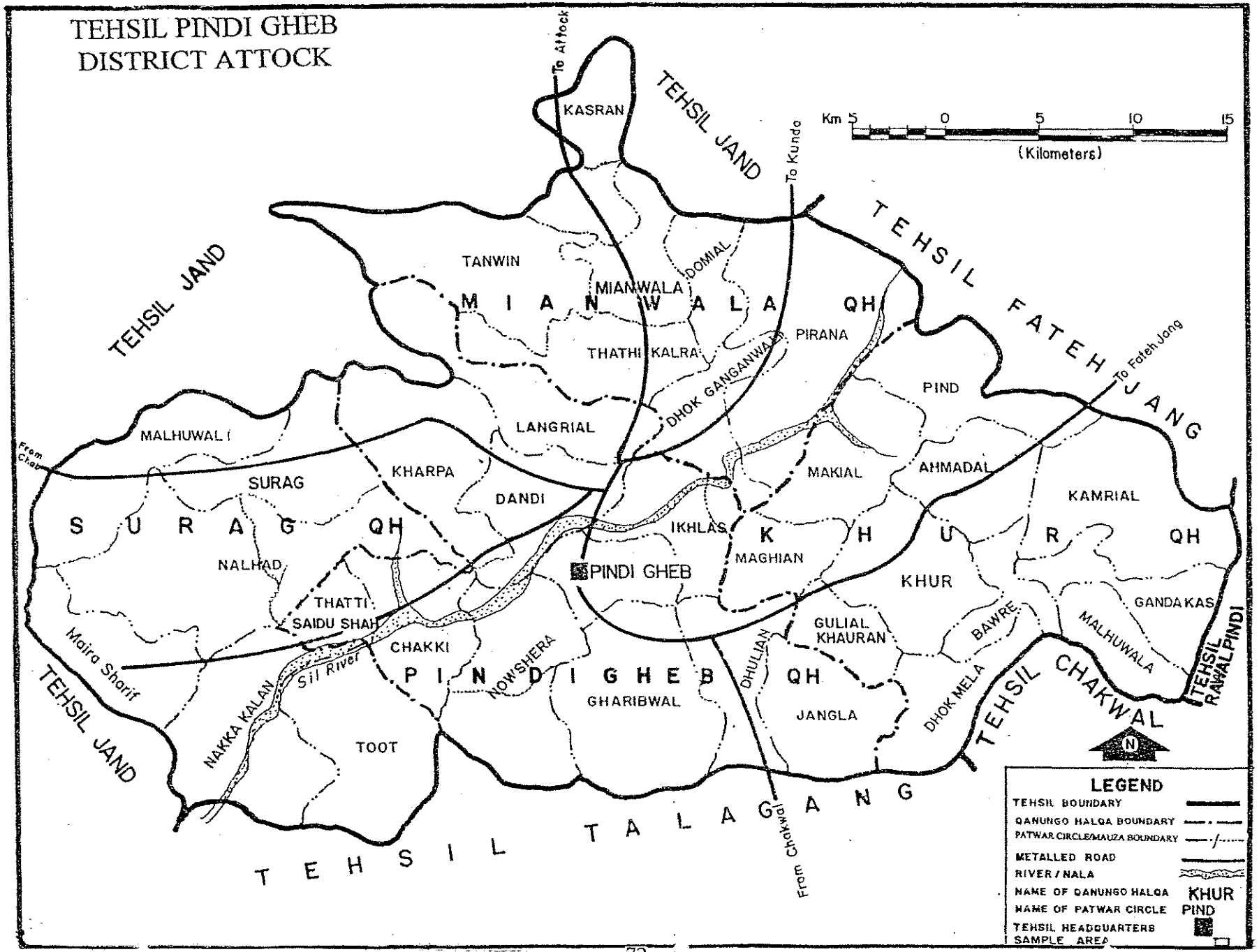
MAP 3.4 SAMPLE AREA

MAP 3.5 SAMPLE AREA



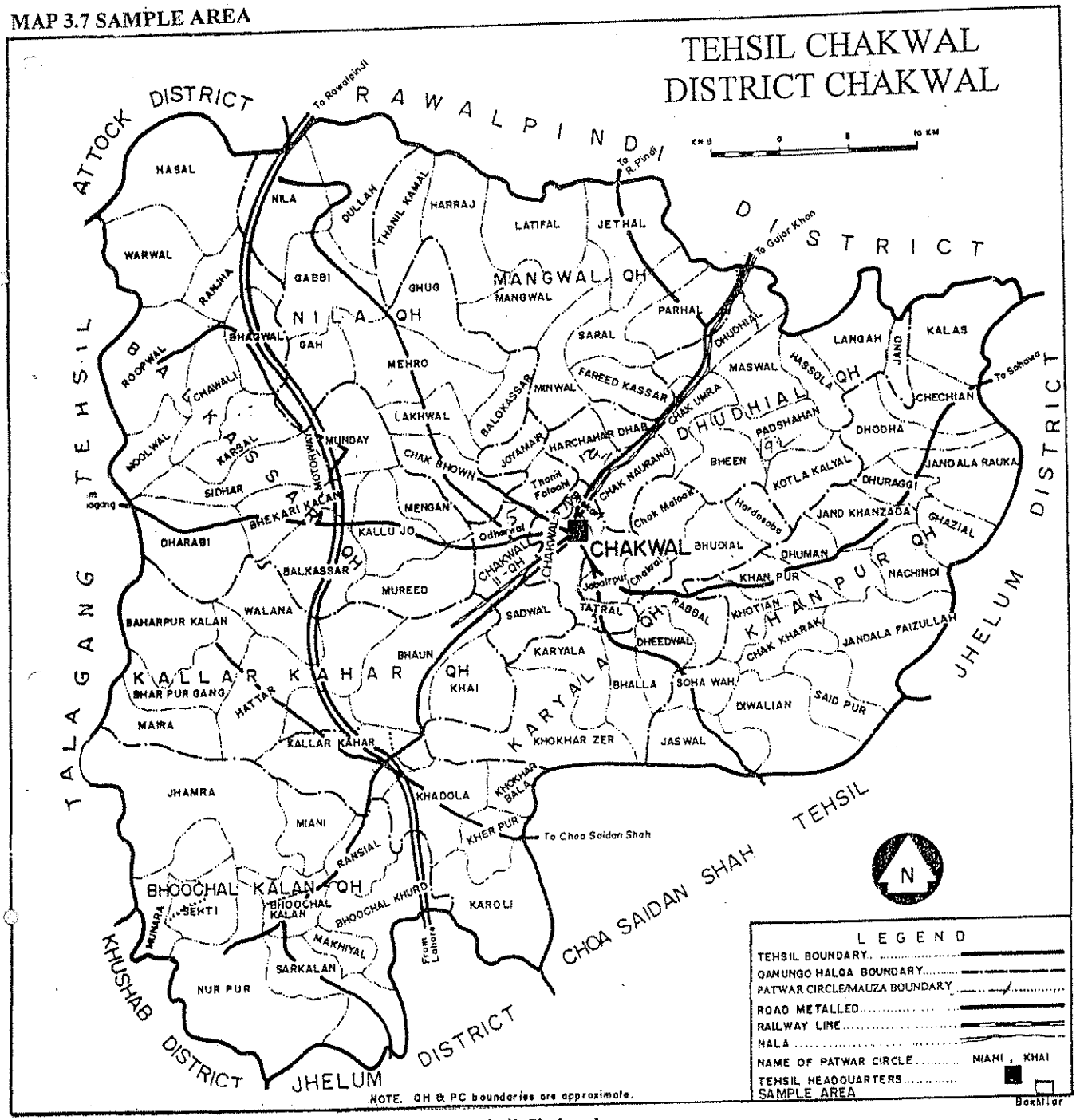
Source: Deputy Collector 1997 Land Record Office, Tehsil Jand

MAP 3.6 SAMPLE AREA



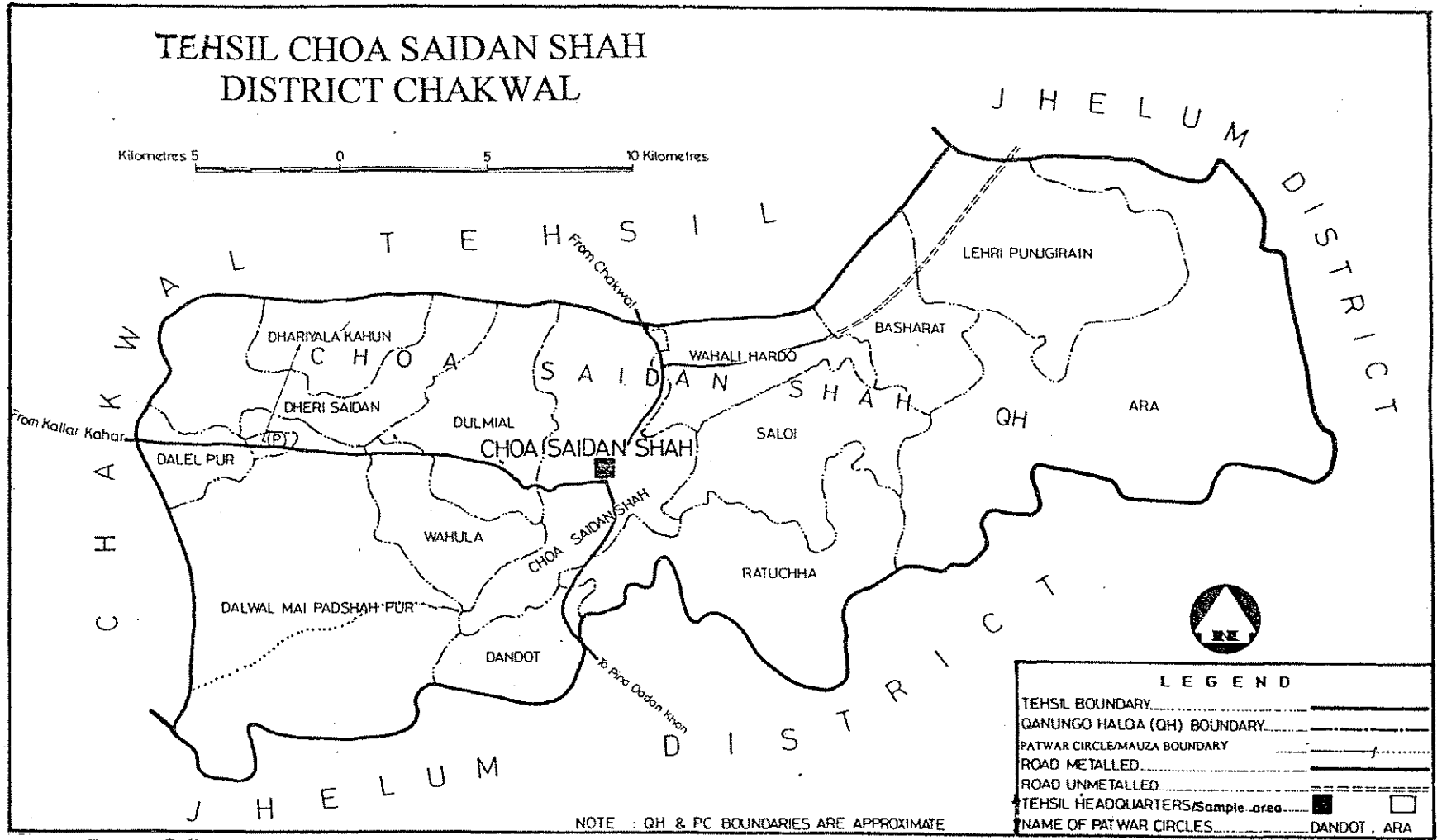
Source: Deputy Collector 1997 Land Record Office, Tehsil Pindi Gheb

MAP 3.7 SAMPLE AREA



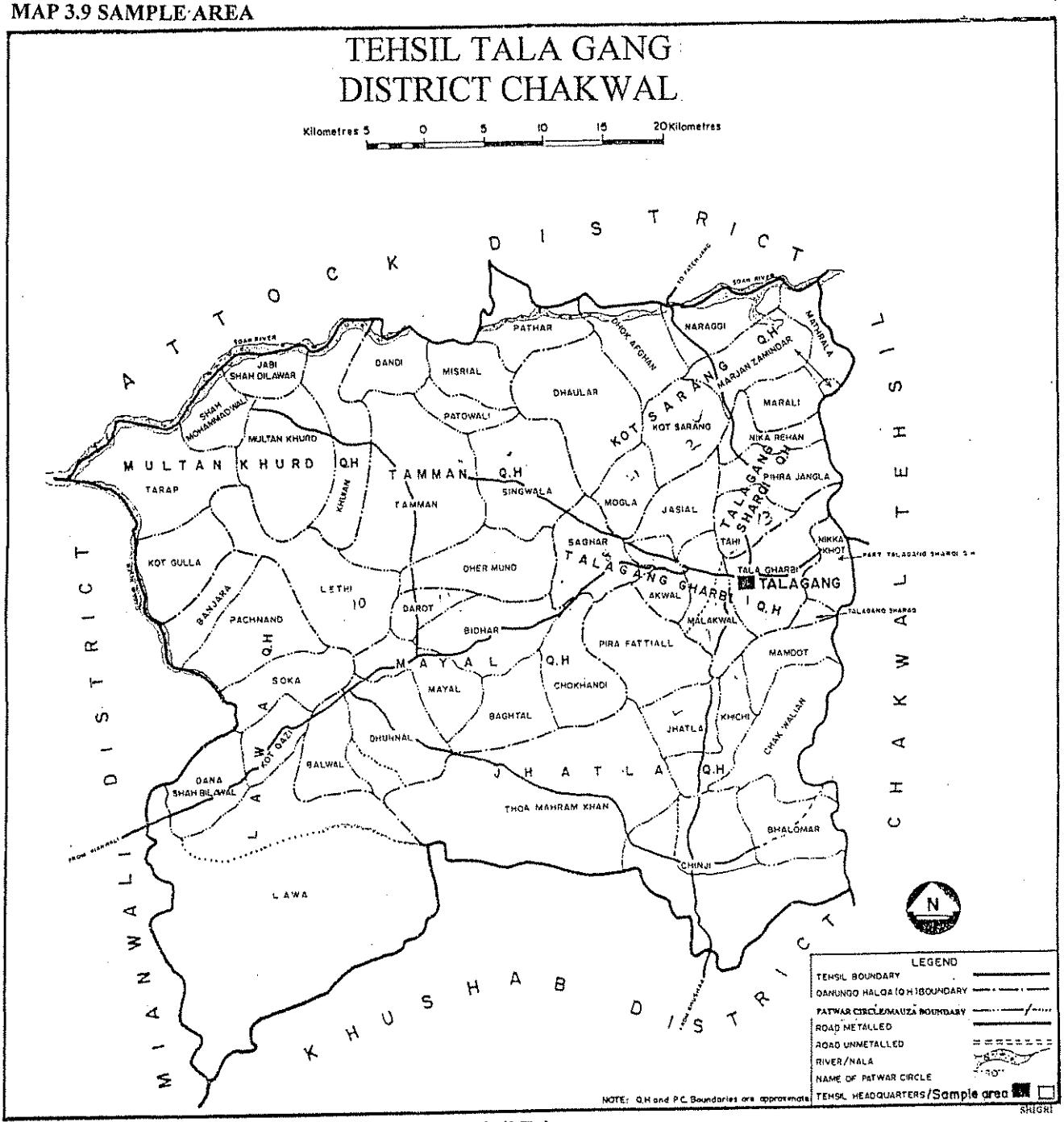
Source: Deputy Collector 1997 Land Record Office, Tehsil Chakwal

MAP 3.8 SAMPLE AREA



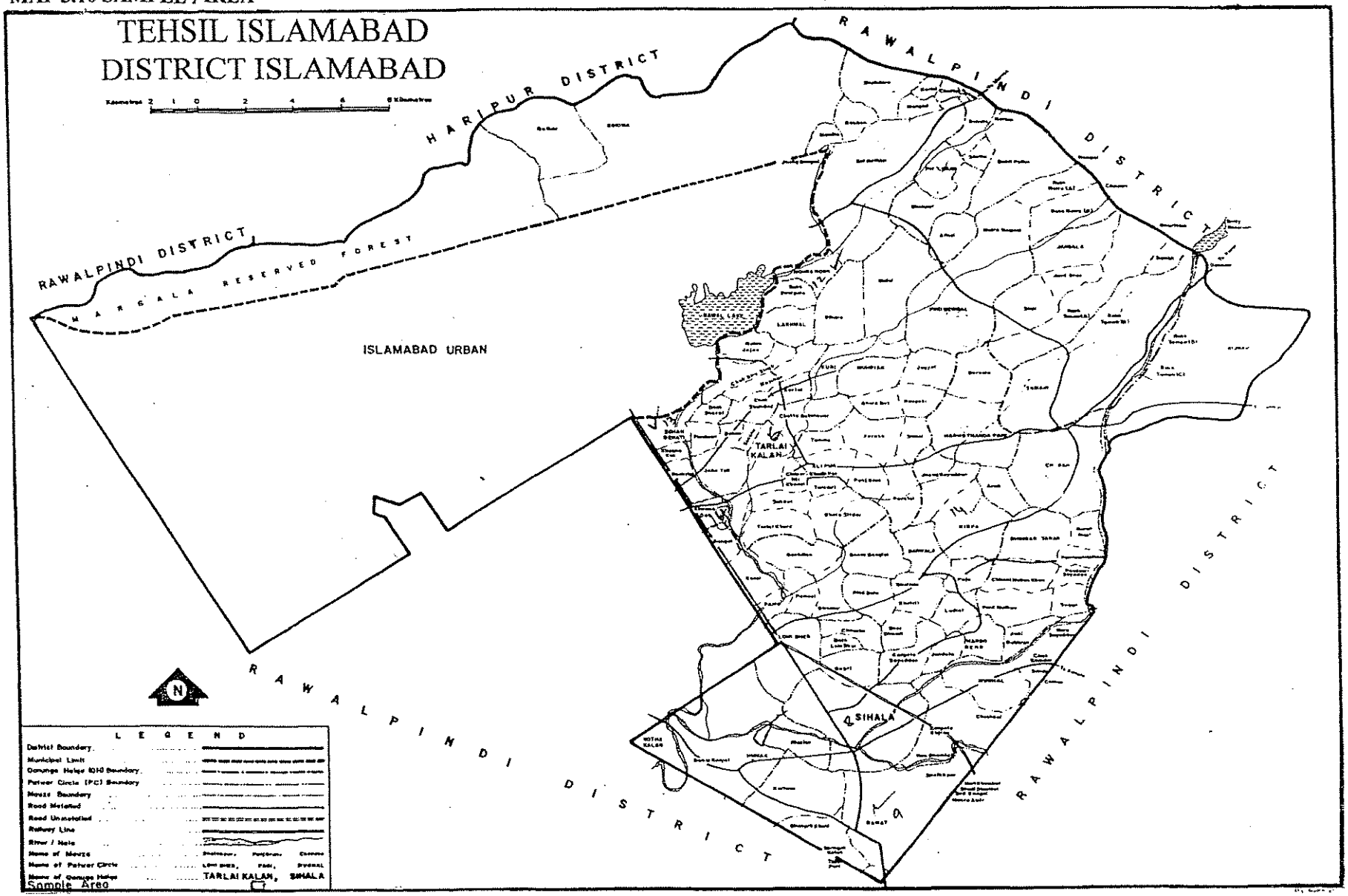
Source: Deputy Collector 1997 Land Record Office, Tehsil Choa Saidan Shah

MAP 3.9 SAMPLE AREA



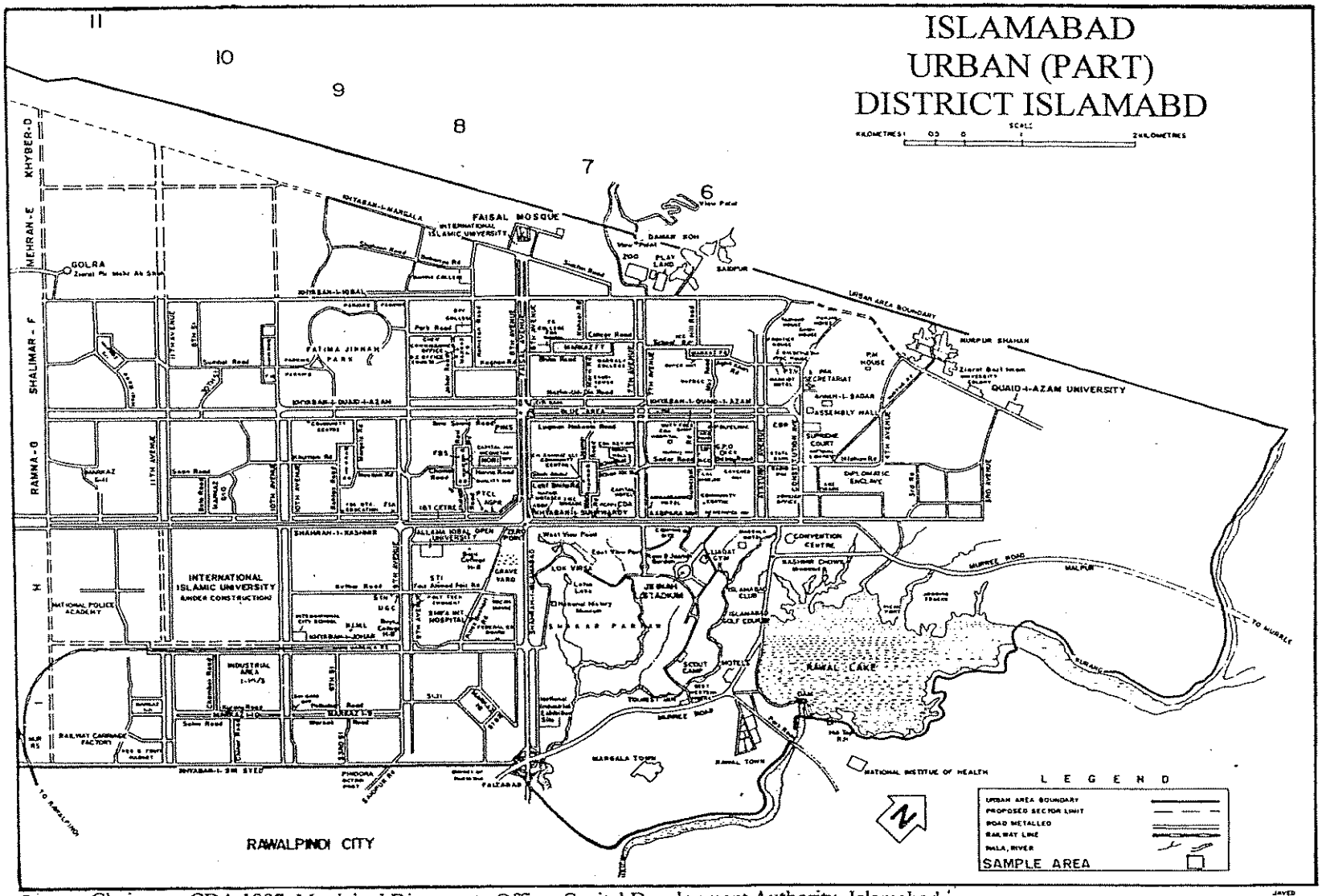
Source: Deputy Collector 1997 Land Record Office, Tehsil Talagang

MAP 3.10 SAMPLE AREA



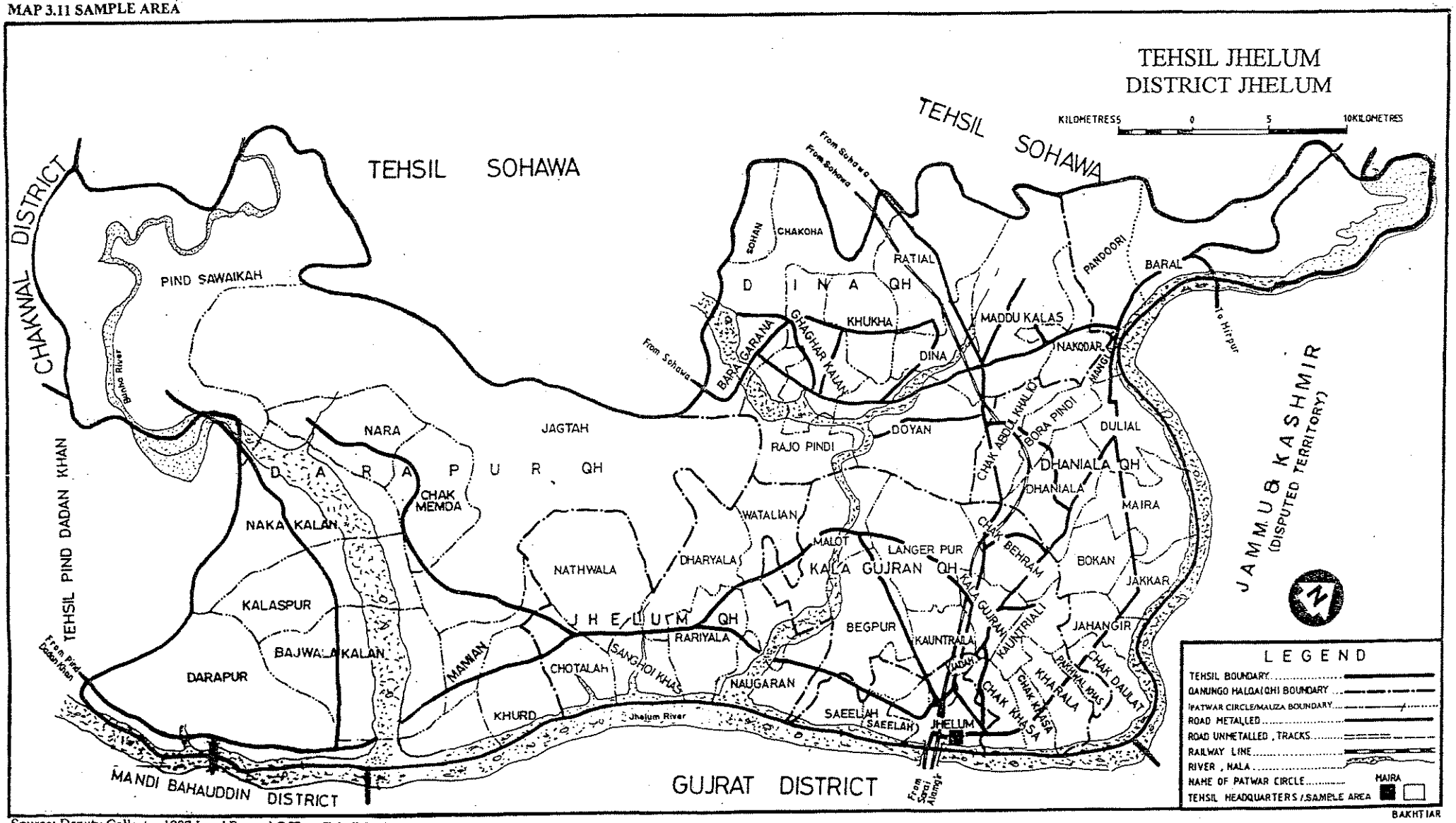
Source: Deputy Collector 1997 Land Record Office, Islamabad District

MAP 3.10.1 SAMPLE AREA



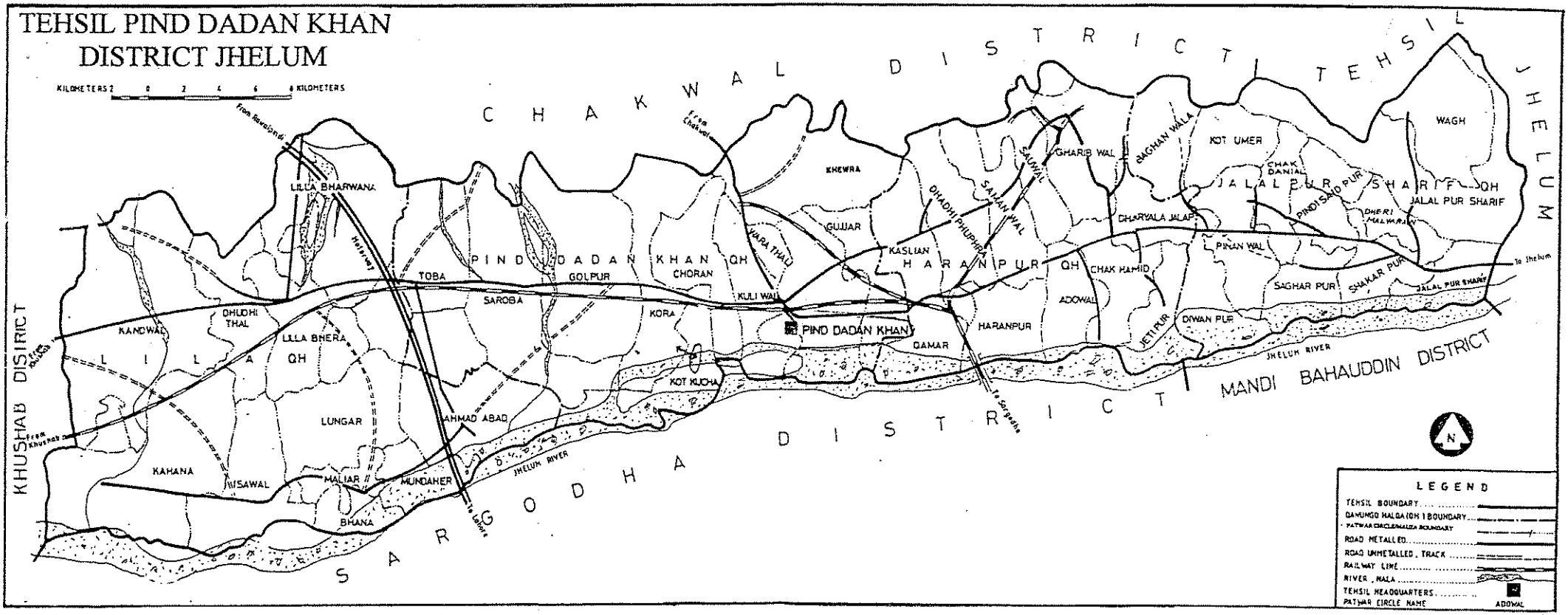
Source: Chairman, CDA 1997, Municipal Directorate Office, Capital Development Authority, Islamabad.

MAP 3.11 SAMPLE AREA



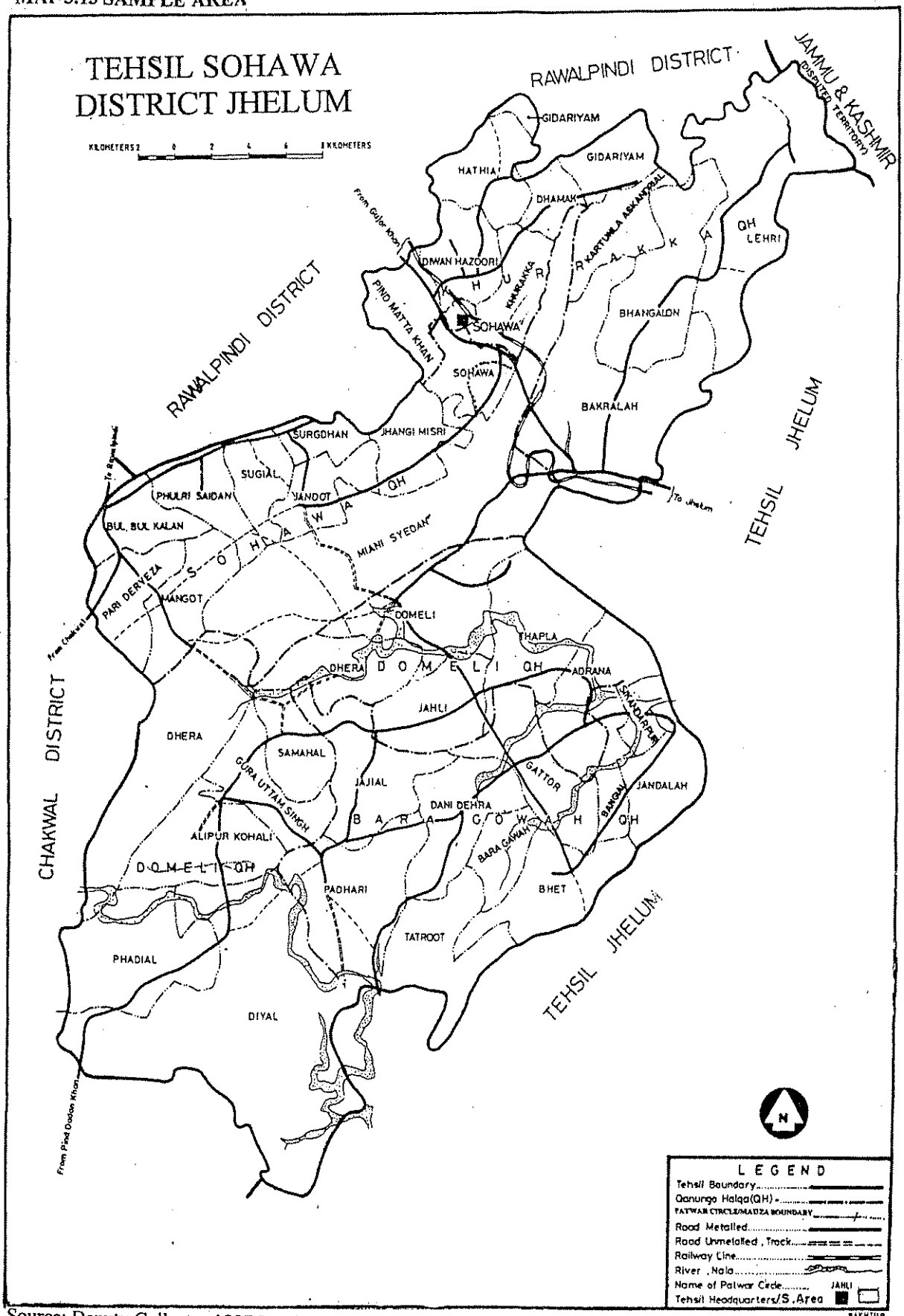
Source: Deputy Collector 1997 Land Record Office, Tehsil Jhelum

MAP 3.12 SAMPLE AREA



Source: Deputy Collector 1997 Land Record Office, Tehsil Pind Dadan Khan

MAP 3.13 SAMPLE AREA



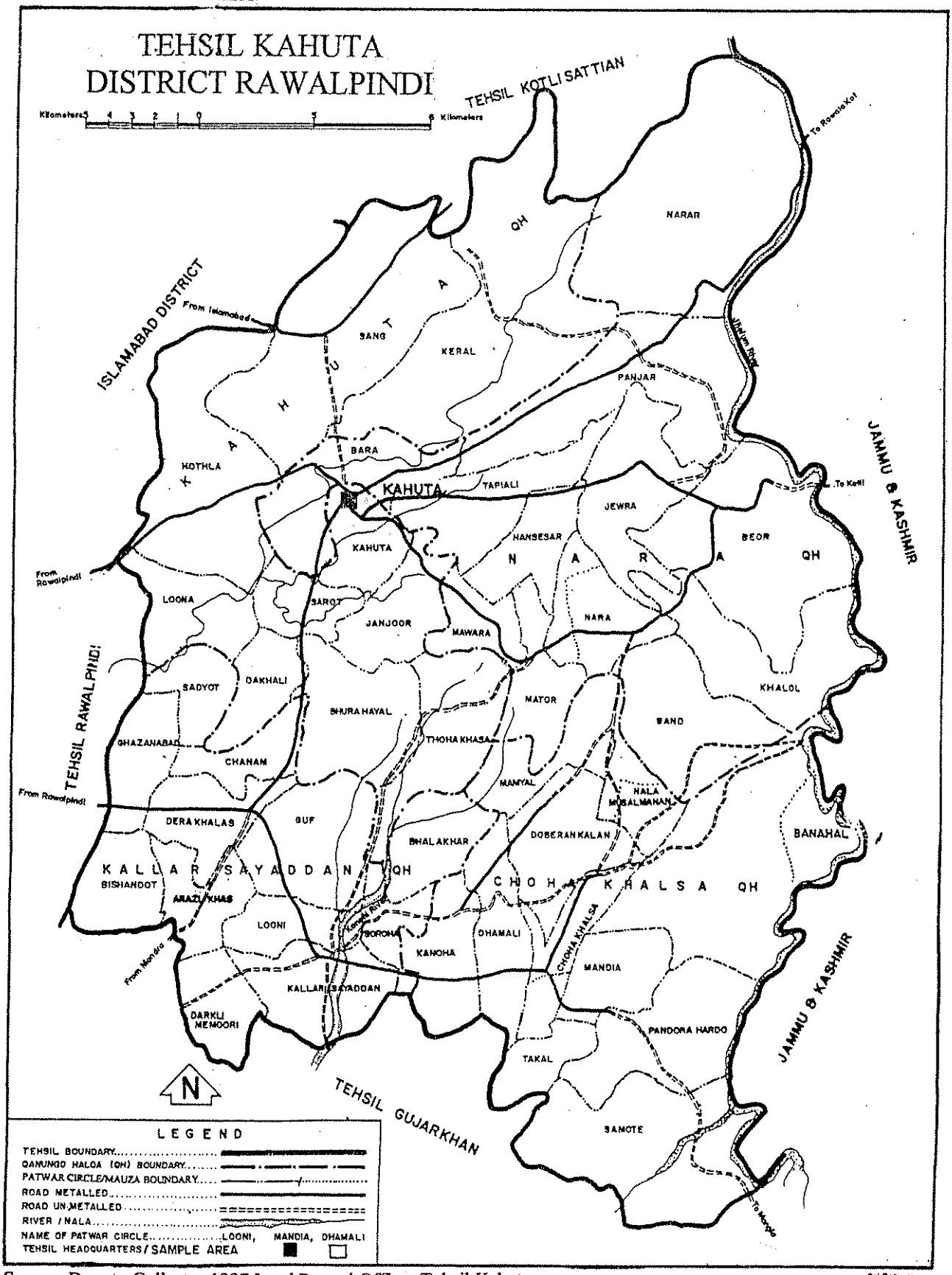
Source: Deputy Collector 1997 Land Record Office, Tehsil Sohawa

MAP 3.14 SAMPLE AREA



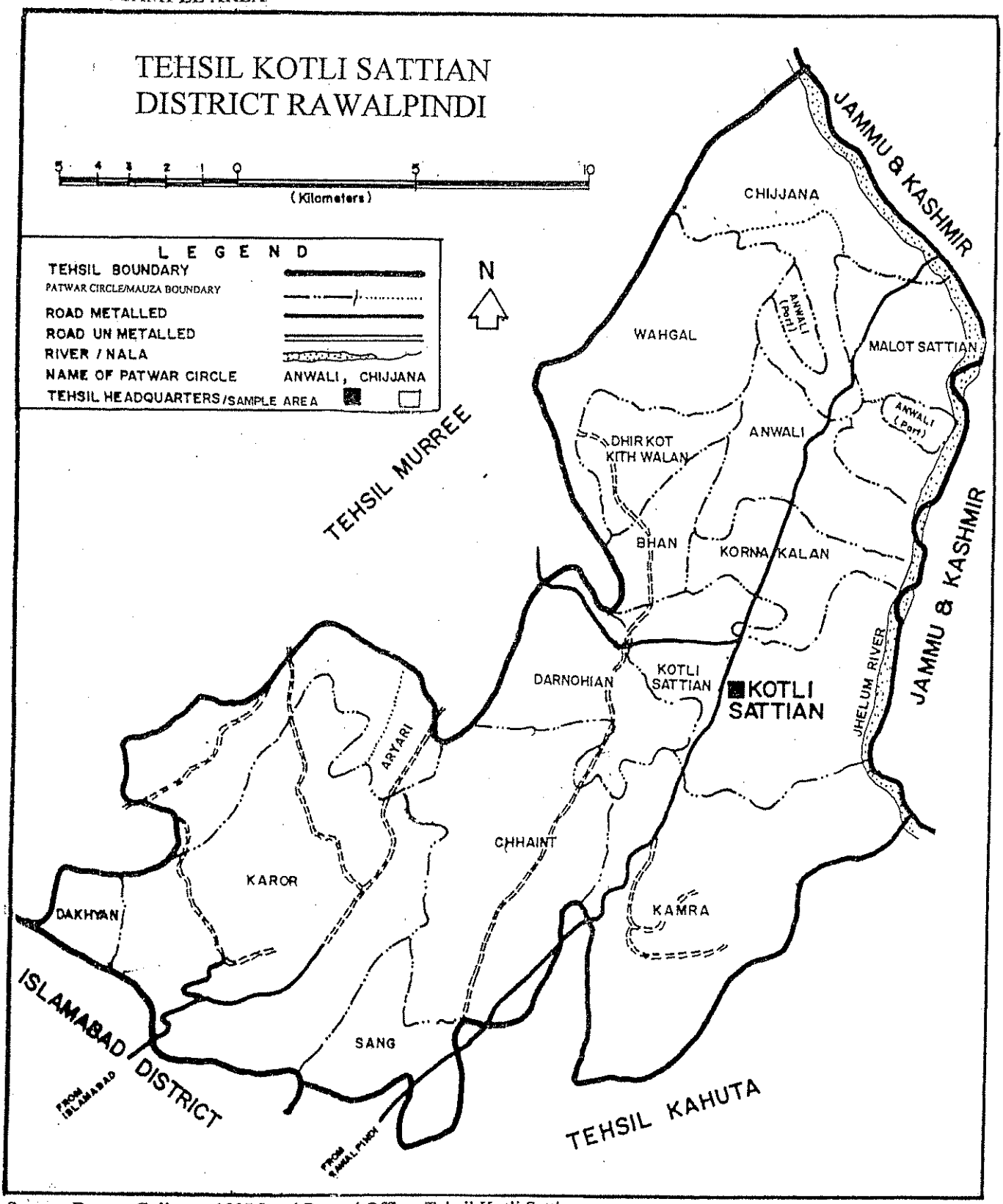
Source: Deputy Collector 1997 Land Record Office, Tehsil Gujarkhan

MAP 3.15 SAMPLE AREA



Source: Deputy Collector 1997 Land Record Office, Tehsil Kahuta

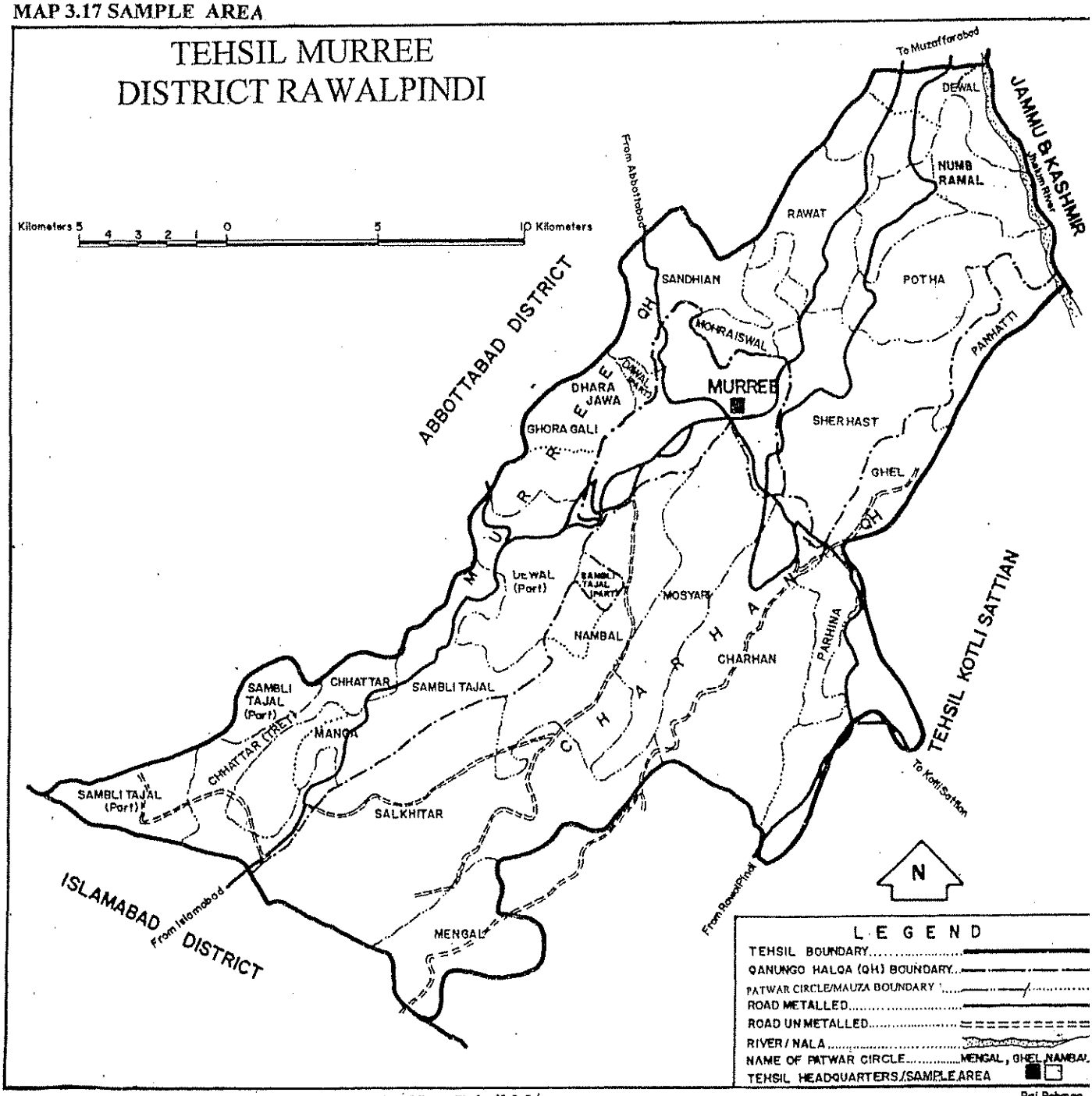
MAP 3.16 SAMPLE AREA



Source: Deputy Collector 1997 Land Record Office, Tehsil Kotli Sattian

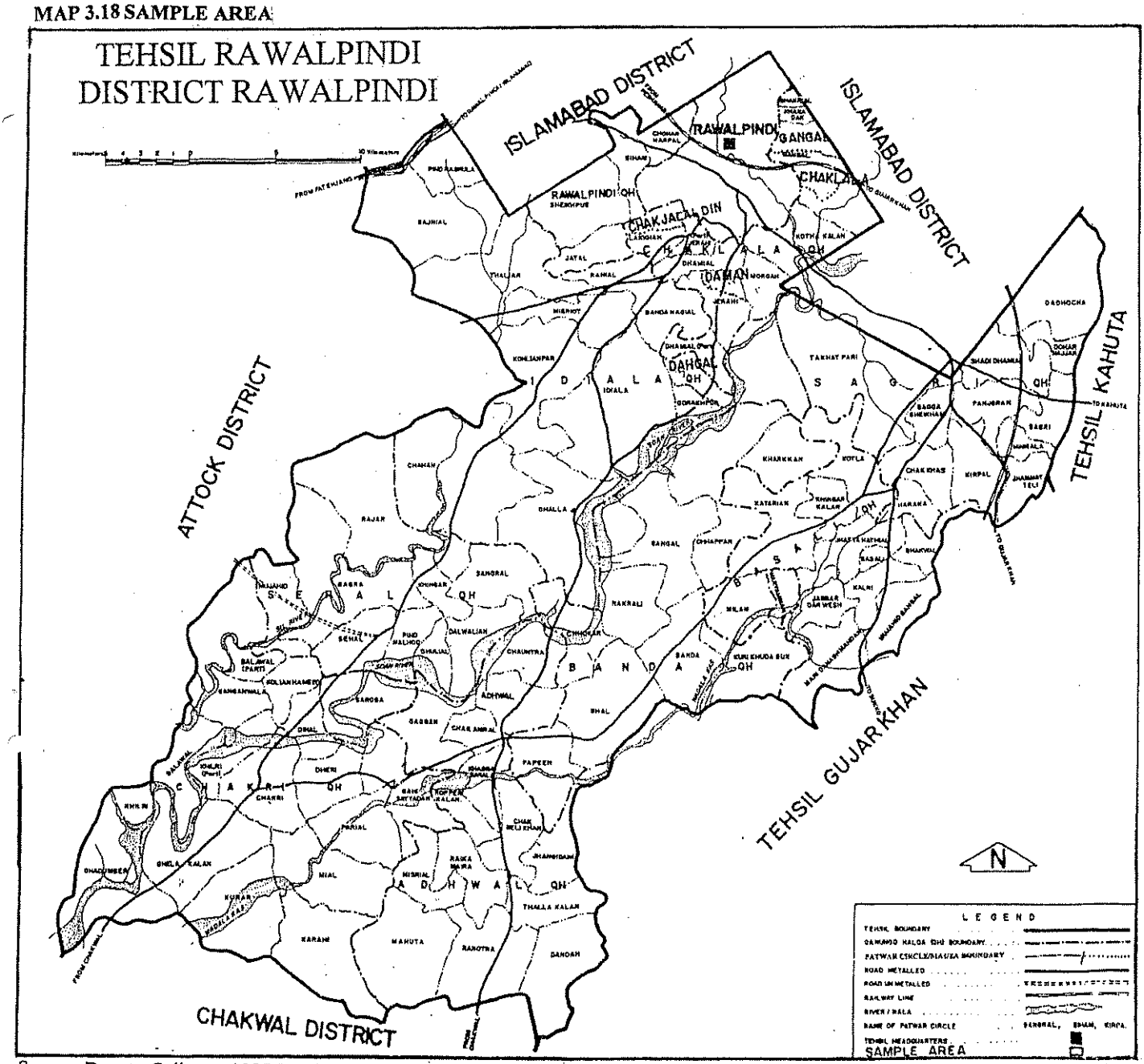
Pai Rehman

MAP 3.17 SAMPLE AREA



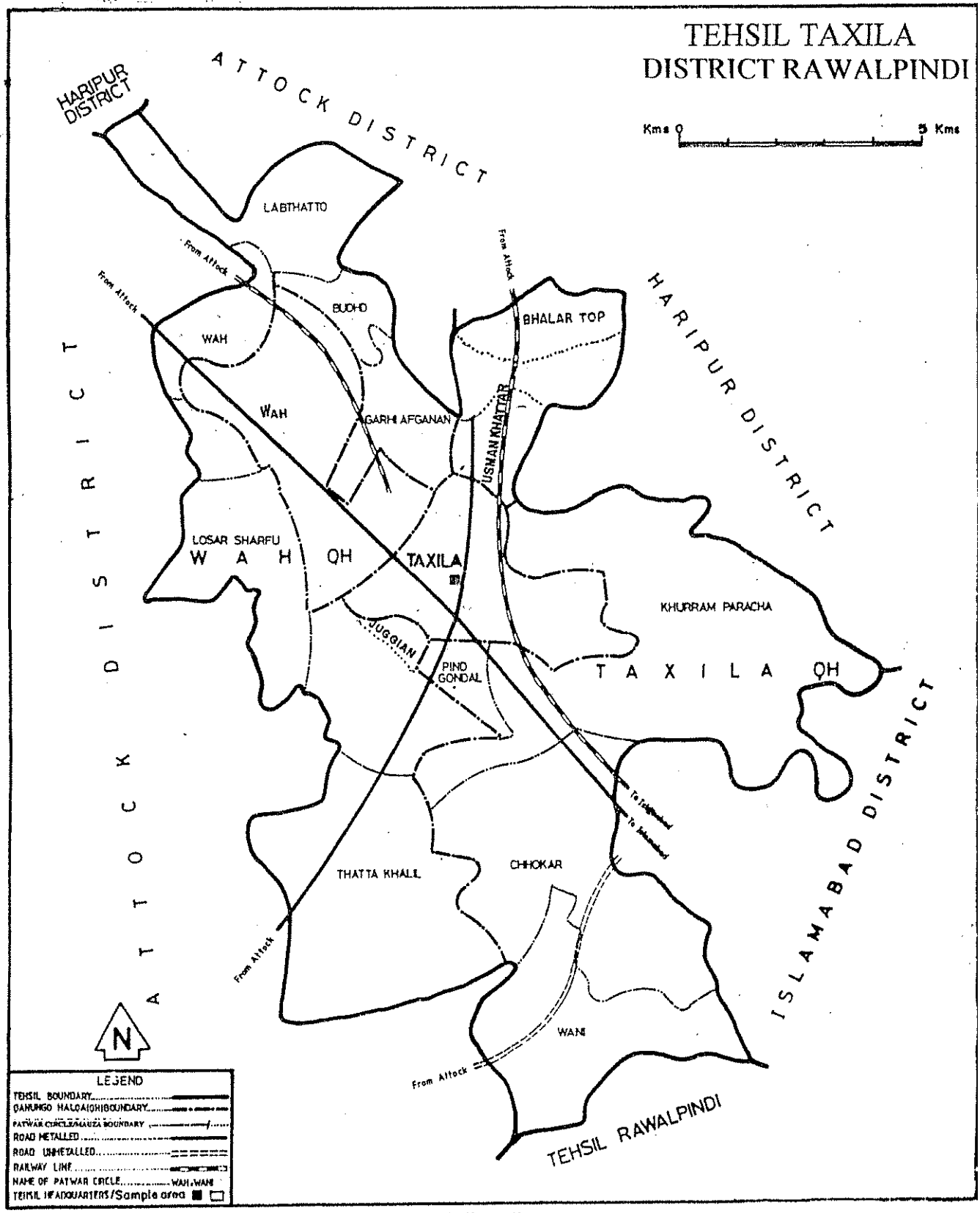
Source: Deputy Collector 1997 Land Record Office, Tehsil Murree

MAP 3.18 SAMPLE AREA



Source: Deputy Collector 1997 Land Record Office, Tehsil Rawalpindi

MAP 3.19 SAMPLE AREA



Source: Deputy Collector 1997 Land Record Office, Tehsil Taxila

Murree tehsils, due to lack of roads and communication facilities. (like rural area the urban sample also conforms to a multistage stratified cluster sample design.)

Although the sample urban/rural area selected was probability the population size of the study area (sample areas), in order to contain having population approximately five thousand are selected and located on the map.

3.6.1 SAMPLE DESIGN

Mauzas/village/settlement lists published by the population Census Organisation, in 1998, the sampling frame for rural areas. Cities[2] and towns declared as urban area (having population 5,000 & above), in 1998 Census were grouped to form the entire urban area.

A two stage stratified random sampling plan was adopted for rural sample where tehsil constituted primary sampling units and clusters (consisting of mauzas/villages), excluding one stratum in which the cluster size consist of 5,000 & above population formed the secondary sampling units.

The entire rural area was divided into six strata. In the study area, similar in characteristics were grouped together to form the strata, of which several were more or less equal out of 2,798 mauzas/settlement (cities/towns) in size. The human settlement of entire Potohar Region are selected 173 sample areas having Population 4,278 thousands and consisted of, 31 human settlement cover 70 percent population urban areas and the remaining human settlement 147 represented cover 30 percent population 1,299 thousand in rural areas. The percentage of human sample areas are larger than the rural sample area because urban population is more heterogeneous than the rural population. Since the field resources fell short of actual requirements the sample was divided into two equal parts by selecting odd number from sample area, named as urban and rural sample.

Foot note:-

[1] A Mauza is defined as a parced or parcels of land having a separate in revenue records with Head best number and known limits.

Single stage stratified random sampling technique was fallowed for urban/rural areas forming the single stage sampling units. In the study area, both urban/rural area was split into strata: human settlement by category wise population i) Metropolitan Cities (5,00,000 & above), ii) Large Cities (1,00,000-4,99,999), iii) Cities (50,000-999 99), iv) Large Towns (25,000-49,999), v) Intermediate Towns (10,000-24,999), vi) Small Towns (5,000-9,999).

3.6.2 MAPPING OF SAMPLE AREA

The rural sample consisted of mauza/villages/settlement was first identified with the help of the local revenue official, the *patwari* and village *chowekeder*. For every sample area maps were prepared from Mauza Massive index map and after that mauza maps checked with the mauza of Latta. The first map was named the settlement sketch map indicated the general location of the sample area with respect to the adjoining mauza/villages. In case a sample area which was spread over a large territory with intervening settlement/mauźa/village, the sketch map showed the entire settlement ground feature including road, street, rivers etc, indicating each of the sample settlement together with the surrounding intervening mauza". All 18 tehsil maps collect from, Population Census Organisation in 1998.

The urban sample areas map called electoral units were demarcated with the cooperation of Chief Office/Building Inspector, and in some cases with the assistance, supervisory, *patwari* and other staff of the Municipal Corporation/Committees Town Committees and Cantonments.

3.6.3 A CRITERIA OF METHODOLOGY

In rural area was interviewed of each sample human settlement for collecting data according to such as to questionnaire designed, such procedure only succeeded in selected human settlement respondent officers/officials, government departments, in urban areas.

Foot note:-

[2] The concept of locality urban centres is more administrative and proper understanding of urban concentrative requires information at city level. Hence on the basis of contiguous Municipal.

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PART TWO
POPULATION CHARACTERISTICS

CHAPTER FOUR

POTOHAR REGION: THE ENVIRONMENT

4.1 INTRODUCTION

This chapter explains the prevailing environmental condition of the study area. After giving a brief background and history it is divided into two parts. Physical environment including the name of Potohar, location, topography, climate, general distribution of temperature, rainfall, the foothills social forestry, the rakhs forest management, reserved protected unclassed forests, varieties of grass, administrative division units of Potohar are briefly explained in part I. Socio-cultural conditions including the socio-economic and cultural language, agriculture of the region, minerals, industry of the study area are given in part 2nd followed by a brief conclusion.

4.1.1 BACKGROUND AND HISTORY

The mode of life of people Potohar reflects a synthesis of various people, who have been living in the study area. Since times in immemorial, the urban landscape has been withstood many changes from the ancient ruins of Taxila to the modern city of Islamabad.

Potohar was the political, academic and ritual core of the vast Buddhist empire that stretched from Afghanistan to southern India. Buddhism was the predominant cultural force in these areas co-existing with Hinduism until the Persians formally annexed Punjab in their empire. Thus Zoroastrianism, Hinduism and Greeks under Alexander, the Macedonian took up arms to wipe out the Persians, who were the traditional rivals in the Near East. Alexander did not venture to conquer the entire world. He just was out on a revenge-spree and when he had done with it, he turned back (Iftikhar Hussain Malik, 1986).

4.1.2 THE NAME OF POTOHAR

The region 'Potohar' which is the focus (Aziz Malik, 1978) of this study was known by this name (Potohar) since long before the Moghals arrived here(Iftikhar Hussain Malik, 1986). But as far as history is concerned, it was Moghal emperor Jehangir, who first mentioned this name i.e. Potohar, in his diary which later

appeared under the title of Tuzak-I-Jahingeri, (Iftikher Hussain Malik, 1986). He referred it as "*Pope Har*", according to Jehangir was the name used by Raj Pathora. Raj Pathora after defeating Shahabuddin Ghauri followed him upto what is now Potohar. It was spring then and all over there was greenery and flowers profusely bedecked the entire land. Raj Pathora was so tremendously impressed by the scenic beauty, he said that the land is "*Pope Har*"; that is the land is all flowers. However, another historian attributed this sentence to King Shahabuddin Ghauri, (Awan Anwar Beg, 1986). '*PopeHar*' it can be opined, came to be converted after years of use, into 'Potohar' as often happens with names of places and persons. It is, however, doubtful that '*PopeHar*' was the name of this region, as '*Pope*' does not stand for flower[1] in any language (Awan Anwar Beg, 1986). Rather it sounds more correct that the actual name of this region is what it is now i.e. Potohar. The name '*Popehar*' mentioned in some historical is a distortion of 'Potohar' which is also called in some places with the accent '*Puthwar*'. In Hindi language Potohar means the land of wreaths of flowers (In Hindi *Potho* - Flowers, and *Har*-wreath) (Souvenir, 1982). Potohar also means the land of rough and broken topography which characterises this region, and it is most probable that the origin of the word Potohar has its roots in this characteristic i.e. the broken land of the area (Potohar Geographical study, 1974).

This reference to emperor Jehangir does not appear to be correct as Raj Pathor never came to Potohar in the pursuit of Shahabuddin Ghauri (Iftikhar Hussain Malik, 1986). After defeat, Shahabuddin and his men all dashed back to Islamic world on the West. The only one left behind was Qazi Taulak who remained in the fort of "Bhatinda" (Iftikhar Hussain Malik, 1986). Raj Pathora advanced towards this fort (Minhaj Siraj) and laid siege for 11 to 13 months (Aziz Malik, 1978). Yayha bin Ahmad says that Raj Pathora instead of chasing Shahabuddin Ghauri after defeating the latter, invaded Bhatinda.

Foot note:-

[1] 'Hind' poet means flower and 'Pothar' means a string of flowers (Aziz Malik, 1978 Potohar Archaeological).

where Malik Ziauddin Taulik fought back with the invader from inside the fort for 13 months (Gazetter, District Rawalpindi, 1893-94). So it seems to have been conclusively proved that Raj Pathora did not come here. So association of Potohar story to Raj Pathora is not finally proved (Awan Anwar Beg, 1986).

It is also noteworthy that after defeat Shahabuddin Ghauri did not return by the same route. He returned to Ghazni via Multan and Bannu, not via Potohar which proves that even Shahabuddin Ghauri did not call this place '*Pope Har*". Later when Sultan Ghauri was returning to his country, he was murdered at 'Dheemak' Sohawa tehsil (Robertson, 1887). But even if we assume that Shahabuddin Ghauri or some one else did pass through this land during the spring he could not have used the word '*Pope Har*'. Possibly, any Persian speaking ruler, who came to India could have, at the most, called the place Bahar 'spring' and later the word adopted the shape of Potohar due to its use down the ages, (Ghaffoor, 1986).

Most of the historians agree that before the arrival of Aryans the Dravadians lived here. Same is said about the Brahvi people who were settled in Balochistan. In the support of this contention, some common words are cited as proof, which in spite of distance between the two places (Potohar where Dravadians lived and Balochistan where Brahvi were settled) sound alike. In Draviadian language '*Poto*' means 'barren land' and '*Dar*' is the place where animals are kept (Iftikhar Hussain Malik, 1986). Perhaps when Dravadians came to settle here they used the 'barren or unproductive' land as pasture for their animal. And, therefore, the place came to be known as '*Poto-warh*' which over a period of time became 'Potohar', (Aziz Malik, 1978).

In South India where Dravadians are settled, an old port is called '*pohar*' which sounds mostly like Potohar. This port was later converted by Augustas the Great as a colony of Romans (Iftikhar Hussain Malik, 1986). This port was located on the bank of River Kaveri. May be the Dravadians after their migration to this place established the '*Pohar*' city on the basis of their old attachment to Pohar.

In most accounts of the derivation of the name of this region. the factor of the region's topographical nature is most probably derived from the area, mixed character

of mountainous and sub-mountainous region interspersed with plains, streams, etc is shown on (Map-4.1).

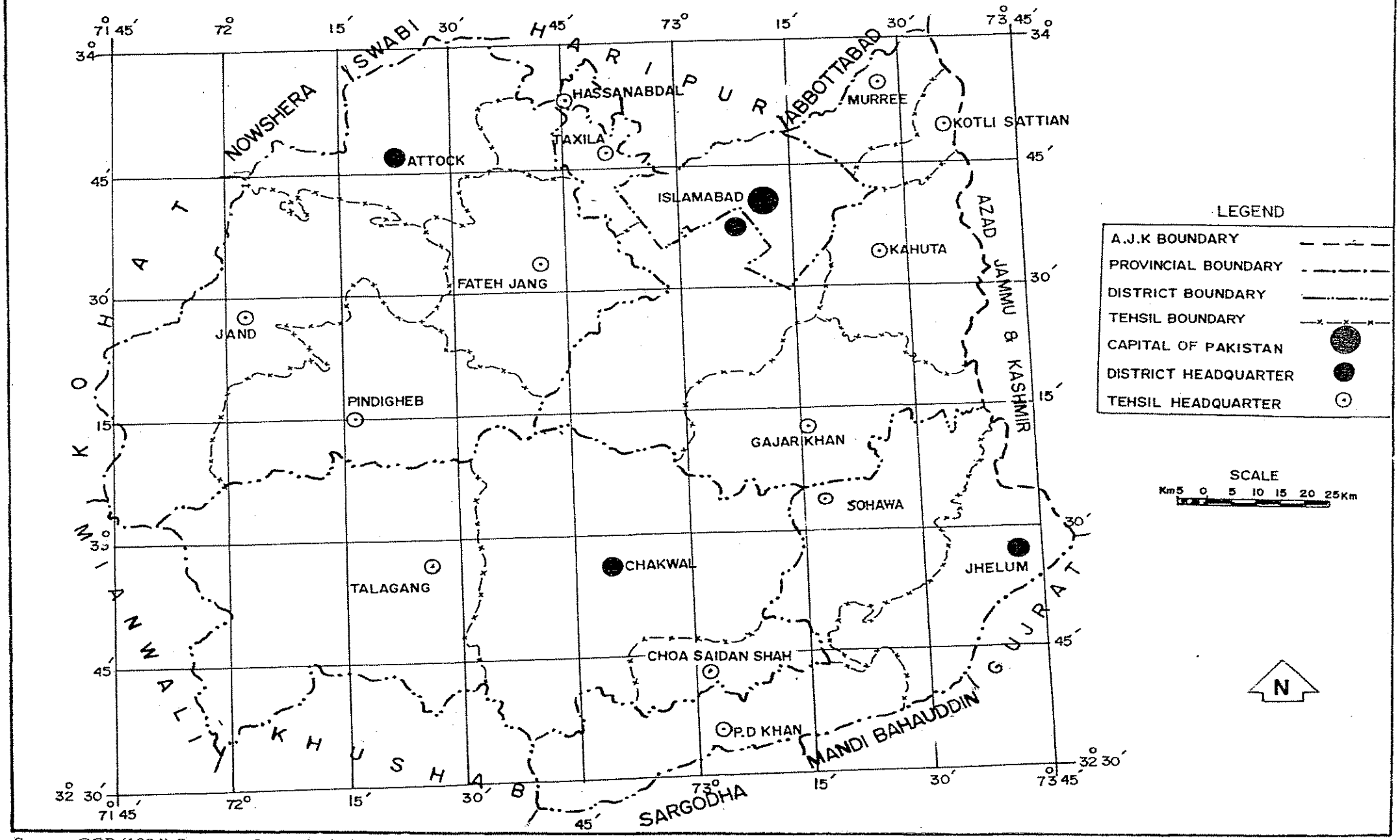
4.1.3 HISTORY

Potohar was the political, academic and ritual core of the vast Buddhist empire that stretched from Afghanistan to southern India (Robertson, 1887). Buddhism was the predominant cultural force in these areas co-existing with Hinduism until the Persians formally annexed Punjab to their empire (New Encyclopedia Britannica, 1973). Thus Zoroastrianism, Hinduism and Greeks under Alexander the Great took up arms to wipe out the Persians, who were the Greeks traditional rivals in the Near East (Muhammad Aslam, 1981).

The Greeks left their lasting imprints on the region, that caused an evolution of the Gandhara culture in the northern parts of the ancient region. The regions on both sides of the Indus and more specifically Taxila regained their socio-cultural, and it was from this very area that Chandra Gupta period (320-540) established the great Mauryan Empire (Gazetteer, District Rawalpindi, 1893-94). He was aided by Kautilya, a native of Taxila and a renowned Hindu political philosopher. Ashoka, the great grandson of Gupta, was the brightest luminary in the dynasty, who before his accession to the throne, was the Governor of Taxila and trans-Attock regions (Marshail John, 1960). Ashoka renounced war and violence after his fierce battle against the Kalingas of East India. He devoted his life for the propagation of Buddhism and strove hard to preserve the relics of the great enlightened teacher. Actually when Buddha expired, his personal relics were divided into eight parts to be sent to various regions of the subcontinent (New Encyclopaedia Britanica, 1973). Now a few centuries later Ashoka saw to it that these relics were well-preserved underneath huge *Stupas*[2] that were ordered to be built across the empire. The native word for *stupa* was "toap" meaning hat which became *Stupa* in English though even today people in Potohar call it "toap".

The Buddhist interlude in Potohar for that matter in South Asia continued until the early Christian era when the invading white Huns destroyed monasteries, universities, granaries and even human settlement, dating from the illustrated reigns of Ashoka, Kanishks and Hersha. Moreover Hinduism proved a more formidable force that chased Buddhism out of the Sub-Continent and it absorbed Jainism in its

MAP 4.1 POTOHAR REGION: LOCATION



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

entity. Only Islam escaped the onslaught otherwise, even the earliest Christian community the Sub-continent could not survive against the overpowering Hinduism.

St. Thomas, one of the apostles of Jesus Christ, was the earliest Christian missionary to visit Potohar area who established the pioneer Christian community at Taxila around A.D. 50 (Robertson, 1887). A few years later he migrated to west coast of India, where the feeble community could not outlive the forces of assimilation until the Portuguese in sixteenth century revived Christianity in that area-like the united Presbyterian establishing Mission Hospital in Taxila in the 1920s (Robterson, 1887).

Muslim mystics and scholars had explored Potohar long before the formal conquest of Sindh by the Arab forces. However, it was from the north-west that influx of Muslim conquerors and immigrants ensued with the arrival of Mahmmod of Ghaznavi (Robertson, 1887). Muhammad Ghaznavi was the first Muslim invaders, who entered the sub-continent from its north western gateway. He attacked seventeen times this Region. In 1001 A.D. he fought his first battle against Jaypal at Hazro near Attock. He last time attacked India in India in 1013 A.D.

The Ghorids extended Muslim political influence in Potohar by defeating Hindu Shahis based in *Koh-i-Juo* in present day Salt Range. It was Sultan Aibak, the slave King, who established regular Sultanate in Delhi - the city itself was established in A.D. 995 (Robertson, 1887). In this region, the Central Asian and South Asian linguistic traditions interacted with a strong near eastern cultural expression to result into Urdu-a language that produced Shah Murad, a well known writer from Potohar, many decades before Wali Daccani (Robertson, 1987).

Foot note:-

2 *Stupa* is the Sanskrit term for a mound or barrow, either of masonry or earth. The pali form is Thupo, and also *stupo* or *Thuva* in the early Aryan inscriptions from the Punjab. The term now used is *Thup* for a tolerably perfect building, and *Thupi*, for a ruined mound. It is therefore, much to be regretted that we should have adopted the word Tope which preserves neither the spelling nor the pronunciation of the original (General Cunnigham "Ancient Geography" p-121).

The Mughal befriended the Ghakhars - the fierce tribe of northern Potohar, the Ghorids in their efforts to dominate the Sub-continent. Certain tribes like the Awans, actually came with the Muslim Turks and settled in Potohar and traditionally proved of utmost strategic and military assistance to the Muslim conquerors of India. However the Suris had a very tough time with the Ghakhars as the latter supported Humayun against Sher Shah (Gazetter, District Rawalpindi, 1893-94). Potohar resisted the Sikhs and the British, though not in a concerted way as some influential families sided with the rulers all along till 1947 to perpetuate their feudatory interest (Gazetter, District Rawalpindi, 1893-94).

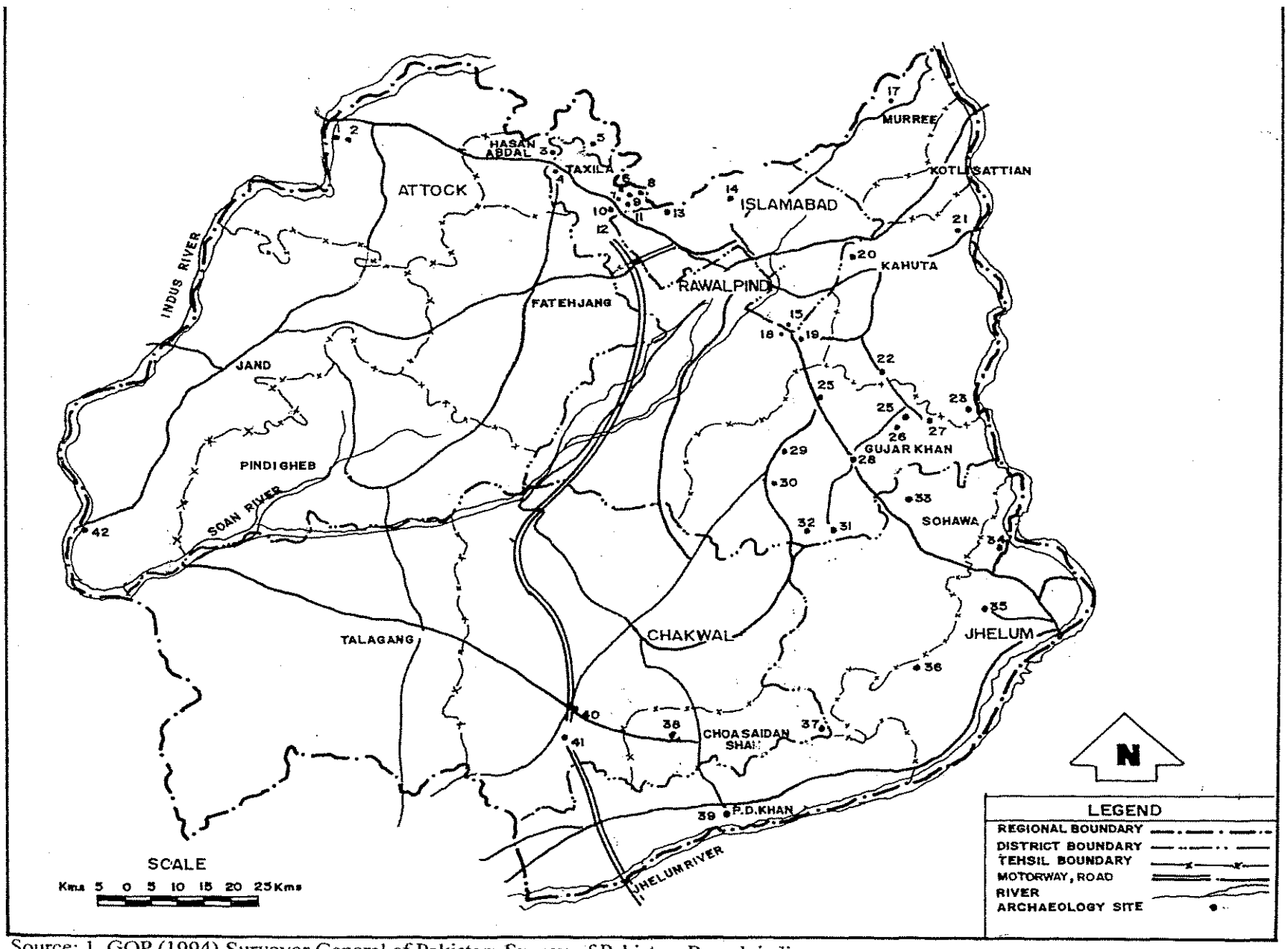
The entire Potohar is dotted with ruins of ancient towns, temples, *stupas*, monasteries, castles, graveyards and remnants of the historic roads, *Sarai*, *Bawalies* (staired wells), forts gateways, gardens and similar other land marks without forgetting the magnificent tombs and a host of archeological artifacts starting from Attock by the Indus river. One is amazed at the enormity of ancient ruins all around the massive Attock Fort Archaeological sites are given in the Table-4.1 and shown on (Map-4.2).

Table-4.1. Potohar Region: Archaeological sites

Name of tehsil by Dists.	Sr. No.	Name of Settlements	Nature of Archaeology sites	Establish period/ Era/Rule
Attock tehsil Attock Dist.	1	Attock	Fort	Mughal
- do -	2	Attock	*Kunjeri* Tomb	Mughal
Hasanabdal tehsil Attock Dist.	3	Hasanabdal	Punja Shahib	Sikh
Taxila tehsil Rawalpindi Dist.	4	Wah (Rural Area)	Garden	Mughal
- do -	5	Bhallor Top	Top	Budha
- do -	6	Taxila	Mesuim	Budha
- do -	7	Joulian	University	Budha
- do -	8	Dhari Masica Rajokee	*Stopas*	Budha
- do -	9	Bhermand	Temple & Building	Budha
- do -	10	Sirkup	Residential Area Budha (Houses ruins)	Budha
- do -	11	Nelson	Tower	Christian
- do -	12	Margalla	Tunnel/University	Sikh
Islamabad tehsil Islamabad Dist.	13	Shah-Allah Ditta	Hindu places Building	Hindu
- do -	14	Saidpur	Hindu places old building/ruins	Hindu
- do -	15	Rawat	Fort	Gugkkhar
Rawalpindi tehsil Rawalpindi Dist.	16	Rawalpindi	Temple	Hindu
- do -	17	Takhat Parri	Places/old building	Gugkkhar
- do -	18	Mankila Top	Top (religious court)	Budha
Murree tehsil Rawalpindi Dist.	19	More	Temple	Hindu
Kahuta tehsil Rawalpindi Dist.	20	Parwala	Fort	Gugkkhar
- do -	21	Sarsoba Shah	Pond	Hindu
- do -	22	Kallar Saydian	Old Building (structure)	Hindu
- do -	23	Dangali	Fort	Mughal
Gujarkhan tehsil Rawalpindi Dist.	24	Mandra	Old well	Sher Shah Sori
- do -	25	Sangani	Fort	Mughal
- do -	26	Qazian	*Marchari* (Hindu)	Hindu
- do -	27	Bewal	*Marchari* (Hindu)	Hindu
- do -	28	Gujarkhan	Temple (Hindu)	Hindu
- do -	29	Sukho	*Mahal*	Sikh
- do -	30	Daultala	Temple (Hindu)	Hindu
- do -	31	Kunteriala	*Mahal*	Sikh
- do -	32	Narali	*Mahal*	Sikh
Sohawa tehsil Jhelum Dist.	33	Kot Demmek	Sher Shah Sori Tomb	Mughal
Jhelum tehsil Jhelum Dist.	34	Mangala	Fort	Hindu
- do -	35	Rohtas	Fort	Gugkkhar
- do -	36	Gogi Tilla	Temple	Hindu
P.D.Khan tehsil Jhelum Dist.	37	P.D.Khan	Old Building Structure	Hindu
Choa Sadian Shah tehsil Chakwal Dist.	38	Nandana(Malot)	Fort	Mughal
Chakwal tehsil Chakwal Distt.	39	Katas Raj	Temple	Hindu
- do -	40	Kallar Kahar	Salt Lake/Hindu places	Natural/Hindu
- do -	41	Sethi Paran Dekhara	Tomb	Modern
Jand tehsil Attock Dist.	42	Makhad	Old Lib	Mughal

Source:-

Field Survey 1999-2000.



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. Field Survey (1999-2000)

MAP 4.2 POTOHAR REGION: ARCHAEOLOGY

The Monasteries, Chauburjis, palaces and even pillars right in the very bed of the river testify to the historical background Potohar. All along the Grand Trunk Road one sees ruins till Hasanabdal appears as another great repository of great historical, spiritual, artistic and aesthetic traditions and institutions.

The Ghakhar's Fort at Rawat stands as a sentinel like Margalla pass on the other side of the twin cities. In the fort lies buried great legendary Sultan Sarang Khan alongwith his notables, who died fighting Sher Shah and his Afghans (Robertson, 1887).

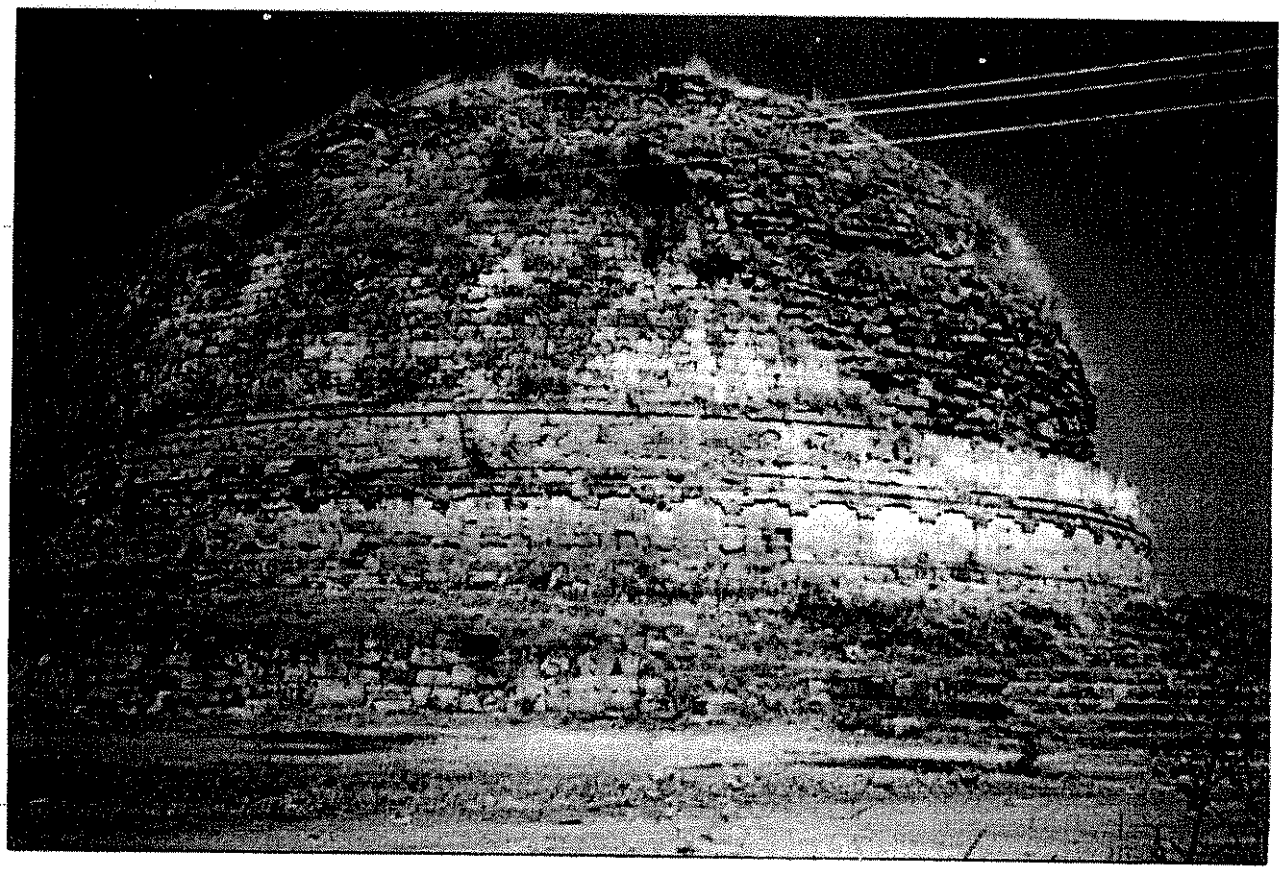
A few miles from Rawat towards Lahore one finds the great Mankiyala *Stupa* looking like a shadowy tree. This 61 meters high structure erected by Ashoka, once housed the rare belongings of Buddha, but now it stands forlorne though in early Christian era, it was surrounded by about 100 smaller stupas as noted by some contemporary Chinese travelers (Gazetter, District Rawalpindi, 1893-94). Hundreds of monks and *bhakshus* studied here and then left for assignments in the Sub-Continent or the Far East. Mankiyala is a historic place with its inhabitants still discovering old coins, ceramics and seals while building their houses (Plate No. 4.1-4.3).

Rohtas Fort the impressive and expansive structure constructed by Sher Shah at a distance of 7 Km. from Dina on the G.T. Road was once a strategic location guarding the great old highway. This was actually meant to control the rebellious Ghakhars. With the construction of Attock Fort under Akbar, Rohtas Fort lost its early significance, though its inside still resounds with a bustling Town whose early inhabitants came from Persia along with Humayun. Fort *Tilla Jogian*[3] is right on the top of the Salt Range, a place favourite to Hindu Jogis, and once visited by Akbar. A few Kms away are the remnants of *Nadana* in Choa Saidan Shah, Pind Dadan Khan Sub-division where Al-beruni, the famous philosopher scientist of Mahmud of

Foot note:-

3 Guru Goraknath established this monastery back in the 1st century B.C. and founded the cult of Kunphatta jogis.(Zoroastrians, Buddhists and followers of the Vedas).

Plate No 4.1: Potohar Region Archaeological Sites



A view of Mankiala Toap/Stupa



A view of 'Katas Temple' important religious centre of Hindu next to Banaras

Plate No 4.2: Potohar Region Archaeological Sites



A view of 'Katas Raj'



A view of 'Katas Shiva Temple' in the Salt Range

Plate No 4.3: Potohar Region Archaeological Sites



A view of Rawat fort



A view of internal structure of Rawat Fort

Ghaznavi completed his researches. In the neighborhood lies the village of Jalalpur where Raja Porus fought Alexander and the latter lost his favorite horse (Gazetter, District Rawalpindi, 1893-94). Potohar is a land where mustard flowers bloom, hundred Kms of the green expanse one sees beautiful yellow flowers lined up systematically and moving rhythmically to welcome the visitor to a land of antiquity, simplicity, hospitality and majesty (Iftikhar Hussain Malik, 1986). The social life of the study area is further described in some detail in (Appendix-4.1).

4.1.4 PHYSICAL ENVIRONMENT

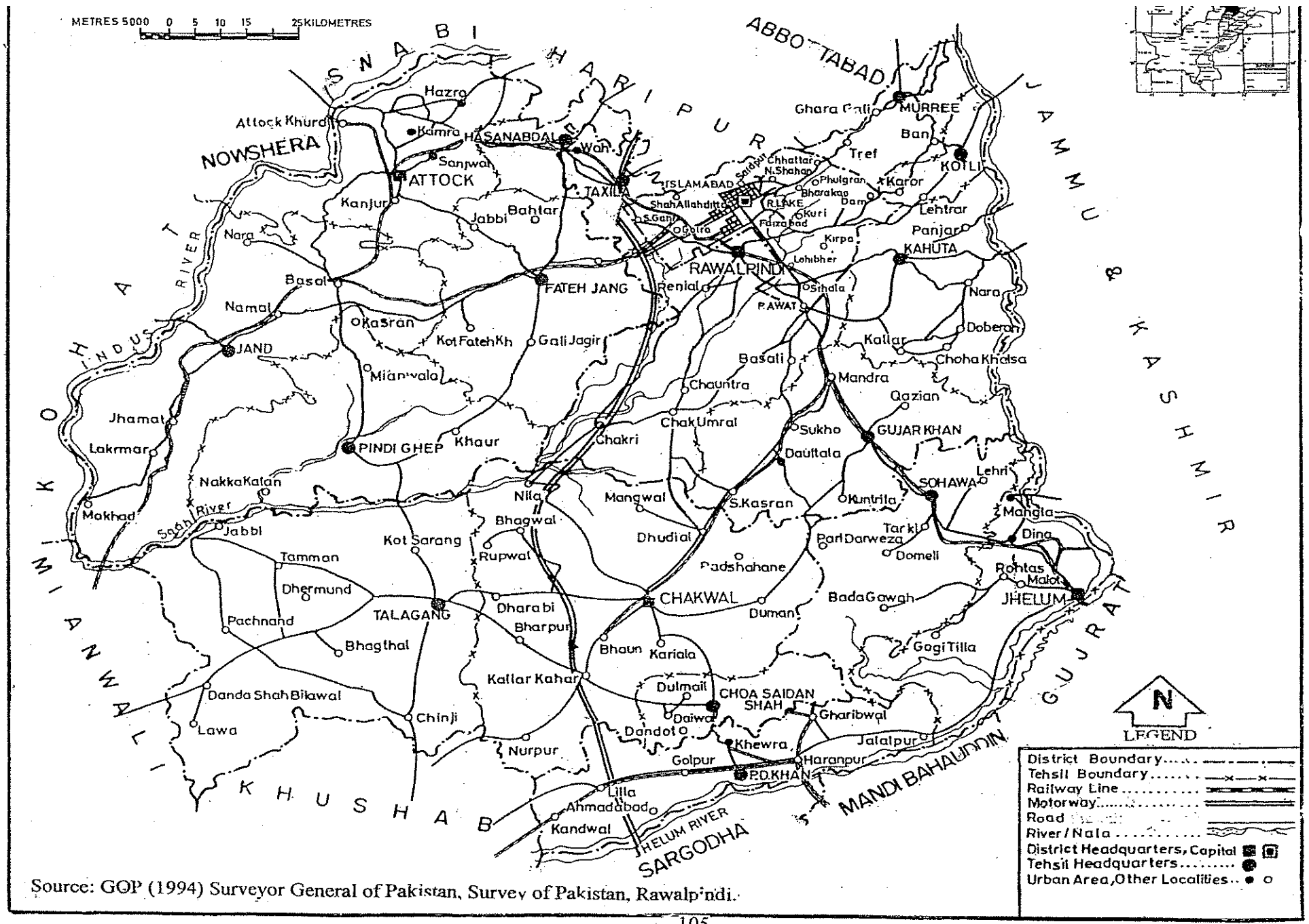
4.1.4.1 LOCATION

In the distant past, Potohar denoted the area lying between the Soan river and the northern slopes of the Salt Range in the north-west of Punjab (Maqbool Ahmad, 1949). Currently, however, the name has been applied comprehensively to the whole undulating region lying between the Indus river and the Jhelum river and stretching from the Salt Range northward to the foot-hills of the Himalayas. The Potohar, thus, embraces the major portions of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Districts (Map-4.3).

Sometimes referred to as the Rawalpindi (Islamabad) in older records and also as the North-west tabe-land of 28488.9 Sq.Km, it extends from 32°-30'N.to 34° latitude and from 71°-45'E to 73°-45'E longitude Shown on Map- 4.4 (Surveyor General of Pakistan, 1994). Physiographically the Potohar marks the border of the Indo-Gangetic plains province but its geological position is characterised by the close proximity of the mobile Himalayan belt to the northern rim of the Indo-Pakistan land mass of which the Salt Range is an advance outpost. This position accounts for most of its physiographic and geological peculiarities (Plate No. 4.4).

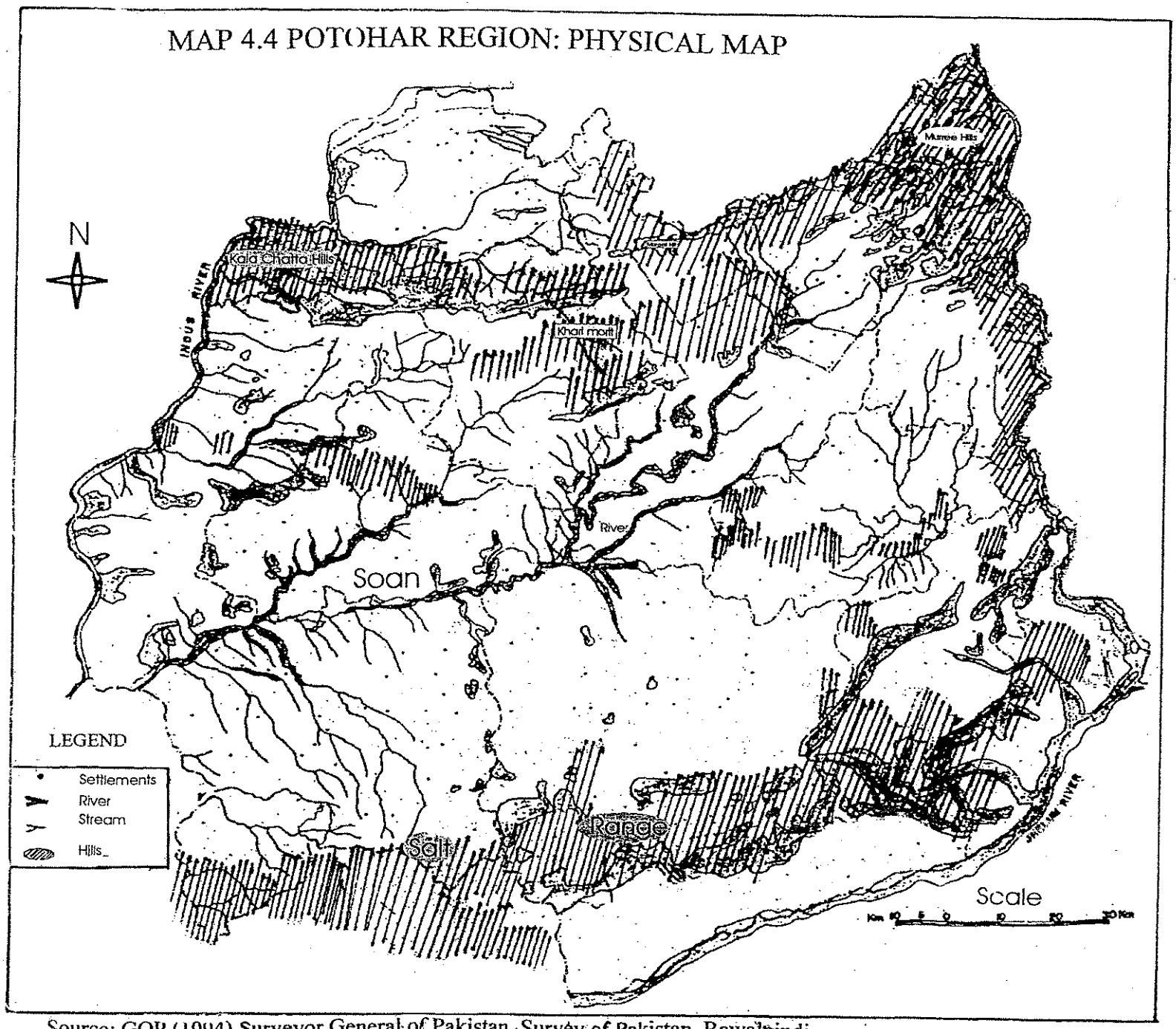
4.1.4.2 TOPOGRAPHY

In the south of Potohar Salt Range stretches from east to west about 257.3 kms in a concave shape. It has two parallel ridges with plateau like depression. These ranges attain 152 metres maximum height in its central part at Sekasar. Murree hills stand like spurs in the north east of the Potohar. Margalla hills, in the north of this region with the average of 731.5 metres height make its boundary with Haripur and Hazara District 72 kms long Kalachita Ranges stretch from the southern limit of



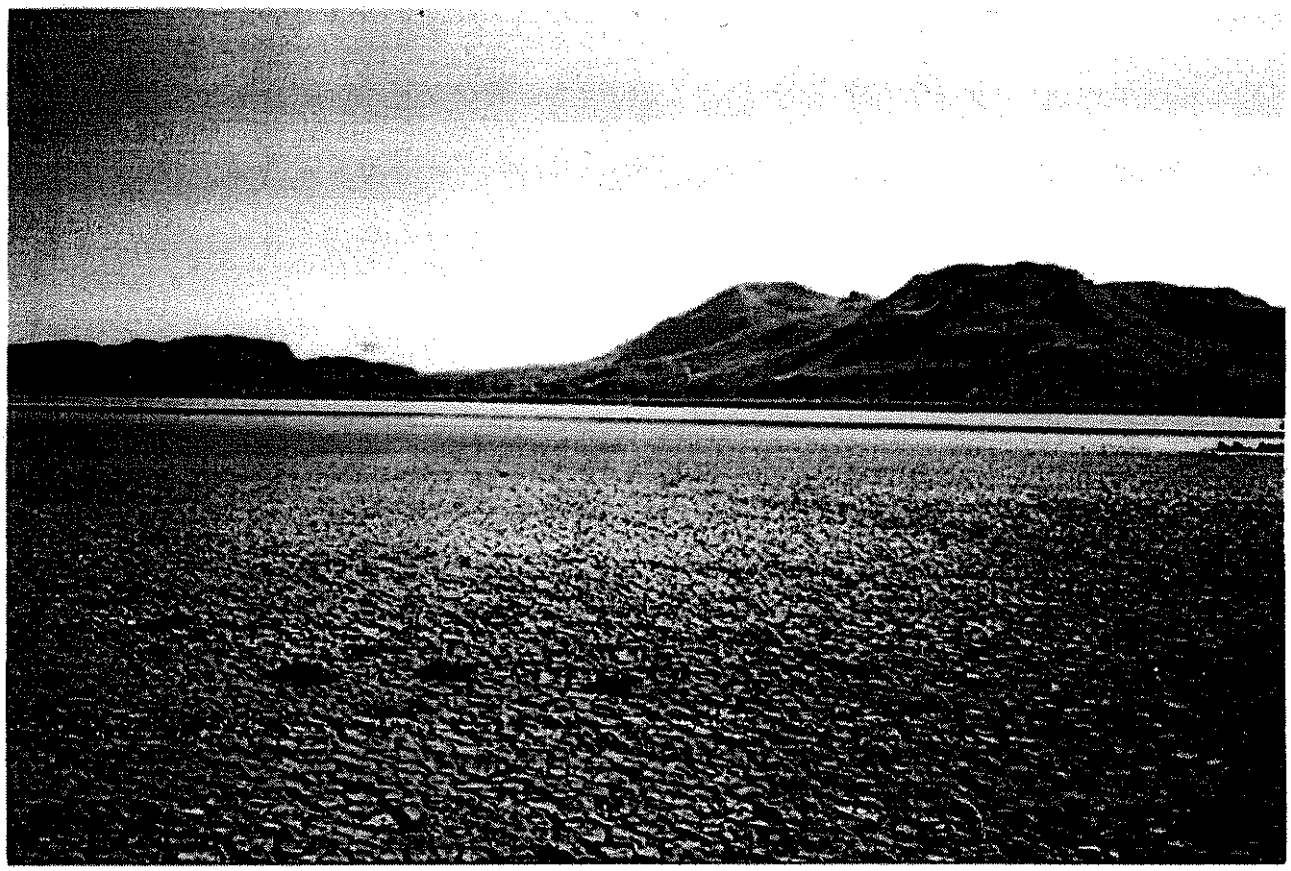
Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

MAP 4.3 PAKISTAN: LOCATION OF POTOHAR REGION



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

Plate No 4.4: Physical Environment



Kallar Kahar A general view of Salt Range



Islamabad City: A general view of Margalla Hills Environment, Blue Area

Margalla to the west of Attock. These Ranges are also 457 metres to 610 metres high. Central portion of Potohar Region has a variety of geographic characteristics, including eroded land, dissected piedmont plains, dissected rivers terraces and active, loess plain and weathered plains commonly called as bad land Topography of Potohar Shown on (Map-4.5).

The highest elevation of this administrative area is found in the north eastern part where Murree hills rises 2,400 metres above the sea level.

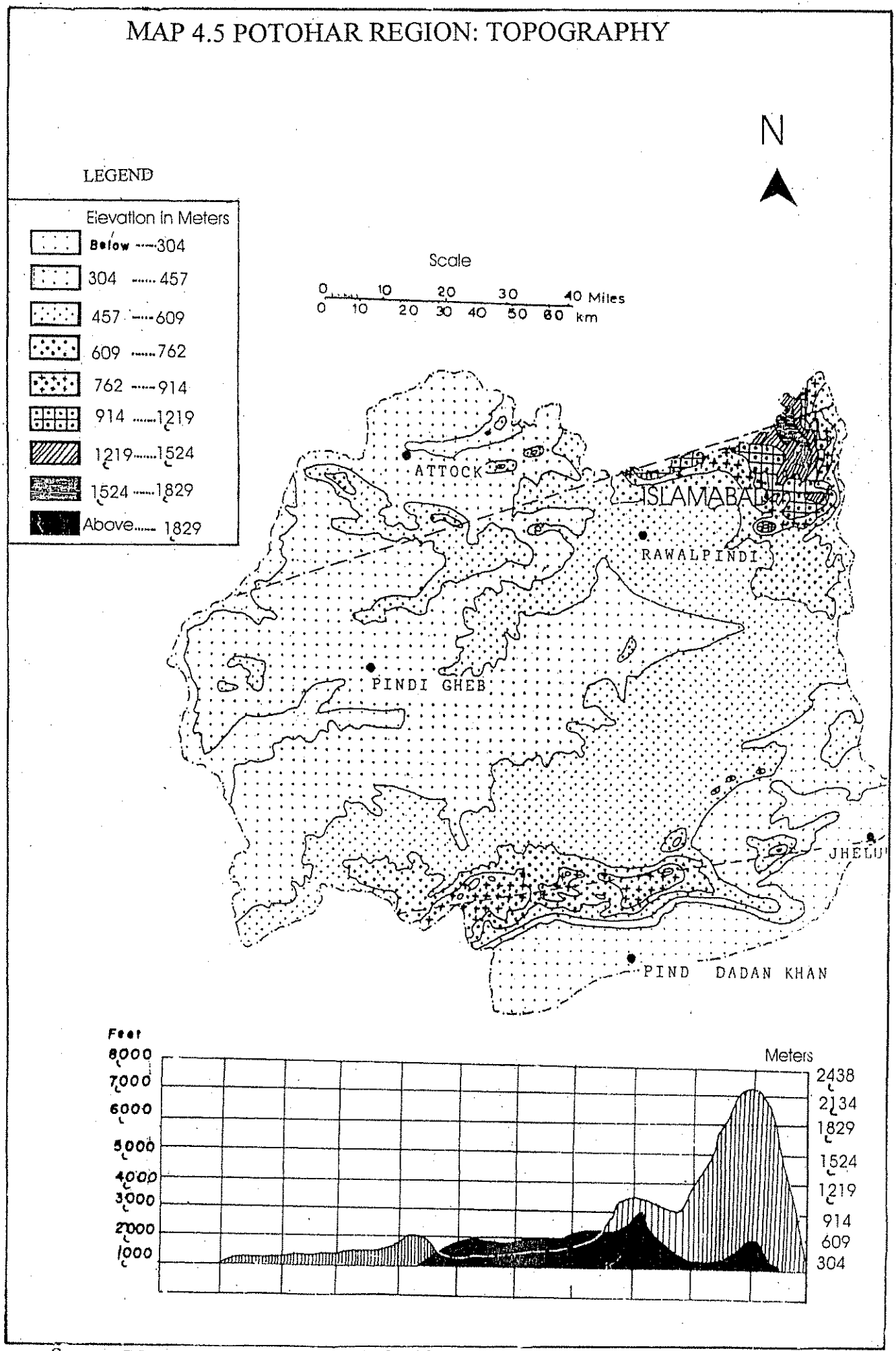
4.1.4.3 GEOLOGY

Two million years ago this region was drained from the north by the siwalik river system (Gazetteer, District Rawalpindi, 1893-94). Horizontal layers of freshly deposited sediment compressed by their own upper layers pressure later due to movement of tectonic plate, became in the inclinic shape (Robertson, 1887). In the Pleistocene era in the warm and cold periods, fluvial glacial deposits greatly changed its upper strata shown on (Map-4.6). Wind deposited LOESS, and fluvial deposits are badly eroded by the erosional agents. That is why today we find a badly eroded surface commonly named bad land of Potohar. Large isolated boulders in many places reveal the effect of glaciations in the Potohar Region (Maqbool Ahmad, 1949). Central part of the Region consists of a thick layer of loess deposits.

4.1.4.4 HYDROLOGY

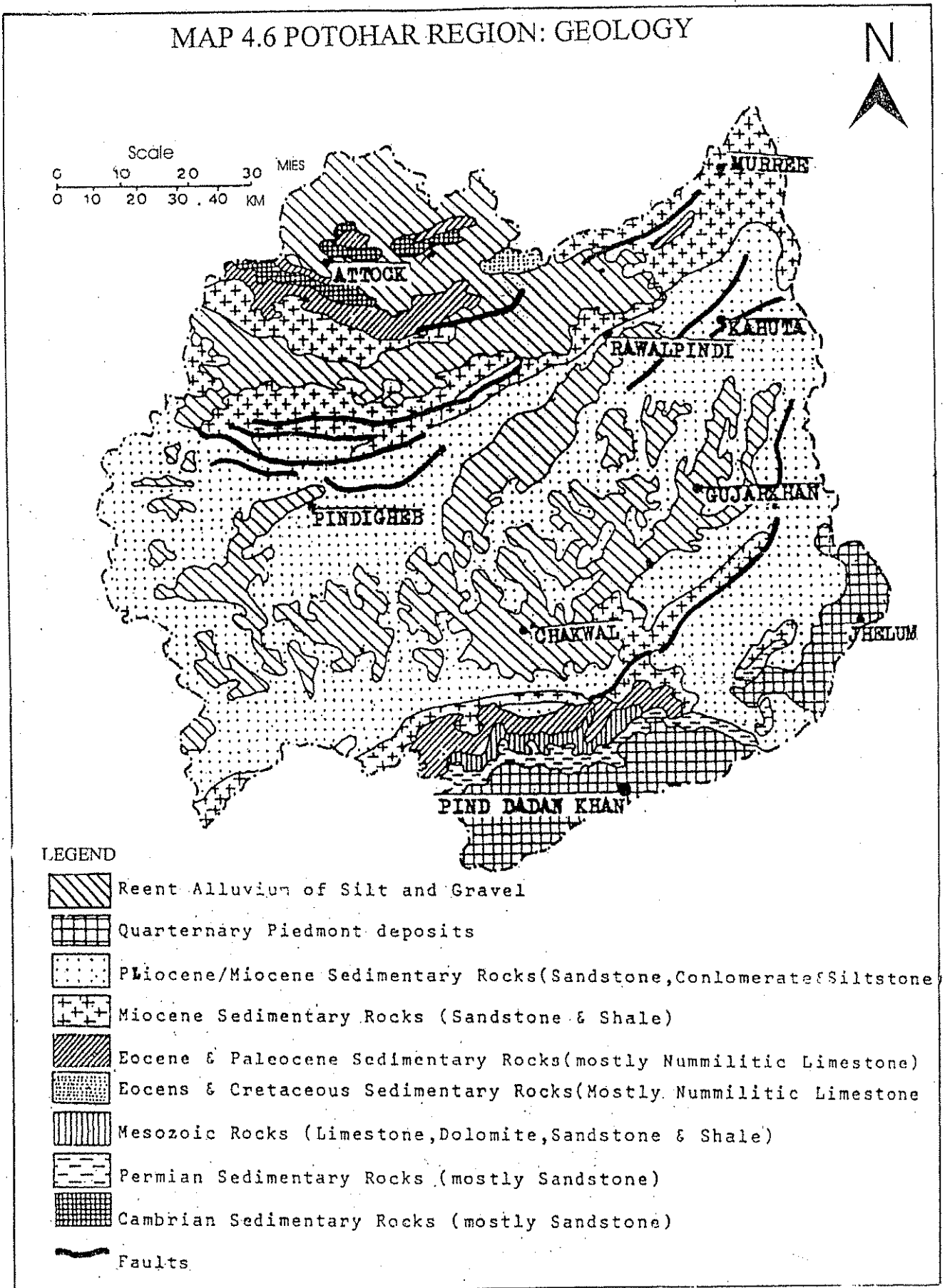
Potohar is bounded by the great rivers Indus in the west and Jhelum in the east. Most of the streams drain into Jhelum. The natural slope of this region is from northeast to the southeast. Soan and Haro rivers are most important left bank tributaries of mighty Indus in this region. Soan river originates from the Murree hills. This river makes 201 metres deep gorge and have geological and importance. Dissected basin plain is also found in the Potohar upland. Near about 800 km dissected plain is found in Soan valley. Finally Soan River joins Indus River. The *Kurang ling, Sil & Lei* are important tributaries of Soan River. The Haro river also emerges near Donga Gali in Abbottabad District and joins the River Indus near Attock. Locally these small streams are named as "*Kas*" or "*Sil*" & "Nala". In the southern part there is no important water channel because of very low amount of annual precipitation. But due to the in land drainage, some salt lakes like Kalar Kahar,

MAP 4.5 POTOHAR REGION: TOPOGRAPHY



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

MAP 4.6 POTOHAR REGION: GEOLOGY



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

Khubaki and uchali emerged in depressions having tremendous importance from bio-diversity and environmental conservation point of view shown (Plate No. 4.5).

The hydrology system of the Potohar is simple in pattern shown on (Map-4.7). All streams find, their way either to the Indus on the west or to the Jhelum on the east. The watershed lies towards the east, starting from the Narar plateau and passing through Kahuta, Mandra and Chakwal. Occurring over the Nili Hills it makes the eastern end of the Salt Range drain towards the Jhelum. The rest of the Potohar region discharges its waters into the Indus mostly through the Soan, which is the most significant local stream.

The Indus and the Jhelum are the main hydrographic features of the region. The hydrology of the study area is further described in some detail in (Appendix-4.2).

4.1.4.5 CLIMATE

Situated at a rather high elevation of 472.2 to 609.6 meters, above sea level the area has an extreme climate with hot summers and cold winters. For three months, July to September, normal climatic conditions are dominated by easterly monsoon depressions while the rest of the year is marked by their retreat and inflow of western disturbances. These are supplemented by local thunderstorms and dust storms which make the weather. The Potohar has the highest number of storm phenomena such as hailstorms, dust storms and thunderstorms for the whole Indo-Pakistan (Maqbool Ahmad, 1949).

The location and altitude of Potohar give it a climate peculiar to itself. Rainfall is well distributed throughout the year and with maximum, a primary one to mark climax of the activity of the eastern monsoon depressions and a secondary one which coincides with the peak of the frequency of western depressions. In fact the Potohar two major influences which determine the climate of India, the summer monsoon and the winter depressions. This also provides the region with a rainfall which is more or less sufficient (other then the extreme drought conditions) for its agricultural needs than that in the arid regions surrounding it on the east, west and south.

4.1.4.6 DISTRIBUTION OF TEMPERATURE

The mean maximum temperature rises till the month of May and June and then falls appreciably with the advent of rains. Likewise the minimum

Plate No 4.5: Potohar Hydrology

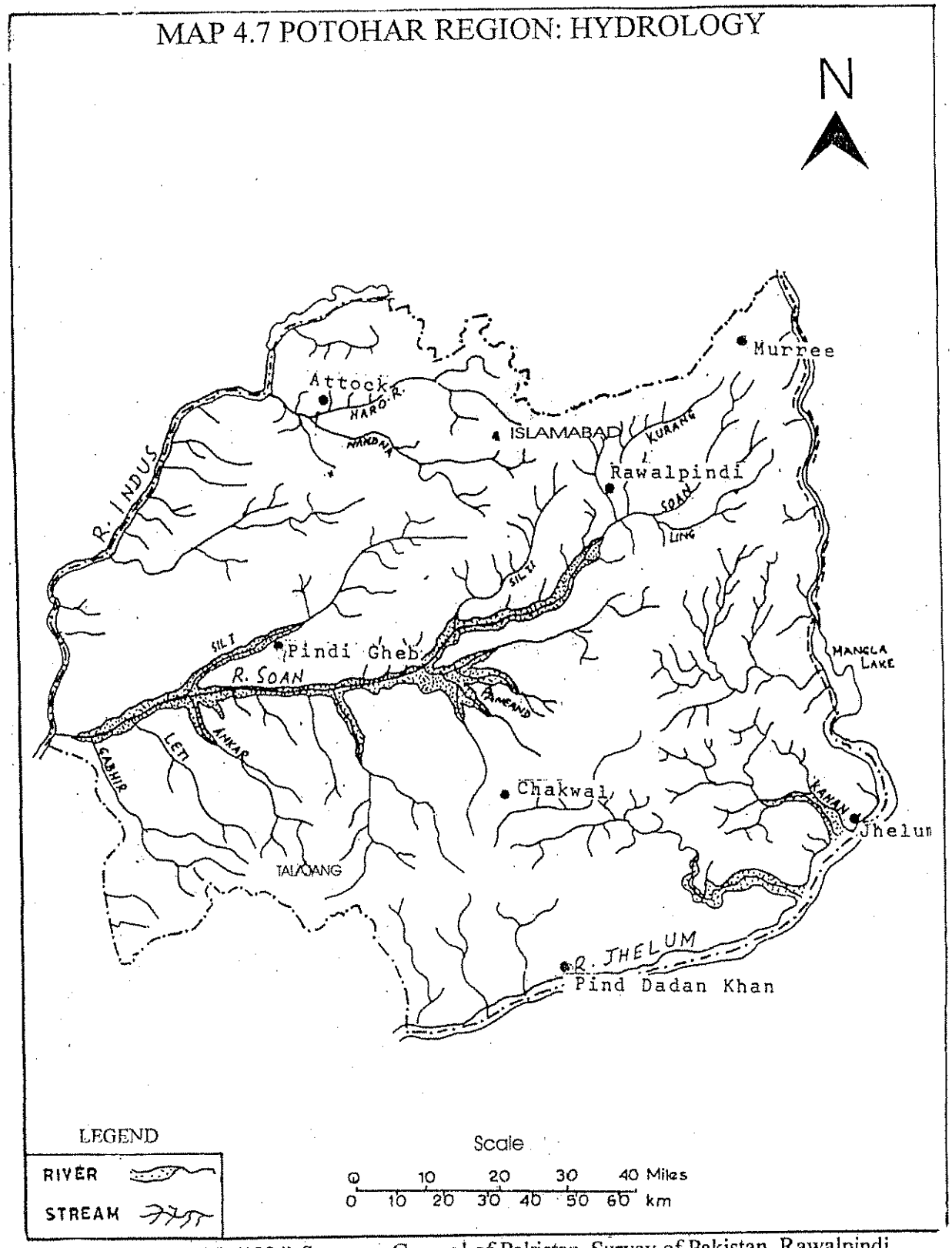


Kotha Kallan A general view of Soan River



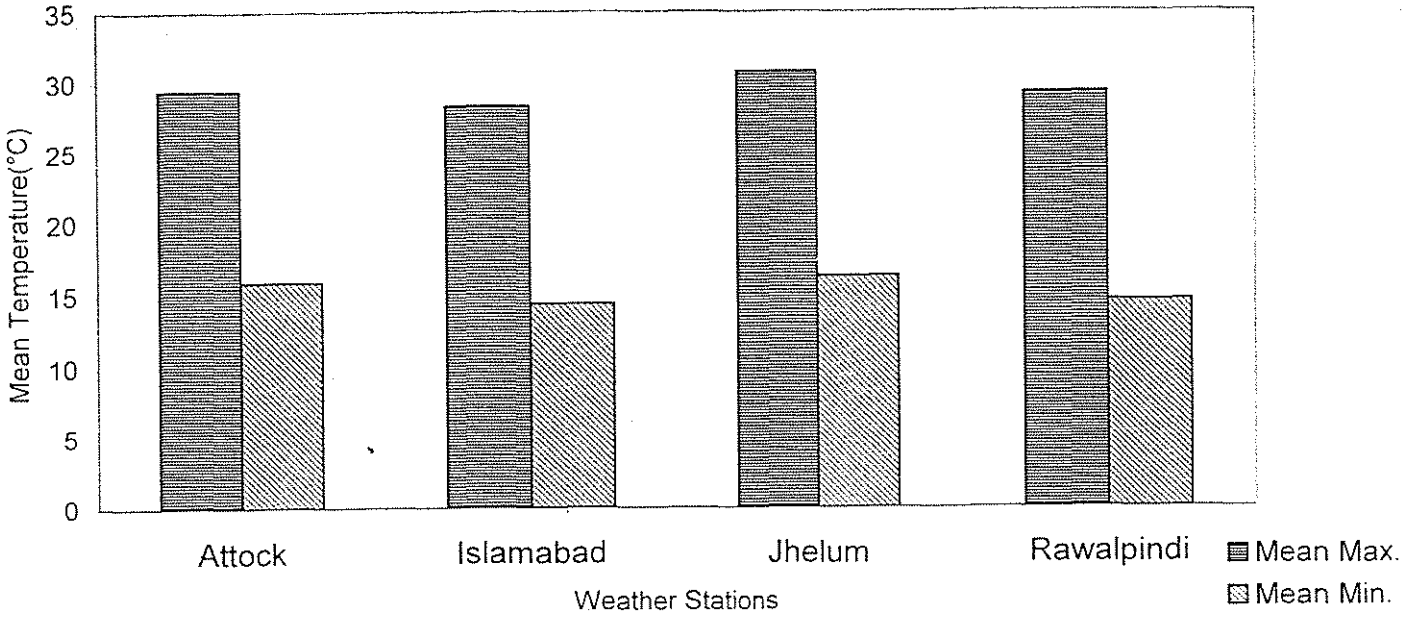
Morgah(Rawalpindi): A general view of Leehi Nala

MAP 4.7 POTOHAR REGION: HYDROLOGY



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

Fig-4.1. Potohar region: Mean Annual Temperature 1998.



Source:

Data Processing Centre 1998, Pakistan Meteorological Department, Karachi.

temperature also shows a similar trend (Fig-4.1). For the Potohar the temperature is remarkably uniform, making allowance for differences with altitude, wherever the ridges and hills rise higher above the general level of the area. The following illustrate the extreme type of temperature conditions prevalent in the region:-

Table-4.2. Potohar Region: Mean Annual Temperature 1998

[Mean Temperature (^{o}c)]

Name of Weather Station	Maximum	Minimum
Attock	29.4	15.9
Islamabad	28.3	14.4
Jhelum	30.7	16.3
Rawalpindi	29.2	14.6

Source:-
G.O.P. 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

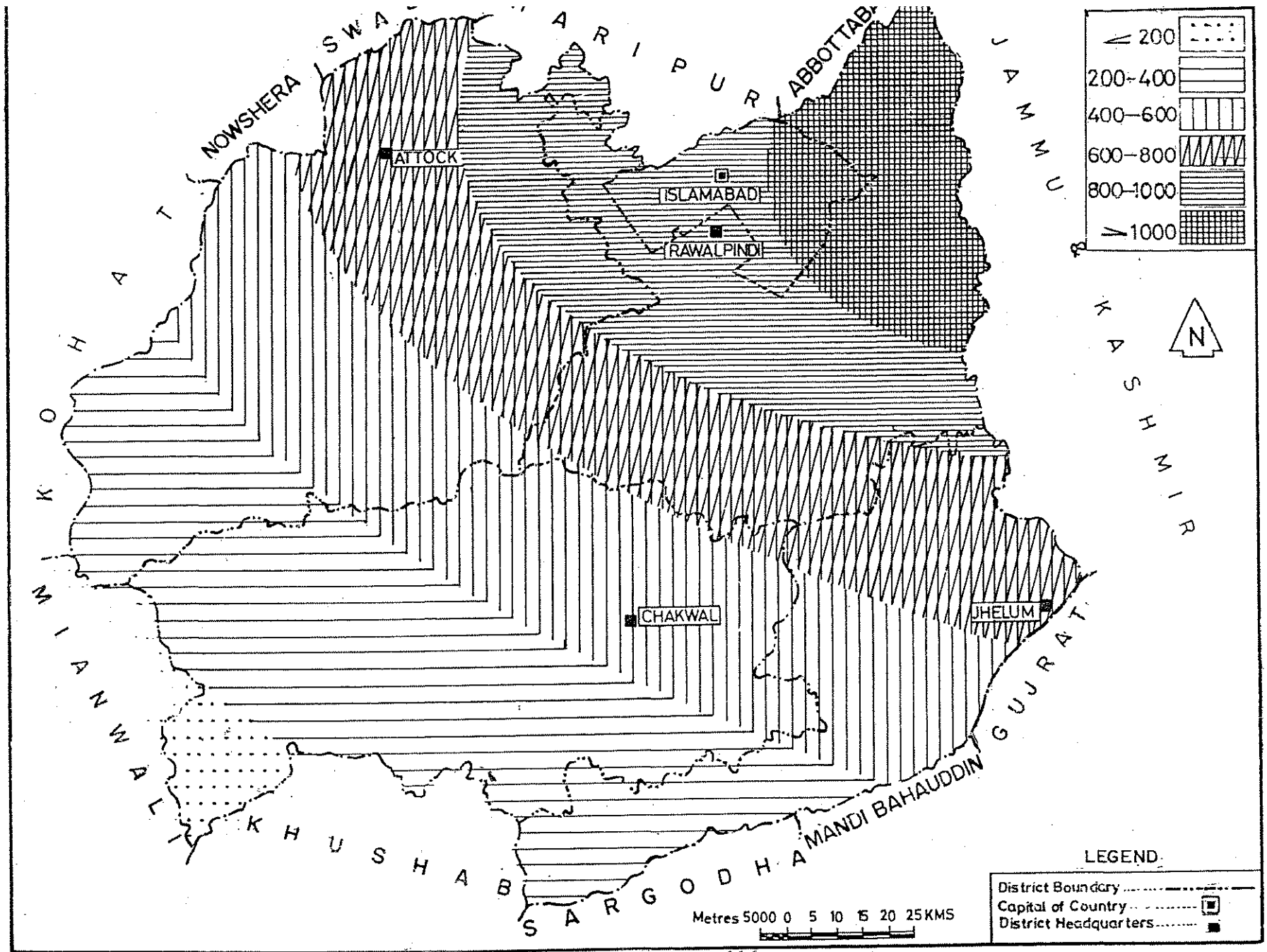
4.1.4.7 PRECIPITATION

Variability of precipitation is a very important factor in determining its economic value. As a general rule highest variability corresponds with the minimum of precipitation and the lowest with the maximum. The high variability in Jhelum, which is contrary to this general observation, is due to the varying intensity and frequency of the western disturbances shown on (Map-4.8). It may be noticed that rainfall has been often in excess than in deficit, (Maqbool Ahmad, 1949).

Table-4.3. Potohar Region: Monthly Precipitation

Month	Mean Precipitation (Millimeters)
January	59.7
February	71.1
March	113.2
April	69.2
May	42.9
June	83.2
July	261.6
August	285.4
September	68.0
October	28.5
November	19.1
December	61.3
Annual Average	96.9

Source:-
G.O.P. 1998 Data processing Branch Meterology department M/O Defence Karachi.



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.116
2. GOP (1999) Data Processing Centre, Meteorology Department, Karachi.

4.1.4.8 TYPES OF SOIL

The region has broadly four types of soils; river alluvium, loess, residual and piedmont alluvium. The river alluvium is found particularly in Haro and Soan basins, which is calcareous, sedimentary metamorphic and igneous rocks of the Hamalayas and siwalik sandstone, wind deposits are also found in places. In valleys two different types of soils are found. The recent alluvial deposits occur in active flood plain. The loessic soil material are composed of silt size particles with some clay and very fine sand (Iqbal Muhammed, 1979).

Nearly half of the total area of the region is occupied together by rough broken and mountainous land. The remaining half of the area is occupied by calcareous, loamy and clayey/calcareous clayey soils non calcareous silty soils, gullied and bad land soils calcareous loamy soils, no-calcareous loamy/non-calcareous clayey soils, and salt affected soils in that order of importance. However the distribution differs from District to District and from tehsil to tehsil each having predominantly soil shown on (Map-4.9).

An outstanding structural feature is the synclinal formation of the plateau. The Soan basis which covers most of the Potohar is a geosycline, over 160.93 Kilometers long and 48.27 to 64.37 Kilometers wide (Maqbool Ahmad, 1949). The Soan is the relic of a much older and larger river which was once contiguous with Indus and possibly connected it with the Ganges and Brahmaputra (Maqbool Ahmad, 1949).

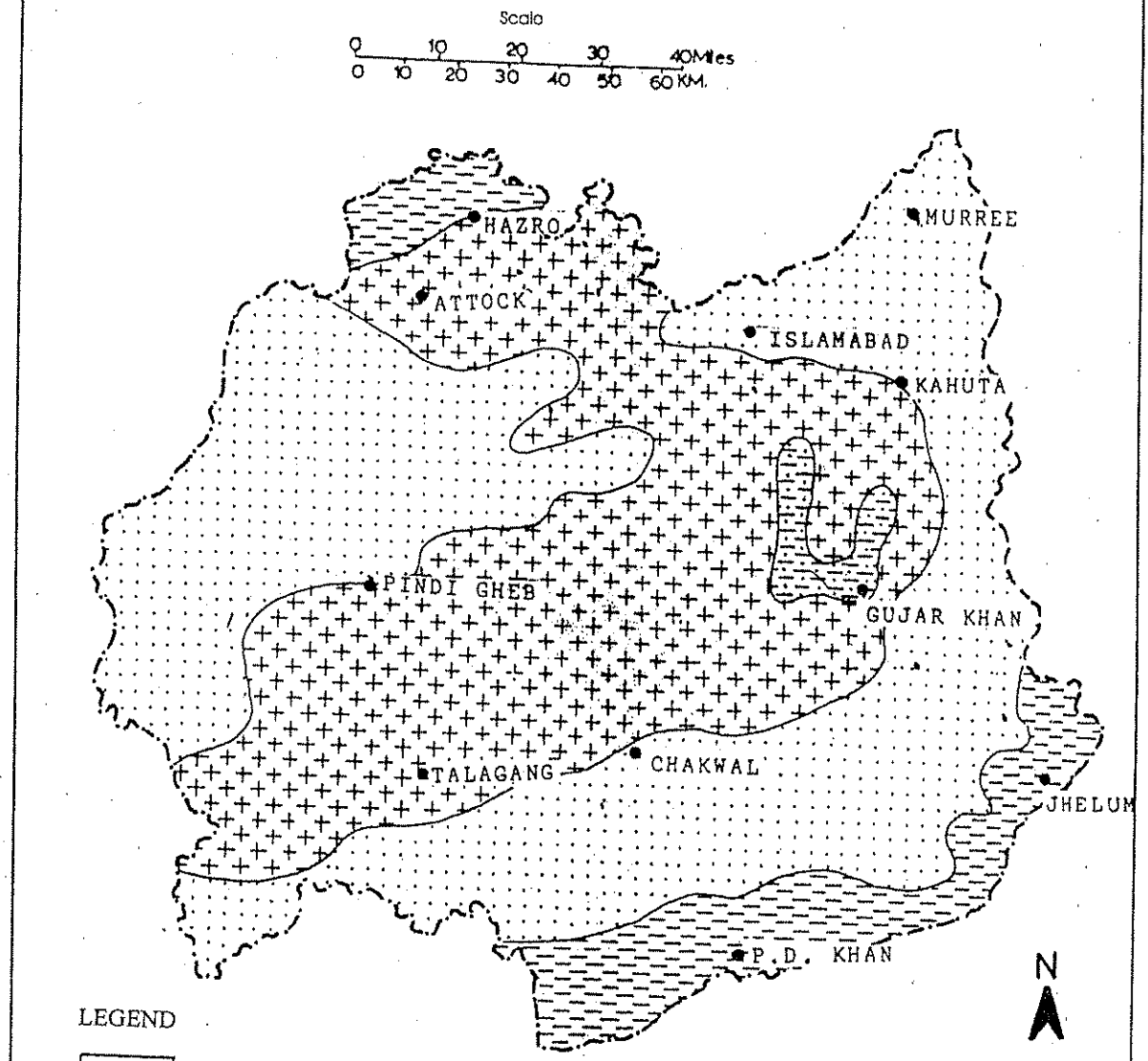
4.1.5 NATURAL VEGETATION

The natural vegetation consists of forests, grass lands and shrubs. The vegetation of Potohar Region varies according to temperature, rainfall and soil conditions. The climate of Potohar is too dry for forests except on the hilly belts.

4.1.5.1 FOREST AREA IN POTOHAR

The total area under forests was 2,41,000 hectares in 1997, which was more than the area under field crops (Deputy conservator forest Punjab, 1999). Only 3,315 thousands hectares are under the control of the government forest department. The per capita area is only 0.05 hectares as compared to the world average of 1.0 hectares (G.O. Punjab, 1999), whereas in the opinion of experts, 25 percent of the

MAP 4.9 POTOHAR REGION: MAJOR SOIL GROUPS



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

The per capita area is only 0.05 hectares as compared to the world average of 1.0 hectares (G.O. Punjab, 1999), whereas in the opinion of experts, 25 percent of the total area is essential to be under forests for the balanced economy of a country (Muhammad Aslam Mian, 1999).

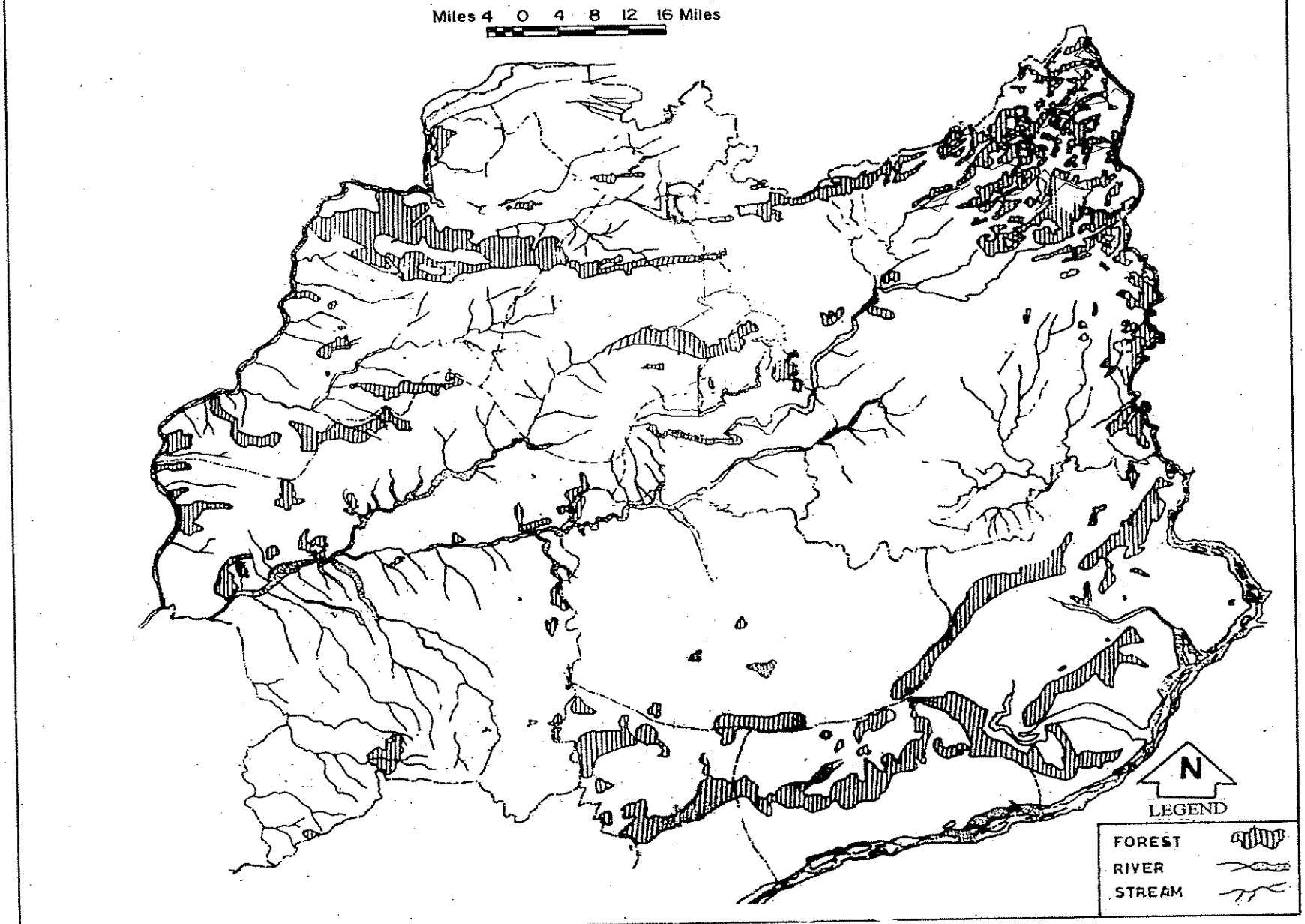
The natural vegetation of any part/area of the earth's surface is directly related to the local climate as well as to soil. The amount and distribution of rainfall major climatic influences on the type of natural vegetation. Climatic conditions are conducive to the luxuriant forests on area of heavy rainfall on the slopes of the hilly belts are given in the Table-4.4. In view of its varied geographical feature, the Potohar region is rich in the variety of its flora, differing in character at different elevations. The main species are shown on (Map-4.10).

Table-4.4. Potohar Region: Main Species

(A list of the most important trees of the Potohar region)

NAMES OF FOREST TREES		
Sr.No.	Botanical	Local
1.	Albizzia Lebbek	*Sirin*
2.	Albizzia sp	*Gharia*
3.	Acacia Catechu	*Khair*
4.	Acacia Modesta	*Phula*
5.	Acacia Eburnea	*Dudea Bambuli*
6.	Esculus indica	*Bankhar*
7.	Adhatoda vasica	*Bahekar*
8.	Acer Cultratum	*Trikan*
9.	Abies pindraw	*Paluddar*
10.	Andromeda ovalifolia	*Rattankat*
11.	Bombax malabaricum	*Simmal*
12.	Butea frondosa	*Chichra*
13.	Berberos Aristata	*Sambalu*
14.	Buxus Sempervirens	*Shamshad Chikri*
15.	Benhinia varigata	*Loliar*
16.	Buddleia Asiatica	*Bhatti*
17.	Cass Fistula	*Amalts*
18.	Cascaria tomentosa	*Chilla*
19.	Cedrela serrata	*Drawa*
20.	Ceslastrus spinosus	*Pataki Kander*
21.	Capparis Aphylla	*Karil*
22.	Cedrela Tuna	*Tan*
23.	Celtis Cancasica	*Batkar*
24.	Carissa Diffusa	*Garenda*
25.	Contenseaster Bsacillaris	*Luni*
26.	Caesalpinia Sepiaria	*Uri*
27.	Cissus Carnosa (vitis)	*Geder-dk*

MAP 4.10 POTOHAR REGION: FORESTS



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

28.	Crataegus oxyacantha	*Gwalbudla*
29.	Dalbergia sissu	*Tali*
30.	Dodonea viscosa	*Sannata*
31.	Diospyros Lotus	*Amlok*
32.	Desmodium Tiliafolium	*Chamkat*
33.	Dendro Calmusstricla	*Bans*
34.	Engenia Jambolana	*Jaman*
35.	Erythrina Suberosa	*Dauldhak*
36.	Ehretia serrata	*Punna*
37.	Euphorbia Royleana	*Thor*
38.	Flacoourtia/Ramontchi	*Kako*
39.	Ficus cordifolia	*Kakbar*
40.	Ficus Rexburghu	*Tussi Barri*
41	Ficus virgata	*Phagwara*
42.	Ficus carica	*Phagwari*
43.	Faraxinus Floribunda	*Sum*
44.	Ficus religiosa	*Pipal*
45.	Ficus Bengalensis	*Bhor*
46.	Grewia oppositifolia	*Dhaman*
47.	G.O.Vestita	*Farri*
48	G.O.Spr	*Phara*
49.	Hedicteres-isora	*Marophal Dhamni*
50.	Hedera Helix	*Banbalkari*
51.	Indigofera Heterantha	*Kainti*
52.	Ilex Dipyrena	*Harbambar*
53.	Juglans Regia	*Akhrot*
54.	Khydia calycine	*Pulla*
55.	Lonicera Guinguelocularis	*Tita Bateri*
56.	Mallotus Phulippinensis	*Kamila*
57.	Melia Azedarach	*Dhrek*
58.	Morus serrata	*Karun; Tut*
59.	Morus indica	*Shah Tut*
60.	Myrsina Africana	*Kikalvavaring*
61.	Moringa Pterygo sperma	*Sohanja*
62.	Mimosa Rubicaulis	*Ral*
63.	Nerium ordorum	*Ganira*
64.	O-dina Wordier	*Kamlai*
65.	Olea Cuspidata	*Kahu, Kawa*
66.	Populus Alba	*Safeda*
67.	Populus Nigra	*Palech*
68.	Populus Ciliata	*Palach*
69.	Phyllanthus Embilica	*Ambli*
70.	Pinus Excelsa	*Bair*
71.	Pinus Longifolia	*Hir*
72.	Pistacia integerrima	*Kangar*
73.	Prunus padus	*Leaflet*
74.	Phyllanthas Nepalensis	*Kalam*

75.	Pyrus vaviolosa	*Batangi*
76.	Parrotia Jacqucmontiana	*Paser*
77.	Punica Granatum	*Daruni Anar*
78.	Phoenix sylvestris	*Khajur Khaji*
79.	Prunus Persia	*Aru*
80.	Prunus Armeniace	*Hari*
81.	Periploca Aphylla	*Bata*
82.	Quercus Amulata	*Barin*
83.	Querus incana	*Rhin*
84.	Querus Dilatata	*Barungi*
85.	Rhododendron Arboreum	*Kikri*
86.	Rosa Macrophylla	*Tarni Bangulab*
87.	Rhus Panjabensis	*Tatri*
88	Rhamnusvirgatus	*Setapajja*
89.	Salix Tetrasperma	*Bins*
90.	Sageretia Brandarethiana	*Gangher*
91.	Solonum verbasciſolum	*Kala Mewa*
92.	Tamarix Articulata	*Ukaon*
93.	Taxus Baccata	*Barmi*
94.	Terminalia Bellerica	*Bahera*
95.	Tetranthera Laurifolia	*Maida Sak*
96.	Ulmus Wallichixna	*Kain*
97.	Yitex Negando	*Marwan*
98.	Yiburnum Foetens	*Kunch*
99.	Woodfordia Floribunda	*Dhavi*
100.	Xanthoxylum	*Timbar*
101.	Zizyphys jujuba	*Bher*
102.	Zizphus Nummularia	*Bheri, Jhari*
103.	Zizphus oxyphylla	*Amlai Jand*

Source:-

Govt of India 1887, F.A.Rabtson settlement Report Rawalpindi District.

Table-4.5. Potohar Region: Important Protected Forests Area

District: Rawalpindi			
Tehsil: Murree		**Tehsil: Kahuta**	
Name of Forest Area	***Area in Acres***	***Name of Forest Area***	***Area in Acres***
Gianthal	448	Kulthea	1,235
Burban	607	Gura	715
Masot	475	Palah	293
Kohati	752	Las	284
Bigraon	548	Beor Khalol	1,614
Patriata Papundihi	4,026	Javand	2,147
Charihan	2,005	Nala Sehr	740
Kachnt	628	Banahal	1,985
Seribri	2,380	Balimah	901
Daleh	1,178	**District: Attock**	
Baroha	899	**Tehsil: Attock**	

Salgrran	698	Chhoi Gariala	3,785
Manga	1,273	Surg Salar	1,194
Samlibheramal	1,454	Dheri Kat	690
Chaka	2,734	Newa	2,288
Sangseri	365	Buta	2,288
Katli	899	Akhori	2,288
Khanwas	636	Akhori	1,250
Kala-basand	1,225	**Tehsil: Fateh Jang**	
Mangal	1,049	Humak	1,250
Khatar	2,924	Jabbi	737
Kharatian	2,630	Gakkar	582
Thun	634	Makam	
Tehsil: Kahuta		Doyan	625
Kamra	2,140	Mansial	625
Danohi	1,819	Kutbal	625
Bhangal	1,346	Hatar	729
Baga	656	Mahura	739
Jantra	675	**Tehsil: Pindi Gheb**	
Salanga	494	Basal	952
Lhila Cherah	4,251	Thatta	2,977
Sang	2,711	Pindi Sarhal	1,583
Kerl	5,287	Mariala	1,741
Narar	1,369	Nara	5,062
Khrian	549		
Salambar	518		
Salitha	949		
Kajli Ban	468		
Panjar	2,016		

Source:-

Govt of Punjab 1999, Deputy conservator data processing record Forestry Department, Lahore

Table-4.6: Potohar Region: Important Reserved Forests Area

District: Rawalpindi		**District: Rawalpindi**	
Tehsil: Murree		**Tehsil: Kahuta**	
Name of Forest Area	***Area in Acres***	***Name of Forest Area***	***Area in Acres***
Dawal	656.81	Haruta	253.14
Ancha	608.52	Parindla	896.44
Khainitak	860.71	Chent	748.42
Potha	631.83	Dhamunta	315.12
Pail	306.29	Talhar	758.89
Ghoi	1582.80	Per Phirian	749.47
Kaseri	560.82	Chanjuian	1683.13
Dhar	235.05	Kaloian Chakla	2642.79
Gora Galli	125.12	Bindla	588.59
Bara Hotar	285.81	Utina	5191
Hokrakar	399.59	Pamathi	77865.00
Jhujana Malot	1826.67	Maniand	503.61

Jawa	670.14
Bagla	1359.04
Phapril	912.25
Saneo	683.15
Nandkot	138.14
Karlot Salgran	1958.33
Salkhetar	1463.81
Juma	678.23
Anguri	347.08
Bhamrat	480.10
Darnoian	579.39
Balaura	752.35
Baduian	591.06
Ariari	1758.87
S.Samli	607.51
Ambani	926.94
Chama	350.45
District: Jhelum	
Tehsil: Sohawa	
Name of Forest Area	***Area in Acres***
Nili	17,214
Lahri	11,968
Jindi	5,345
Barali	8,253
Grate	2,084
Pinala	1,332
Sakar	930
District: Jhelum	
Tehsil: Jhelum	
Tilla	23,388
Bela Piraghib	1,066
Tehsil: Pind Dadan Khan	
Bela Sagharpur	64
District: Chakwal	
Tehsil: Chakwal	
Taliala	1,606
Bakhshiwala	2,548
Noorpur	15,190
Bagga	3,723
Diljabba	9,284
Simli (North)	13,700
Samaraand (South)	9,196

Pharwala	792.14
Hanesar	573.09
Kanad	479.71
Suheri	323.16
Janhatal	162.54
Seri	465.09
Dodili Mafor	483.71
Thoa	192.74
Palakhar	419.89
Thuthar	363.89
Rajdhani	829.74
Bhoagarh	812.00
Khad	1612.05
Chinam	1081.70
District: Chakwal	
Tehsil: Choa Saidan Shah	
Name of Forest Area	***Area in Acres***
Darengan	4,756
Karangal	1,262
Dewan	861
Gandhal	2,878
Dharam Tirath	513
Ram Hilwan	499
Malot	4,589
Parera	3,264
District: Chakwal	
Tehsil: Talagang	
Chinji	15,002
Jhatla	285
Faiza	1,034
Nara	520
Dandi	607
Datwal	526
Kot Kalan	2,233
Naka Kahut	1,587
Chak Walian	718

Source:-

Govt of Punjab, 1999 Deputy conservator Record Branch, Forestry Department, Lahore.

Table-4.7: Potohar Region: Important Unclassed Forests Area

District: Chakwal	
Tehsil: Chakwal	
Name of Forest Area	***Area in Acres***
Surla	9,632
Warhal	202
Jabwal	73
Hasil	2,023
Pilo	972
Rahna	395
Simli (South)	3,113
Dand	649
Thircha	2,031
Samaraand (Nort)	5,406
Nagri	815
Rangpur	898
Malkani	483
Tehsil Choa Saidan Shah	
Dalwal	10,009
Kassak	8,005
Dandoot Rakh	8,000

Source:-
Govt of Punjab 1999-2000 District Forest Office, Data processing Section Forest Department Chakwal.

4.1.5.2 TYPES OF FORESTS OF POTOHAR

The slopes of the northern and north western mountains above 900 m and below trees a belt of forests. These are the main forests of Pakistan and adjoining area as well as the District of Rawalpindi. The rainfall in Potohar Region is plentiful a little more than 100 cm, and well distributed during the year.

Below 900 m on the foot-hills these forests consist of *phulai, kao, chinar, mulberry, wild olive* and other fruit trees.

4.1.5.3 THE FOOT-HILL FOREST

These are the sub-mountain forests at a height of about 300 m. above sea-level. They are found in Rawalpindi, Jhelum and Chakwal Districts. The principal species are *acacia, wild alive, phulai, kahu, jand and blackberry.* These forests are classified as broad-leaved sub tropical forests (Muhammad Aslam Mian, 1999). They

cover an area of hectaress, spreading on the foot-hills of the Sub-Himalayas, Salt Rang and Kala-Chitta Hills.

4.1.5.4 THE *RAKHS*

The R*akhs* are dry forests found in small patches all over the arid plain, away from the Urban Areas. The species include *farash, Jand Bakain* and *Kril*, which are chiefly used for fuel.

4.1.5.5 FOREST MANAGEMENT

The forests of Potohar area can be divided into two major groups viz; reserve forests and protected forests.

4.1.5.6 RESERVED FOREST

These forests are government owned. No law exists in the area to declare any piece of forest as reserved. The forest growing on its own is declared in majority of the area as Government owned. The total area of reserved forests was 1,50,570 hectares in 1997- 98.

4.1.5.7 PROTECTED FOREST

These forests are maintained for the protection of steep slopes liable to be washed away by accelerated erosion. These forests are non-commercial and are confined only to steep slopes in Potohar areas. Settlement (hamlet) are restricted in the forests. The total area of protected forests was 2,091 hectares in 1997-98. The main area of the protected and reserved forests is given in Table-4.5 & 4.6.

4.1.5.8 VARIETIES OF GRASS

The other important type of natural vegetation of the Potohar Region is grass which occupies about half of the total geographic area of the region (Robertson, 1887). In the Potohar hilly area meadows are visited seasonally by the Gujar nomads of Azad Kashmir who own herds of sheep, goat, horse, cow and other cattle. The Gujar nomads have constructed temporary dispersed and isolated huts in these areas. The rangeland grasses are found in the lower altitudes at usually between 1,219 and 3,048 metres elevation majority of such grasses are found between 1,219 and 1,829 meters height. In the past these areas were under forests which have degenerated into grass lands due.to the over exploitation and interference of the man who have cut the trees and cleared the area for cultivation and grasses for the cattle (Robertson, 1887).

The grasses of Potohar region are of great importance as in many places there is very little fodder. Apart from fodder crops especially grown and used for cattle, good supplies of fodder are obtained in area specially reserved for grass production. Some of the principal varieties of grasses found in the area are described as under:- (Plate No. 4.6)

4.1.5.9 *KHABBUL*

It is a good short, green grass, growing chiefly in the plains, on the boundaries of field of good soil, and in the hills on fallow level lands. This is probably the best grass in the region and is available at all times of the year when rain has fallen. It is eaten by all kinds of cattle sheep and goats and is very good for horses (Robertson, 1887).

4.1.5.10 *SAWAK*

It is a longer grass, growing best in places where water has been lying for some time. This ripens with the Kharif crops and in places is sown as a crop drying up after the rains have fully ceased. It is a very good grass up to the time of ripening, after that it is little good as it completely dries up.

4.1.5.11 *BARUN*

Barun is another long grass ripening in the Kharif season. It is injurious to cattle when unripe but fairly useful afterwards.

4.1.5.12 *PARAN*

Paran is a good grass, excellent for horses and cattle, growing in cool places Murree Kahuta and Kotli Sattian tehsil.

4.1.5.13 *PALWANA*

Palwana is a long fine grass of light color, ripening with the autumn harvest, chiefly found in the hill. It reaches a height of 61-91 centimeters, only to be eaten green. It is found in Murree and Kotli Sattian tehsil area and in other hill tracts.

4.1.5.14 *BABBAR*

Babbar is an inferior grass which grows much in the hills. It is not good for grazing, but is valuable for making rough ropes, and is much used by the



Kallar Kahar A view of grass

Plate No 4.6: Potohar Natural Vegetation

Murree Brewery Company for making cases for beer bottles. Now a days it is used for vegetable ghee, oil packing, etc.

4.1.5.15 *SARALA*

Sarala is an autumn grass preserved in rakhs, reaches a height of 61 centimeters only to be eaten green. It is found in Murree/Kotli Sattian tehsils and in other hill tracts.

There are many other varieties locally known, but the one are the most common and important.

4.1.6 ENVIRONMENTAL DEGRADATION

As much as 46.8 percent of cropped area and 53.1 percent of the total un-cultivated land is estimated to be suffering to varying degrees from officiation like wind, soil erosion, nutrients depletion, nergrasing grass, etc (Nasreen Aslam, 1984). Similarly industrial pollution is estimated to be worsening at a rate more than twice as fast as the growth of economy (Khan Amir, 1989). A study of recent 25 years 1963-88 calculated at 6 to 10 percent vehicular emissions have also made life miserable in the urban areas of Potohar Region. It has been estimated that an average vehicle in Potohar emits 15-20 times more pollutants than the average vehicle in the developed world (DOE, 1990). The number of motor vehicles 250 thousand in 1998, has also tripled in the last 15 years and it is growing at an annual rate of 11.79 percent (Bureau of Statistics Punjab, 1998) Traffic jams in major cities on main road (on G.T. Road and other Urban areas) dust and smoke along with increasing noise pollution are increasing fast. Thus on the whole the environmental profile is deteriorating day by day. The ongoing effort to check this deterioration are not adequate.

4.1.6.1 LAKES

Among the hydrographic features of the Potohar, lakes also figure. In the centre of the Salt Range valley which lies between the two parallel components of the range, the surplus drainage collects in the Achhali lake (Kahen) locally called the *Sammundar*. The area of the lake averages 809.41 hectares, rising to over 1011.75 hectares in years of heavy rainfall and dwindling with the dry season. Its water is salty. A few Km. further east is the Khabakki lake the area of which also varies with seasons and rainfall, its highest being 240.79 hectares and lowest 59.08 hectares. The corresponding figures for a smaller lake at Jahlar are 33.99 and 17.80 hectares

respectively. There are other hollows at Khutakha, Pail Bhadrar, Mardwal, Ugali and Shakarkot which are apt to be flooded.

Close to the northern slope of the Salt Range in Jhelum and Chakwal Districts lies the Salt lake of Kallar Kahar across and 1.2 meters deep when full. It is remarkable that wells situated within a short distance of these salt lakes yield good, sweet drinking water showing they do not influence the underground water (Plate No. 4.7).

There are no lakes in Rawalpindi and Attock Districts, only large marshes. The Hattian in Attock is generally known as "*Jhil*" and is over 242.82 hectares in extent. The much smaller marsh in Rawalpindi District is the Khanna *Jhil* which consists of insignificant size.

4.1.6.2 RAWAL LAKE

Rawal lake is a reservoir which provides domestic water supply for the city of Rawalpindi. It is an important winter refuge for migratory waterfowl, an important recreational area, a buffer against flooding, and a source of irrigation water for local farms.

Most of the catchment's area of 275 sq.km. is drained by the Korang river, which originates in the Murree Hills towards the north-east. Some of the lower tributaries of the Korang drain sections of the south facing slopes of the margalla hills. Normal maximum discharge at the Rawal dam spillway is 2,321 m/sec. Storage capacity of the reservoir is 45,000 ac.ft and maximum depth is 30 m. Water level fluctuates widely according to precipitation, most of which comes as monsoons seasonal rain in july and August.

Principel aquatic vegetation includes phragmites Karka and Typha angustata, which are found along the shoreline. Natural vegetation in the zone where the lake is located had been cleared long ago for settlements and cultivation. Much of it was submerged when the reservoir flooded after the dam was completed. Presently the zone above the left bank is degraded scrub and grassland, and is heavily grazed. Right bank vegetation is mostly dominated by the tree Dalbergia sissou and paper mulberry (broussonetia sp). The native Asia niletica is locally co-dominant.

Plate No 4.7: Environment Degradation



Islamabad: A general view of environment



Kallar Kahar A general view of Salt Lake

Non-native fish have been stocked in the lake and are thought to adversely affect native fish primary introduced fish include channa, cyprinus carpio and tilppia, mossambica. The primary native fish is masheer Tor putitora.

4.1.7 ADMINISTRATIVE DIVISION OF POTOHAR

Potohar consists of five Districts and 18 Tehsils administratively the Potohar is part of the Northern Punjab Province of Pakistan. Total area of the region is 23،160 sq. km. The Potohar has five Districts in all, each under the charge of a District Coordination Officer (D.C.O.), politically under District *Nazam*. For facility of administration, the Districts are divided in sub-Divisions/Tehsils. Each has a Political head-Tehsil *Nazim*, Deputy District Officer, DDO (Revenue) supported by (Tehsils, each under a Tehsildar) and Revenue and *Qanungo* Circles, each under Naib Tehsildar and Field *Qanungo* which are further Sub-Division into smaller groups for purposes of the maintenance of revenue record and agricultural statistics (each under *patwar halqa*) headed by *Patwari*. The Federal Capital Territory, Islamabad has a similar administrative area set up. The names of the Districts, tehsil, *Qanungo Halqa*, *Patwar Circle* and *Mauza* are given below.

Table-4.8. Potohar Region: Administrative Units 1998

Sr. No	Name of		Area (in sq Km)	Number of		
	Districts[4]	Sub-division/Tehsil[4]		*Qanungo Halqa*[4]	*Patwar* Circle[4]	*Mauzas*[4]
1	Attock		6،857	18	174	446
		Attock	1،350	6	47	124
		Fatehjang	1،249	3	35	114
		Hasanabadal	350	2	17	49
		Jand	2،043	3	40	79
		Pindi Ghib	1،865	4	35	80
2	Chakwal		6،524	19	268	452
		Chakwal	3،120	10	100	307
		Choa Saidan Shah	472	1	14	50
		Talagang	2،932	8	154	95
3	Islamabad		906.0	2	26	132
		Islamabad	906.0	2	26	132

4	Jhelum		3,587	13	132	573
		Jhelum	1,062	5	51	285
		Pind Dadan Khan	1,267	4	41	129
		Sohawa	1,258	4	40	159
5	Rawalpindi		5,285	26	271	1,164
		Gujar Khan	1,457	8	89	379
		Kahuta	1,096	4	45	261
		Kotli Sattian	304	1	13	62
		Murree	434	2	18	111
		Rawalpindi	1,682	9	94	313
		Taxila	312	2	12	38
Potohar region			2,3160	78	871	2,767

Source:-

1.G.O.P. 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

2.G.O.P. 1951-98 Administrative units Population Census Organisation, Islamabad.

Foot note:-

4 Rawalpindi Division is divided into a number of Districts/administrative revenue Districts of Attock, Chakwal, Jhelum, and Rawalpindi (under the control of Punjab Goverment) and Islamabad district is Goverment of Pakistan).The district is under the charge of Deputy Commissioner. Which is the recongnised unit of administration. Each District is divied into a number of tehsils.The more important out lying tehsils/Sub-Division.The tehsils are divided into *Qanungo circles* than into *Patwar circles* and village/*mauza*. The basic unit of administration in Pakistan is the '*Mauza*' which revenue estate or village/*mauza* a group of which is formed into *Patwar circle* under the charge of a *Patwari*, who is the lowest official in the hierarchy of revenue administration. A group of Patwar circal consitute a *Qanungo circle* under the charge of the *Qanungo* who is a supervisory officer in each tehsil there is a Naib Tehsildar who assist the Tehsildar in revenue work.

The Islamabad was developed in 1960. Chakwal district was newly created after 1981 census. Some new tehsils were also created viz. Hasanabdal and Jand in Attock Islamabad was also district, Taxila and Kotli Sattian in Rawalpindi district. Sohawa tehsil was newly created after 1981 census, Choa Saidan Shah tehsil in Chakwal district were created after 1981 Census, besides the declared as a district given in (Appendix-4.3 & 4.4).

The latest composition of new Admn. district as well as reconstituted district tehsil's alongwith the area and population 1951-1998 (adjusted) Population have been shown on (Map-4.11 & Fig-4.2).

4.1.8 SOCIO ECONOMIC & CULTURAL ENVIRONMENT

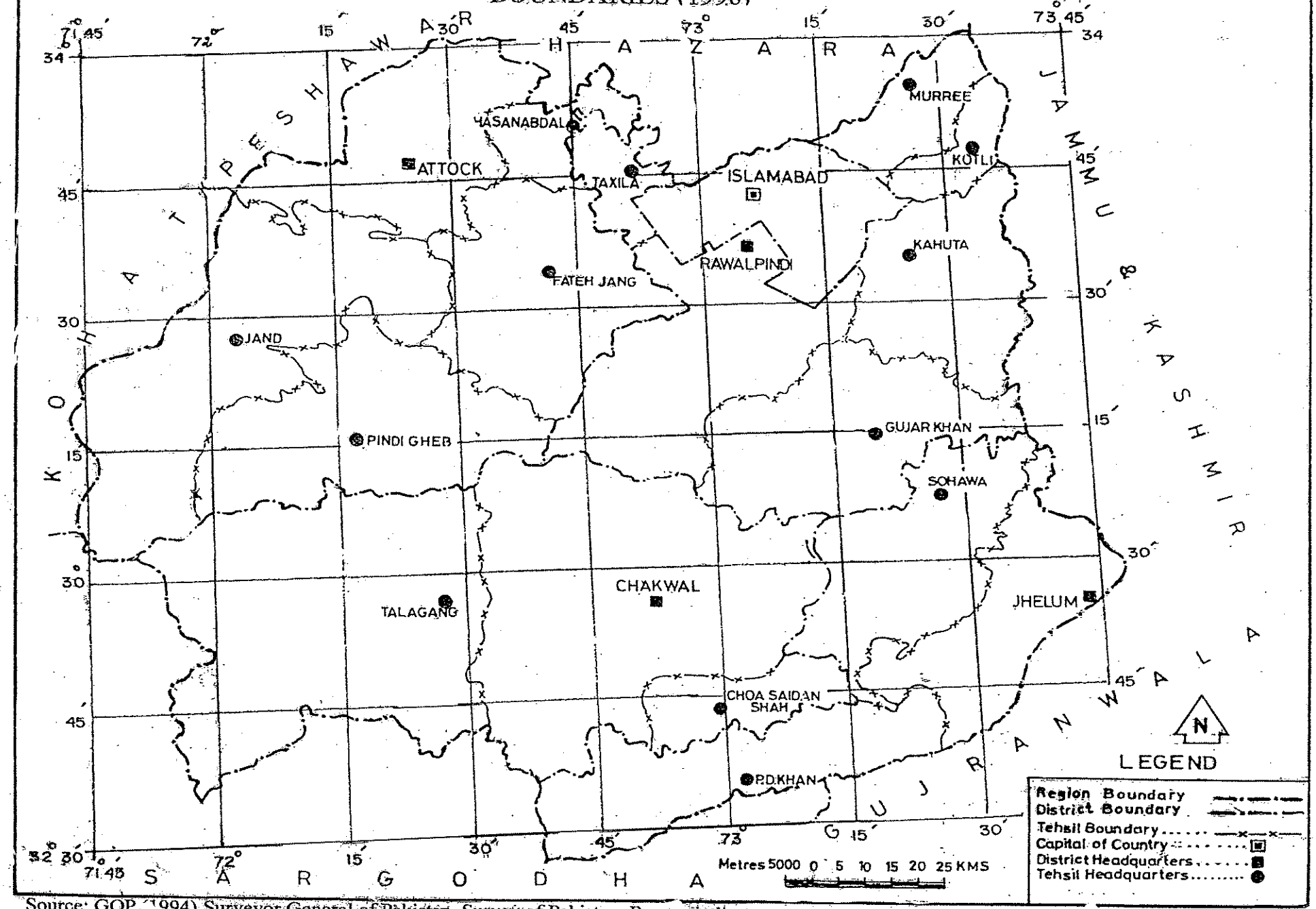
Polluted air can seriously affect the quality of life, However the urban area is mainly increase in industrial and manifacturing activities and in the number of motor vehicles production of various types of air pollutants, including carbon, monoxide, hydrocarbon, nitrogenoxides and particulate.

In the Potohar region twin city/river/streams are heavily polluted with domestic sewage, industrial effluent and solid wastes typical example Soan river/*Leh* and *Korang Nallah* Islamabad-Rawalpindi.

The majority of the industries located in and around the urban centres in the study area. Central systems and the congestion in many urban areas make more difficult the management of wastes coming from industrial units/chemical plants and Hospitals etc. The transported are halogenated hydrocarbons known to be injurious to human health. Among heavy metals certain forms of mercury and lead attack the nervous system nickel/barillm attack the human body. Urban mase and traffic congestion are emerging problems in the principal cities of the study area Rawalpindi-Islamabad they are the most visible urban enviromental problems.

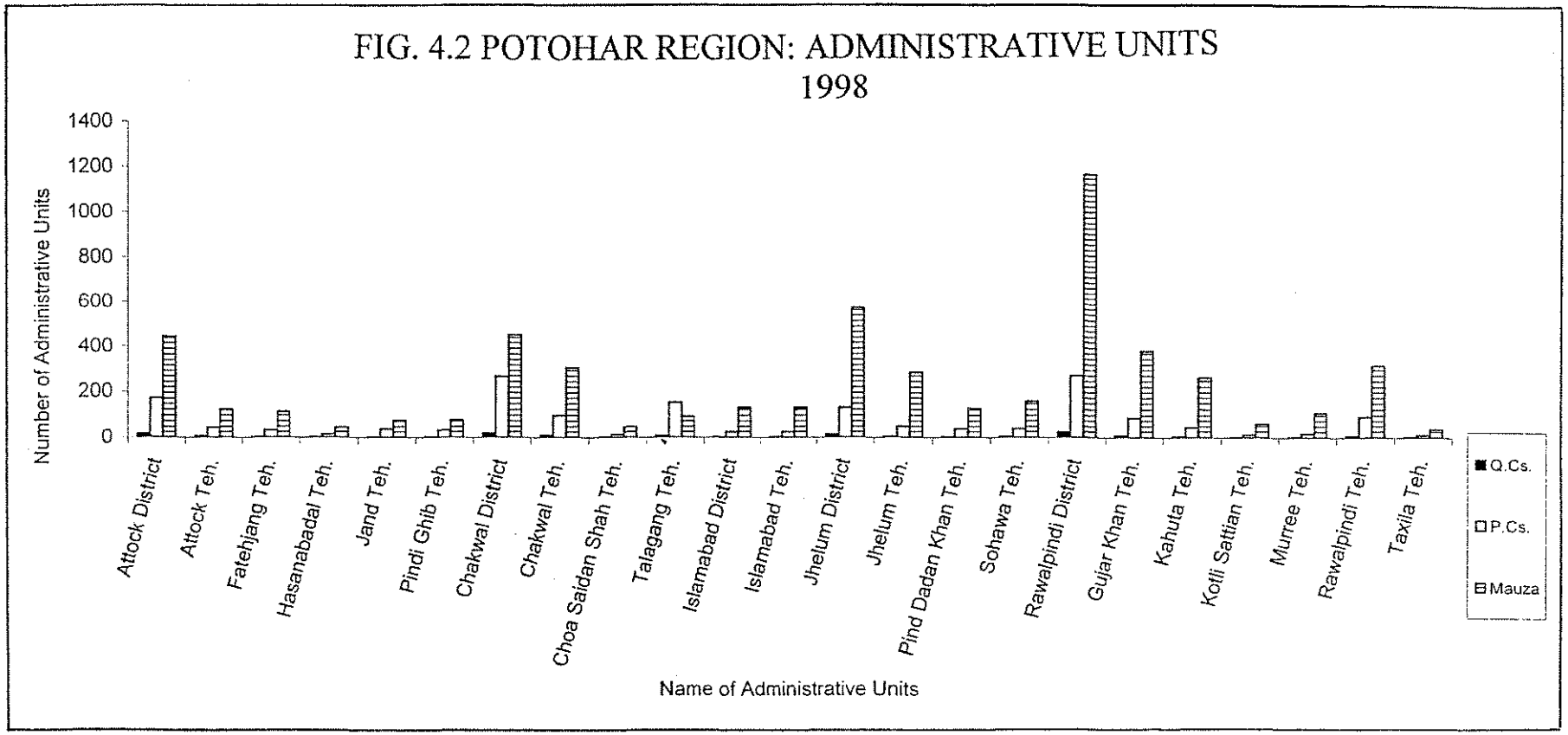
There are strong links between Population, Socio-Economic development and the enviroment. Therefore, the governement are urged to strengthen machanisms to coordinate policies planning and programm and give unified direction for interating environmental and population concerns into development police making, when formulating socio-economic, ploices plans and programms. Their

MAP 4.11 POTOHAR REGION: ADMINISTRATIVE BOUNDARIES (1998)



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

FIG. 4.2 POTOHAR REGION: ADMINISTRATIVE UNITS 1998



Source: GOP, 1998 District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Table-39, Population Census Organisation, Islamabad.

implication om demographic trend/patterns of production of the environment and the conserration of natural resources be account.

4.1.8.1 LANGUAGE-CULTURE

Different tribes, Greeks, Afghans, etc. have ruled over Potohar which has also played the important role of a halting station between the mountainous areas of the north and the vast plains of the south. That is why, the language and culture of this region have adapted different qualities at different times. *Potohari* language has adapted its basic material from Greek, Persian, *Punjabi*, Sindhi, Roman and English languages, (Robertson, 1887) the social life of the study area is further described in some details in (Appendix-4.5).

4.1.9 AGRICULTURE OF THE POTOHAR

The rugged nature of the study area's terrain and limited irrigation facilities against growth of flourishing agriculture sector in the area. The total cultivated area is estimated to be 1,10,600 hectares in 2002-03 (Crops area production, 2002-03). In the plain there are two crop seasons viz *Rabi* (Winter crop season) and *Kharif* (Summer crop season). The mountainous regions, have only a single crop season. Wheat is the major field crop in the area. The other important field crops are barley, *bajra*, gram, maize, and ground nut. A large variety of vegetables is also grown (Plate No. 4.8).

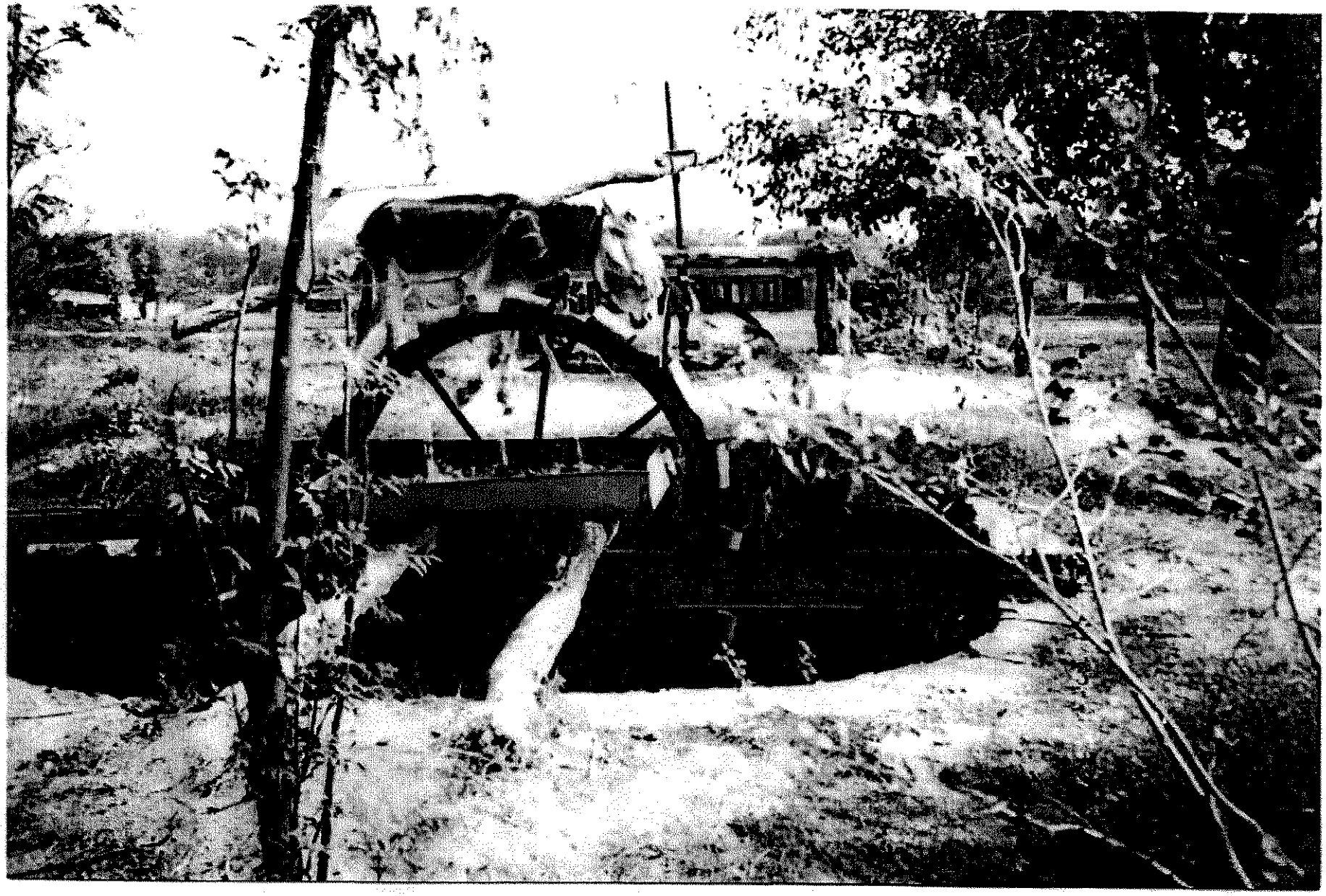
In the upper reaches of the study area large variety of fruits grown, the most important is apple.

4.1.9.1 RABI CROPS CHIEF STAPLES

There are two crop seasons Spring or *Kharif* and Autumn or *Rabi* season start in October and end in March with a minor devlation depending upon the climatic condition and harresting the grown-up crops.The *rabi* crops comprise wheat, gram, *masorr*, barley, tobaco and reseeds/mustards. The total cropped area in 2002-03 was estimated at nine thousand hectares. The production of some important *rabi* crops in potohar seven thousand tonnes.

4.1.9.2 WHEAT

Wheat is the most important crop in *Barani* agriculture of the study area. It is shown in winter (September-October) and harvested in summer (May-June).



Kurali (Gujarkhan) A view of Rabi Crop irrigated by Persian Well

Plate No 4.8: Potohar Irrigation System

It is cultivated in the irrigated and un-irrigated land of the region. In 2002-03 the total area under wheat was 409 thousand hectares, comprising 37 thousand hectares of irrigated and 372 thousand hectares of un-irrigated (*Barani* lands). The total production was 571 thousand tonnes 76 thousand tonnes from irrigated and 495 thousand tonnes from un-irrigated or Barani Lands. The area is not self-sufficient in wheat (Crops Area Production, 2002-2003).

4.1.9.3 GRAM

Gram another important *Rabi* crop, is mainly sown on the barani un-irrigated lands. It is sown in (September-October) and cut in (April-May). The Potohar region total land under Gram was 10 thousand hectares and the total annual production was 6 thousand tonnes in 2002-03. Gram is grown in Jand, Pindi Gheb, Fateh Jang, Chakwal, Attock, Talagang, Taxila, Kahuta, Choa Sadian Shah, Pind Dadan Khan, Suhawa and Gujrakhan tehsils of the Potohar region.

4.1.9.4 MUSTARD (*SARSON* AND *TARAMIRA*)

The Mustard oil seed is sown in the Potohar areas alongwith wheat crop. It is a cash crop. It is primarily used as oil seed and its by product is oil cakes for cattle feed. Two varieties of Mustard-the yellow and black, are in use. The total mustard area was 23 thousand hectares with 17 thousand tonnes of annual production in 2002-03.

4.1.9.5 MASOOR

Masoor is very important pulas in the Potohar areas alongwith wheat crop. It is sown in September and cut in April-May. It is a totally a cash crop. Total area is 9 thousand hectares in 2002-03.

4.1.9.6 BARLEY

Barley is the third main *Rabi* crop which is mainly sown on the *Barani* lands. The total barely crop cultivated area was 3 thousand hectares and its *Rabi* season production was 3 thousand tonnes in 2002-03.

4.1.9.7 *KHARIF* CROPS

Kharif locally known as *barani Kharif* crops grown between July and October totally depending rainfall are most important in the Potohar Region. Cover-percent of total area and provide-percent of the total production Maiz, *bajra*, and

jawar the most important *Kharif* crops is grown throughout the study area. Maiz area is 66 thousand hectares production 102 thousand tonnes. *Bajara* area 64 thousand hectares production 20 thousand tonnes in 2002-2003. Groundnut is very important cugh crop in the Potohar Region total area 69،885 thousand hectares production 5،519 tonnes in 2002-2003.

4.1.9.8 MAIZE

Maize is the most widely grown crops in *Kharif* season in the Potohar Region. It is sown in summer (July-August) and harvested in (October-November) throughout the region. The total area under Maize in 2002-03 was 86 thousand hectares comprising 14 thousand hectares of irrigated and 72 thousand hectares of barani lands. The total annual production of maize 102 thousand tonnes. The area was not self sufficient in maize (Crops area production, 2002-03).

4.1.9.9 *BAJRA*

The second major *Kharif* crop is Bajra is sown usually in the later half of July and in August, and is harvested in October-November. It is grown on all classes of the *barani* un-irrigated land of Potohar region. The total cultivated area under this crop in 2002-03 was 64 thousand hectares and its annual production is 20 thousand tonnes.

4.1.9.10 JAWAR

Another major *Kharif* crop, it is sown in summer July-August, and harvested in October - November. The total area under Jawar in 2002-03 was 86 thousand hectares with a total production of 38 thousand tonnes.

4.1.9.11 GROUND NUT

Ground nut is a popular *Kharif* crop of the study area. It is sown in summer (June-July) and harvested in (November-December). Ground nut is mainly grown in all area of the region except in Kotli Sattian tahsil and Murree tehsil. The total area under ground nut was 70 thousand hectares in 2002-03 with a total production of 65 thousand tonnes. The area is self sufficient in ground nut and also exports it.

4.1.9.12 OTHER CROPS

In the Potohar Region, in addition to the major crops mentioned above a variety of other crops are grown on small scale in *barani* land. These include *Mung*, *Mash*, Cotton Rice Tobacco, Onion, Garlic Potato and Pulses etc.

4.1.9.13 FRUIT

The Potohar area offers favourable condition for the cultivation of different verities of fruit. The Murree tehsil and Kallar Khar and Choa Sadan Shah Tehsil in District Chakwal are very famous for Apple, Peach, Pears, Apricot etc. The area and production of these fruit is given in Table-4.9.

Table-4.9. Potohar Region: Production of Major Fruit 2002-03

Sr.No	Name of Fruit	Area in Hectares	Annual Production in tonnes.
1.	Apple	384	3,546
2.	Citrus	390	3,369
3	Apricot	50	281
4	Guava	124	728
5	Banana	26	133
6	Peach	5	33
7	Pear	8	60
8	Pomegranate	4	20
9	Mango	1	11
	Areas all fruits	992	8,181

Source:-

G.O.P. 2002-03 Crops area production, Food, Agriculture and livestock Division Economic Wing, Islamabad.

Table-4.10: Land and Crop Statistics of Districts of Potohar and Punjab province 2002-2003

Characteristics	Year's	Punjab	Potohar	Attock	Rawalpindi	Jhelum	Chakwal	Islamabad
1	2	3	4	5	6	7	8	9
Reported Area	2002-03	17,455	2,357	692	516	386	669	94
Cultivated Area	-do-	12,231	1,105	320	270	149	318	48
Net Sown Area	-do-	11,266	862	243	216	120	258	25
Current fallow	-do-	964	244	77	54	29	60	24
Cropped Area	-do-	15,912	919	252	246	124	265	33
Un-cultivated Area	-do-	5,224	1,251	372	246	237	351	46
Cultivated Waste	-do-	1,634	199	36	37	64	33	29
Not available for Cultivation	2002-03	3,101	802	264	146	128	258	6
Irrigated Area	-do-	12,954	71	27	10	24	10	-
Canal	-do-	3,920	8	3	2	1	2	-

Wells	-do-	126	30	17	6	2	5	-
Tube Wells	-do-	2,411	25	4	-	20	1	-
Canal tube wells	-do-	6,325	1	-	1	-	-	-
Well	-do-	98	30	17	6	2	5	-
Others	-do-	74	7	3	1	1	2	-
Crops, Area & Production:		i) Area 000 Hectares production in 000 Tonnes. ii) 000 Bale's cotton. iii) 00 Tonnes sugarcane production.						
Wheat Area	2002-03	6097.3	409.2	127.9	109.3	44.1	115.3	12.6
Production		15355.0	570.8	195.0	174.1	53.0	129.0	19.7
Jawar Area	-do-	235.4	86.3	22.3	35.5	3.5	23.3	1.7
Production		132.5	38.4	10.4	16.6	1.8	8.8	0.8
Maize Area	-do-	419.5	85.8	19.3	50.2	3.3	0.4	12.6
Production		282.9	101.6	22.7	53.8	11.8	0.5	12.8
Bajra Area	-do-	332.5	63.6	7.0	11.0	2.6	19.2	0.3
Production		180.9	20.3	2.2	3.4	8.3	6.3	0.1
Gram Area	-do-	860.0	10.3	3.0	0.6	0.3	6.4	0.0
Production		611.5	6.2	2.1	0.4	0.2	3.5	0.0
Barley Area	-do-	39.9	3.4	2.1	0.4	0.0	0.8	0.1
Production		38.4	3.2	1.9	0.5	0.0	0.7	0.1
Cotton Area	-do-	2208.3	0.4	0.0	0.0	0.4	0.0	0.0
Production		7664.0	0.4	0.0	0.0	0.4	0.0	0.0
Sugarcane Area	-do-	735.3	0.4	0.2	0.0	0.2	0.0	0.0
Production		33168.6	16.4	7.7	0.0	8.7	0.0	0.0
Rapeseed & Mustard Area	-do-	150.8	22.7	5.0	2.9	3.6	11.0	0.2
Ground Nut Area	-do-	74,351	69,875	26,822	7,676	476	34,901	0
Mash Area	-do-	50,777	6,659	16	5,174	647	627	195
Masoor Area	-do-	34,242	9,103	242	4,113	911	3,826	11
Mung Area	-do-	2,37,323	4,125	127	1,422	1,438	995	143
Other Kharif Pulses Crops Area	-do-	2,921	1,185	148	580	389	65	3
Sugar Seed Area	-do-	1,72,924	1,419	175	3	0.2	-	-
Tobacco Area	-do-	17,514	87	81	0	6	0	0
Mattri Area	-do-	21,726	120	48	5	33	27	7
Sunn Hemp Area	-do-	3,075	104	7	17	65	15	0
Potato	-do-	8,92,878	24,116	15,122	3,559	5,435	0	0
Other Rabi pulses Crops	-do-	422	43	2	11	1	17	12
Gine Seed	2002-03	1,675	8	0	0	2	6	0
Custer Seed	-do-	104	9	-	5	4	0	-
Vegetable	-do-	1,35,062	4,747	2,518	1,118	441	470	200
Potato	-do-	1,02,170	2,568	1,156	211	1,196	5	-
Chilies	-do-	7,275	427	346	2	0	79	0
Onion	-do-	26,457	466	265	129	45	27	-
Garlic	-do-	2,669	181	113	24	32	8	4
Coriander	-do-	632	30	18	0	0	12	0
FRUITS								
Apple	2002-03	389	384		384			
Guava	-do-	50,996	124	33	28	31	25	7
Banana	-do-	2,244	26	0	0	14	12	0
Apricot	-do-	68	50	28	6	-	12	4
Pears	-do-	183	8	-	6	-	2	-
Pomegranate	-do-	2,355	4	-	-	-	4	-
Mango	-do-	54,010	1	0	1	0	0	0
Area at all fruits	-do-	3,40,066	1,596	600	656	115	175	50

FORESTS								
Total Compact Area (in hectares) Forests	2002-03	3,3,15,256	4,02,263	67,442	1,27,722	38,396	63,355	1,05,348
Protected Forests	-do-	3,3,83,491	18263	47	18,216	-	-	-
Reserved Forests	-do-	3,37,705	1,87,611	65,111	38,170	29,700	44,282	10,348
Section 38 Forests & Resumed Lands	-do-	28,810	1,00,810	2,284	363	610	2,553	95,000
Un-classified Forests	-do-	1,10,240	27,344	-	2,738	8,086	16,520	-
Chosact	-do-	1,11,620	-	-	-	-	-	-
Others *Guzara*	-do-	68,235	68,235	-	68,235	-	-	-

Source:-

1.Govt of Punjab 1998 Statistical Pocket Book of the Punjab table 2, 18-27 Bureau of Statistics, Lahore.

2.G.O.P., 2002-03 Craps Area Production table 1-54 Food & Agriculture & Live Stock and Division Economic Wing, Islamabad.

3.G.O.P. 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 39 & 40 Population Census Organisation, Islamabad.

4.1.10 MINERALS

Minerals play a vital role in economic development of a region. Which are found in abundance in country. But due to resource crunch and non-availbality of high-tech technology this potential is not being materialzed fully. Particularly, the region of salt-range Makarwal, Mial, Dullian Misa Kaswal, Gujar Khan are well-known for mineral wealth. At present there are various principal solid minerals like coal, rock salt, lime stone, marble china clay, dalomite, firclay, gypsuom, silica sand and emerald, alongwith other two important minerals such as natural gas and crude oil 2.0 Million barrels in 1998-99 in the Potohar region. Potohar is endowed with minerals of various kind. The important ones are briefly introduced as follows:

4.1.10.1 COAL

Coal in Potohar is mined principally in the salt range. The main coal mines are at Dandot and Pidh in eastern salt range and Makarwal. Coal is also found in other areas, but in most of them mining is uneconomical, either because quality is poor and quantity is small or because the place is not easily accessible (Muhammad Aslam Mian, 1999). On the whole the coal is of poor quality. It generally occurs in intricate folded blocks with makes mining difficult (Muhammad Aslam Mian, 1999). The coal seem are generally thin and the coal has high ash and sulphur content, and a high percentage of volatile matter. It is mainly used in brick and lime burning kilns.

4.1.10.2 MINERAL OIL OR PETROLEUM

1) The Khaur oil field (Pindi Ghaib Tehsil, Attock district) which has been

working since 1915 and is now nearly exhausted.

2) The Dhulian oil field (Pindi Ghaib Tahsil, Attock district) discovered in 1935, lying at about 6 km to the north west of Khaur Oil Field, is the biggest oil field of the country (Directorate of Industry, 1992).

3) The Joyamir Oil Field (Jhelum district) was discovered in 1944 by the Attock Oil Company.

4) The Balkassar Oil Field (Chakwal district) was discovered in 1946. The Chakwal Oil Field discovered in 1949 is now being worked as a part of Balkassar Oil Field.

5) The Karsal Oil Field (Chakwal district) was discovered in 1956. This Oil Field lies to the North West of Balkassar Oil Field and produces good quality oil (Muhammad Aslam Mian, 1999).

6) The Tut Oil Field (Attock district) was discovered in 1968.

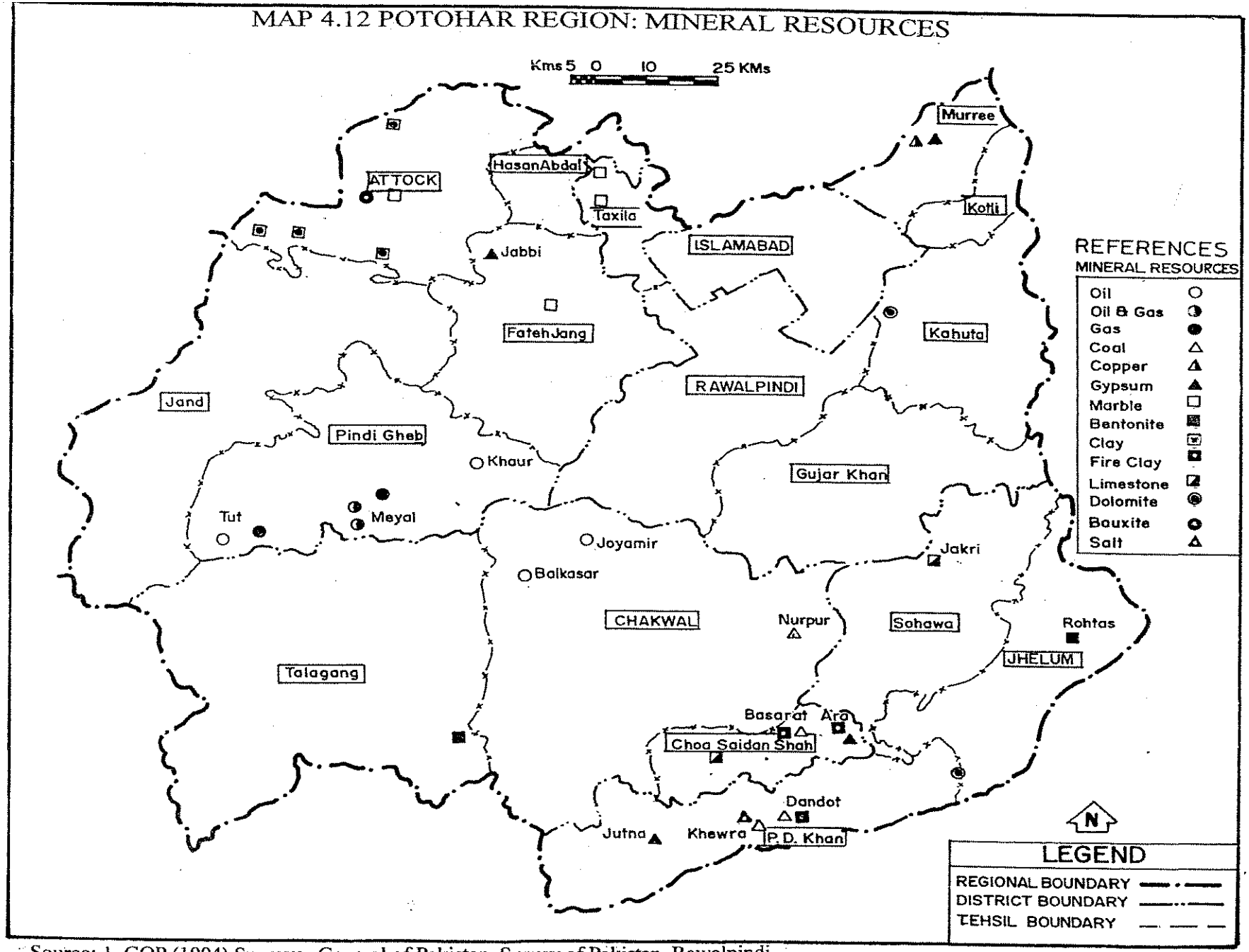
These oil fields produced 19858 barrels of crud oil in 1994-95 (Muhammad Aslam Mian, 1999). Balkassar and Dhulian oil field produce more than 90 percent of the total crude oil. Oil has also been discovered also at Dakhni Jand tehsil, Attock district Adhi, Missa Kaswal, Barratial and Qazian Gujar Khan tehsil Rawalpindi district is Shown on (Map-4.12).

4.1.10.3 NATURAL GAS

In 1982 Natural Gas was discovered at Bair Ratial, (Jatli), Missakaswal and Adhi (Gujar Khan, tehsil Rawalpindi district) while workers were drilling for oil. The gas field is considered one of the largest in the country, and is of great value and importance to Pakistan./Potohar region. The Potohar region gas is being used for domestic and industrial/commercial purposes. It is cheaper than fuel oil or petroleum. Most of the factories in Potohar region now use gas. Pipe lines from Missakaswal to Islamabad and various other parts of the region have been laid to carry gas. The oil and gas development corporation (OGDC) have been assigned the task of prospecting oil and gas in various areas of Potohar region.

4.1.10.4 GYPSUM

MAP 4.12 POTOHAR REGION: MINERAL RESOURCES



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (2001) Directorate of Industry, M/O Commerce, Islamabad.

This is found in large deposits in the Salt Range. The most important being at Khewra and Dondot. It is used mainly manufacture of cement, plaster of paris, fertilizer and sulphate products (sulphuric-acid and ammonium sulphate).

4.1.10.5 LIMESTONE

Lime stone is used in the making of cement and is burnt to make lime. It is found in large qualities in the Attock, Rawalpindi, Chakwal and Jhelum Districts, and is primarily used to meet the requirement of cement industry. Total production was 939 thousand million tonnes in 1989-90 (Muhammad Aslam Mian, 1999).

4.1.10.6 MARBLE

Black and white marble has been found in large quantities in the kala chitta hills (Attock District).

4.1.10.7 FIRE-CLAY

Fire clay deposits have been found in salt range and kalla chitta hills. It is used for making bricks, which are used for melting steel in Kilns. Total production in the region was 64 thousand tonnes in 1998-99 (Muhammad Aslam Mian, 1999).

4.1.10.8 ROCK SALT

Potohar has vast deposits of rock salt in the salt range area. The main area of production is Khewara, which has the chief mine of the world. This is the most important and extensively worked mine. The total salt reserves available are estimated at four million tonnes (Muhammad Aslam Mian, 1999).

4.1.11 INDUSTRY IN POTOHAR

Inspite of rich owneral and agricultural resources, industries are relatively less developed in Potohar as compare to other area/region of Pakistan. There are various factories in 2003-2004, out of which majority belongs small scale and cottage. Large scale industries are based on mineral agriculture livestock and feed. Mineral based industries cement mechanical complex (Taxila) Aeronautical. Attock feed industry and flour mill (Jhelum, Rawalpindi, Gujarkhan) limestone, gypsum produces causticesoda P.V.C (P.D. Khan) salt industry (Khewara) cotton textiles (G Kechawan) were processing (lawarn Rawalpindi).

There are two categories of industries in Potohar region.

4.1.11.1 HEAVY MECHANICAL COMPLEX TAXILA

With the assistance of People's Republic of China an important heavy industrial complex has been set up near Taxila, (37 km. from Rawalpindi city). The complex manufactures heavy machinery, heavy cranes, Wah cement manufacturing plants, transformers, switch growers and capacitors.

4.1.11.2 COTTON TEXTILE INDUSTRY

Cotton textile industry the regions biggest large scale industry and in the past few years it has made an outstanding progress. It represents one of the most important sectors of the economy as its products form almost 60 percent of Potohar total exports and has 18 percent weight in the regions large scale industrial production. In 1997-98 there were ten textile mills in the region.

In the beginning, Karachi became the centre of this industry outside the cotton growing area. Later there was a shift to the up country centres within the cotton producing areas. Karachi had the advantage of capital, banking, facilities, business ability, transportation facilities and fine harbour. Faisalabad is now 2nd to Karachi and is called Manchester of Pakistan. Other centres are established in Potohar region. These centres outside the cotton belt are Rawalpindi, Gujarkhan, Chakwal and Jhelum tehsils.

4.1.11.3 WOOLLEN INDUSTRY

The large scale woollen mill are located at Rawalpindi and Lawerncepur (Hassanabdal tehsil) Attock District. They produce high quality woollen cloth and other woollen goods. Most of the products are exported to the foreign countries. Besides the above woollen mills centres there are some more-though much smaller in the other cities of Potohar.

4.1.12 CEMENT FACTORIES

The two important basic raw materials for the cement industry in Potohar are lime stone and gypsum. Plenty of lime stone suitable for the manufacture of cement is available throughout the hilly areas of the Potohar region. Gypsum also occurs in large quantities in different area and fuel is available in the form of natural gas and mineral oil.

Cement industry in this part of the sub-continent was first established in 1921 at Wah (Taxila tehsil Rawalpindi District) with a small capacity of 44.5 thousand tonnes per annum. In 1937 M/s Dalmia set up one plant at Dandot (Choa Saidan Shah tehsil Chakwal District) and Bestway Cement plant was established in 1999 in Taxila tehsil and Chakwal tehsil in 2004. Later on one more industries were set up at Gharibwal cement, tehsil Pind Dadan Khan Jhelum district.

4.1.12.1 COTTAGE INDUSTRIES

The cottage or small scale industrial sector plays a pivotal role in industrial development because it employees less investment, generates more employment opportunities, uses indigenous technology and raw materials and urban immigration. The important cottage and small scale industries of the region are Cement products, concrete products, bus and truck body makers, bakery food products, agricultural implements, *atta-chakki*, oil crushing expeller, auto workshop, cold storage, fruit processing, ice cream, ice factory, light engineering, repairing workshop, leather shoe, marble factory, oil milling, newspapers, poultry farm, pharmaceutical, plastic shoe factory, printing press, polyphone products, ready made garments, steel plates, soap factory, steel fabrication, saw machine steel tanks, stone crushers factory, and wooden furniture (Directorate of industry, 1999).

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4.2 *SUMMARY/CONCLUSION*

Potohar is an important *Barani* agricultural tract in the area of the Northern Punjab. It is a geosynclines over 161 kms. long and 48.3 to 66.4 kms.

St. Thomas on the pestles of Jesus Christ was the earliest Christian missionary to visit Potohar, who established the pioneer Christian community at Taxila around A.D. 50. Muslim mystics and scholars had explored Potohar long before the formal conquest of Sindh by the Arab forces. However it was from the North-West that influx of Muslim conquerors and immigrants took place with the arrival of Mehmood of ghanzavi.

In the region various archaeological sites are identified - human settlement, temples, stupas, castles, graveyards and remnants of the historic G.T.Road, sarais, bawolies, garden, wells and several other land marks, Chauburjis and historical places. The grave of Baba Wali Qandhari on small hill, *Punja Sahib* of the Sikhs and the Mughal garden situated at the old villages Wah near G.T. Road are prominent sites in the area.

The development during British period followed its own strategic design. The British penetrated the region in the middle of nineteenth century. Nevertheless the construction of new roads, cantonment board and general development had substantial effect on the growth of population of region.

Potohar region is occupied in north eastern side by rough broken, shawalik hills of Himalayan mountain land, and other remaining area is occupied by calcareous, loamy and clayey soil, non-calcareous, loamy/calcareous and salt affected soil. Potohar area has an extreme climate with hot in summer and cold in winter.

Rainfall declines away from the mountains edge, and Attock averages 612 mm but the winter rain fall is 229 mm. The environment sets constrains upon development, and many people leave Potohar to find work elsewhere; the Army services being common career.

The *barani* agriculture totally depends on rainfall which at Rawalpindi 960 mm of which 259 mm occurs in the winter half year from October to March.

The history of human settlement in Potohar goes back to several thousand years when many people was still hunter and lived in caves. Excavations reveal that several civilizations flourished in Potohar in the past and such civilizations have been established in Taxila, Manikiala top, Parwala, Attock Fort, Rohtas Fort, kallar kahar, and Katas Raj temple etc. in Potohar region.

Potohar was the political, academic and ritual area of the vast Buddhist empire from Afghanistan to southern India. Buddhism was the predominant cultural force in these areas co-existing with Hinduism until the Persians formally annexed Punjab in their empire.

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CHAPTER FIVE

PROFILE OF POPULATION OF POTOHAR

5.1 INTRODUCTION

This chapter is devoted study of population growth trend in Potohar up to the year 1998, followed by projection of the trend for up to the year 2016. The past trend is studied in two parts. First a brief descriptive account of population size and growth situation in ancient times is presented. This is followed by analysis of growth trend in post-1881 period. The latter is further divided into two sections. The first one discusses the population growth of the region as a whole while the second one explains the growth by districts.

5.1.1 POPULATION DISTRIBUTION, DENSITY AND GROWTH

Important Population and human settlement indicators of the study area are given in Table-5.1. The total area of the Potohar is about 23,160 Km^2 . There is a wide variation in the distribution of area within the Region as in the population. Islamabad district, the largest population centre occupies only 3.9 percent of the region area, with the highest density of 889 person per Km^2 in 1998. Rawalpindi district is second in population with 22.8 percent of the total area and a density of 636 persons per Km^2 Jhelum district is third in population and occupies nearly 15.5 percent of the area, with a population density of 261 persons per Km^2 Attock district has population density of only 186 person per Km^2 but occupies a little over 29.6 percent of the area and has the lowest density 164 persons per Km^2.

The population of Potohar in 1998 was about 7,4,65,000 having grown at an annual rate of 2.5 percent during the inter-censual period 1981-98 (Population Census Organisation, 1998) Annual growth rate was 2.1 percent for the period 1972-1981. Adjusting for estimated under count of 2.3 percent in the 1972 census, the annual growth 1972-81 would come down to 2.1 percent. Thus there does not appear to be any change in the growth rate of the population during the past two decades.

At the present growth rate 2.5 percent the population will double in the next 20 years. This rapid growth population is attributed mainly to the sharp fall in the death rate, due to improved environmental conditions and health facilities (NIPS, 2001). Such trends have implications for migration pattern in the Region. Table-5.1, also provides the annual growth rate of each district during the last two decades. The Urban population at regional level has increased from 32.2 in 1981 to 39.9 percent in 1998, which shows that every 2nd person now

lives in a city or town (urban settlement). Other provinces of Pakistan show similar trend with a slightly higher increase in Balochistan followed by Sindh, Punjab and NWFP / FATA has the lowest urban proportion of 2.7 percent as against 1981 when it was all rural.

There are four major cities having population 2,2,85,000 and above. The biggest city in Potohar is Rawalpindi with a population of 1,409 thousand followed by Islamabad 529 thousand, Wah 198 thousand and Jhelum 147 thousand. Almost more than 77 percent of the total urban population lives in these four large cities in Potohar.

The sex ratio i.e. males over hundred females in the Potohar region was 105 in 1981 which fell to 102 in 1998. The decline in the over all sex ratio could be attributed to better coverage of females and improvement in their life expectancy (Population Census Organisation, 1981-98). The sex ratio of Islamabad, Rawalpindi and Attock districts have, however, decreased-Islamabad from 118.8 in 1981 to 117 in 1998; Rawalpindi from 107.5 to 104.6; Attock from 101.5 to 96.6 respectively.

Table-5.1. Potohar Region: population and human settlement selected characteristics 1997-1998

Characteristics	Year	Pakistan	Punjab	Potohar	Attock	Chakwal	Islamabad	Jhelum	Rawalpindi
Area's (in km^2)	1998	7,96,095	1,83,090	23,160	6,857	6,524	906	3,587	5,286
Total Population (in thousand)	1998	1,32,352	66,961	7,464	1,274	1,083	805	936	3,363
Rural Population (in thousand)	1998	89,316	46,393	4,485	1,003	952	276	677	1,575
Urban Population (in thousand)	1998	43,036	20,568	2,979	271	131	529	259	1,788
Average Annual Growth Rate (Total)	1981-98	2.5	2.4	2.5	2.1	1.9	4.9	2.0	2.6
Average Annual Growth Rate (Urban)	1981-98	3.3	2.5	3.6	4.1	4.0	5.4	2.4	3.2
Population Density (Total) person per km^2	1998	164	360	322	186	166	889	261	636
Population Density per km^2 (Urban)	1998	--	366	3,588	1,143	3,368	2,581	1,882	8,463
Human Settlement Density per km^2	1998	--	0.01	0.03	0.03	0.01	0.07	0.04	0.06
Agriculture Density (on the bases of area per km^2)	1997-98	--	548	675	398	341	1643	629	1,246
Cultivated area (000 hectares)	1997-98	8169.8	1,223	1,106	320	318	49	149	270
Sex Ratio (male per 1000 female)	1998	1081	1075	1025	996	916	1170	998	1,049
Total Dependency Ratio	1998	62.7	86.9	75.5	78.4	81.8	68.4	80.4	73.0

Literacy Ratio (in percent)	1998	45.0	47.4	62.5	49.3	56.7	72.4	63.9	70.4
No's of Cities (having pop 100,000+)	1998	60	33	5	-	-	1	1	3
Total No. of Mauzas	1998	48,363	25,875	2,767	446	452	132	573	1,164
Total No of Human Settlement	1998 T	4,202	2,222	178	56	43	15	20	44
	U	511	2,023	31	10	3	1	7	10
	R	3,691	199	147	46	40	14	13	34
degree of Urbanisation	1998	32.5	31.3	39.9	21.3	12.2	65.7	27.7	53.2
Age Group (under 15 year proportion)	1998	55,0,64,747	42.5	36.6	39.5	39.0	37.9	39.7	38.6
Housing Units No's	1998	19,2,11,738	10,5,37,127	1,1,94,239	2,06,678	1,87,076	1,28,753	1,50,225	5,21,507
Person per Housing unit (size)	1998	6.8	6.9	6.1	6.1	5.7	6.2	6.1	6.4
Room per Housing Units	1998	2.2	2.3	2.3	2.6	2.9	2.9	2.8	3.4
Person per Room	1998	3.1	3.0	2.0	2.3	1.9	2.1	2.2	1.9
In Migrant	1998	8,3,51,930	6,7,01,256	1,2,93,081	88,926	29,716	3,97,731	65,904	7,10,804
Road Transport Intensity (000 per km^2)	1998	--	0.53	0.0012	0.0018	0.0040	0.0009	0.0023	0.0007
Source of Drinking Water(in Housing Units in percent)	1998 In	75.04	86.7	53.6	62.0	70.1	62.8	66.2	67.8
	Out	24.96	13.3	34.2	38.0	29.9	37.2	33.8	32.2
Source of lighting (in Housing Units in percent)	1998 Ele	70.46	72.5	81.0	69.7	91.5	69.7	83.1	91.0
	Kerosin oil	27.87	26.6	18.4	29.7	8.0	29.6	16.3	8.5
	Other	1.68							
Source of Cooking Fuel (in Housing Units in percent)	1998 Wood	68.83	68.3	62.5	76.2	38.2	85.7	72.9	39.6
	Kerosin oil	3.72	3.8	4.5	2.7	4.4	2.1	9.2	4.3
	Gas	20.19	17.7	30.1	17.4	56.0	8.9	15.4	52.9

Source:-

1.G.O.P. 1998 District Census Reports Attock, Chakwal, Islamabad and Rawalpindi table 39 & 40-44 Population Census Organisation, Islamabad.

2.G.O.P. 1998 Provincial Census Report of Punjab Population Census Organisation, Islamabad.

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5.1.2 GROWTH IN ANCIENT PERIOD

No historical account is available of the size and growth rate of Potohar's population in ancient times. There are, however, some sketchy direct and indirect evidences suggest this region had densely populated dwelling centres thousands of years ago. However population growth of the region can be discussed in three distinct periods. Pre-census, Post Census–Pre-Independence, Post Independence.

5.1.3 PRE-CENSUS PERIOD

The Taxila excavations reveal that as far back as the 3rd or 4th millennium B.C. and probably much earlier still, Taxila region (Soan & Indus civilization) had highly developed large and populous cities, well built houses, temples, forts, *stupas*, houses and public buildings of bricks and many other amenities enjoyed at that period by the people of Mesopotamian and Egypt (Kingsley Davis, 1951). The inhabitants of cities depended largely on agriculture. They had numerous types of domesticated animals including sheep, pigs, humped bulls and elephants. They were familiar with the art of spinning, weaving, cultivation of cotton, etc. They possessed a well developed system of evidenced by the discovery of over a thousand tablets engraved with well executed animal devices and pictographic legends in an unknown script (Kingsley Davis, 1951).

The other source of advanced culture was the Aryans, who came into Potohar from the north around 2000 B.C. (Population Census Organisation, 1998). They were agricultural and pastoral people who understood the principles of irrigation, manuring and used the animal drawn plough (Kroeber, 1948). They knew the use of wheel, employing chariots for fighting and racing and carts for hauling (Kroeber, 1948). They used metal probably copper, and understood spinning and weaving. They exhibited a marked division of labour; the society was distributed into different segments - wood workers, metal workers, leather workers, wearers, soldiers, priests, slaves, etc (Kroeber, 1948). After arriving in Potohar of Punjab (Pak), they made additional acquisitions - the most important of which was alphabetic writing borrowed from Semitic source about 800 B.C. and iron, acquired even earlier (J. Marshall, 1960).

So in Potohar some three to seven thousand years ago there were people possessing a technology sufficiently advanced to support a dense population, the soil and climate of Potohar favourable condition for the application of this technology (Robertson, 1887).

The ancient historical periods bear out the belief that the Region was populated in a remote age, whereas the earliest literature, the "*Rigveda*" makes it clear that the population was scanty and spread over wide area in small villages. The old brahmana literature around 800 B.C. reveals that some of the villages had grown into towns and capitals with an urban mode of life (Robertson, 1887).

The Buddhists literature indicates that between the 7th and 4th centuries B.C. the economy of Potohar Region was comparable to that of the later middle age in Europe

(Kingsley Davis, 1951). Crafts and commerce were flourishing, and were highly organised. Money and credit were every day instruments (Kingsley Davis, 1951).

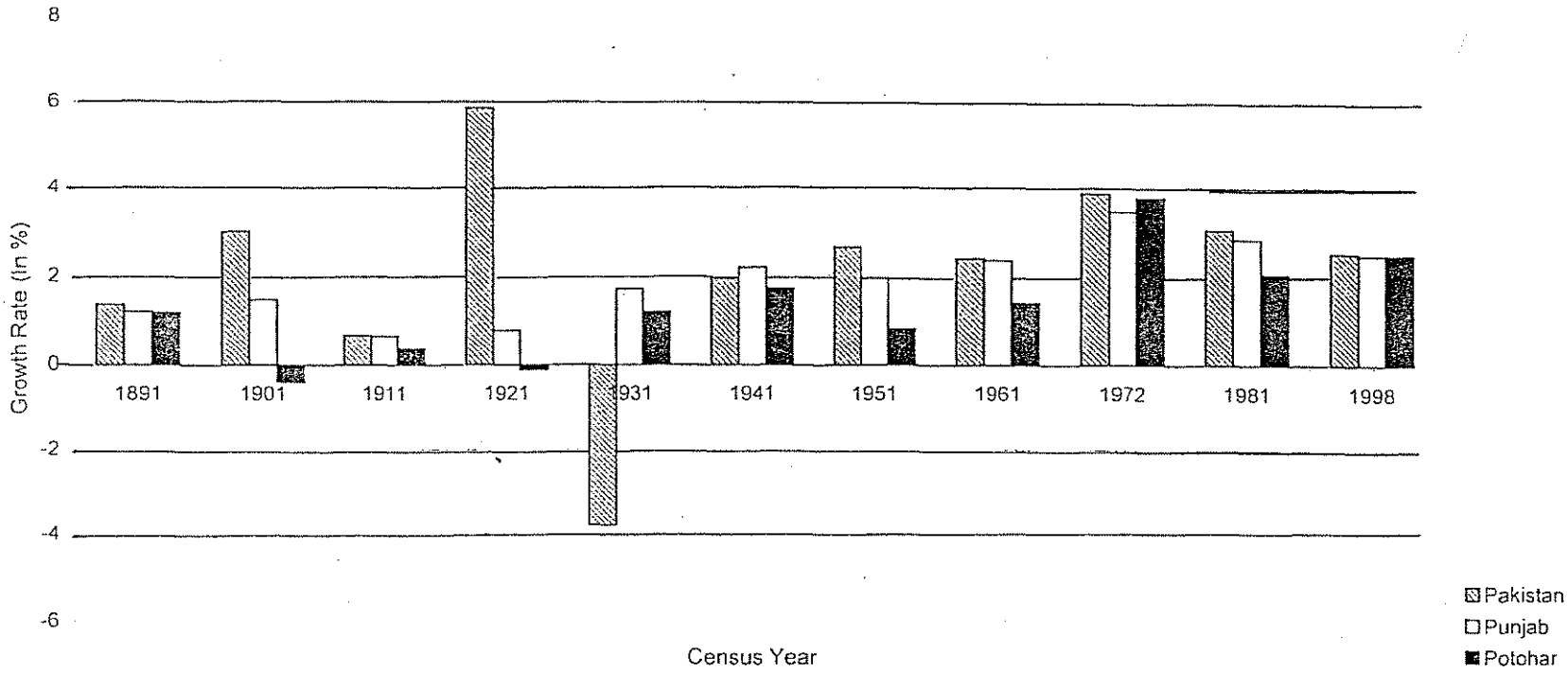
This impression of a large population was confirmed by Alexander's army, invaded Potohar (Punjab) in 326-327 B.C. Though great sections remained sparsely settled, some of the have a dense population. This view is confirmed by Dr Pran-Nath, who after careful examination of this evidence believes that the population of ancient India around 300 B.C. was between 100 and 140 million (Asiatic Society, 1929).

5.1.4. POTOHAR POST CENSUS PERIOD (1881) POPULATION GROWTH

The first population census in the Punjab (including Potohar) was conducted in 1855 (Robertson,1887). Population statistics for Potohar are not available for the 1855 census nor for the one conducted in 1868. Data for the regions comprised in Potohar are, however, available for 1881 onwards for the twelve censuses conducted since then. The growth trend in Potohar as a whole is analysed as follows.

During 1881-1998, population of Potohar experienced annual growth rate of 2.5 percent. On the total it increased 36 percent vide 12 folds are shown in (Appendix-5.1). The population enumerated in the twelve censuses in 1881 onwards is given in the Table-5.2 shown in (Fig -5.1).

FIG. 5.1 POTOHAR REGION: POPULATION GROWTH
COMPARISON WITH PUNJAB & PAKISTAN 1891-1998



Source:

1. Government of India 1881-1939, Census of India.
2. GOP 1951-98, Census Report of Pakistan, Population Census Organisation, Islamabad.
3. GOP 1951-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-1, Population Census Organisation, Islamabad.

Table-5.2. Potohar Region: Population Average Annual Growth Rate Comparison Punjab and Country 1881-1998

Census Year	Potohar Population In (000)	Average Annual Growth Rate in %	Punjab Population In (000)	Average Annual Growth Rate in %	Pakistan Population In (000)	Average Annual Growth Rate in %
1881	1,410	1.20	6,701	1.22	10,693	1.40
1891	1,589	-0.41	7,568	1.50	12,300	3.02
1901	1,524	0.35	8,789	0.68	16,576	0.69
1911	1,578	-0.12	9,412	0.80	17,759	4.84
1921	1,558	1.21	10,202	1.73	31,343	-3.79
1931	1,759	1.74	12,115	2.21	21,283	1.98
1941	2,090	0.85	15,077	1.98	25,904	2.67
1951	2,276	1.44	18,360	2.38	33,740	2.42
1961	2,653	3.79	23,228	3.47	42,880	3.89
1972	4,016	2.07	33,829	2.85	65,309	3.07
1981	4,773	2.51	42,860	2.50	84,254	2.54
1998	7,465		6,6962		1,32,352	

Source:-

1.Govt of India 1881-1941 Census of India.
2.G.O.P. 1951-1998 Census Report Pakistan Population Census Organisation, Islamabad.
3.G.O.P. 1951-1998 Provincial Census Report Punjab Population Census Organisation, Islamabad.
4.G.O.P. 1951-1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

5.1.5 POST INDEPENDENCE

The growth trend has been erratic through out the period 1851-1998. In two censuses population of Potohar was lower than the previous censuses; the declines were recorded in 1901 and 1921. The out-break of Influenza in 1919 could be a possible factor of the decline recorded in 1921, but there must be more factors including improvement in the quality of enumeration - a factor that would explain a decline in some years and a marked increase in some other (Robertson, 1887).

As observed above the growth path taken by the study, population during 1851-1998 was in erratic terms of rate of growth, though the overall tendency was upwards. It is not possible, nor it would it be an objective proposition, to make any generalization about the factors shaping this path over the period of nearly a century and a half bracketed between the

censuses of 1851 and 1998, yet it may not be entirely futile to seek an explanation for this trend. The study area witnessed some fundamental changes-social, economic, and political during this period (Muhammad Afzal, 2003). Therefore, it appears appropriate to re-tabulate the data of Table 5.2 in the context of socio-economic-political transition as that may help provide explanation for the trend and more particularly for the upsurge in growth rate in post 1951 period-though it was still highly. In terms of socio-economic/political scenario, the censuses of 1881 to 1998 can be grouped in five distinct periods as given in Table-5.3.

Table-5.3. Potohar Region: Population Growth Trend and Historical Land Marks during 1881-1998

Census Period	Intercensal Period	Base Pop (000)	Growth Total (000)	Annual Growth Rate %	Major characteristics events of the period
1881-1901	20	1,410	114	0.39	The British Colonial rule got firmly entrenched in the area (Robertson, 1887)
1901-1921	20	1,524	34	0.11	The first World War took place during the period and marked decline in public health observed. In addition to the above there occurred journal spread of malaria and influenza epidemic apart from general poor harvest of crops (Robertson, 1887).
1921-1941	20	1,558	532	1.47	Second World war started and great political turmoil world over.
1941-1951	10	2,090	186	0.85	End of World war II, acceleration of political movement, end of British rule Partition of Indo-Pak sub-continent into two sovereign states – India & Pakistan. Establishment of Pakistan. Mass exodus of population from both the newly born states on the basis of religion and inflow of population.
1951-1998	47	2,276	5,189	2.55	The major eco development projects of particular significance for Potohar were: Construction of Mangla Mega Dam which largest earth filled dam in the world, And some other dams Rawal, Dungi, Fatehjang, Shahpur, Chakwal. Also (under construction) hydal power station presently under hand like Ghazi Brotha Hydropower project (GBHPP) a mega project of national importance. Worth mentioning is the Kamra and Sanjwal Aeronautical complex arm ammunition tank etc. Wah Factory as well which gave impetus to development in the defence of the country. With China help we also have seen Taxila Heavy Mechanical complex producing tanks etc. The industrial empire the construction of Islamabad. Rural Health Centres and Educational Institutions from Primary level to Higher Secondary level, apart from technical centres. In urban settlement information technology various university training institutions were set up and also some of university in the region are also have their part to play role in educational sector of the region. A multi-purposes Motor Way (M1) which is meant for utilization for traffic which gives further projection to trade ways to Central Asian states through Afghanistan and also with China through Shah-Rahe-Resham. This all is a contributory growth factor. Potohar area is rich in Mineral/Oil & Gas exploration in Jatli, Missa Kaswal, Ber Ratial, Jhelum, Tarkwal and Norang etc.

Source:-

1.Govt of India 1901 Census of India.

2.G.O.P. 1961 Census of Pakistan Population and Registration office M/O Home and Kashmir affairs Karachi, Vol. III p. 112-133.

3.G.O.P. 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 1 Population Census Organisation, Islamabad.

In contrast with post-1947 period, the pre-1947 period was characterise by colonial rule and a general socio-economic stagnation, rather deliberate repression in the Potohar region, as also elsewhere in the country (B.L.C Johnson, 1979). In the particular context of Potohar, there were little or no pull factors to induce population inflow from other areas (Muhammad Amin Khan Raja, 1983). This area rather sent out more people than it received (Najaf Ali, 1997). This factor and the high mortality rate are the major explanations of low growth rate in pre-1951 period- low by the current standard (Perveen Azara, 1991).

The post–1951 period witnessed unprecedented developmental activities in the Potohar region. These included, as partly mentioned above, construction of two mega dams (Mangla and Tarbela) on the flank of the region, the country's new capital at Islamabad and a huge industrial complex at Wah, Kamra, Sanjwal and Taxila. The study area economy received a great and continuous boost inducing large scale in-migration as well as intra-regional rural-urban migration. The social and economic indicators improved considerably (Perveen Azara, 1991). The most clearly visible improvement is the fall in mortality rate meaning a corresponding rise in survival rate and hence a relatively higher rate of population growth (Parveen Azara, 1991) is given in (Fig-5.2).

5.1.6 POPULATION GROWTH IN DISTRICTS

In the preceding parts of the chapter the study's focus was on growth trend of population in the Potohar region taken as a whole. In this section the growth trend in the region five districts is analysed. The time reference is 1951-98 as older data for the individual districts not available, more importantly as going back into the very distant past is not necessary or appropriate, of the fact that the post 1951 period's social, economic and political scenario are so fundamentally different from preceeding fifty years as to make the two periods quite incomparable. Hence the need to focus the analysis on 1951-98 period as given in the Table-5.4.

Table-5.4. Potohar Region: District Wise Population 1951-1998

Census Year	Name of Districts										Potohar	
	Attock		Chakwal		Islamabad		Jhelum		Rawalpindi			
	Population in(000)	V%[1]	Population in(000)	V %[1]	Population in(000)	V%[1]	Population in(000)	V%[1]	Population in(000)	V %[1]	Population in(000)	V%[1]
1951	486	-	455	-	96	-	368	-	872	-	2,276	-
1961	533	8.8 (47)	502	9.4 (47)	118	18.6 (22)	415	11.3 (47)	1,086	19.7 (214)	2,653	14.2 (377)
1972	749	28.8 (216)	693	27.6 (191)	238	50.4 (120)	592	29.9 (177)	1,745	37.8 (659)	4,016	33.9 (1,363)
1981	877	14.6 (128)	776	10.7 (83)	340	30.0 (102)	659	10.2 (67)	2,121	17.7 (376)	4,773	15.9 (757)
1998	1275	31.2 (398)	1,084	28.4 (308)	805	57.8 (465)	937	29.7 (278)	3,364	37.0 (1,243)	7,465	36.1 (2,692)
1951-98 Variatio)	789	38.4 (303)	629	27.7 (174)	709	86.4 (613)	569	35.3 (201)	2,492	65.0 (1,620)	5,189	56.1 (2,913)

Source:-

G.O.P. 1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

Over the period 1951-98 the study area's population increased by 5.2 million. Almost half of the population was in Rawalpindi District, which is also the most populous district in the region accounting for 45.06 percent of its total population (Population Census Organisation, 1998). Rawalpindi and Islamabad are two separate districts in administrative terms, but they are so close together and functionally integrated that for demographic purpose they should better be treated as a single district. In fact, Rawalpindi-Islamabad are mostly termed as twin cities (Appendix-5.2). Similarly, the two districts need be taken as one for the present analysis. Considered as such the two districts accounted for 55.84 percent of the total population of Potohar in 1998 and for 43.86 percent of the region's incremental population during 1951-98 are Shown in (Map-5.1).

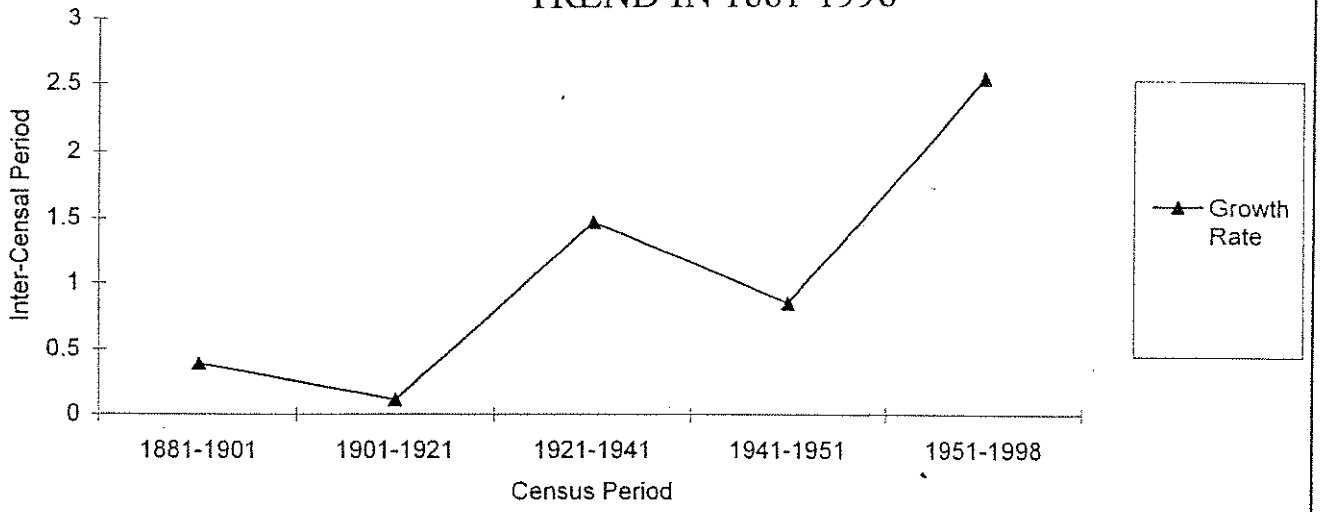
5.1.7 CHANGE IN RANKING

Population wise ranking of the five districts under study remained unchanged during

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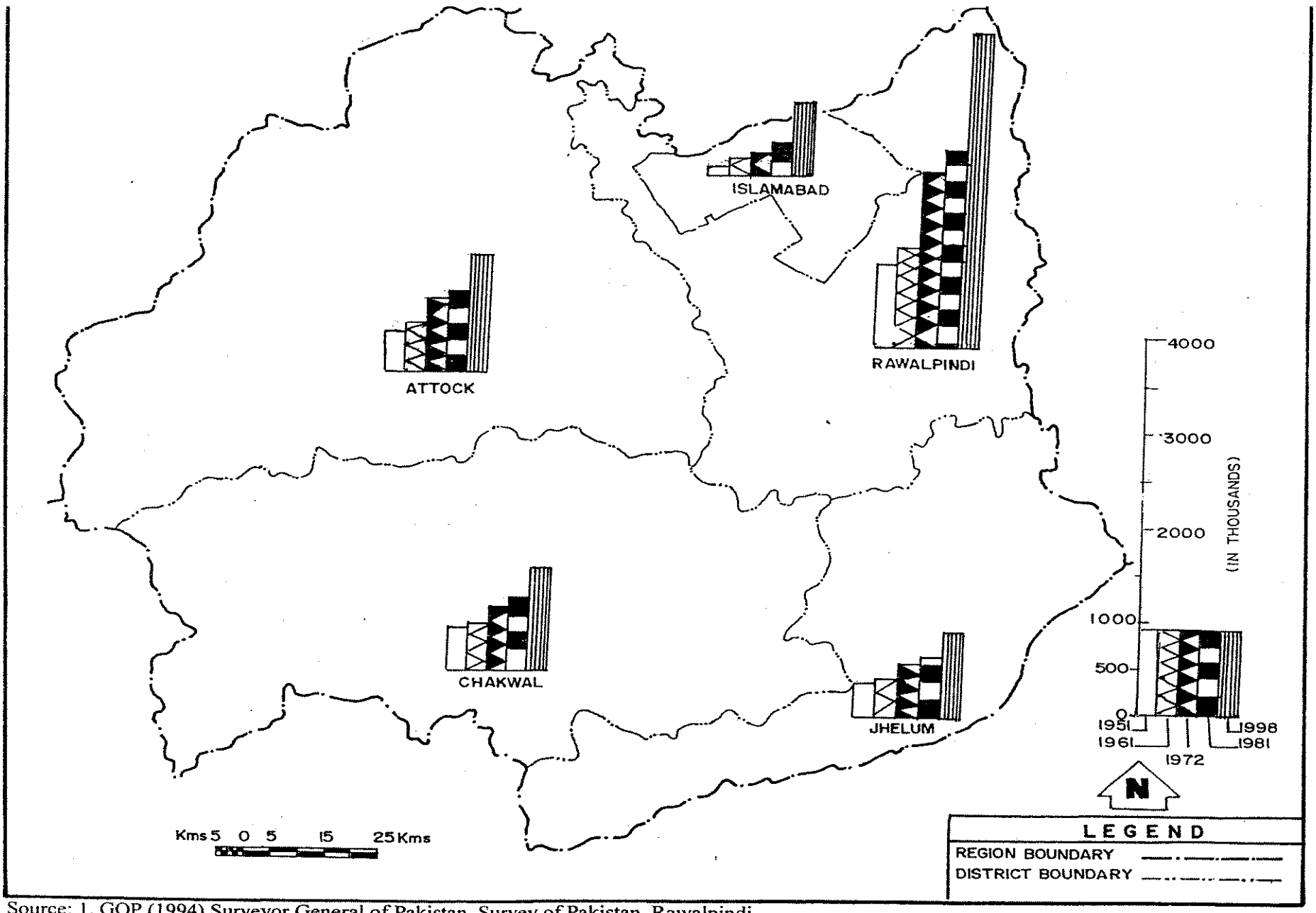
[1] V% means = average annual % change.

FIG. 5.2 POTOHAR REGION: POPULATION GROWTH TREND IN 1881-1998



Source:

1. Government of India 1901-41, Census of India.
2. GOP 1951-98, Census Report of Pakistan Table-1, Population Census Organisation, Islamabad.
3. GOP 1951-98, Provincial Census Report of Punjab Table-1, Population Census Organisation, Islamabad.
4. GOP 1951-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-1, Population Census Organisation, Islamabad.



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

(1951-98)

1951-98 periods. This holds true for whole 20th century with the solitary exception that in 1901 Jhelum ranked second and Attock ranked third and there after Attock climbed to the second position (in 1911) which it has retained ever since; (Population Census Organisation, 1951-98).

While the ranking in terms of absolute population of five districts of Potohar has not change the percentage distribution of population over these districts registered a substantial change as shown in Table-5.5 (Fig-5.3).

Table-5.5. Potohar Region: Percentage Distribution of Population by Districts

Census Year	Attock	Chakwal	Islamabad	Jhelum	Rawalpindi
1951	21.3	20.0	4.2	16.2	38.3
1961	20.1	18.9	4.4	15.6	41.0
1972	18.6	17.3	5.9	14.7	43.5
1981	18.4	16.2	7.1	13.8	44.5
1998	17.1	14.5	10.8	12.5	45.1

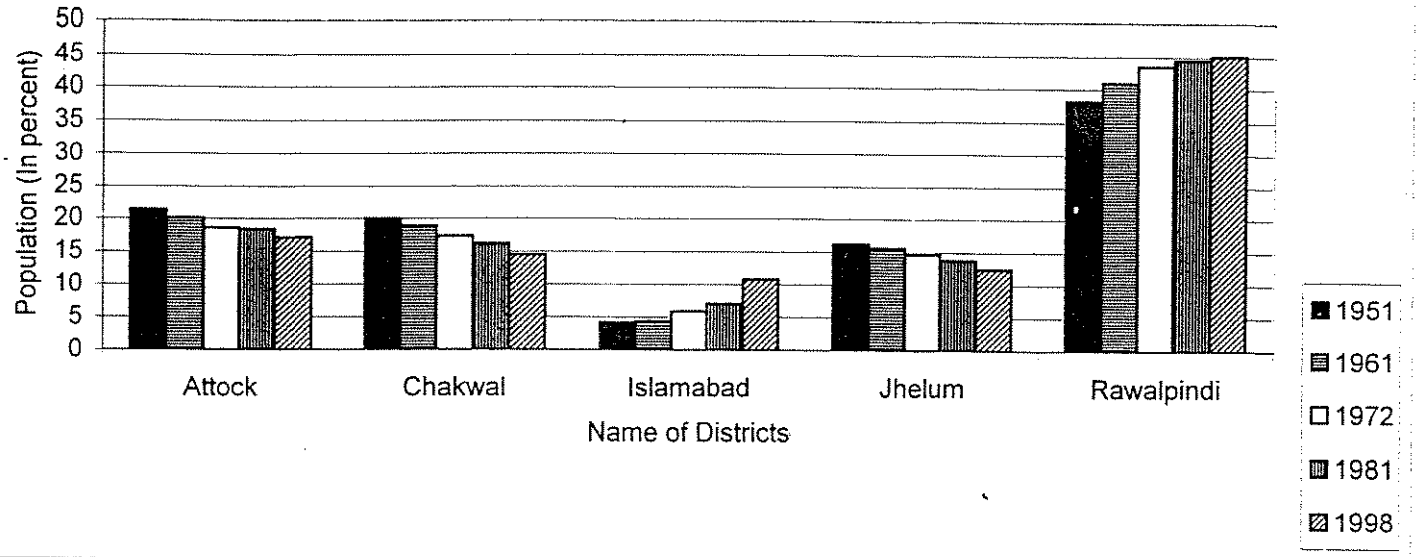
Source:-

1.G.O.P. 1961 Census of Pakistan Population and Registration office M/O Home and Kashmir affairs Karachi, Vol.III.

2.G.O.P. 1972, 1981-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 1 Population Census Organisation, Islamabad.

The relative (%age) share of Rawalpindi and Islamabad districts increased during 1951-98 while that of the other three districts declined to varying extents. Islamabad's share rose from 4.2 percent in 1951 to 10.8 percent in 1998, while the corresponding figures for Rawalpindi 38.3 percent and 45.1 percent respectively. This trend is consistent with the over all pace and level of development in the five districts under study. The Islamabad- Rawalpindi districts are better placed in this respect as compared with the other three and this comparative advantage is likely to stay stable in the foreseeable future (Population Census Organisation 1951-1998 & Shahida Shaheen, 1976).

FIG 5.3. Potohar Region: Population Growth by District-wise in 1951-1998.



Source:

1. GOP 1961, Census of Pakistan, Volume III, Table 8, Home and Kashmir Affairs, Karachi.
2. GOP 1951-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-1, Population Census Organisation, Islamabad.

5.1.8 POPULATION PROJECTION

On the assumption that in 1981-98 growth rate stays stable over the period 1998-2021, the total population of Potohar is projected to be 9.7 million in 2011 and 11.3 million in 2021. The district wise projections are given in Table-5.6.

Table-5.6. Potohar Region: Projected Population Growth by Districts 2011 - 2021

Name of District	Population		1981-98 Inter Censal Growth Rate	Population Estimated for the year (in thousand)	
	1981	1998		March 2011	March 2021
1. Attock	8,76,667	1,2,74,935	2.10	1,619	1,870
2. Chakwal	7,75,600	1,0,83,725	1.87	1,376	1,590
3. Islamabad	3,40,286	8,05,235	4.90	1,284	1,611
4. Jhelum	6,59,012	9,36,957	1.97	1,190	1,375
5. Rawalpindi	2,1,21,450	3,3,63,911	2.59	4,271	4,934
6. Potohar	4,7,73,015	7,4,64,763	2.51	9,740	11,380

Source:-

1. G.O.P., 1981-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.
2. G.O.P., 2001 National Institute of Population Studies Pakistan Population Data Sheet, p. 1.

FIG-5.4. POTOHAR REGION: POPULATION GROWTH AND PROJECTED POPULATION BY DISTRICTS 1981, 1998, 2011 & 2021.

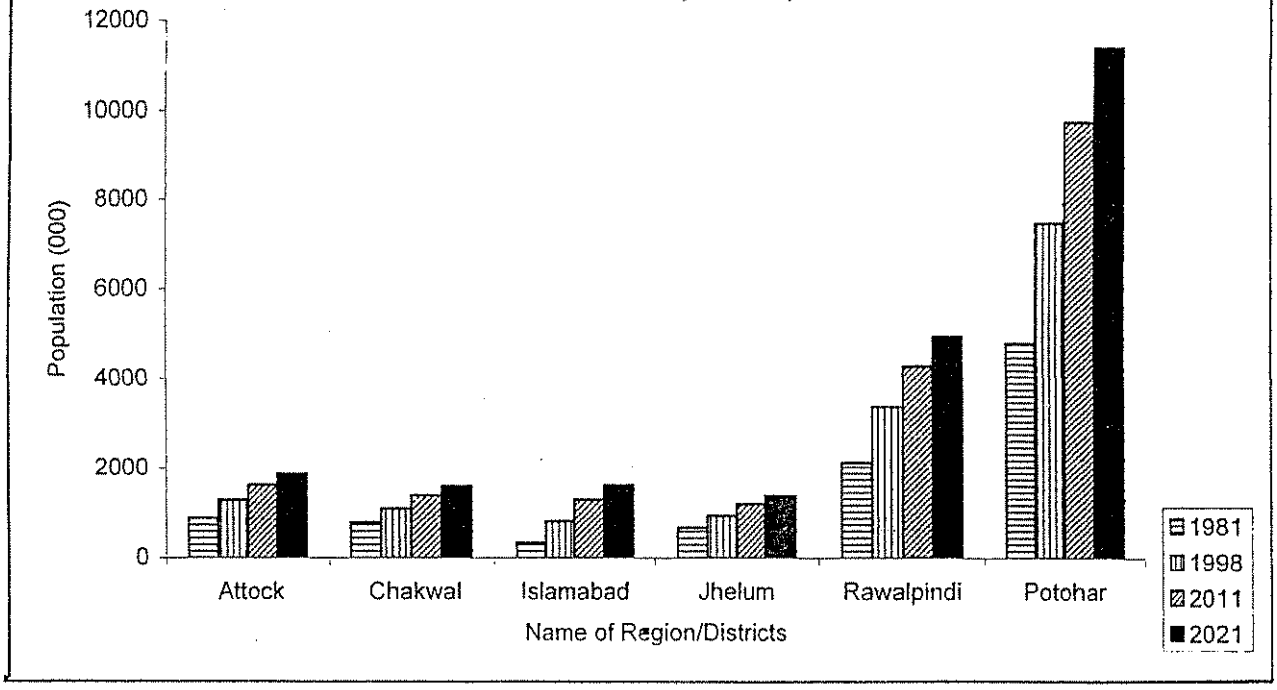
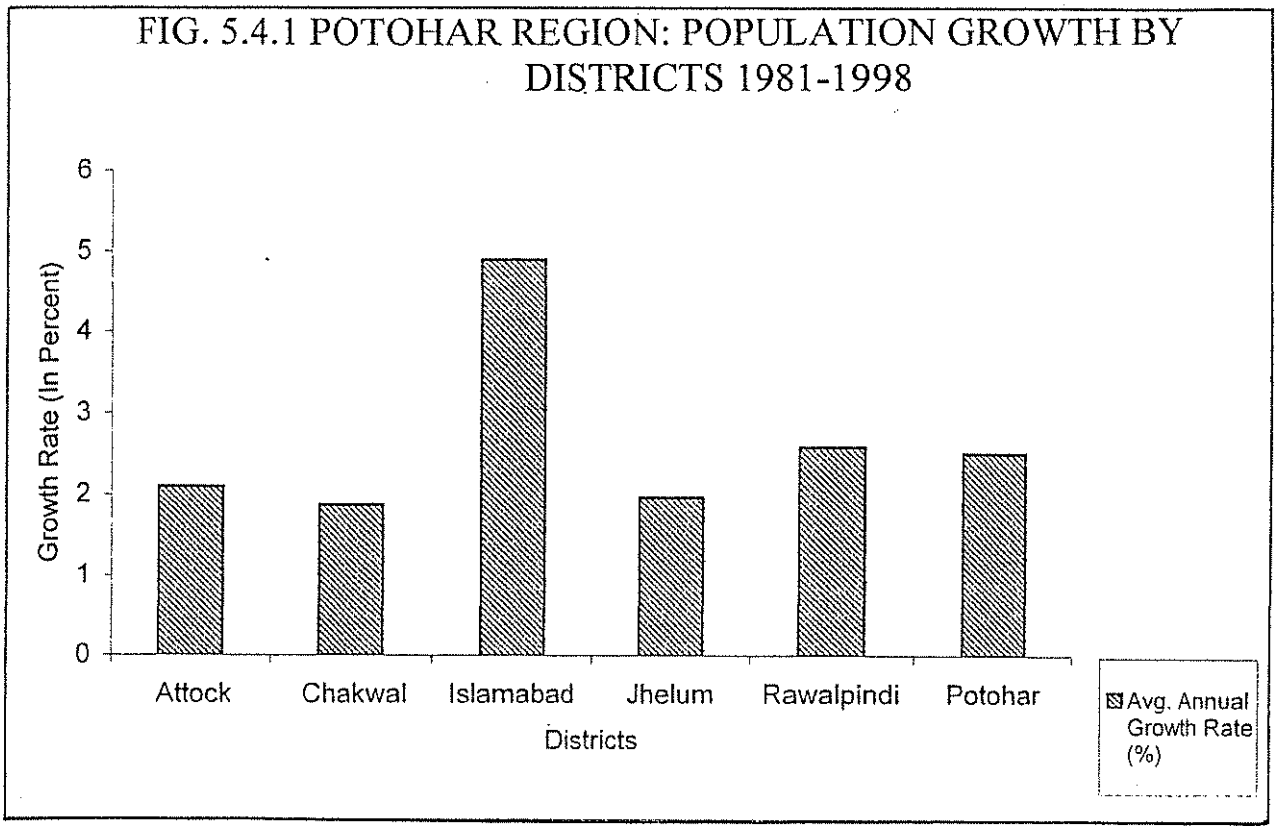


FIG. 5.4.1 POTOHAR REGION: POPULATION GROWTH BY DISTRICTS 1981-1998



Source:

1. GOP 1981-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Table-1, Population Census Organisation, Islamabad.

SECTION II

5.2 POPULATION DENSITY

The analysis of the population distribution and density is fundamental for understanding the population geography of any area. The population distribution means the spatail arrangement of people in a region, which is mainly based on the aggregate of investigations about the people within small areal units of a region. Population distribution is a dynamic process, which is ever changing and its cause and effect vary in spatio-temporal frame.

5.2.1 INTRODUCTION

In the previous section, the analysis was focused on population growth trend in the study area i.e. in Potohar. It was found that the population grew at the rate of 0.80 percent maximum during 1901-51. The rate accelerated there after, averaging 2.55 percent per annual in during 1951-98. The rate of population growth however, does not in itself constitute an objective and sufficient basis for determining the nature and problems that may come in its wake for development planners. We need also to know how this growth affected the density situation. The present section focuses on this question. The time reference of analysis is 1981-1998.

5.2.2 POTOHAR VIS-A-VIS OTHER REGIONS

Density wise, Potohar occupied prominent position in Pakistan in 1981 as well as 1998. The Punjab province (including Potohar) ranked first. As will be seen in Table-5.7, in 1998 Potohar's population density was 322 persons per km^2 as compared with the corresponding figures of 358 and 166 person per km^2 for Punjab and Pakistan as a whole.

Table-5.7. Potohar Region: Population density vis-à-vis Provinces of Pakistan (1981-1998)

Locality	Population Density persons per km²	
	1981	1998
Pakistan	106	166
Punjab	234	358
Potohar Region	206	322
N.W.F.P.	148	235
Sindh	135	212
Balochistan	12	18
F.A.T.A	81	115

Source:-

1.G.O.P., 1981-98 Census Reports of Pakistan table 1 Population Census Organisation, Islamabad.

2.G.O.P. 1981-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 1 Population Census Organisation, Islamabad.

During the inter censual period of 1981-98 Potohar's population density increased by 115 persons per km^2. The absolute figure being 206 person per km^2 in 1981 and 322 person per km^2 in 1998. The corresponding figures for Pakistan taken as a whole are 106 persons per km^2 and 166 person per km^2 respectively shown on (Map-5.2).

5.2.3 INTRA-POTOHAR DENSITY VARATION

Comparative data on population density in the five districts of Potohar for 1981 and 1998 are given in Table-5.8, in which it will be seen that the density was highest in Islamabad district in 1998. This district also experienced fastest growth in terms of density during 1951-98 in the Potohar region.

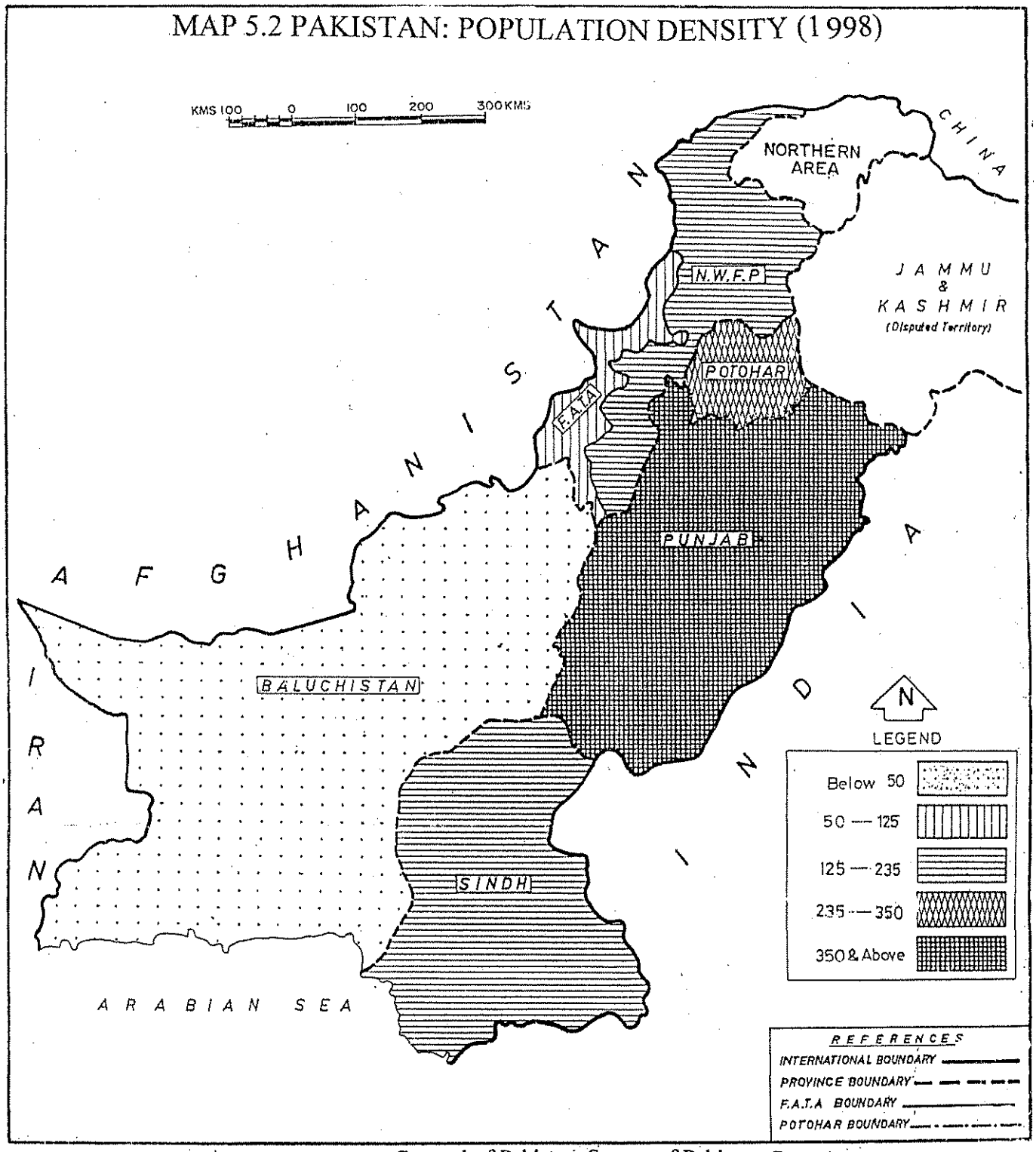
Table-5.8. Potohar Region: District-wise Area, Population Density in 1981 & 1998

District	Geographic Area sq.km.	Population (000)		Density (persons per km²)	
		1981	1998	1981	1998
Attock	6,857	877	1,275	128	186
Chakwal	6,524	775	1,084	119	166
Islamabad	906	340	805	375	889
Jhelum	3,587	659	937	183	261
Rawalpindi	5,286	2,121	3,364	401	636
Potohar	23,160	4,773	7,464	206	322

Source:-

G.O.P. 1981-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 1 Population Census Organisation, Islamabad.

MAP 5.2 PAKISTAN: POPULATION DENSITY (1998)



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

The population density in the area's five districts as in 1998, and its growth trend during 1981-98 are shown in (Appendix-5.2) as also during 1951-98, are quite consistent with the districts, economic growth trend and level of development. Islamabad district is placed more advantageously in these terms as compared with the other four districts. This factor has been instrumental in a fast growth in population due to acceleration in the migration, leading to the consequent rise in density shown in (Map-5.3).

5.2.4 TEHSIL-WISE DENSITY

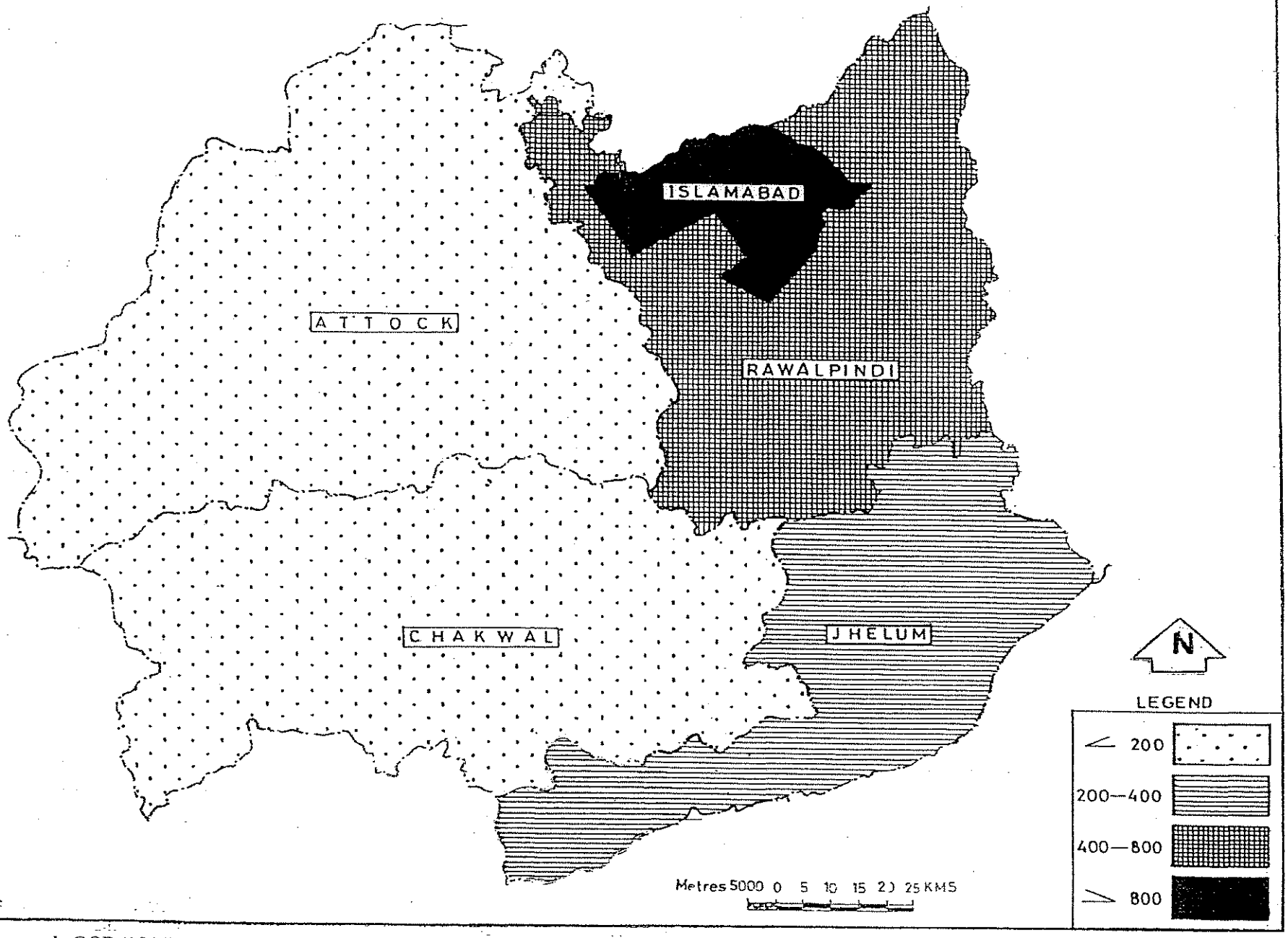
Tehsil-wise distribution of density is quite asymmetrical shown in (Appendix-5.3). The density range is as wide as 1،190 persons per km^2 (in Taxila Tehsil) to 105 persons per km^2 (in Pindi Gheb Tehsil) are given in Table-5.9 & (Map-5.4).

Table-5.9. Potohar Region: Density by Tehsils 1998

Name of Sub Division/Tehsils	Density (High to Low)	Rank Size
1. Taxila	1،190	1
2. Rawalpindi	1،146	2
3. Islamabad	889	3
4. Jhelum	487	4
5. Murree	406	5
6. Hasanabdal	388	6
7. Attock	371	7
8. Gujar Khan	339	8
9. Kahuta	286	9
10. Kotli Sattian	268	10
11. Choa Saidan Shah	223	11
12. P.D.Khan	208	12
13. Chakwal	192	13
14. Fatahjang	171	14
15. Talagang	130	15
16. Sohawa	124	16
17. Jand	112	17
18. Pindi Gheb	105	18

Source:-
G.O.P. 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 39 & 40 Population Census Organisation, Islamabad.

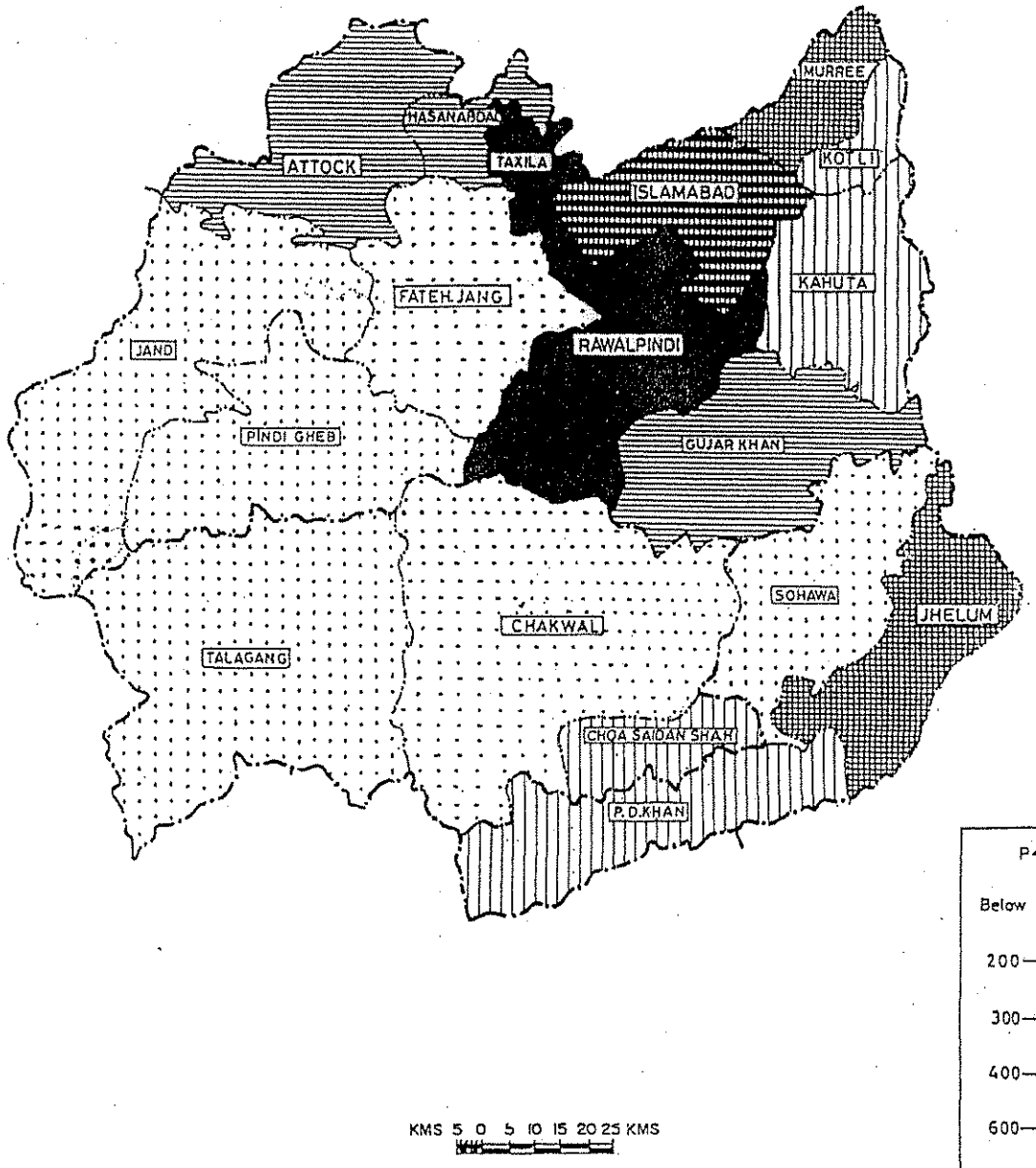
DISTRICTS (1998)



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

MAP 5.3 POTOHAR REGION: POPULATION DENSITY BY

MAP 5.4 POTOHAR REGION: POPULATION DENSITY BY TEHSILS (1998)



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1998) Census Report of Pakistan, Population Census Organisation, Islamabad.

5.3 SUMMARY/CONCLUSION

The total area of the region is 23,160 km^2. There is wide variation in the districts as far as population is concerned. The average annual population increase between 1901-1951 was 0.8 percent. In 1998, Potohar had a total population of 7,4,64,763 or 5.6 percent of the national total. Amongst provinces/regions of Pakistan it ranked 4th after Punjab, Sindh, and NWFP including FATA which had 50.6 percent, 23 percent and 15.8 percent share of the country's population respectively. In contrast, Balochistan, the largest province by area, has the least population with 5.0 percent of Pakistan population at the time the population census was undertaken in 1998. Amongst the districts, Rawalpindi was the leader with about 45.1 percent share, followed by Attock, with about 17.1 percent share, Jhelum, Chakwal and Islamabad districts accounted for 12.5 percent, 14.5 percent and 10.8 shares respectively.

The British penetrated into the Potohar Region in the middle of nineteenth century. The development during British period depended on, their own strategic designs. Nevertheless, the construction of new roads, cantonments had substantial effect on the growth of the population of the Potohar.

According to 1998 census, density of population in the Potohar region was 322 persons per km^2 as compared to the national figures of 166 persons per km^2. However, the density is not uniform as per 1998, Rawalpindi district shows the largest density of 636 persons per km^2, while Attock district has the lowest density of 186 persons per km^2. The population density of the Potohar reflects wide variations in their aerographic location, topography and development level. The density is positively associated with the level of development of a region, the availability of social services etc.

It was during the British rule that the first census of population was carried out in Potohar in 1881. Twelve censuses have taken place since then. During this phase the population has increased from 1,4,09,885 in 1881 to 7,4,64,763 in 1998, an increase of more than five times. Population growth during the 1881-1998 can be divided into three distinct periods.

The first period lasted from 1981 to 1901 when the population increase was nearly 2.5 percent. This is calculated at the compound rate 2.42 percent per annum being the lowest amongst the Potohar region of Punjab.

During the period 1951 to 1998, annual growth rate of population has been 5.9 percent. The population almost doubled itself during these forty-seven years. The average growth rate has been in conformity with the overall growth rate in the province of Punjab. However, the growth rate shows a surprising upward trend during the second decade, 1961-72, when Islamabad was declared as the capital city of the state and this decade witnessed a significant influx of people from various provinces to Islamabad and its neighbouring cities.

The magnitude of growth has been a subject of much speculation in the old census reports in the region, due to the rapid socio-economic development, demographic and rapid urban growth. The pressure on natural resources particularly in cities has been increasing rapid population. The urban growth is very high particularly in Rawalpindi and Islamabad districts of the region due to natural increase as well as from migration. The urban areas particularly the large cities account for a large share of the economic activities.

The past population growth trend continues, then by the year 2008, the population of Potohar region would be about 11.5 million compared with 7.4 million in 1998.

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CHAPTER SIX

AGE STRUCTURE AND SEX COMPOSITION

6.1 INTRODUCTION

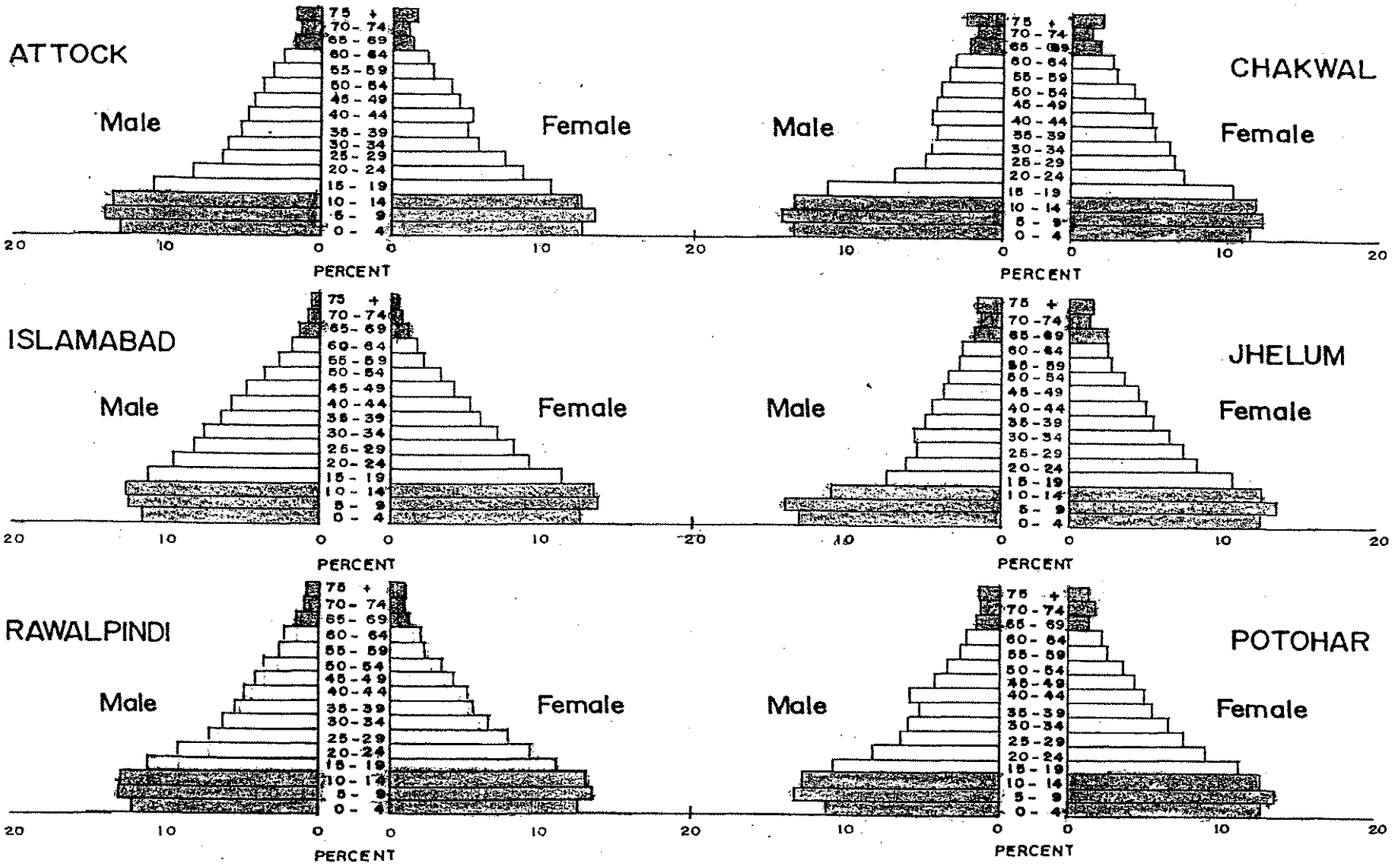
The age structure and gender composition of population are important components of any demographic study as they help in projection of population trend and identification of socio-economic problems specific to age composition and male/female ratio. In the context of urban planning the study of these characteristics is useful as it helps determine future demand patterns pertaining not only housing need, but also social infrastructure and gender specific amenities e.g. mothers and children specific health care, education, etc. Therefore, the present chapter is devoted to the analysis of age structure and gender composition of Potohar population.

6.1.1 POTOHAR AGE STRUCTURE

Knowledge of population characteristic such as age and sex is very important, because demographic characteristic influence the primary social and economic conditions of the society. Data concerning population of Potohar region by age and sex reveals some striking features. According to the 1998 census, about 39 percent of Potohar population was less than 14 years old 57 percent was 15-64 years old and only 4 percent was 65 years or older given in Table-6.1.

It is evident that population of Potohar is composed of a very high proportion of young persons especially of those 15-64 years of age followed by children age group 0-14 years and a very small population of old age group are shown in (Appendix-6.1).

Fig-6.1, graphically presents the age and sex distribution of the population of Potohar. The broad base of the pyramid indicates the concentration of the population in the young age group. Such a preponderance of very young in Potohar region population has important economic and social implications. The fact that a large proportion of population of Potohar consists of children below 15 years of age has immediate economic disadvantages of creating a high ratio of young dependents to the economically active age groups. Socially this situation may result in forcing



Source: GOP, 1998 District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Table-4, Population Census Organisation, Islamabad

GROUP AND SEX BY DISTRICTS 1998

children into the acceptance of adults roles mainly economic role, at the expense of receiving education and engaging in activities conducive to their unique development need.

TABLE-6.1. POTOHAR POPULATION BY AGE GROUPS 1998.

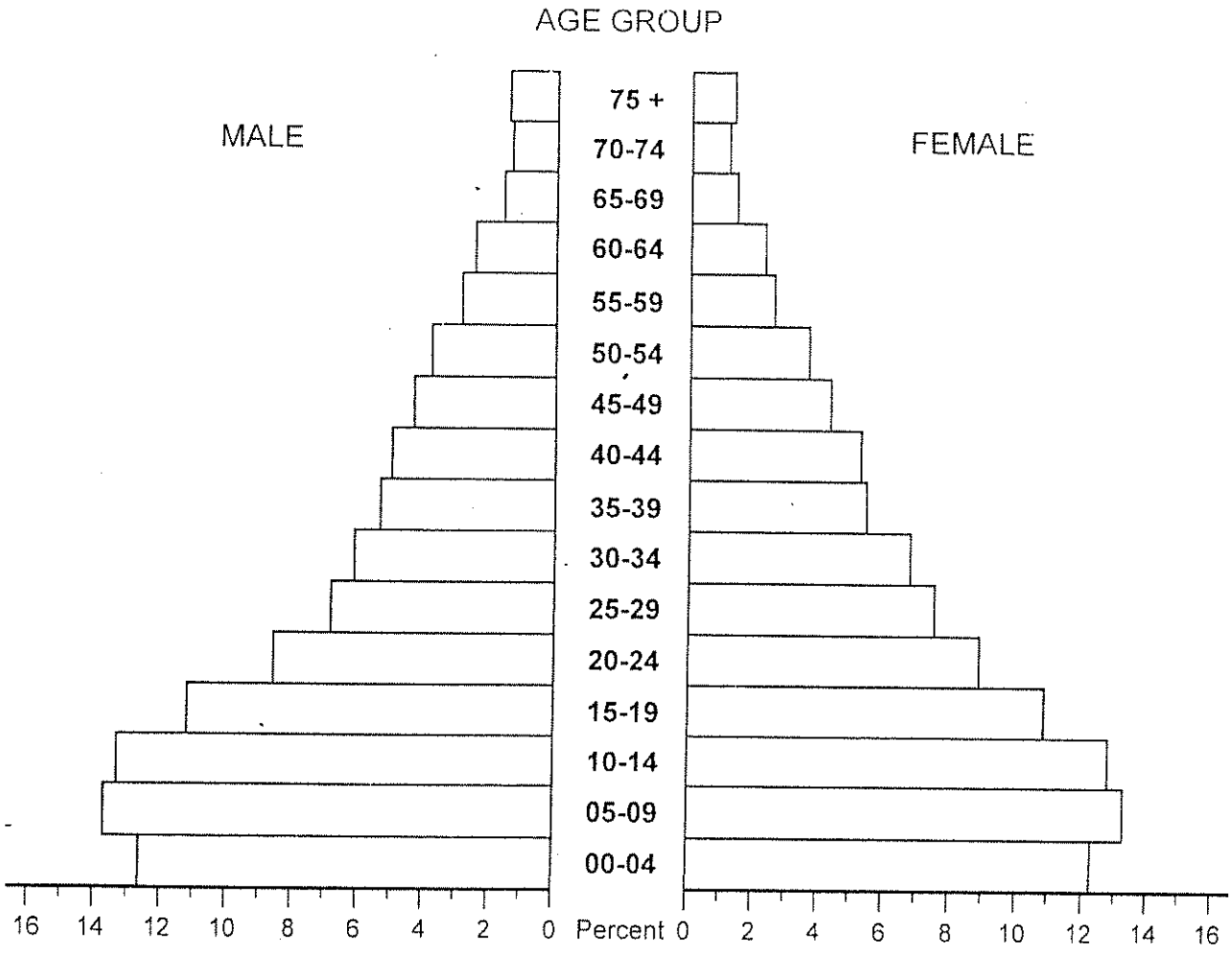
Districts	Years (In Percent)								
	0-14			15-64			65 & Above		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
Attock	39.52	20.26	19.25	56.03	27.38	28.65	4.44	2.26	2.17
Chakwal	39.04	20.02	19.02	55.00	24.77	30.23	5.95	3.02	2.93
Islamabad	37.89	19.62	18.27	59.37	32.79	26.58	2.72	1.51	1.21
Jhelum	39.68	20.43	19.25	55.43	26.92	28.51	4.87	2.59	2.27
Rawalpindi	38.62	19.82	18.79	57.78	29.42	28.36	3.59	1.94	1.64
Potohar	38.89	19.98	18.90	56.96	28.45	28.51	4.14	2.19	1.95

Source:-
G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 4 Population Census Organisation, Islamabad.

6.1.2 AGE AND SEX PYRAMID 1998.

The distribution of Potohar region by age group under 5 years interval for 1998, is given in Table 6.2. Three main features of age structure in this table i) a lower percentage of population in 0-4 years of age group as compared to 5-9 years group ii) comparatively broad based and tapering apex of the pyramid (Fig-6.2) indicating high birth rate and relatively high death rates in the population and iii) minor unevenness in the slope of pyramid are shown in (Appendix-6.2).

FIG. 6.2: POPULATION PYRAMID OF POTOHAR REGION
1998



Source: GOP, 1998 District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Table-4, Population Census Organisation, Islamabad

TABLE-6.2. POPULATION BY AGE AND SEX

(5 YEARS) 1998

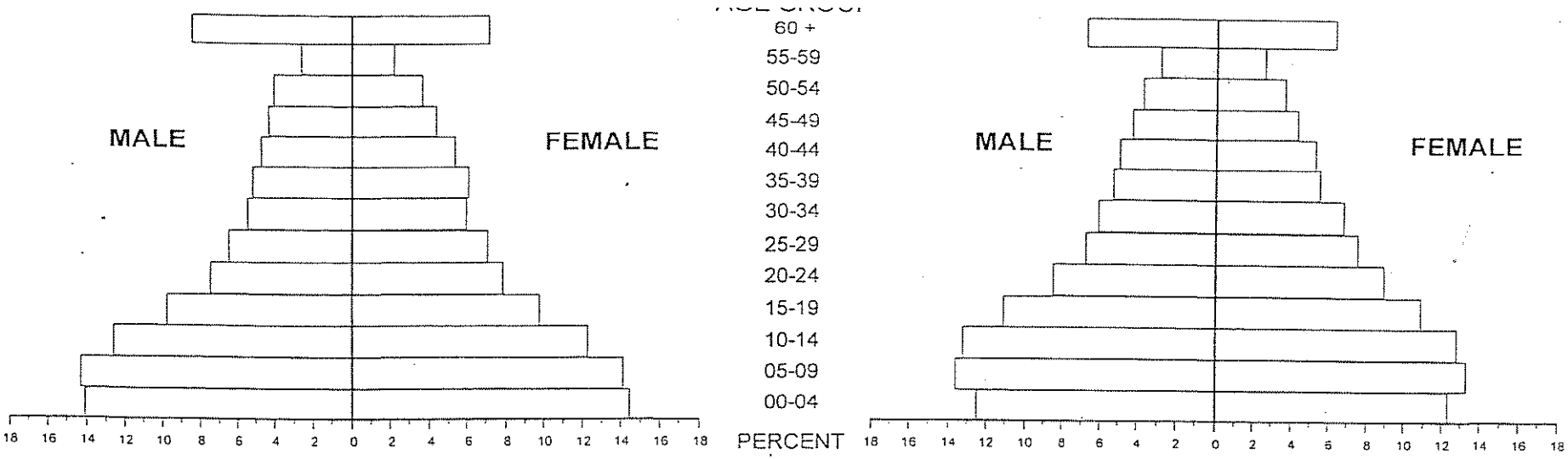
All Groups	Population by Sex		
	Both Sexes	Male	Female
All Ages	7,4,64,763 100	3,7,79,415 100	3,6,85,348 100
0-4	9,27,813 (12.42)	4,34,628 (11.49)	4,53,185 (12.74)
5-9	1,0,04,283 (13.45)	5,15,878 (13.64)	4,88,405 (13.25)
10-14	9,71,080 (13.00)	5,01,354 (13.26)	4,69,726 (12.27)
15-19	8,22,084 (11.02)	4,20,927 (11.13)	4,01,157 (10.88)
20-24	6,49,631 (8.70)	3,21,723 (8.51)	3,27,908 (8.89)
25-29	5,34,394 (7.15)	2,56,690 (6.79)	2,77,704 (7.53)
30-34	4,81,380 (6.44)	2,31,237 (6.11)	2,50,143 (6.78)
35-39	4,02,501 (5.39)	2,00,761 (5.31)	2,01,740 (5.47)
40-44	3,82,359 (5.12)	1,88,673 (5.99)	1,93,686 (5.25)
45-49	3,22,290 (4.31)	1,62,589 (4.30)	1,59,701 (4.33)
50-54	2,77,270 (3.71)	1,42,171 (3.76)	1,35,099 (3.66)
55-59	2,02,550 (2.71)	1,06,975 (2.83)	95,575 (2.59)
60-64	1,77,517 (2.37)	91,998 (2.43)	85,519 (2.32)
65-69	1,13,330 (1.51)	60,182 (1.59)	53,148 (1.44)
70-74	94,074 (1.26)	49,914 (1.32)	44,160 (1.9)
75 +	1,02,207 (1.36)	53,715 (1.42)	48,492 (1.31)

Source:-

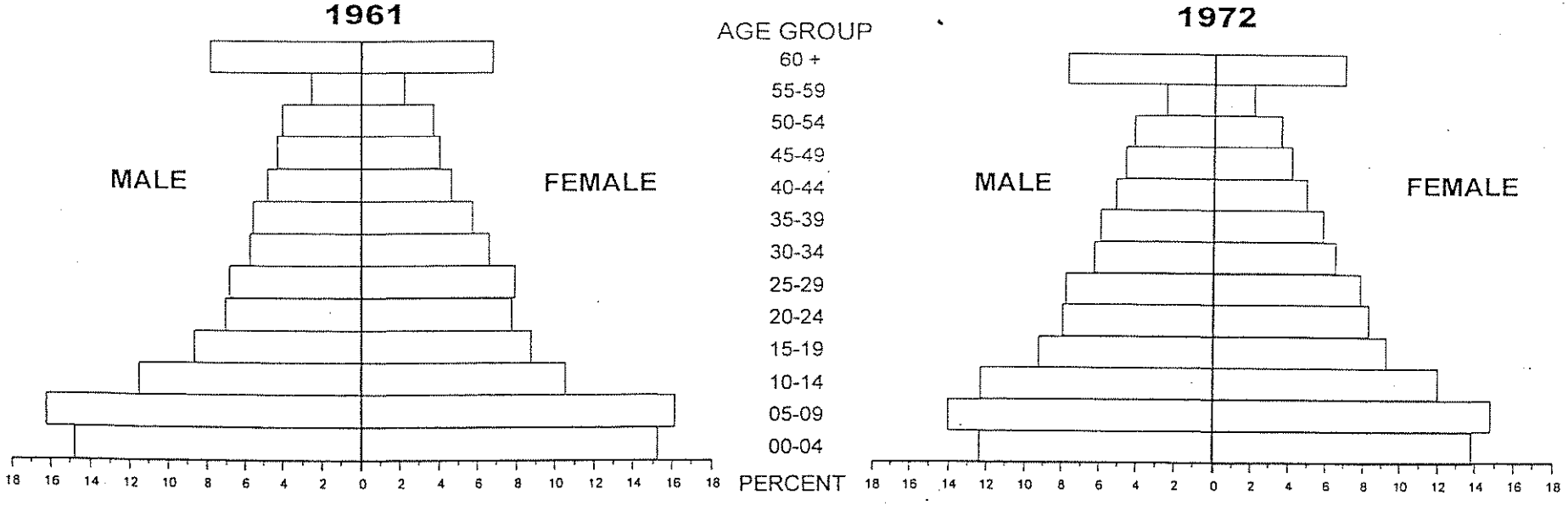
G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 4 Population Census Organisation, Islamabad.

6.1.3 POTOHAR AGE STRUCTURE OF POPULATION 1961-98

The age distribution by 5-year interval is a recorded in the censuses of 1961, 1972, 1981 and 1998, are shown in (Appendix-6.3) ,Table-6.3 and (Fig-6.3).



1961 1972



Source: 1. GOP 1961, Census of Pakistan, Volume-III, Table-4, Home & Kashmir Affairs, Karachi.
2. GOP 1972-98, District Census Report of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organization, Islamabad.

1981 1998

TABLE-6.3. POTOHAR AGE STRUCTURE OF POPULATION 1961-98

All Groups	Population			
	1961	1972	1981	1998
All Ages	2,6,53,127 100	4,0,16,096 100	4,7,73,015 100	7,4,64,763 100
0-4	3,99,850 (15.07)	5,24,572 (13.06)	6,80,407 (14.25)	9,27,813 (12.42)
5-9	4,28,832 (16.16)	5,76,917 (14.36)	6,78,221 (14.20)	1,0,04,283 (13.45)
10-14	2,92,897 (11.4)	4,87,814 (12.14)	5,94,957 (12.46)	9,71,080 (13.00)
15-19	2,31,243 (8.71)	3,71,876 (9.25)	4,66,009 (9.76)	8,22,084 (11.01)
20-24	1,95,899 (7.38)	3,25,362 (8.10)	3,65,870 (7.66)	6,49,631 (8.70)
25-29	1,94,661 (7.33)	3,14,902 (7.84)	3,22,764 (6.76)	5,34,394 (7.15)
30-34	1,63,293 (6.15)	2,56,548 (6.38)	2,72,973 (5.71)	4,81,380 (6.44)
35-39	1,50,259 (5.66)	2,36,950 (5.9)	2,67,989 (5.61)	4,02,501 (5.39)
40-44	1,24,790 (4.70)	2,01,611 (5.02)	2,41,265 (5.05)	3,82,359 (5.12)
45-49	1,10,516 (4.16)	1,75,726 (4.37)	2,08,331 (4.36)	3,22,290 (4.31)
50-54	1,02,353 (3.85)	1,56,285 (3.89)	1,84,402 (3.86)	2,77,270 (3.71)
55-59	63,981 (2.41)	91,984 (2.29)	1,15,194 (2.41)	2,02,550 (2.71)
60 +	1,94,553 (7.33)	2,95,549 (7.35)	3,74,633 (7.84)	4,87,128 (6.52)

Source:-
G.O.P., 1961-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

6.1.4 DEPENDENCY RATIO

In general high fertility rate associated with high dependency ratio and low fertility with low dependency ratio. For the study area, Potohar and its different districts, the proportions of population with three broad age groups 0-14 (below working age), 15-65 (working age) and above 65 years in 1998 census. (Amir Khan, 2000) are given in the Table-6.4, the tables shown that there is concentration of dependence youth in every district. Chakwal district tops with a dependency ratio 82.

As apposed to this Islamabad has the lowest dependency ratio of 68.4, data are shown in (Appendix-6.1).

6.1.4.1 CHILD DEPENDENCY

The district wise figure about the dependency ratio displayed in table. The table reveals that there is a higher child dependency ratio (71.6) in Jhelum district, 70.5 in Attock and 71 in Chakwal district which was above the average of 68.3 recorded for the Potohar region. However, Islamabad (63.8) and Rawalpindi (66.8) had recorded lower child dependency ratios.

6.1.4.2 ADULT DEPENDENCY

In Potohar region, the average adult dependency ratio was 7.3 computed in 1998 census. Attock, Chakwal and Jhelum recorded the higher age dependency with respective ratios of 7.9, 10.8 & 8.8. The lowest dependency ratio is 4.6 and 6.2 in Islamabad and Rawalpindi district respectively Table-6.4.

6.1.4.3 TOTAL DEPENDECY

The Potohar regional pymaid indicates the total dependency ratio was recorded 75.5 in 1998. Attock, Jhelum and Chakwal districts had higher corresponding figures of 78.4, 80.4 and 82 respectively as compared to the regional average. In Rawalpindi and Islamabad districts the dependency level was lower than the regional level are shown (Fig-6.4).

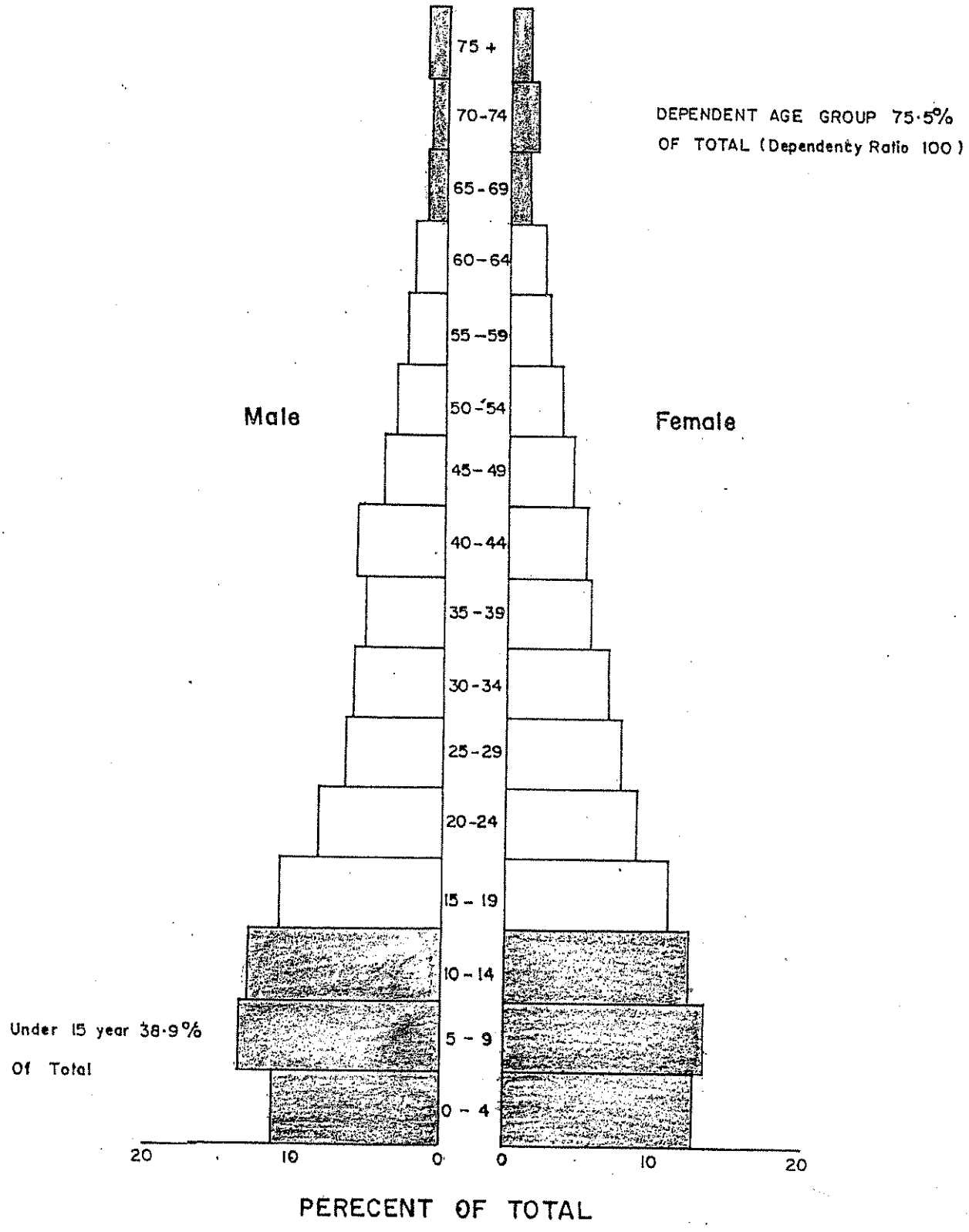
TABLE-6.4. POTOHAR DEPENDENCY RATIO BY DISTRICTS 1998

Districts	Total Population	Population-1998			Dependency Ratio		
		Child 0-14Years	Adult 15-64	Aged 65+	Child	Adult	Total
Potohar	7,4,64,763	2,9,03,176	4,2,51,976	3,09,611	68.27	7.28	75.55
Attock	1,2,74,935	5,03,892	7,14,409	56,634	70.53	7.92	78.45
Chakwal	1,0,83,725	4,23,106	5,96,078	64,541	70.98	10.82	81.80
Islamabad	8,05,235	3,05,151	4,78,116	21,968	63.82	4.59	68.41
Jhelum	9,36,957	3,71,838	5,19,442	45,677	71.58	8.79	80.37
Rawalpinidi	3,3,63,911	1,2,99,189	1,9,43,931	1,20,791	66.83	6.21	73.04

Source:-

G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 4 Population Census Organisation, Islamabad.

FIG. 6.4 POTOHAR REGION: POPULATION PYRAMID DEPENDENCY RATIO BY AGE GROUP & SEX 1998



Source: GOP, 1998 District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Table-4, Population Census Organisation, Islamabad

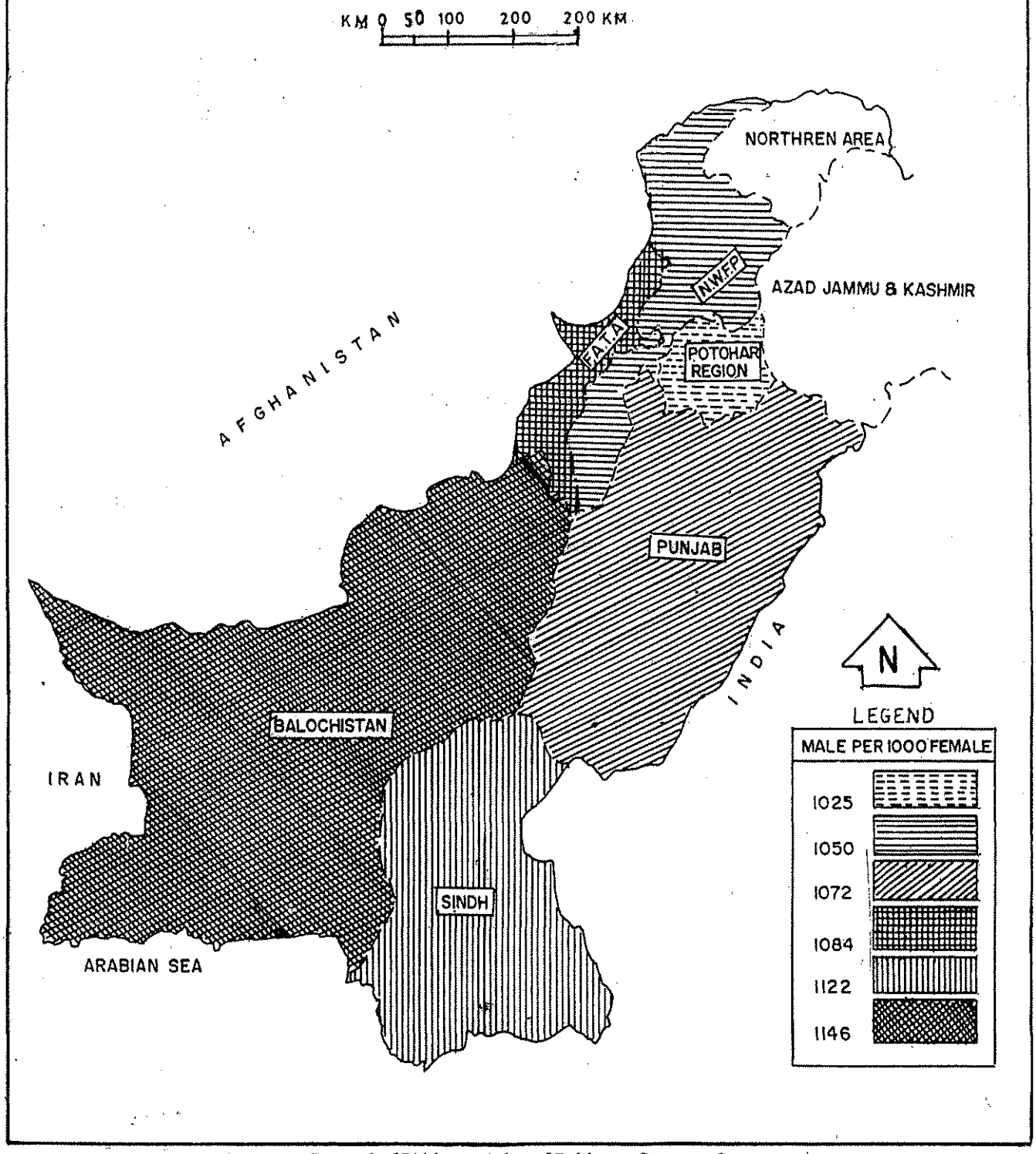
SECTION-II

6.2 SEX COMPOSITION

The sex composition, more appropriately termed as gender distributio, of prime importance in population studies. Separate data for males and females are important in themselves for the analysis of other types of data and for the evaluation of completeness and accuracy of the census counts of population. Many types of planning in both public and private sectors such as, planning of community institutions and services education planning, health services, number of health units, doctors, services require separate population data for male/female by urban/rural settlement. The present section, is therefore, devoted to presentation and analysis of data on gender composition in Potohar region.

Sex composition of population is represented by sex ratio and population pyramids. The term sex ratio is defined as the number of males per 1,000 females. The normal sex ratio of an area should be around 1,000 that is 1,000 males per 1,000 females. The sex ratios for industrialized countries, however, are generally below 1,000 indicating slight surpluses of females (Muhammad Aslam, 1981). As opposed to this the sex ratios for developing countries are often above 1,000 showing male surpluses. This is true for Asian region Pakistan as well as Potohar region which had sex ratio of 1,029, 1,085, 1,025 respectively in 1998, as can seen in Table-6.5 and shown on (Map-6.1).

MAP 6.1 SEX-RATIO DIFFERENT PROVINCES/REGIONS OF PAKISTAN (1998)



Source: 1. GOP (1997) Surveyor General of Pakistan, Atlas of Pakistan, Survey of Pakistan 2nd Edition, Rawalpindi.

2. GOP (1998) Census Report of Pakistan, Population Census Organisation, Islamabad.

TABLE-6.5. POTOHAR: SEX RATIO AS COMPARED WITH OTHER PROVINCES/REGIONS OF PAKISTAN 1998

AREA	SEX RATIO [1]
PAKISTAN	1,085
PUNJAB	1,072
POTOHAR REGION	1,025
NWFP	1,050
SINDH	1,122
BALOCHISTAN	1,146
FATA	1,084

Source:-

1.G.O.P., 1998 Census Report of Pakistan table 4 Population Census Organisation, Islamabad.
2.G.O.P., 1998 Provincial Census Report of Punjab table 4 Population Census Organisation, Islamabad.
3.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 1 & 4 Population Census Organisation, Islamabad.

A number of factors account for high sex ratio. They include (i) high female mortality during early childhood (ii) Unskilful and insanitary method of midwifery (iii) A very high birth rate which may result in a very high female death rate (iv) hard life of widows (Census of India, 1931).

Unskilful and unsanitary methods of midwifery undoubtedly contribute heavily to the mortality in Potohar region and so does hard labour which certain widows undertake (M. Aslam, 1981). However, the excess of males over females is one of those general factors in the sex determination which scientists have not been able to explain fully or accurately. Latimer's theory (Census of India, 1931) is that nature restricts proportionate increase of females for the reason that the more females are born, the more rapidly the population increases. Therefore, to check this growth more male are born. A partail explanation of excess male in the older ages is that the female life expectancey remained lower in male in the later ages (Muhammad Arshad, 2003) morcover, some under reporting of female in these age groups should also be the likely reasons.

Whatever may be the factor, men have always been more numerous than women in the study area are shown in (Appendix-6.4). The disparity in the sex ratio however, has been declining with the passage of time, as can be seen in Table-6.6 (Fig-6.5).

TABLE-6.6: POTOHAR SEX RATIO VARIATION IN 1881-1998

YEARS	SEX RATIO [1]
1881	1،179
1891	1،137
1901	1،091
1911	1،132
1921	1،104
1931	1،127
1941	1،124
1951	1،119
1961	1،052
1972	1،131
1981	1،049
1998	1،025

Source:-

1.Govt of India 1881 & 1941 Census of India Punjab

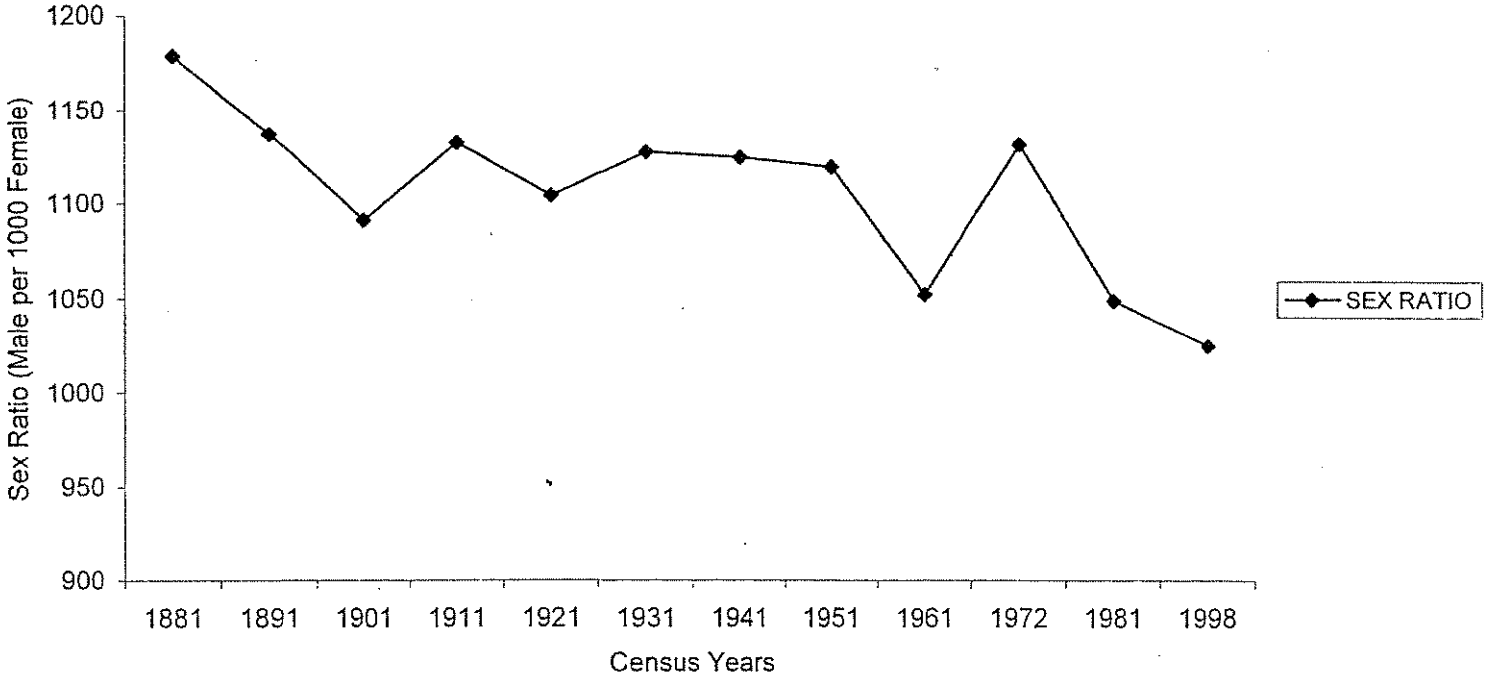
2.G.O.P.,1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 4 Population Census Organisation, Islamabad.

Sex Ratio by 5 years age group variation from 1961-1998 in Potohar are given in (Appendix-6.5) , Table-6.7 and shown (Fig-6.6).

Foot note:-

[1] Sex ratio mean male per thousand female.

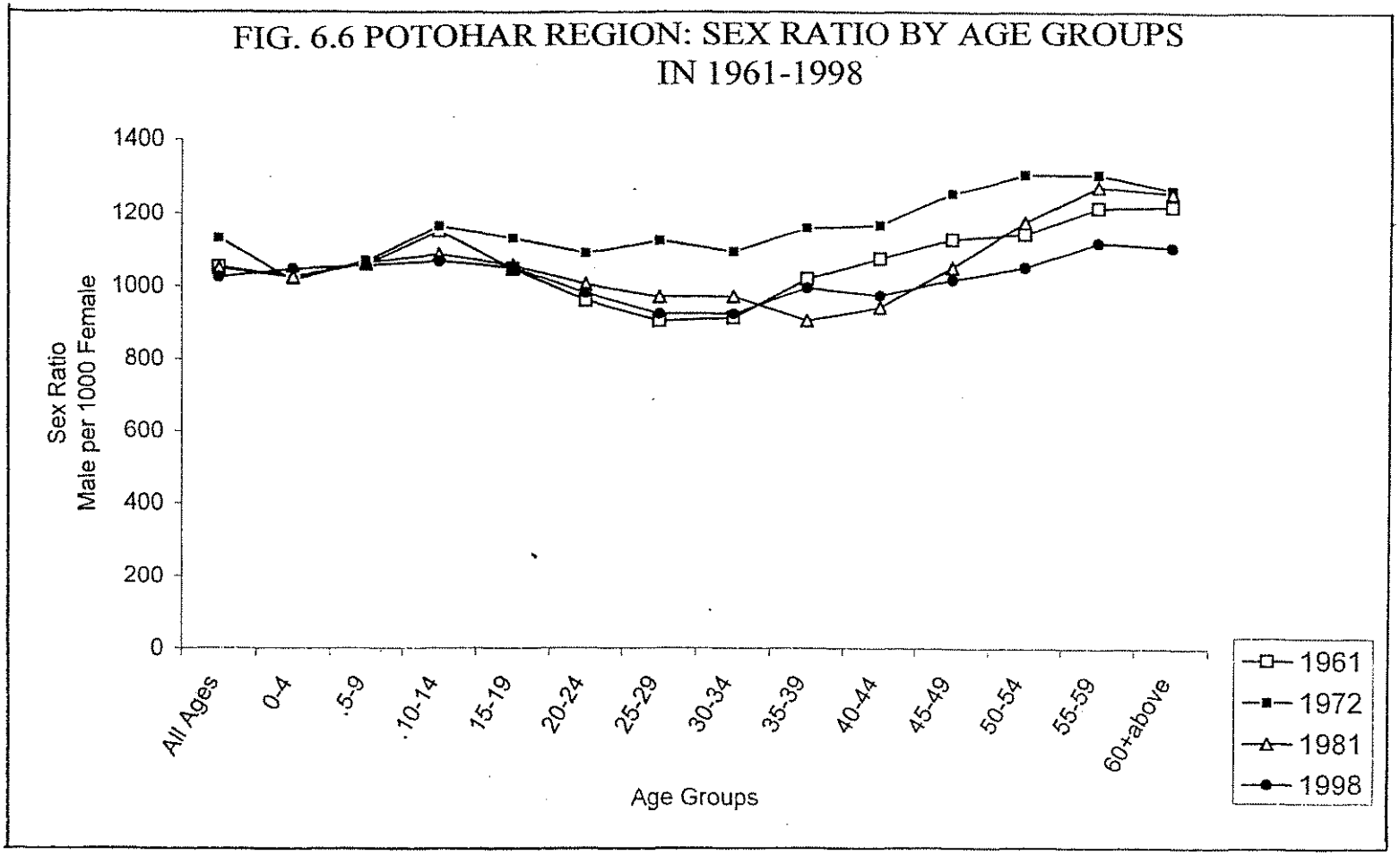
FIG. 6.5 POTOHAR REGION: SEX RATIO VARIATION IN 1881-1998



Source:

1. Government of India, 1911, Census of India, Punjab.
2. GOP, 1961, Census of Pakistan, Volume-III, Table-4, M/O Home and Kashmir Affairs, Karachi.
3. GOP, 1951-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

FIG. 6.6 POTOHAR REGION: SEX RATIO BY AGE GROUPS IN 1961-1998



Source:

1. GOP, 1961-72, Census of Pakistan, Volume-III, Table-4, M/O Home & Kashmir Affairs, Karachi.
2. GOP, 1981-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organisation, Islamabad.

TABLE-6.7. POTOHAR: SEX RATIO BY AGE GROUPS

Age Group	1961	1972	1981	1998
All Ages!	1,052	1,131	1,049	1,025
0-4	1,027	1,016	1,025	1,047
5-9	1,060	1,069	1,064	1,056
10-14	1,149	1,163	1,086	1,067
15-19	1,046	1,129	1,055	1,049
20-24	961	1,089	1,005	981
25-29	904	1,123	970	924
30-34	913	1,093	971	924
35-39	1,022	1,158	905	995
40-44	1,079	1,166	942	974
45-49	1,128	1,255	1,051	1,018
50-54	1,143	1,306	1,176	1,052
55-59	1,215	1,307	1,274	1,119
60+above	1,218	1,265	1,253	1,106

Source:-

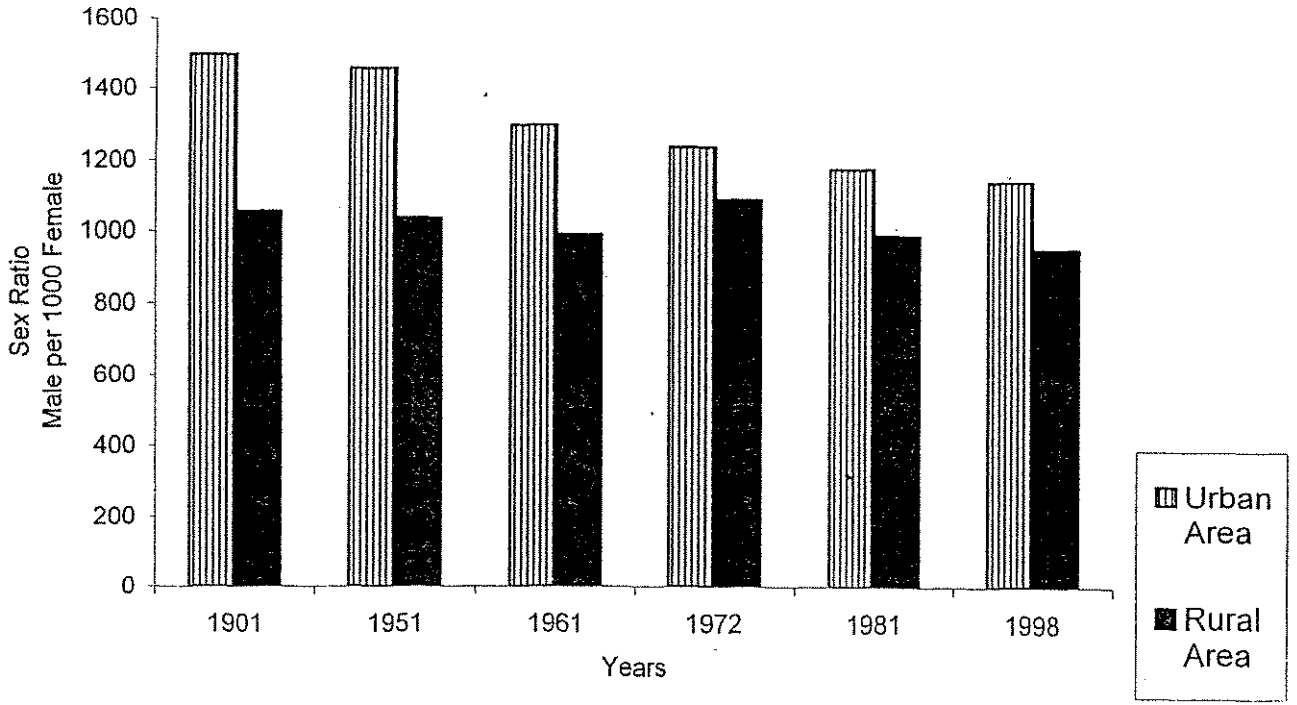
1. G.O.P.,1961 Census of Pakistan Vol. III, table 11, M/O Home and Kashmir affairs Karachi.
2. G.O.P., 1972-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 4, Population Census Organisation, Islamabad.

There are three interesting features in this table. First, preponderance of male in most age groups and also as a whole. With few exceptions, the pattern prevailed during all the four Censuses (1961-1998). The deviating age groups, however, were not the same in all four censuses. Age groups 20-24, 25-29 , 30-34 in 1961, 25-29, 30-34, 35-39, 40-44 in 1981, 20-24, 25-29, 30-34, 35-39, 40-44 in 1998. Second, strong dominance of males among persons in age group 50 + in all the four censuses. This may be indication of high female fertility and lower expectation of life amongst females as compared to male population. Third, The imbalance of sex ratio i.e. female exceeding the male in the age groups of 20-24 to 40-44 in 1998 and also in earlier censuses. Through to a lesser this could be a due to male out migrations but that alone would not sufficiently explain it.

6.2.1 GEOGRAPHICAL VARIATION

Sex ratio by urban/rural residence are given in Table-6.8. There is a marked disproportion in sex ratio in urban and rural areas. The high figure for urban population supports the view that migration to urban areas and emigration from rural areas are largely of men are shown in (Appendix-6.4). Nevertheless, the narrowing disparity indicates that there is a gradual change in the trend and now the immigrants are taking their families after settling in job and acquiring accommodation is given (Fig-6.7).

FIG. 6.7 POTOHAR REGION: SEX RATIO BY URBAN/RURAL, 1901, 1951-1998



Source:

1. Government of India, 1911, Census of India, Table-1, Imperial Tables Vol. XVII-A (i-VIII-X-XV & XVIII), .
2. GOP, Punjab, Bahawalpur State, Census of Pakistan, Vol. V, Table-1.
3. GOP, 1961, Census of Pakistan, Volume-III, Table-4, M/O Home and Kashmir Affairs, Karachi.
4. GOP, 1972-98, District Census of Attock, Islamabad, Jhelum and Rawalpindi, Table-3, Population Census Organistion, Islambad.

TABLE-6.8: POTOHAR SEX RATIO BY URBAN AND RURAL

1901-1998

Years	Urban Area	Rural Area
	Sex Ratio	Sex Ratio
1901	1،498	1،058
1911	1،688	1،085
1921	1،808	1،038
1931	1،576	1،076
1941	1،634	1،049
1951	1،459	1،037
1961	1،296	991
1972	1،239	1،091
1981	1،177	991
1998	1،143	954

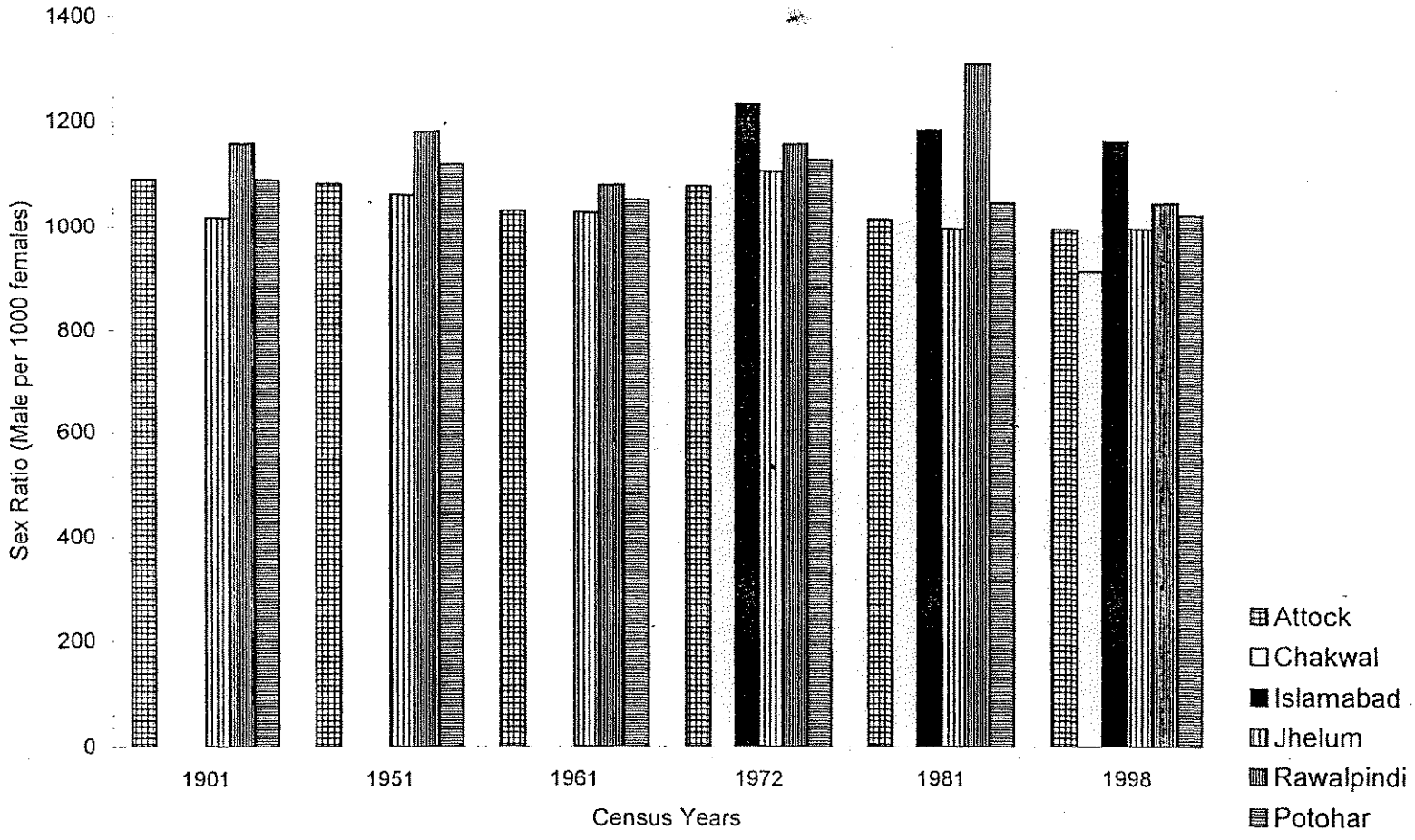
Source:-

1. Govt of India, 1901 Census of India (Punjab).
2. G.O.P.,1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 4, Population Census Organisation, Islamabad.

6.2.2 POTOHAR SEX RATIO BY DISTRICTS

The comparative data on sex ratio in different district of Potohar are given in table-6.9. Rawalpindi and Islamabad districts maintained high sex ratio throughout the period with trends. In Attock, Chakwal and Jhelum, the females out numbered the males in 1998 census are shown in (Appendix-6.4) which is a marked departure from the pre 1998 census period (Fig-6.8).

FIG. 6.8 POTOHAR REGION: SEX RATIO BY DISTRICTS
1901 & 1951-98



Source:

1. Govt. of India, 1901-1941, Punjab, Census of India
2. GOP-1951-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum & Rawalpindi, Table-1, Population Census Organisation, Islamabad.

TABLE-6.9. POTOHAR: SEX RATIO (MALE PER 1000 FEMALES) BY DISTRICTS 1881-1998

Districts	1881	1901	1911	1921	1931	1941	1951	1961	1972	1981	1998
Attock	1,092	1,092	1,109	1,071	1,108	1,117	1,083	1,031	1,079	1,016	996
Chakwal[2]	-	-	-	-	-	-	-	-	-	-	916
Islamabad [2]	-	-	-	-	-	-	-	-	1,236	1,188	1,170
Jhelum	924	1,019	1,106	1,024	1,094	1,062	1,062	1,029	1,108	998	998
Rawalpindi	1,159	1,159	1,180	1,210	1,175	1,182	1,182	1,081	1,161	1,314	1,049
Potohar	1,091	1,091	805	1,104	1,127	1,675	1,119	1,052	1,131	1,049	1,025

Source:-

1.Govt of India, 1901-1941 Census of India (Punjab).

2.G.O.P.,1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 4 Population Census Organisation, Islamabad.

6.2.3 SEX RATIO BY TEHSILS

The sex ratio amongst tehsils varies from as low as 895 in Jand tehsil of Attock district, to as high as 1,170 in Islamabad tehsil are shown in (Appendix-6.7). It can also be seen that with the only exception of Jand tehsil population even at tehsils level shows preponderance of males; the detail is given in Table-6.10 and shown on (Map-6.2).

Foot note:-

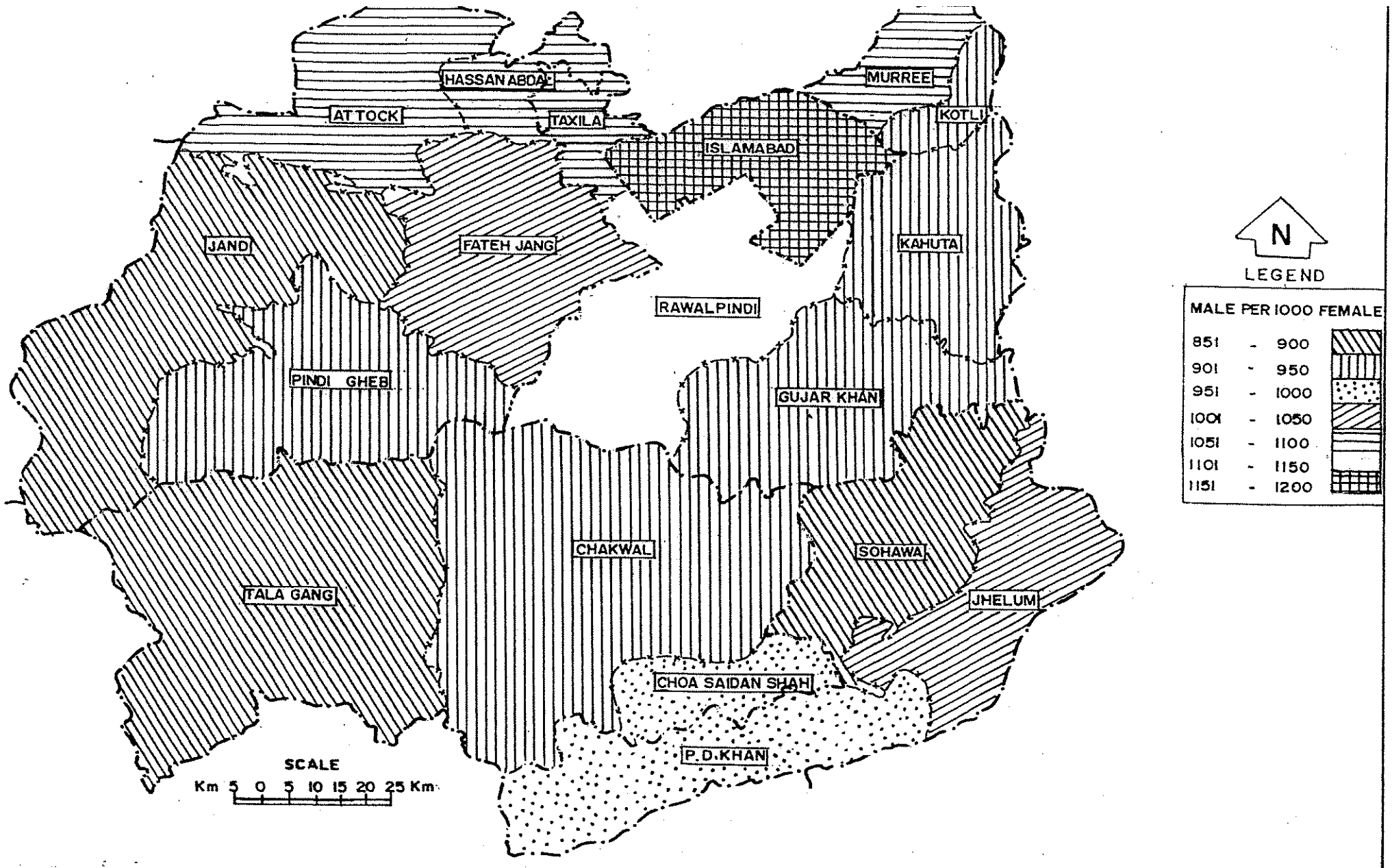
[2] Islamabad district created after 1961 Census and Chakwal district created after 1981 . Census.

TABLE-6.10. POTOHAR: SEX RATIO TEHSIL WISE BY DISTRICT IN 1998

Name of Tehsils	Sex Ratio	Rank
Attock District	**996**	-
1. Attock Tehsil	1,051	6
2.FatehJang Tehsil	1,004	8
3.Hasanabdal Tehsil	1,073	4
4.Jand Tehsil	895	18
5.Pindi Gheb Tehsil	928	12
2.Chakwal District	**916**	-
6.Chakwal Tehsil	918	14
7.Choa Sadian Shah Tehsil	967	10
8.Talagang Tehsil	**900**	16
3.Islamabad District	**1,170**	
9.Islamabad Tehsil	1,170	1
4.Jhelum District	998	-
10.Jhelum Tehsil	**1,043**	7
11.P.D. Khan Tehsil	975	9
12.Sohawa Tehsil	899	17
5.Rawalpindi District	**1,049**	-
13.Gujar Khan Tehsil	963	11
14.Kahuta Tehsil	908	15
15.Kotli Sattian	923	13
16.Murree Tehsil	1,060	5
17.Rawalpindi Tehsil	1,109	2
18.Taxila Tehsil	1,095	3

Source:-

G.O.P.,1998 District Census Reports, Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

6.3 SUMMARY/CONCLUSION

The age structure in 1998 population pyramid of Potohar gives an overall picture of a broad based age structure. The young age group, below 15 years, constituted 39.9 percent of the total Potohar population. This is very different from the national figures of 43.4 percent but very close to the Asia figures of 39.7 percent. The adult population (15-59 years) accounted for 46.8 percent of the total population, while old age group (60 years and above) constituted 6.5 percent of the total. Demographic/historical analysis of age structure during the last seventy years 1921-98, shows an increase of young population indicating increase in fertility and relative decline of mortality.

A comparative study of dependency ratio between Potohar 75.5 percent in 1998, Pakistan (62.7 percent in 1998) and (Asia 56.1 percent in 1970) places Potohar region at the top of the list. It may be added that because of high fertility during the last fifty years there is a heavy concentration of young dependents in the Potohar region.

The sex ratio for the Potohar in 1998 was 1,025. There was a marked disproportion of sex ratio between urban (1,143) and rural (954) areas in 1998. The high figure for urban population supports the view that the immigration to urban areas involves primarily male population. The population pyramid points presence of heavy dependency ratio and mounting pressure on social services, education health and the jobs market and has serious environmental as well as governance implications which the urban planners need to take a serious note of. Nevertheless, a comparison of 1998 figures with those of early censuses shows narrowing disparity between urban and rural areas due to enhancement of family and population mobility.

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1. Amir Khan 2000, 'State of Environment and Development' in the HKH Region of Pak, Department of Geography, Urban and Regional Planning, University of Peshawar N.W.F.P. Pakistan Vol. 1, p. 85.
2. Govt of India 1931, Census of (Punjab & N.W.F.P) India, p. 133.
3. Muhammad Arshad 2003, 'Estimates of Mortality in the book on Pakistan 1998' Population Census Evaluation Project, PIDE, Islamabad, pp. 34-39 & 56.
4. Muhammad Aslam Khan 1981, Spatial Analysis of Demography pattern and trend in N.W.F.P, p. 132.

CHAPTER SEVEN

URBANISATION

7.1 INTRODUCTION

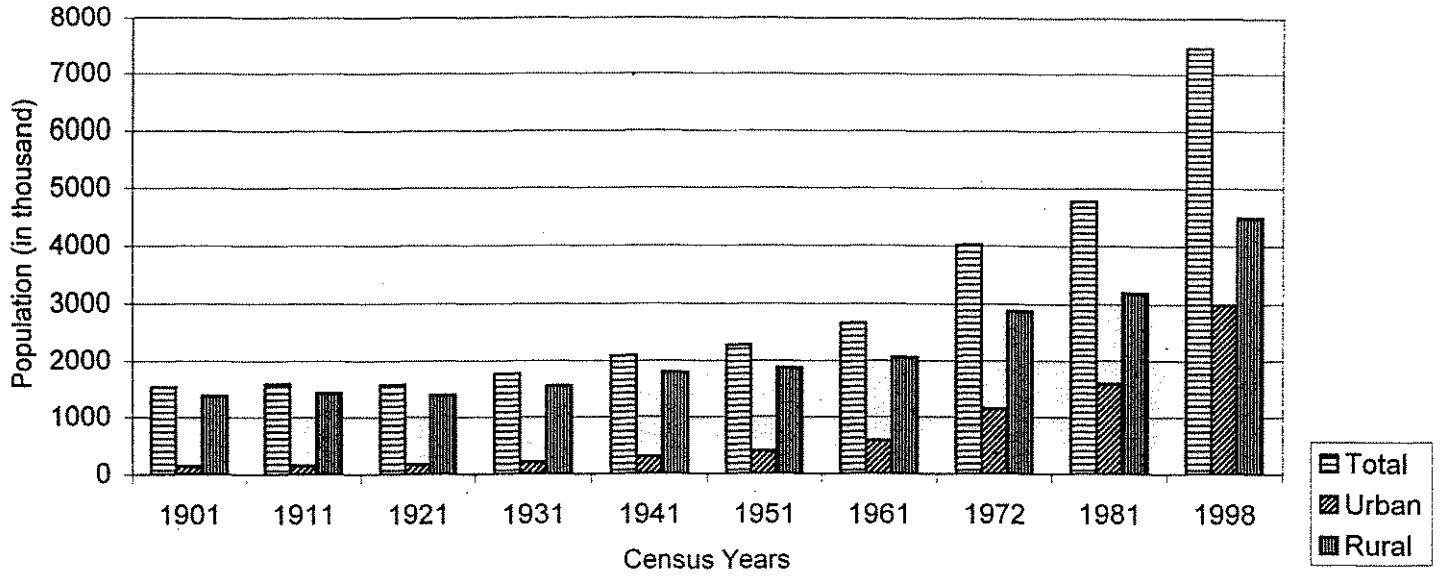
The 20th century witnessed continuous, though erratic, increase in Potohar's urban population as well as the number of urban settlement. The urbanisation level i.e. the percentage of total population living in urban centers, increased from ten percent in 1901 to forty percent in 1998, while the number of urban settlement, increased from 11 to 31 in the same period. The urban transformation was particularly rapid in post independence period is expected to continue, though not as fast, in the foreseeable future (Nasreen Abbasi, 1987).

Urbanisation is manifestation of socio-economic transformation of a complex nature. Generally speaking it lifts or is supposed to lift the population to higher levels in all or most respects in terms of income, access to civil amenities, quality of life, patterns, etc. At the same time it brings in its wake-when it proceeds fast and unplanned, a number of socio-economic problems. The magnitude of positive and the negative social and economic implications of urbanisation process would depend on the scale of transformation indicated by the size of population affected. The number of urban centers, the rate of urban-growth population center, and other relevant data pertaining urbanisation in Potohar area are described and analysed in the present chapter. First, the trend in urbanisation level is analysed in this context, in the Potohar area as a whole as well as its component districts, (Population Census Organisation, 1951-1998 Administrative unit). (Appendix-7.1).

7.1.1 GROWTH TREND

The urbanity level is indicated in its most simple sense by the proportion of total population of a given region residing in urban center. The latter are defined in terms of population size of dwelling centers, the state of its social and economic infrastructure, occupational patterns, etc. The urban rural distribution of population of Potohar Region as recorded in the decennial census of 1901 and later years is given in Table-7.1 (Fig-7.1), which also provides data on decennial variation in urban and rural population. Analysis of the trend Potohar level followed by district-level is given in (Appendix-7.1).

FIG. 7.1 POTOHAR REGION: POPULATION GROWTH BY TOTAL, URBAN AND RURAL 1911-98



Source:

1 Govt. of India 1901-41, Punjab, Census of India.
2 GOP, 1961, Census of Pakistan, Volume-III, Table-4, M/O Home and Kashmir Affairs, Karachi.
3 GOP, 1951-98, Population of Administrative Units, Population Census Organization, Islamabad.

Table-7.1. Potohar Region: Population growth by total urban and rural 1911-98

Census Year	Population (in thousand)			Percentage			Decennial Variation (in Percentage)		
	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
1901	1,5,24	1,46	1,3,78	100.00	9.58	90.41	–	–	–
1911	1,5,78	1,55	1,4,24	100.00	9.79	90.20	3.54	5.85	3.30
1921	1,5,58	1,72	1,3,86	100.00	11.03	88.96	-1.32	11.21	-2.67
1931	1,7,59	2,13	1,5,46	100.00	12.11	87.88	12.92	23.96	11.55
1941	2,0,90	3,05	1,7,86	100.00	14.57	85.42	18.84	42.88	15.52
1951[1]	2,2,76	4,04	1,8,72	100.00	17.74	82.25	8.90	32.63	4.85
1961	2,6,53	5,90	2,0,63	100.00	22.25	77.74	16.54	46.12	10.16
1972	40,16	1,1,39	2,8,77	100.00	28.36	71.63	51.37	92.96	39.46
1981	4,7,73	1,5,83	3,1,90	100.00	33.20	66.69	18.84	38.96	10.87
1998	7,4,65	2,9,79	4,4,85	100.00	39.91	60.08	56.39	88.21	40.60

Source:-

1.Govt of India 1941 Census of Punjab (tables) India.

2.G.O.P.1961 Census of Pakistan Population Census and Registration office M/O Home and Kashmir affairs Vol.3 Karachi, pp.114-117.

3.G.O.P.1951-98 Administrative units table 1 & 4 Population Census Organisation, Islamabad.

7.1.2 AGGREGATIVE TRENDS

Aggregative viewed within the context of the Potohar area as a whole, the urbanity level increased four folds during the 20th century. As stated earlier in this chapter in 1901 census of population approximately ten percent of the Potohar total population was classified as urban. The corresponding figure for the 1998 census was 40 percent.

Foot note:-

[1] Adjusted Population from 1951 to 1998 of Potohar region According to 1998 Census.

Between 1901 and 1998, the study area's total population increased by 4.9 percent from 1,5,24,226 in 1901 to 7,4,64,763 in 1998. The incremental total population was thus 489.74 percent. In the same period urban population increased by 39.91 percent. The incremental urban population was 2,8,33,507 in number. The higher rate of growth of urban population, as noted above, is typical of the urban transition observed nationally and internationally (Population Census Organisation, 1961&1998). It came about due to the normal natural growth of the base urban population, migration to urban areas from the Potohar rural areas and from outside Potohar and also from transformation of some rural centers into urban areas. In the period 1901-98 a few urban settlements, were declassified i.e. declared non urban, but the resulting effect, even other wise too small on the urban population was more than offset by the afore-stated factors.

As will be seen in Table-7.1, the study area's urban population registered positive growth rate in every inter-census period. The rate was, however, not smoothly upwards, especially in pre-1951 period. For a clearer and better perception of urban growth trend the period 1901-98 is split into 1901-41 and 1951-98 encompassing five censuses each and also representing pre and post Independence era, is given (Fig-7.2).

Table-7.2. Potohar Region: Pre and post Independence trend and urban growth

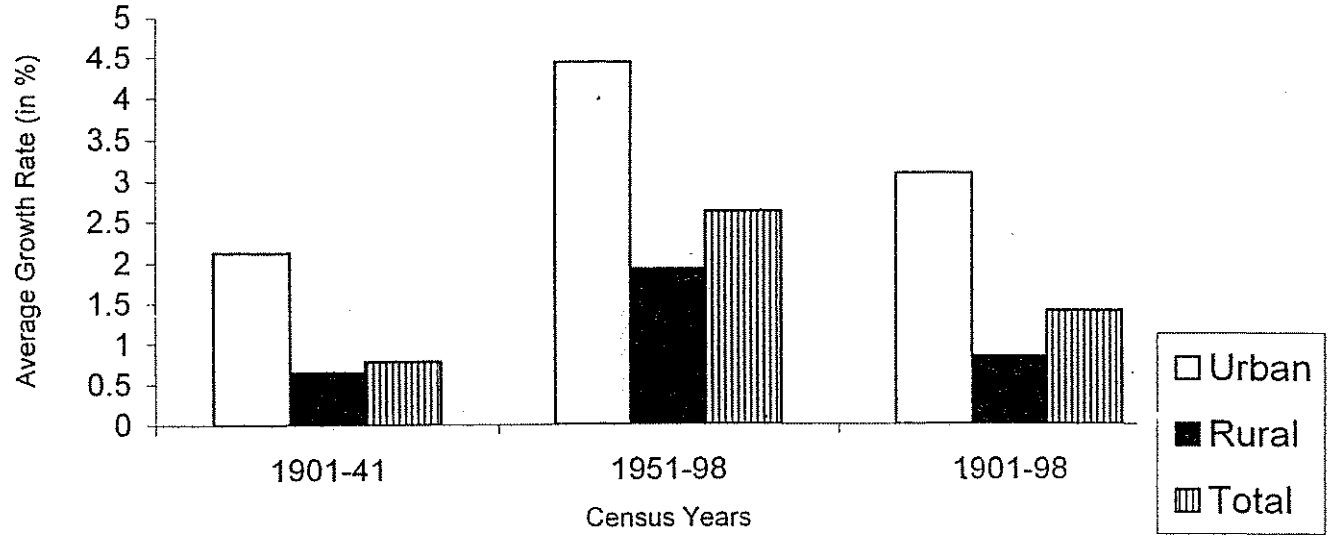
Year/Period	Population (Million)			Average annual growth rate (Percent)		
	Urban	Rural	Total	Urban	Rural	Total
1901	0.146	1.378	1.524	2.13	0.65	0.79
1941	0.304	1.786	2.090			
Variation 1901-41	0.158	0.408	1.566			
1951	0.404	1.872	2.276	4.44	1.92	2.62
1998	2.980	4.485	7.465			
Variation 1951-98	2.576	2.613	5.189			
1901-98	2.834	3.107	5.941	3.10	0.84	1.41

Source:-

1.Govt of India 1941 Census of India (tables) Punjab.
2.G.O.P., 1961 Census of Pakistan Vol.3 M/O Home and Kashmir, Karachi.
3.G.O.P., 1951-98 Administrative units table 1 & 4, Population Census Organisation, Islamabad.

As will be seen in Table-7.2, the urban population growth rate (annual) during 1951-98 was as high as 4.44 percent as compared with 2.13 percent during 1901-41. The highest inter-censual growth rate was recorded during 1951-98 when it was 2.6 percent. Variations in urban growth during different periods are explained by a host of

FIG. 7.2 POTOHAR REGION: URBAN GROWTH TREND IN 1901-1998



Source:

1. Govt. of India, 1901-1941, Punjab Census of India.
2. GOP, 1951-98 Population of Administrative Units, Table 1 & 4, Population Census Organisation, Islamabad.

factors, mostly economic. The period mid fifties to mid sixties was characterised by, what may be described by the Pakistan standard, economic boom, which was in full strides till mid sixties. It was also during this period that the process of urbanisation accelerated and ostensibly in consequence of economic transformation.

7.1.3 URBANITY LEVEL OF DISTRICTS

Two out of the five districts now comprising Potohar region were created after 1901; Chakwal in 1998 and Islamabad in 1972. The other three existed also in 1901, and all in 1972. As will be seen in Table-7.3 (Fig-7.3) Islamabad district is the most highly urbanised district with urban population accounting for 65.7 percent of its total population in the year 1998. The Rawalpindi district follows with 53.2 percent.

Table-7.3. Potohar Region: Degree of Urbanisation 1901 & 1951-1998

Locality	Degree of urbanisation					
	1901	1951	1961	1972	1981	1998
Potohar	9.6	17.7	22.3	28.3	33.2	39.9
Attock	1.4	10.0	14.4	14.1	15.0	21.3
Chakwal	-	4.9	6.8	7.9	8.3	12.2
Islamabad	-	-	-	32.3	60.1	65.7
Jhelum	2.3	10.6	19.8	22.1	25.5	27.7
Rawalpindi	25.9	33.0	37.4	44.2	47.8	53.2

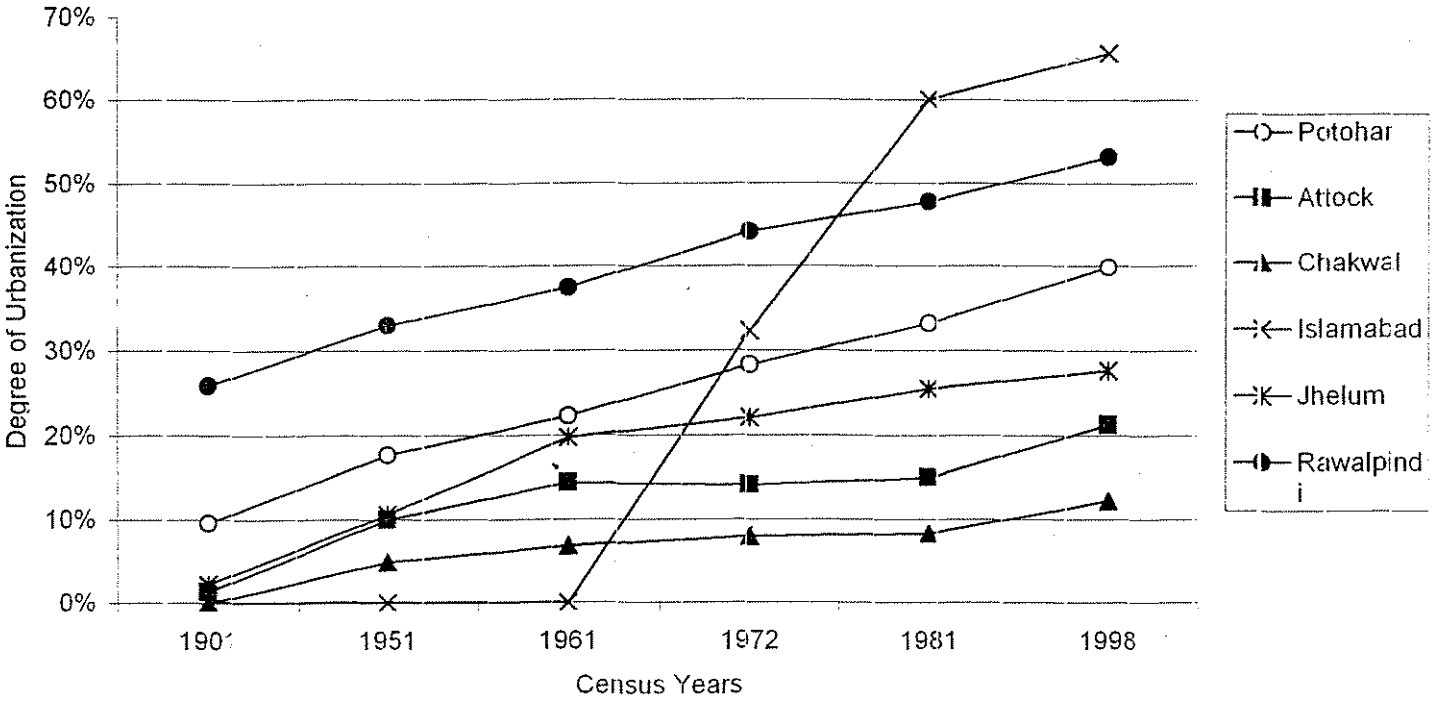
Source:-

1.G.O.P.1961 Census of Pakistan M/O Home and Kashmir affairs Vol.3 Karachi pp.114-117.

2.G.O.P.1951-98 Administrative units table 1 & 4, Population Census Organisation, Islamabad.

The five districts under study registered widely different rates of urban growth. The highest was recorded in Islamabad, where the urban population grew at the rate of 39.9 percent during 1981-98. The district-wise growth is analysed in the time context of 1951-98, and not a longer period, because comparable adjusted data for earlier years is not available.

FIG-7.3. Potohar Region: Degree of Urbanisation by districts 1901, 1951-1998.



Source:

1. Govt. of India 1901, Census of India, Punjab.
2. GOP, 1961, Census of Pakistan, Volume III, Table 4, Page 112-116, M/O Home and Kashmir Affairs, Karachi.
3. GOP, 1951-98. District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Part-IV, Table-I, Population Census Organisation, Islamabad.

Table-7.4. Urban population growth in districts of Potohar (1951-98)

District	Incremental Urban population 1998		1951-1998 Annual Growth Rate (Percent)	Urbanisation level (Percent)	
	Total number	Percent share		1951	1998
1. Attock	2,71,092	9.1	4.35	10.0	21.3
2. Chakwal	1,31,692	4.4	4.28	4.9	12.2
3. Islamabad	5,29,180	17.8	5.75	--	65.7
4. Jhelum	2,59,330	8.7	2.58	10.6	27.2
5. Rawalpindi	1,7,88,273	60.0	3.38	33.0	53.2
Total= Potohar area	2,9,79,567	100.0	3.63	17.7	39.9

Source:-

G.O.P.1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 1 & 2, Population Census Organisation, Islamabad.

In 1951-98 the urban population of Potohar increased by 39.9 percent. The incremental population was distributed over the areas five districts on the pattern shown in Table-7.4. District Rawalpindi accounted for 60 percent share of the total incremental population followed by district Islamabad with 17.8 percent share. District Islamabad experienced the highest growth rate, 5.75 percent in the study area. The district Attock with corresponding figure of 4.35 percent (Fig-7.4, 7.4.1 & 7.4.2).

7.1.4 URBAN GROWTH IN POTOHAR OTHER REGIONS OF PAKISTAN (1981-98)

Potohar's urban population growth rate was 3.6 percent during 1981-98 as compared with corresponding figure of 3.3 percent for Pakistan taken as a whole and was higher than of all provinces corresponding figures except that of Balochistan which registered 4.8 percent Table-7.5 (Fig-7.5 & 7.5.1).

FIG. 7.4 POTOHAR REGION: URBANISATION LEVEL BY DISTRICTS, 1951-98

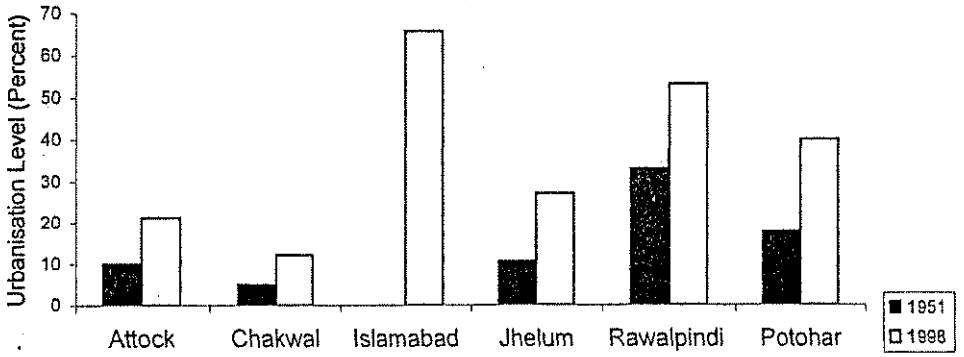


FIG. 7.4.1 POTOHAR REGION: URBAN POPULATION GROWTH BY DISTRICTS, 1951-98

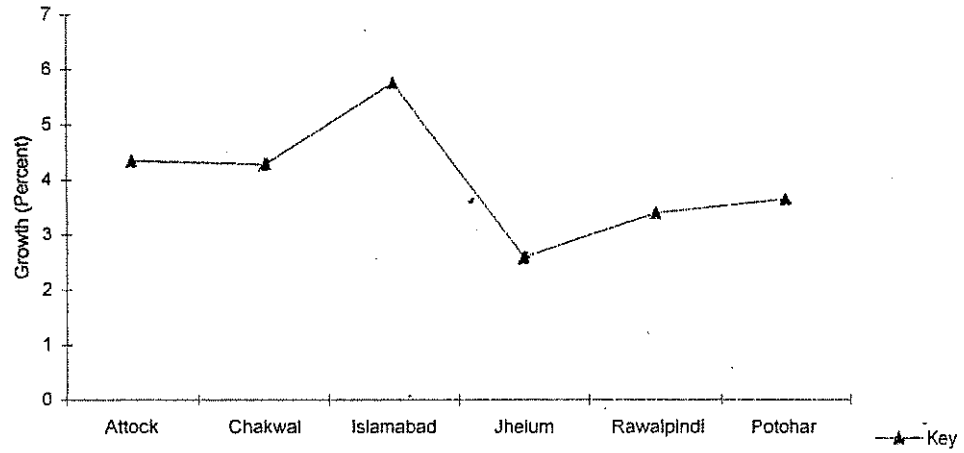
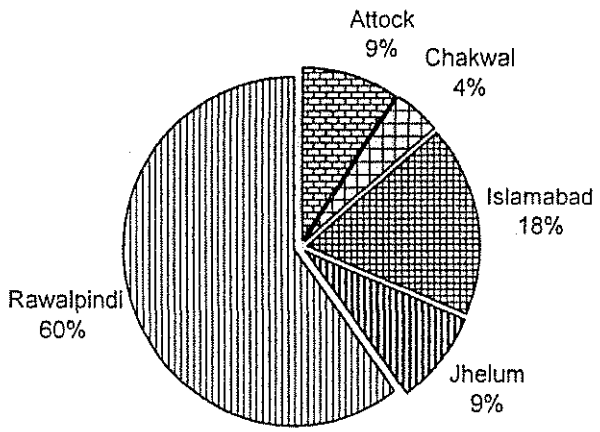
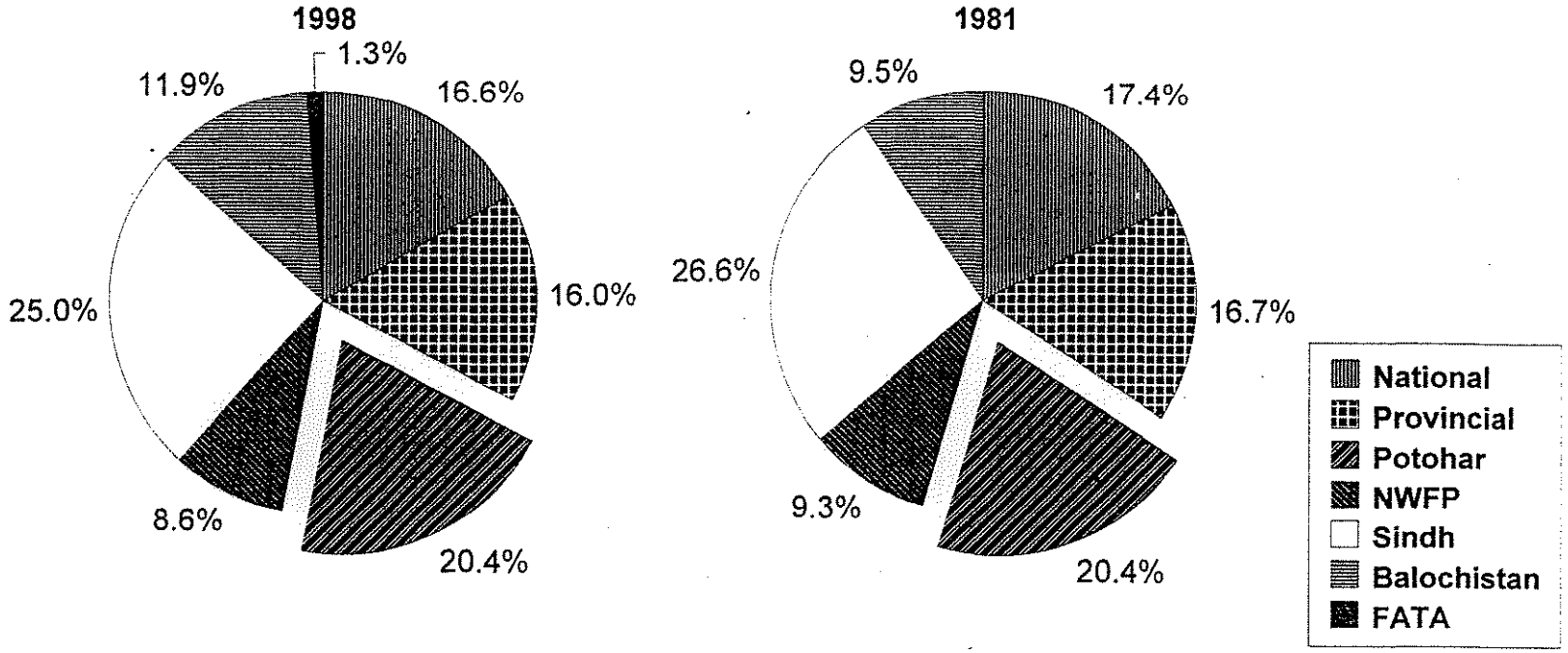


FIG. 7.4.2 POTOHAR REGION: PERCENTAGE/SHARE INCREMENTAL URBAN POPULATION BY DISTRICTS, 1998

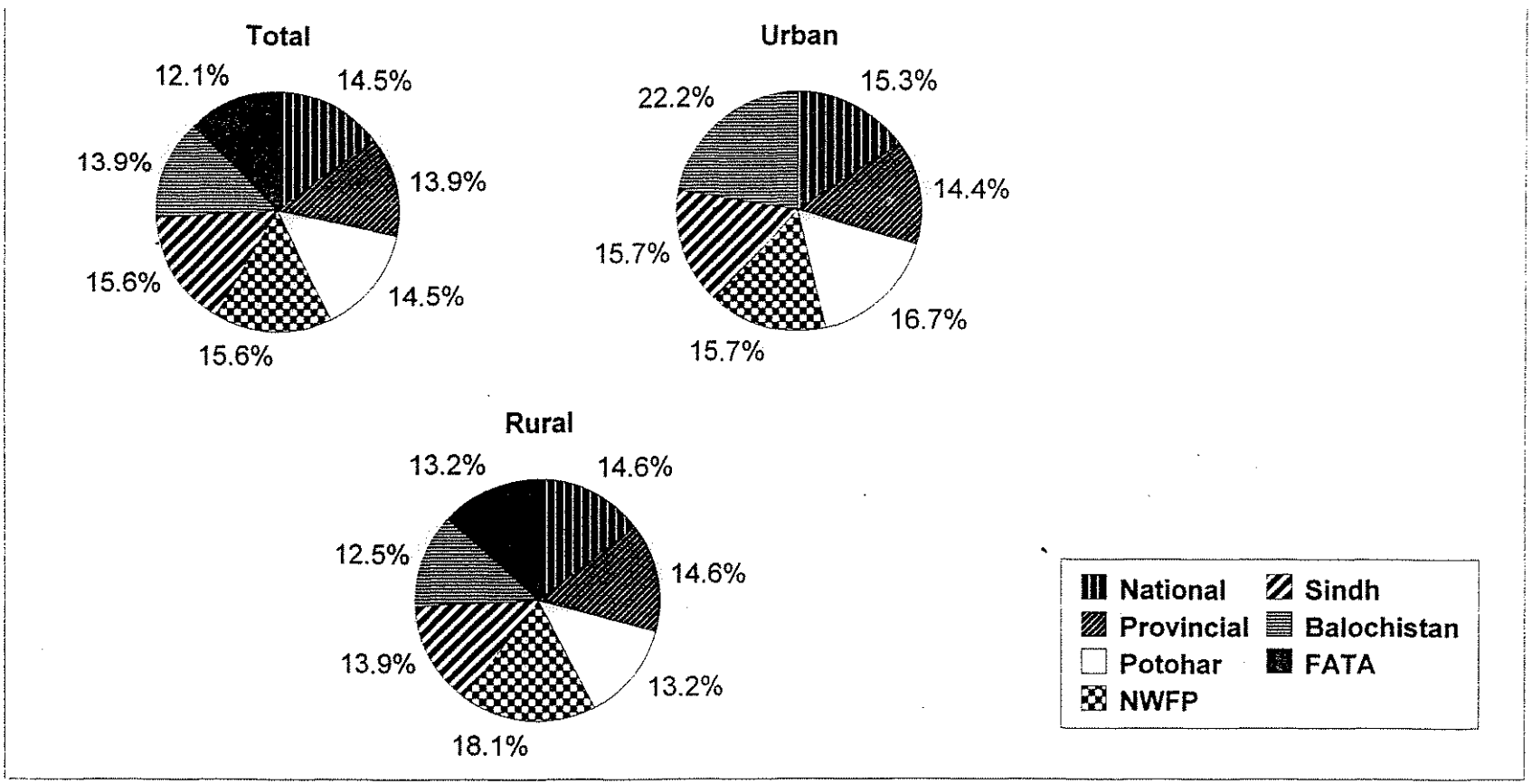


Source:
GOP 1998, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.



Source:

1. GOP, 1981-98, Census Report of Pakistan, Table 1, Population Census Organisation, Islamabad.
2. GOP, 1981-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.



Source:

1. GOP, 1981-98, Census Report of Pakistan, Table 1, Population Census Organisation, Islamabad.
2. GOP, 1981-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

AVAERAGE ANNUAL GROWTH RATE 1981-98

Table-7.5. Degree and growth of urban population in Potohar and other administrative areas in 1981-98

Locality	Degree of Urbanisation (Percent)		Urban and Rural Growth (Percent)			Annual growth rate of population 1981-1998 (Percent)		
	1998	1981	Total	Urban	Rural	Total	Urban	Rural
National	32.5	28.3	55.0	78.2	45.8	2.5	3.3	2.1
Provincial	31.3	27.2	53.5	73.9	45.7	2.4	3.1	2.1
Potohar	39.9	33.2	56.1	87.0	40.6	2.5	3.6	1.9
NWFP	16.9	15.1	58.7	78.4	55.1	2.7	3.4	2.6
Sindh	48.9	43.3	56.7	77.8	42.1	2.7	3.4	2.0
Balochistan	23.3	15.5	50.3	124.0	36.6	2.4	4.8	1.8
FATA	2.6	-	42.7	-	38.9	2.1	-	1.9

Source:-
G.O.P.,1981-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 2, Population Census Organisation, Islamabad.

The share of Potohar in the country's total urban population rose from 6.4 percent in 1981 to 7.0 percent in 1998 is given in Table-7.6. During the same period Punjab and Sindh provinces experienced a decline in this respect, while the share of Balochistan rose from 2.8 percent in 1981 to 3.6 percent in 1998; is shown (Fig-7.6 & 7.6.1).

Table-7.6. Share of urban Pakistan population by province/region in 1981-1998

Locality	Urban Population		Share in National total (Percent)		Change in Shares (Percent)
	1998	1981	1998	1981	1981-1998
National	43,0,36,404	23,8,41,471	100.0	100.0	-
Provincial	20,5,68,638	11,7,19,728	47.7	49.2	- 1.5
Potohar	2,9,79,567	1,5,36,282	7.0	6.4	0.6
NWFP	2,9,94,084	1,6,65,653	7.0	7.0	0.1
Sindh	14,8,39,862	8,2,43,036	34.5	34.6	- 0.1
Balochistan	1,5,68,780	6,76,772	3.6	2.8	0.8
FATA [2]	83,131	-	0.1	-	0.1

Source:-
G.O.P.1981-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

Foot note:-
[2] FATA urban area de-notified after 1972 census.

FIG. 7.6 POTOHAR REGION: SHARE OF URBAN POPULATION BY PROVINCES/REGIONS 1981

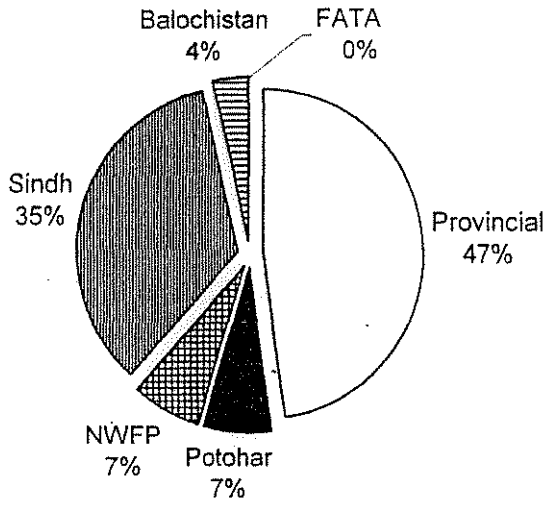
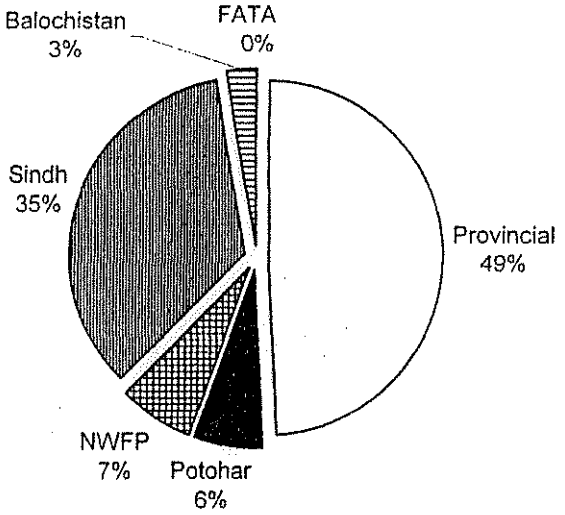


FIG. 7.6.1 POTOHAR REGION: SHARE OF URBAN POPULATION BY PROVINCES /REGIONS 1998



Source:

1. GOP 1981-98, District Cessus Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Part-IV, Table-I, , Population Census Organisation, Islamabad.
2. GOP 1981-98, Census of Pakistan/Provinicial Reports of NWFP/FATA, Punjab, Sindh and Balochistan Table-I, Population Census Organisation, Islamabad.

7.2 URBAN SETTLEMENT

In 1901, only eleven dwelling centers were classified as urban centers or urban settlement. The number rose to 31 by 1998. The number of urban centers in terms of population was prominently larger towards the end of the last century than at its inception. As will be seen in Table-7.7, in 1901 & 1911, (Appendix-7.4) the study area had no urban center with a population of 50,000 or more. In 1998 the number was eight in this category of urban centers is shown in (Fig-7.7).

Table-7.7. Potohar: Number of Cities/Towns by size classes in 1901-1998

City Size	Class	1901	1911	1921	1931	1941	1951	1961	1972	1981	1998
Under 5,000	VI	4	4	4	4	3	1	4	3	1	-
5,000-9,999	V	3	5	6	7	4	9	8	4	6	2
10,000-19,999	IV	2	2	1	2	5	3	8	12	7	11
20,000-49,999	III	2	2	1	1	1	2	2	3	8	10
50,000-99,999	II	-	-	1	1	1	1	-	1	1	3
1,00,000 +	I	-	-	-	-	1	1	2	4	4	5
All size		11	13	13	15	15	17	24	24	27	31

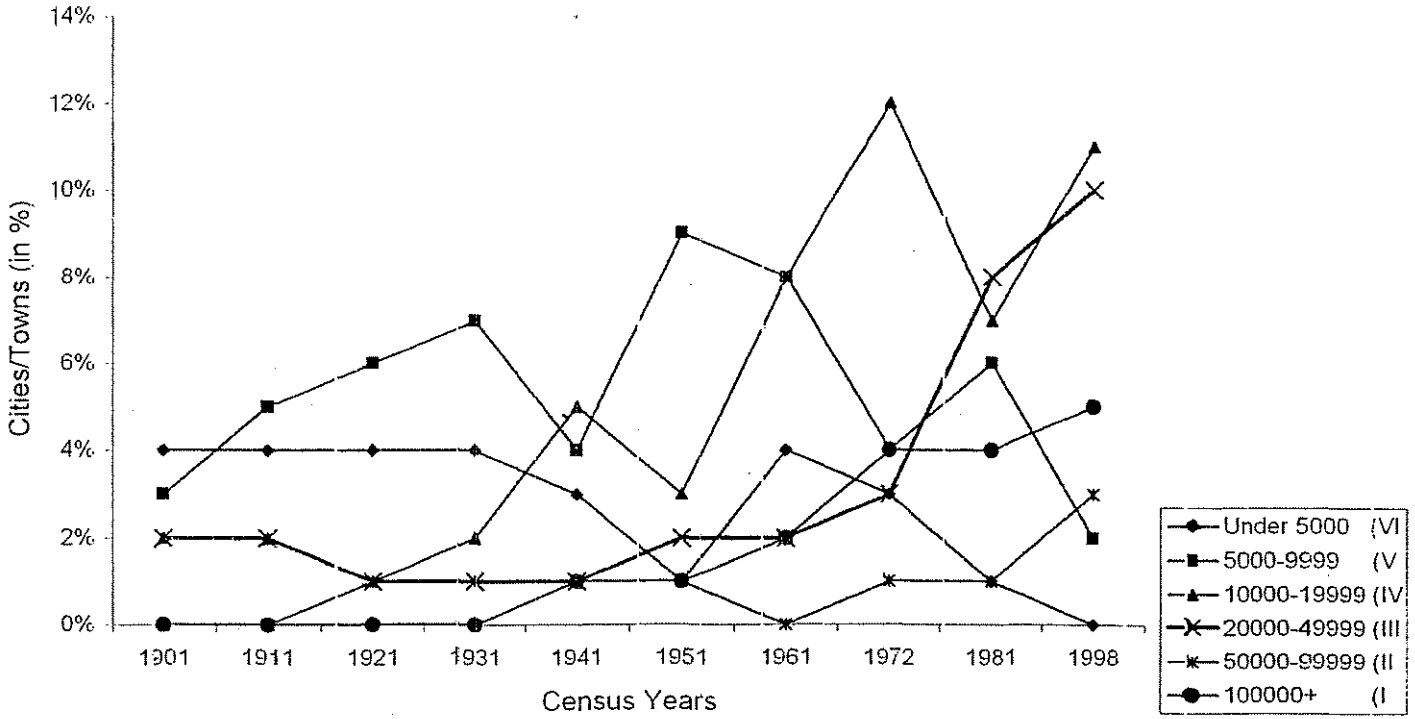
Source:-

1.G.O.P.1961 Census of Pakistan M/O Home and Kashmir affairs Vol.3 Karachi.
2.G.O.P.1951-98 Administrative units table 1 & 4, Population Census Organisation, Islamabad.
3.G.O.P.1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 2 Population Census Organisation, Islamabad.

7.2.1 DISTRIBUTION OF URBAN POPULATION

The entire urban population in 1901 was confined to urban centers in below category II centers. In 1998 category I settlement with a population of 1,00,000 or more, three quarter (76.7 Percent) of the study area total urban population as shown in Table-7.8, (Fig-7.8).

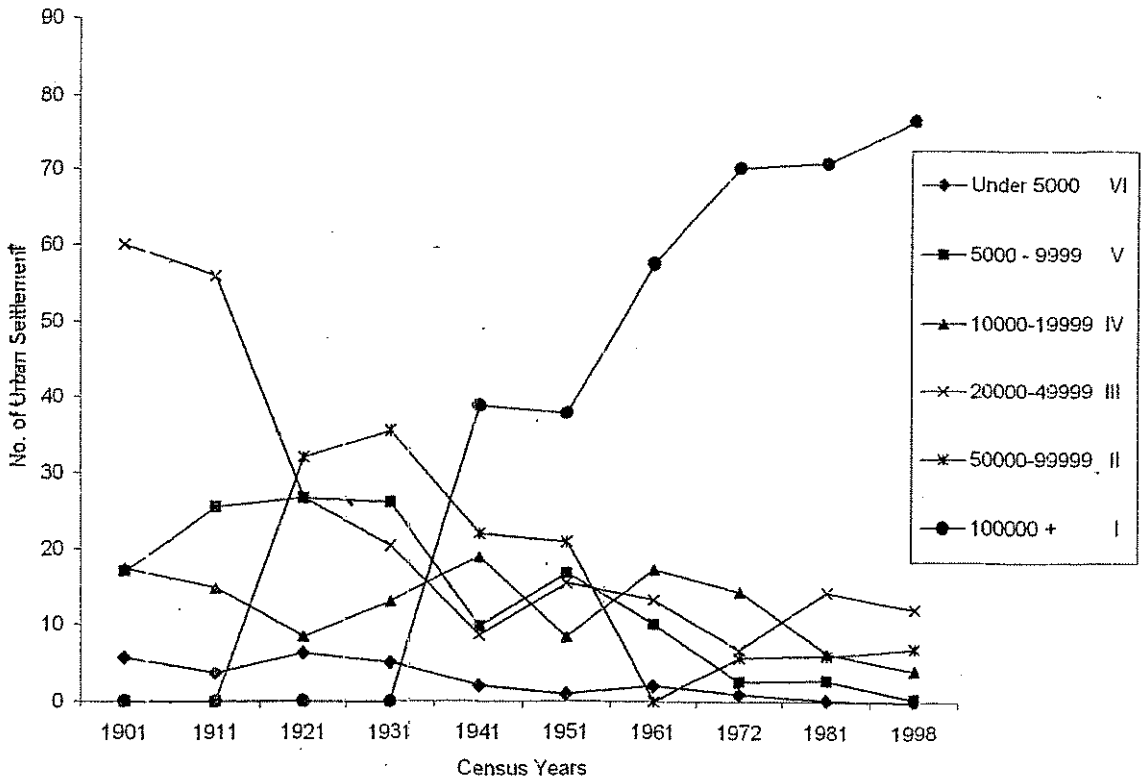
FIG. 7.7 POTOHAR REGION: PERCENTAGE NUMBER OF CITIES/TOWNS BY SIZE, CLASS 1901-98



Source:

1. GOP 1981-98, District Cessus Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Part-IV, Table-I, , Population Census Organisation, Islamabad.
2. GOP, 1961, Census of Pakistan, Volume III, Table 4, Page 112-116, M/O Home and Kashmir Affairs, Karachi.

FIG. 7.8 POTOHAR REGION: NUMBER OF URBAN SETTLEMENT BY SIZE/CLASS 1901-98



Source:

1. Govt. of India, 1901-1941, Punjab Census of India
2. GOP, 1951-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.
3. GOP, 1961, Census of Pakistan, Volume III, Table 4, Page 112-116, M/O Home and Kashmir Affairs, Karachi.

Table-7.8. Potohar: Percentage of Urban Settlement by size class 1901-1998

Size Class of Urban Localities	1901	1911	1921	1931	1941	Adjusted				
						1951	1961	1972	1982	1998
Under 5,000 VI	5.6	3.7	6.2	5.0	2.0	0.9	2.0	0.9	0.2	-
5,000-9,999 V	17.0	25.5	26.6	26.1	9.7	16.7	10.0	2.5	2.7	0.3
10,000-19,999 IV	17.4	14.8	8.4	13.0	18.9	8.3	17.2	14.3	6.2	4.0
20,000-49,999 III	60.0	56.0	26.7	20.4	8.6	15.4	13.2	6.6	14.2	12.0
50,000-99,999 II	-	-	32.1	35.5	22.0	20.9	-	5.6	5.9	6.9
1,00,000 + I	-	-	-	-	38.8	37.8	57.6	70.1	70.8	76.7
All Urban Settlement	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source:-

1.G.O.P.1961 Census of Pakistan M/O Home and Kashmir Offairs Vol.3 Karachi.
2.G.O.P.1951-98 Administrative units table 1 & 4, Population Census Organisation, Islamabad.
3.G.O.P.1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 2, Population Census Organisation, Islamabad.

From tables 7.7 and 7.8, it is evident that during 1901-98 urban growth took place both through vertical and horizontal expansion of urban centers. The latter's number increased and also their average population. The tendency has been towards concentration of population in a few urban centers. To be precise, while the latter increased form 11 (1901) to 31 (1998), bulk (76.7 percent) of the total urban population came to be concentrated in four centers Rawalpindi 1,4,09,768, Islamabad 5,29,180, Wah 1,98,891 and Jhelum 1,47,392 (Fig-7.8). Presently, it seems appropriate to present data on average size of urban centers in 1951 onwards shown on (Map-7.1& 7.1.1).

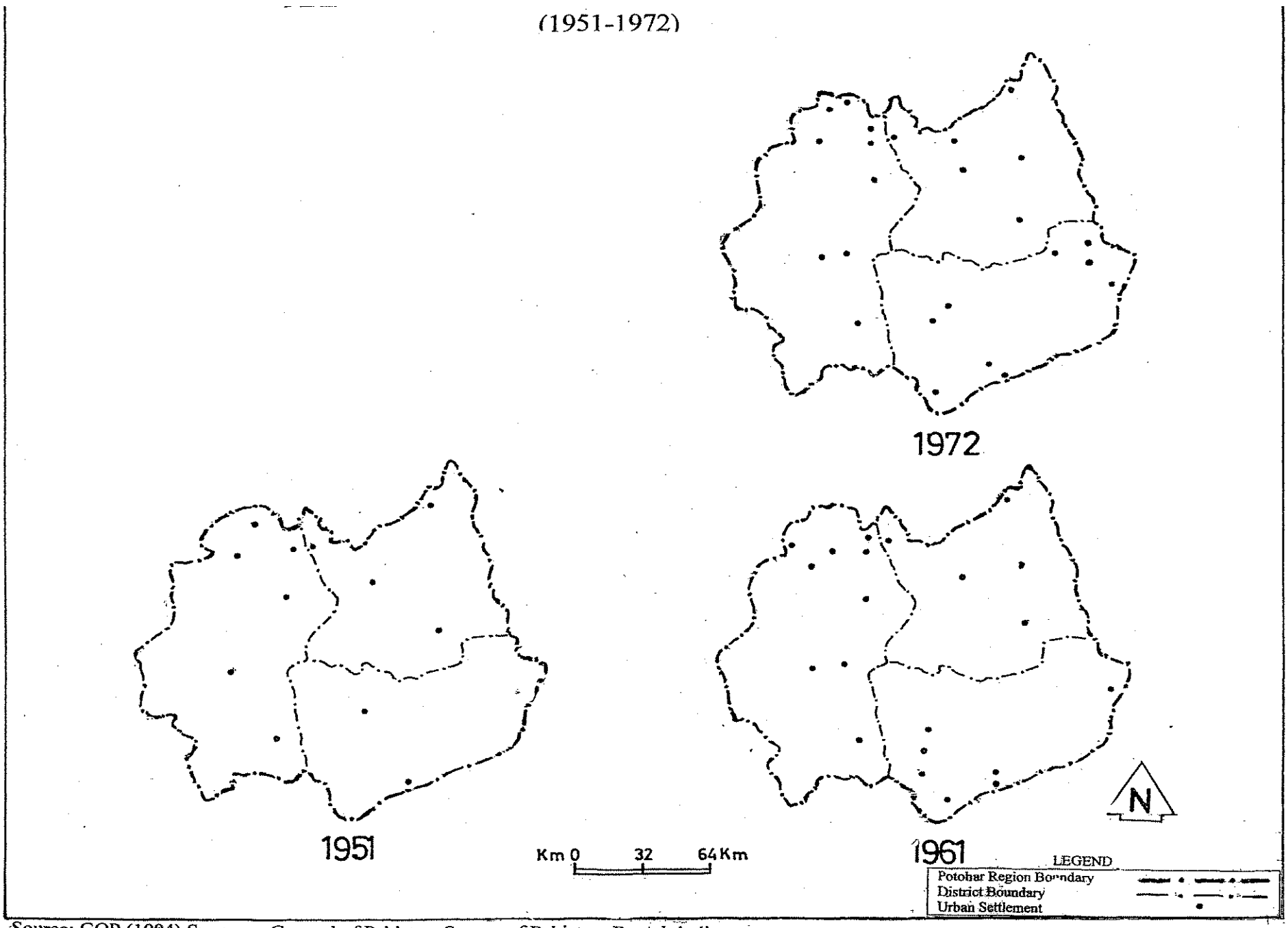
Table-7.9. Number of urban centres and urban population in Potohar 1951-1998

Census Year	Urban Centers[4]	Total Population	Average size of Population
1951	14	4,04,009	28,858
1961	21	5,90,352	28,112
1972	24	1,139,179	47,466
1981	22	1,5,83,092	71,959
1998	26	2,9,79,567	1,14,599

Source:-

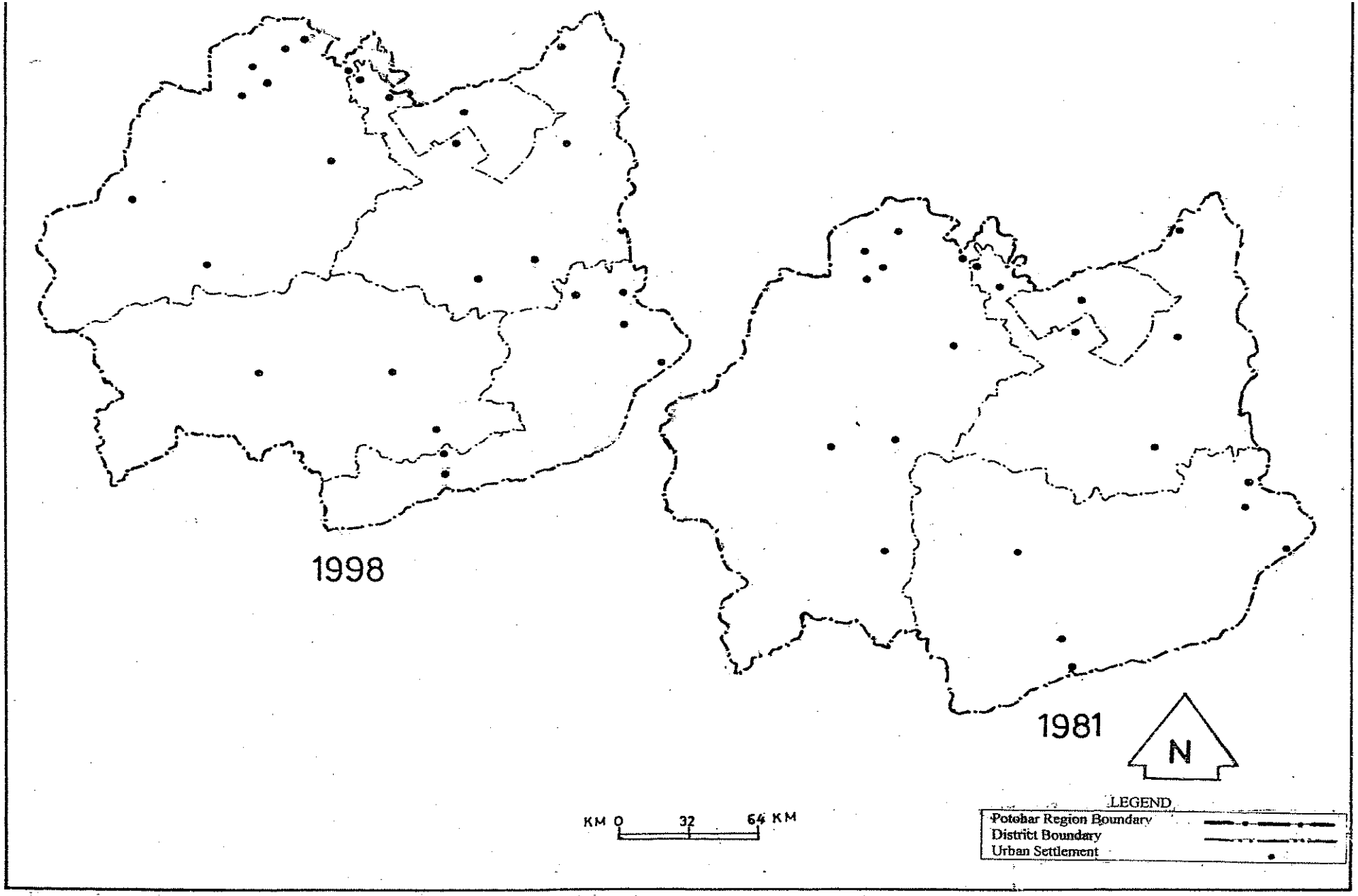
G.O.P.1951-98 Administrative units table 1 & 4, Population Census Organisation, Islamabad.

(1951-1972)



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

MAP 7.1 POTOHAR REGION: URBAN SETTLEMENT



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan. Rawalpindi.

(1981-1998)

Amongst the 31 urban centers of the study area four stand out quite distinctly. These are Rawalpindi (including the cantonment area), Islamabad, Jhelum (including the Cantonment area) and Wah. These four major urban centers [3] accounted for more than three quarter (76.7 percent) of the total urban population of Potohar in 1998 (Appendix-7.3). Among these four centers [3], Rawalpindi is and has always been the biggest is shown Fig-7.9. In 1998 it accounted for nearly half (47.3 percent) of the Potohar area's total urban population (Population Census Organisation, 1951-1998).

Table-7.10. Growth of the four major urban settlement of Potohar 1951-98

Year	Total population of all urban settlement	Selected Four Major [4] Urban settlement Population	All other urban settlement population
1951	4,04,009	1,52,893	2,51,116
1961	5,90,352	3,40,175	2,50,177
1972	1,1,39,179	7,22,319	4,16,860
1981	1,5,83,092	1,0,34,494	5,48,598
1998	2,9,79,567	2,2,57,085	7,22,482

Source:-
G.O.P.,1951-98 Administrative units table 1 & 4, Population Census Organisation, Islamabad.

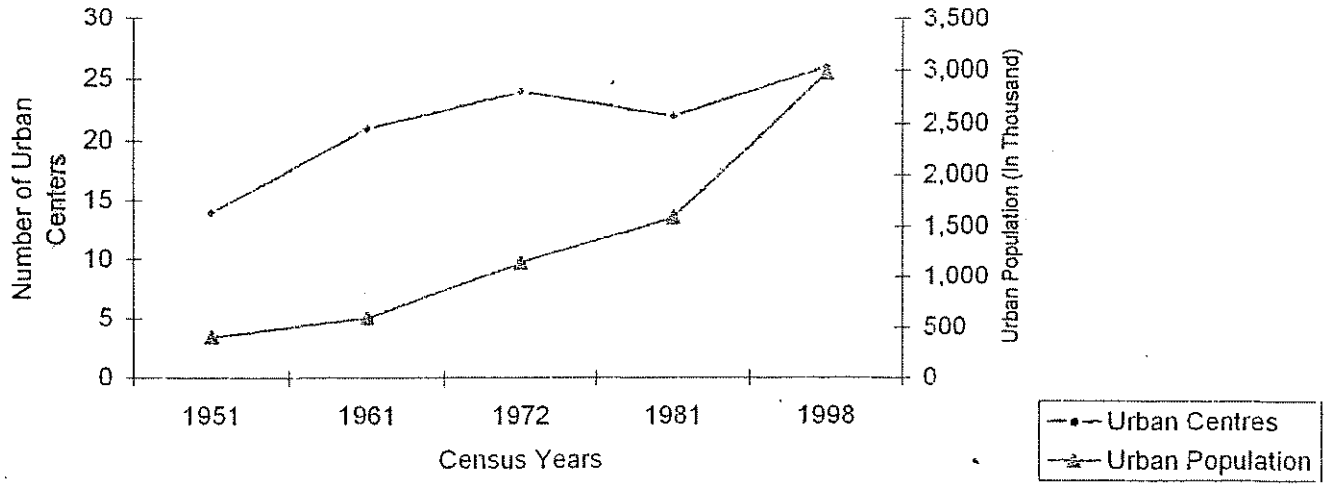
The prime position of the selected four urban centers under study in the urban hierarchy is brought into sharper focus is given in Table-7.11, in which relevant data for each of them is shown separately for the year 1998 (Fig-7.10).

Foot note:-

[3] Urban center: within the boundaries of M.Corp./MC & Cantonment Boards are a combination of two adjacent urban settlement/centers are treated one urban settlement.

[4] Major Four Urban Center: Urban having Population 1,00,000 persons or more are treated major urban centers, (Rawalpindi, Islamabad, Wah and Jhelum).

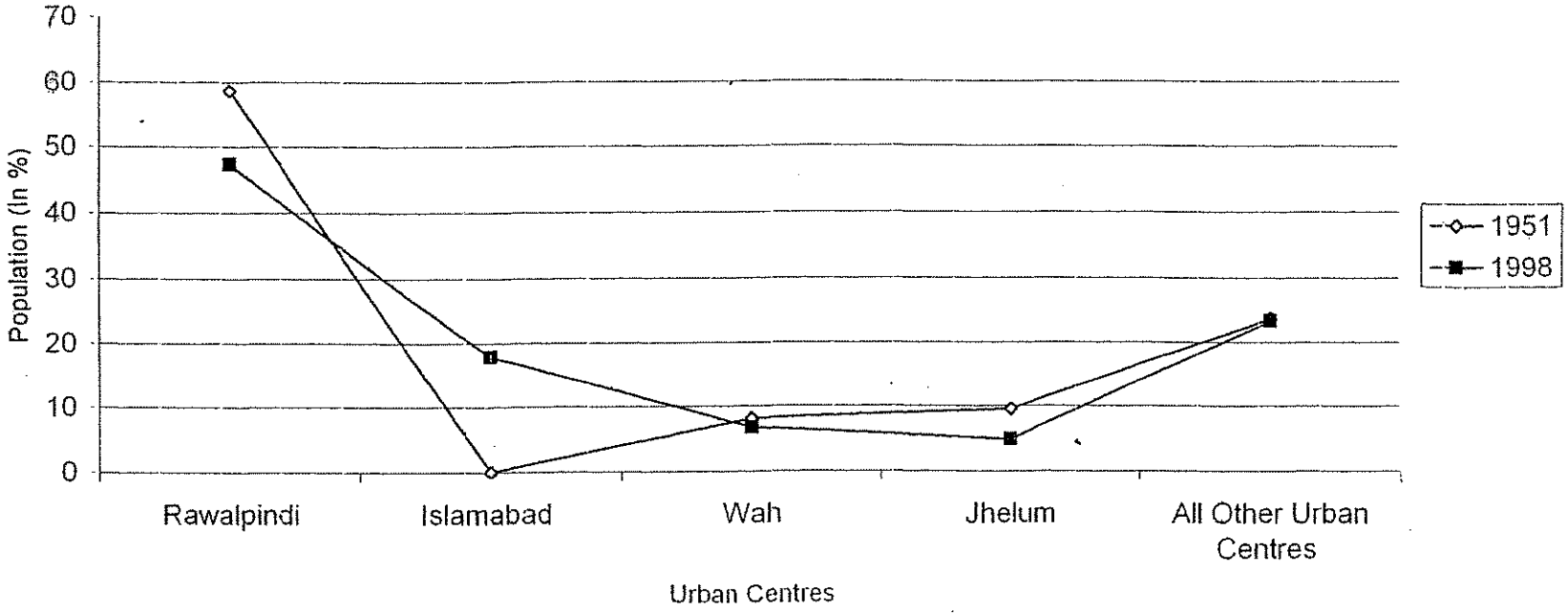
FIG. 7.9 POTOHAR REGION: NUMBER OF URBAN CENTRES AND POPULATION IN 1951-98



Source:

1. Govt. of India, 1901-1941, Punjab Census of India
2. GOP, 1951-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

FIG. 7.10 POTOHAR REGION: PERCENTAGE POPULATION OF MAJOR URBAN CENTRES AND COMPARISON OTHER URBAN CENTRES 1951-98



Source: GOP, 1951-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table 1 & 2, Population Census Organisation, Islamabad.

FIG. 7.10 POTOHAR REGION: PERCENTAGE POPULATION

Table-7.11. Population of the top four urban centres of Potohar as recorded in the 5 censuses of 1951 & 1998 (adjusted)

Name of Urban Settlement	1951 Census		1998 Census	
	Population	Percent	Population	Percent
1. Rawalpindi	2,36,877	58.6	1,4,09,768	47.3
2. Islamabad [5]	--	--	5,29,180	17.8
3. Wah	32,823	8.1	1,98,891	6.7
4. Jhelum	38,567	9.5	1,47,392	4.9
Sub- total	3,08,267	76.3	2,2,85,231	76.7
5. All other urban settlement	95,742	23.7	6,94,336	23.3
Total	4,04,009	100.0	2,9,79,567	100.00

Source:-
G.O.P., 1951-98 Administrative units table 1 & 4, Population Census Organisation, Islamabad.

7.3. DISTRIBUTION OF URBAN SETTLEMENT OF POTOHAR ACCORDING TO RANK-SIZE RULE

In the previous decade the point interest of urban/population geographers was focussed on the rank size distribution of cities (Richard J. Chorley and Peter Haggett, 1972). This is the geographical relationship between large number of large towns and a few numbers of cities in the Potohar region. When all the urban settlement in an area are ranked in decline order of population size, the settlement of a given rank appear to be related to the size of largest town in that area. The rank size rule gives the balanced system of city size distribution, characterized by uniformity and smoothly increasing size of settlement in hierarchy. No sudden jumps and breaks would be visible if the urban settlement are distributed according to Rank Size Rule.

Formula: Formula of the Rank Size Rule applied to the set of urban settlement in Potohar region is as follows: (B.J Garner, 1967, Richard J.Chorley and Petter Haggett, 1972).

Foot note:-

[5] Islamabad is established in1959.

$Pr = P1/rq$ I

Where 'Pr' is the population size of city of Rank 'r' in the descending array of towns and 'PI' is the population of the largest settlement. In the simplest way, the statement of the equation is that the expected population of the largest town to be four and eight times the size of the fourth largest town in the Potohar.

For the convenience of calculation the formula is used in logarithmic form given below:-

Log Pr : Log P1-q Log r II

The value thus calculated, when plotted on double log paper gives the linear relationship similar results are also obtained if the Logarithmic values are plotted on the simple graph paper. The constant 'q' in the equation, I and equation II is calculated by the application of the following two equations:

a) Log Pr = n Log PI--- q Σ Log r

b) Log Pr . Σ Log r = Σ log PI Σ Log r – q Σ Log r

Where 'Pr' is the population size of the settlement in Rank 'r', 'PI' is the population of the primate city and 'q' is the constant.

The actual values, when plotted against the population calculated by Rank size Rule gives three types of distributional patterns (Petter Haggett, 1972).

a. Primate Pattern: When the actual population of urban settlement is less its calculate population (Petter Haggett, 1972).

b. Binary Pattern: When the actual population of urban settlement is more than its calculated population (Petter Haggett, 1972).

c. Rank Size Pattern: This is the only pattern that confirms the Rank Size Rule and is obtained when the actual population of urban settlement is equal or nearly equal to their calculated population.

The validity of the rule in the regional space of Potohar region as a whole is tested against the population census data of the years 1951-1998.

7.3.1 RESULT

The results obtained by the application of the rank size Rule for the year 1951-1998 are given in the Tables-7.12. The same are illustrated in (Fig-7.11). The curves correspond to the ranking order of settlement headed by Rawalpindi city. It is concluded that the resulting distributional pattern of settlement size does not conform to the Rank Size Rule. The resulting curves confirm the primate pattern. The settlement system of Potohar is characterised by over dominance of Rawalpindi, Islamabad, twin cities of the Potohar region. It shows a disproportionate rate of development with respect to other urban settlement of the region.

There are a number of reasons for it, Some of theses are as follows:

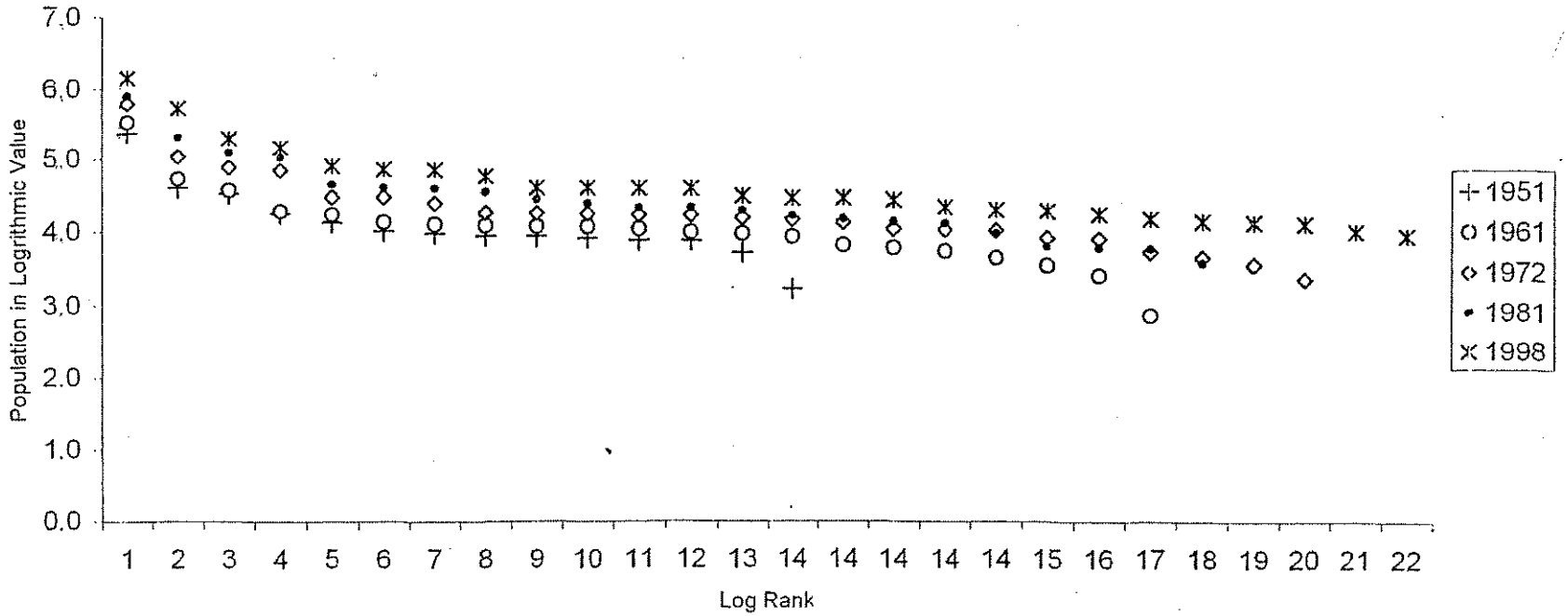
i. Rawalpindi city has long history as a major urban center in the Potohar Region. Rawalpindi urban area was notified in 1887 by the Punjab Province (Himalayas State) India Government (Robertson, 1887).

ii. It is located on the main national highway and M-2 (Motorways) and enjoys the advantage of good accessibility.

iii. It has a large number of civil and military offices including the General Headquater Army (GHQ), Navel HQ, PAF HQ. and federal secretariat, which contribute to the inflow of population not only from Potohar but from throughout the country.

iv. It also possesses several types of commercial, financial, industrial, administrative and educational establishments, which provide a great pull factor population movement.

FIG. 7.11 POTOHAR REGION: RANK SIZE RELATIONSHIP OF URBAN SETTLEMENT 1951-98



Source: GOP, 1951-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

Table-7.12. Potohar Region: Population of urban settlement according to rank size rule in 1951-1998

Rank	Urban Locality	Urban Population		Rank	Urban Locality	Urban Population	
		Actual	Expected			Actual	Expected
1951							
1	Rawalpindi	2,36,877	2,36,877	8	Talagang	8,755	29,609
2	Jhelum	38,567	1,18,438	9	Gujarkhan	8,496	26,319
3	Wah	32,823	78,959	10	Hasanabdal	8,006	23,687
4	Attock	17,671	59,219	11	Hazro	7,512	21,534
5	Chakwal	13,310	47,375	12	Pind Dadan Khan	7,318	19,739
6	Pindi Ghaib	10,150	39,479	13	Fateh Jang	5,126	18,221
7	Murree	9,398	33,839	14	Wah Cement Works	1,663	16,919
1961							
1	Rawalpindi	3,40,175	3,40,175	12	Hazro	9,622	28,347
2	Jhelum	52,585	1,70,087	13	Lilla	9,260	26,167
3	Wah	37,035	1,13,391	14	Pind Dadan Khan	8,328	24,298
4	Attock	19,041	85,043	15	Bhaun	6,467	22,678
5	Chakwal	16,843	68,035	16	Fateh Jang	5,989	21,260
6	Murree	13,486	56,695	17	Mansar	5,459	20,010
7	Pindi Gheb	12,416	48,596	18	Kahuta	4,398	18,898
8	Khewra	12,086	42,521	19	Wah Cement Works	3,505	17,903
9	Gujarkhan	11,529	37,797	20	Khur	2,600	17,008
10	Hasanabdal	11,469	34,017	21	Lawarancepur	746	16,198
11	Talagang	10,818	30,925				
1972							
1	Rawalpindi	6,14,809	6,14,809	13	Khewra	15,004	47,293
2	Wah	1,07,510	3,07,404	14	Ghurshati	14,126	43,914
3	Islamabad	76,641	2,04,936	15	Hazro	12,969	40,987
4	Jhelum	70,157	1,53,702	16	Fateh Jang	10,662	38,425
5	Attock	29,172	1,22,961	17	Lilla	10,580	36,165
6	Chakwal	29,143	1,02,468	18	Pind Dadan Khan	10,253	34,156
7	Gujarkhan	24,127	87,829	19	Bhaun	8,178	32,358
8	Pindi Ghib	17,982	76,851	20	Kahuta	8,097	30,740
9	Talagang	17,395	68,312	21	Sohawa	5,354	27,945
10	Murree	17,083	61,480	22	Wah Cement Works	4,473	26,730
11	Hasanabdal	16,721	55,891	23	Khur	3,642	29,276
12	Dina	16,292	51,234	24	Mangla	2,306	25,617

1981							
1	Rawalpindi	7,94,843	7,94,843	12	Pindi Gheb	20,535	66,236
2	Islamabad	2,04,364	3,97,421	13	Khewra	19,083	61,141
3	Wah	1,22,335	2,64,947	14	Murree	15,928	56,774
4	Jhelum	1,06,462	1,98,710	15	Hazro	14,307	52,989
5	Chakwal	43,670	1,58,968	16	Fatehjang	13,505	49,677
6	Attock	39,986	1,32,473	17	Pind Dadan Khan	12,639	46,755
7	Taxila	38,374	1,13,549	18	Kahuta	9,455	44,157
8	Gujarkhan	33,920	99,355	19	Sanjwal	6,275	41,833
9	Hasanabdal	27,132	88,315	20	Mangla	6,063	39,742
10	Dina	23,670	79,484	21	Kamra	5,858	37,849
11	Talagang	20,885	72,258	22	Khaur	3,803	36,129
1998							
1	Rawalpindi	1,4,09,768	1,4,09,768	14	Khewra	27,826	1,00,697
2	Islamabad	5,29,180	7,04,884	15	Hazro	27,826	93,984
3	Wah	1,98,891	4,69,922	16	Fateh Jang	25,986	88,110
4	Jhelum	1,47,392	3,52,442	17	Murree	21,375	82,927
5	Chakwal	80,508	2,81,953	18	Kahuta	19,207	78,320
6	Taxila	71,882	2,01,395	19	Pind Dadan Khan	18,766	74,198
7	Attock	69,729	2,34,961	20	Jand	17,284	70,488
8	Gujarkhan	57,099	1,76,221	21	Ghurgushti	14,730	67,131
9	Kamra	39,005	1,56,640	22	Mangla	13,848	64,080
10	Dina	38,790	1,40,976	23	Choa Saidan Shah	13,418	67,131
11	Hasanabdal	37,976	1,28,160	24	Sohawa	12,708	61,294
12	Talagang	37,766	1,17,480	25	Daultala	10,051	56,390
13	Pindi Gheb	29,850	1,08,443	26	Sanjwal	9,106	54,221

Source:-

G.O.P.1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhulem and Rawalpindi table 39 & 40 Population Census Organisation, Islamabad.

7.3.2 PRIMACY RATIO OF RAWALPINDI CITY

Rawalpindi city with a population of 2,36,877 in 1951, 3,40,175 in 1961, 6,14,809 in 1972, 7,94,843 in 1981 and 1,4,09,768 in 1998 was the primate city of Potohar in these years. Its magnitude of primacy is calculated by the Primacy Ratio, which is obtained by dividing the population of primate city with the population of the urban settlement next to its population size. This is called as two city primacy index. Mathematically it is expressed as:-

$$P1 : \frac{P^1}{P^2}$$

Where 'PI' is the two city primacy index, 'P^1' is the population of the urban settlement next to the primate city in population size (Qazi Saeed Ahmed, 1977).

In 1951 and 1961 Jhelum city with the population of 38,567 and 52,585 persons respectively was the urban settlement next to Wah and in 1972 its place was taken by Wah city with the population of 1,07,510, and in 1981, 1,22,335 and 1,98,891 in 1998 its place was taken by Islamabad city with the population 76,641 , 2,04,364 and 5,29,180 respectively.

The two city primacy index for Rawalpindi city given in table-7.13, reveals that the city had shown high primacy with respect to the cities next to it. It has decreased in 1998 Census.

Table-7.13. Primacy of Rawalpindi city, 1951-1998

Year	Primacy Ratio
1951	6.1
1961	6.5
1972	5.7
1981	3.9
1998	2.7

Source:-
G.O.P.1951-98 Administrative Units tables 1 & 4, Population Census Organisation, Islamabad.

There are two important points related to the high primacy of Rawalpindi city. They are as follows: -

a) The low number of urban settlement in Rawalpindi districts, as pointed earlier, are due to high primacy of Rawalpindi city. It is attracting the population of the district towards itself, as well as population throughout the country as well.

b) If this primacy of Rawalpindi city is allowed to increase in future, (the phenomenon that has happened up to now) it will continue to attract the population of the district towards it will little chance for the new urban settlement, for development to urban status except for those having locational advantages.

7.3.3 RELATION OF RANK SIZE AND CENTRALITY VALUE OF URBAN SETTLEMENT OF POTOHAR

(Walter Christaller, 1933 transl C.Baskin, 1966) defined the centrality of an urban center as the ratio between all the services provided there for both its own residents and for visitors from its complementary region, and the services needed just for its own residents. Towns with high centrality, supply many services per resident, and those with low centrality few services per resident. Christaller found that the number of telephones offers a useful indicator of range of central goods available in a town.

Centrality value for the urban centres is calculated by the technique developed by (Walter Christaller, 1933). According to him, "if the status of town were a reflection of its dominance over the surrounding areas, then it could be argued that the degree of dominance could best be measured by some assessment of the strength of the area, town link,. However, it is more simple than the sophisticated and complex methods of calculating centrality based on establishment of facilities.

The formula used for calculating the centrality value Zz is as follow:-

Zz = Tz-Ez ..... (Tg/Eg)

Where Tz is the number of telephones in the central place, 'Eg' is the population of the central place, 'Tg' is the number of telephones in the Potohar region and 'Eg' is the population of the Potohar region. So Tg = Eg is the ratio of telephone to population in the study area, which multiplied by the population of the central place gives the expected total if the distribution of telephones was even. This subtracted from the total number of telephones in central place, gives a measures of centrality (Zz) which is the relative concentration of telephone in the central place. Centrality value is given in the Table-7.14 (Fig-7.12).

Table-7.14. Potohar: Centrality of Urban Settlement in 1998

Rank	Name of Urban Settlement	Population	Number of Telephones	Centrality Value
1	Rawalpindi	1,409,768	170,900	1056.75
2	Islamabad	529,180	92,668	372.34
3	Wah	198,891	5,926	164.59
4	Jhelum	147,392	19,965	108.69
5	Chakwal	80,508	8,090	61.77
6	Taxila	71,882	4,875	57.15
7	Attock	69,729	9,138	51.68
8	Gujarkhan	57,099	4,500	44.86
9	Kamera	39,005	3,931	29.91
10	Dina	38,790	3,640	29.98
11	Hasanabdal	37,976	2,110	30.59
12	Talagang	37,766	3,778	28.99
13	Pindi Gheb	29,850	1,400	24.26
14	Khewera	27,826	3,500	20.75
15	Hazro	27426	2,410	21.33
16	Fateh Jang	25,986	1,300	21.05
17	Murree	21,375	1,007	17.37
18	Kahuta	19,207	1,710	14.92
19	Pind Dadan Khan	18,766	1,820	14.45
20	Jand	17,284	910	13.96
21	Ghurgushti	14,730	1,310	11.44
22	Mangla	13,848	382	11.48
23	Choa Saidan Shah	13,418	910	10.66
24	Sohawa	12,708	910	10.06
25	Daultala	10,051	650	8.01
26	Sunjwal	9,106	1,560	6.43

Source:-

1.G.O.P.1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 2 Population Census Organisation, Islamabad.

2.G.O.P.2001 Pakistan Telecommunication Department Data Processing Branch HQ Islamabad.

In this methodology the physical presence of an instrument and not the number or directions of calls is considered. Large number of telephones in the central place indicates the incremental trade and service facilities in the urban area. (General Manager Data Processing Branch, 2001 PTCL).

7.3.3.1 RESULT

The calculated centrality value when ranked in the descending order matched the population ranking in the same sequence. This indicates that higher centrality is associated with high number of persons living in the urban settlement are given in table-7.14 (Fig-7.12). Highest centrality value was scored by Rawalpindi city with the highest numbers of persons (With Telephone Facility or Connection) living in it and lowest by Sanjwal Cantt; less centrality value having lowest number of people (Telephone) living in it.

However there is an exception in case of Chakwal and Taxila urban localities where high population scored less centrality value. Urban locality of Wah Cantt. with less population scored high centrality value. The population-centrality relationship is measured by co-efficient of co-relation[6]. The formula is as follow:

The co-efficient of co-relation is 1.0, which shows the positive relationship

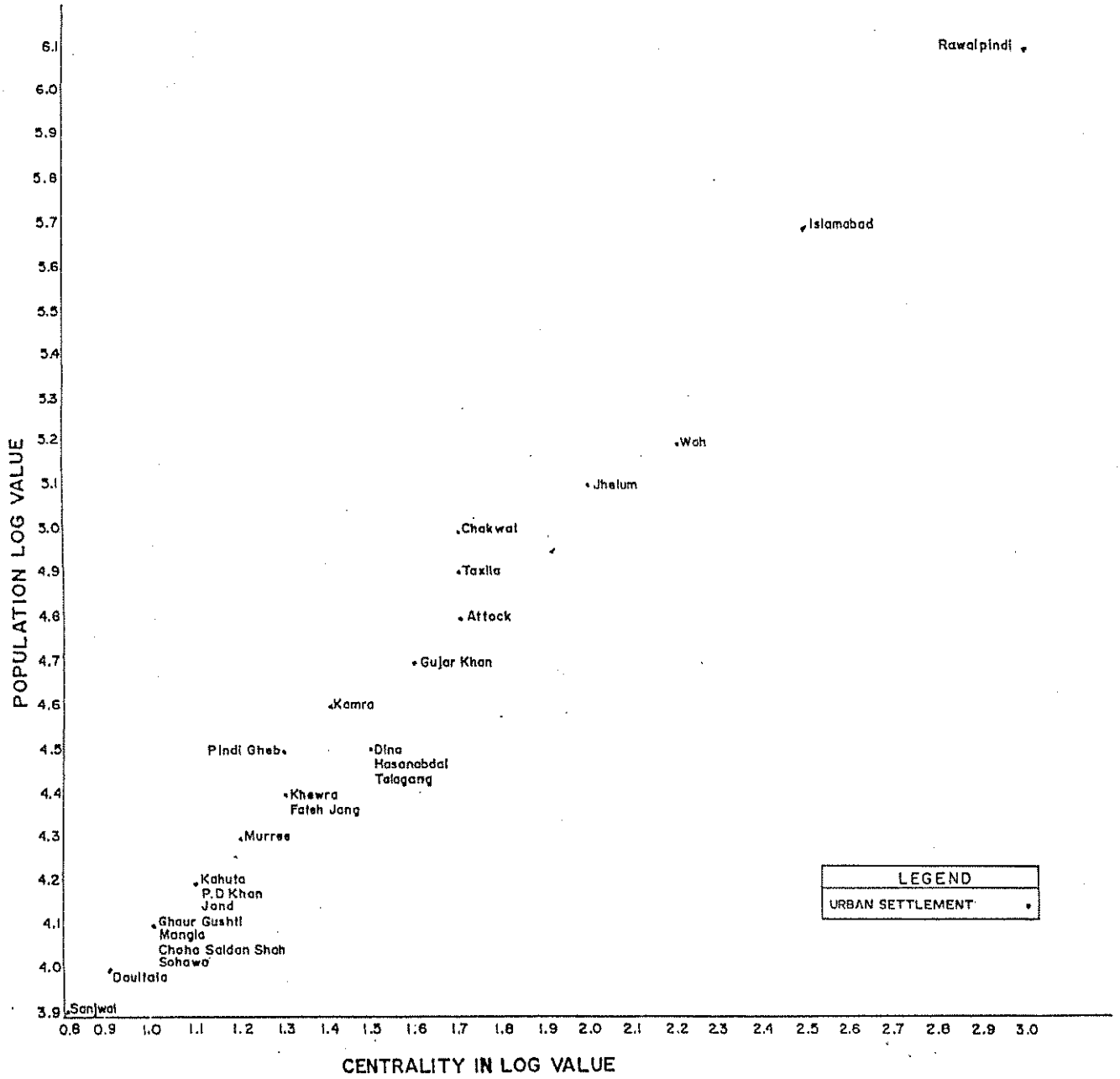
$$\Upsilon = \frac{(x-x \quad y-y)}{\sqrt{(x-x)(y-y)^2}}$$

between population size & the centrality of urban settlement (Appendix-7.5). The relationship is illustrated by the scatter diagrams shown on (Fig-7.13).

Foot note:-

6 For the calculation of co-efficient of co-relation population is taken as x and centrality value as Υ.

FIG 7.12. POTOHAR REGION: CENTRALITY RELATIONSHIP OF URBAN SETTLEMENT 1998



Source: GOP 1998, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

7.4 DISTRIBUTION OF URBAN SETTLEMENT IN POTOHAR

An attempt has been made in this section to study the distribution of urban settlement in the Potohar region.

7.4.1 NEAREST NEIGHBOURHOOD ANALYSIS

The technique adopted for the present analysis is based on the quantitative analysis used by (F.C Evans and P.J Clark Peter Haggett 1954). This technique is called as Nearest Neighbourhood Analysis, which indicates the degree which what might be expected distributed in a theoretical random manner within the same area. A random distribution. Points is defined as a set of points on a given area as for which any point that any sub area of specified size has had the same chance of receiving a point as any other sub area of that size, and that the placement of each point has not been influenced by that of any other point (R. Hamanond & P.S.Mc Cullangh, 1947).

The Potohar pattern of urban settlement is calculated for 1951, 1961, 1972, 1981 and 1998. All the settlement urban area by the population census organisation are included for calculating the pattern. For the year 1998 the pattern of urban settlement is also calculated district wise. This was not possible in previous years (Adjusted Population) because the number of urban settlement were small and a few in those census years in Potohar.

The spacing regularity in the Potohar region and the value (percent) concentration of urban settlement in each district is calculated for the year 1998, with the technique developed by (Jack. P.Gibbs and Harley L.Browning, 1970). The distance are measured in kilometers and area in square kilometers.

Following three types of calculations have been made for determining the pattern of urban settlement spacing regularity and concentration.

1. Calculation of rA, defined as the mean series of distance to nearest neighbor.
2. Calculation of rE, defined as the mean distance to nearest neighbour expected in an infinitely large random distribution.
3. Calculation of R, defined as the ratio of observed mean distance (rA) to the expected mean distance (rE).

7.4.1.1 CALCULATIN OF rA

Straight line measurements were taken between the urban centres and their respective nearest neighbours town. No consideration was given to population size of urban centres. In cases where the nearest neighbours of urban centre laid outside of the specified area, the distances to these neighbours were measured and included in computations. But no such towns (lying out side the specified area) were used as centres of measurement. In other words distances were not measured from such towns to the towns, lying in the specified area. In cases where two towns within the area were located close to one another, they were to any other town, the same distance was measured twice.

In this commutation, the following commutations were used:-

N : Number of urban centres.

r : Distance from the town to its nearest neighbours.

rA : Mean of series of distance to nearest neighbours.

Σ.r: Sum of all the distance measured, since N equals to the number of urban centres and r to the distance from each urban centre to its nearest neighbours, the mean observed distance may be calculated as follow :-

$$rA = \frac{\sum r}{N}$$

7.4.1.2 CALCULATION OF rE

rE or the mean distance to nearest neighbour expected in an infinitely large random distribution of density is calculated by the following formula:-

$$rE \frac{1}{2\sqrt{P}}$$

Where P is the nearest neighbour analysis density of urban centres per unit area. 'P' is calculated by dividing the number of urban centres by the total area of the Potohar region or the districts as the case may be.

7.4.1.3 CALCULATION OF R

'R' the ratio of mean observed distance to expected the following formula:

$$R = \frac{rA}{rE}$$

This ratio gives the measure of the degree to which the observed distribution approach from random expectations with respect to the distance to the nearest neighbour.

In random distribution R=1, under the condition of maximum aggregation R = o and in state of uniform distribution R = 2.1491. The value of R, equal to Zero is based on the logic that all the individuals and distance to nearest neighbour is zero. For maximum spacing, the urban settlement will be distributed in an even and every, urban centre (except those at the periphery) will be equal distance from six other individuals. In such a distribution, mean distance to nearest

neighbour will be maximized and will have value $\frac{1.0746}{\sqrt{P}}$ Then this is the case R = 2.1491.

As R has limited range with values showing randomness, uniformity and aggregation, this measure can therefore be rapidly, interpreted in simple terms and is also useful practically because it can be computed easily (P.J. clark and F.C evans, 1954).

7.4.1.4 TEST OF SIGNIFICANCE

It is necessary here that the reliability of the methodology should be ascertained. If the

calculated value of R indicates that the given urban centres are randomly distributed or not

distributed, the significance of the departure of rA from rE is tested by normal curve.

The formula used in this test of significance is:

$$C = \frac{rA - rE}{Or^{E}}$$

Where 'C' is the standard variate of the normal curve and Or^E is the standard error of mean distance of nearest neighbour in randomly distributed urban centres. The value of Or^E of the density of urban centres 'P' is $\frac{.26136}{\sqrt{NP}}$. Where N is the number of urban centres. The 'C' values 1.96 and 2.58 represents, 5 percent and 10 percent significance respectively (P.J clark and F.C Evans, 1954).

7.4.2. METHODOLOGYH FOR DETERMINING SPACING REULARITY

Another feature of spatial distribution of urban centres in the study area is the regularity in the distance between the urban centres and nearest neighbour. If the regularity exists, the distance separating each urban centres from its nearest neighbour would be close to the mean distance for all of the urban centres in the Potohar region. Accordingly, the average deviation of urban settlement from regional mean provides an indication of regularity in the distance separating urban settlement and their nearest neighbour.

The procedure for its calculation is as follows:-

1. Determine the distance between each urban centre and its nearest neighbour (The procedure is the same as for the calculation or rA except that the nearest neighbour lying outside the specified area were not taken). Calculate the mean distance.
2. Determine the deviation between each urban centres and the regional mean.
3. Total the difference between the each urban centre and the regional mean and divide this total by number of urban settlement. The resulting quotient indicates the average deviation of the distance of urban centres from regional mean values.

7.4.3 METHODLOGY FOR DETERMING DEGREE OF CENTRATION

Urban centres are some time concentrated in other region and some times they are dispersed. The problem therefore is how to express their distribution in quantative terms. The

problem can be solved in the following manner:-

i) Determine the approximate distance (Hd) between the urban centres by the following formula

$$Hd = \frac{1}{2}\sqrt{\frac{A}{N}}$$

Source:- P.J Clark and F.C Evans 1954,"Distance to Nearest Neighbour as a Measure of Spatial Relationship in Population" Ecology 35, p. 488.

Where 'A' is the Area and 'N' is the number of urban settlement.

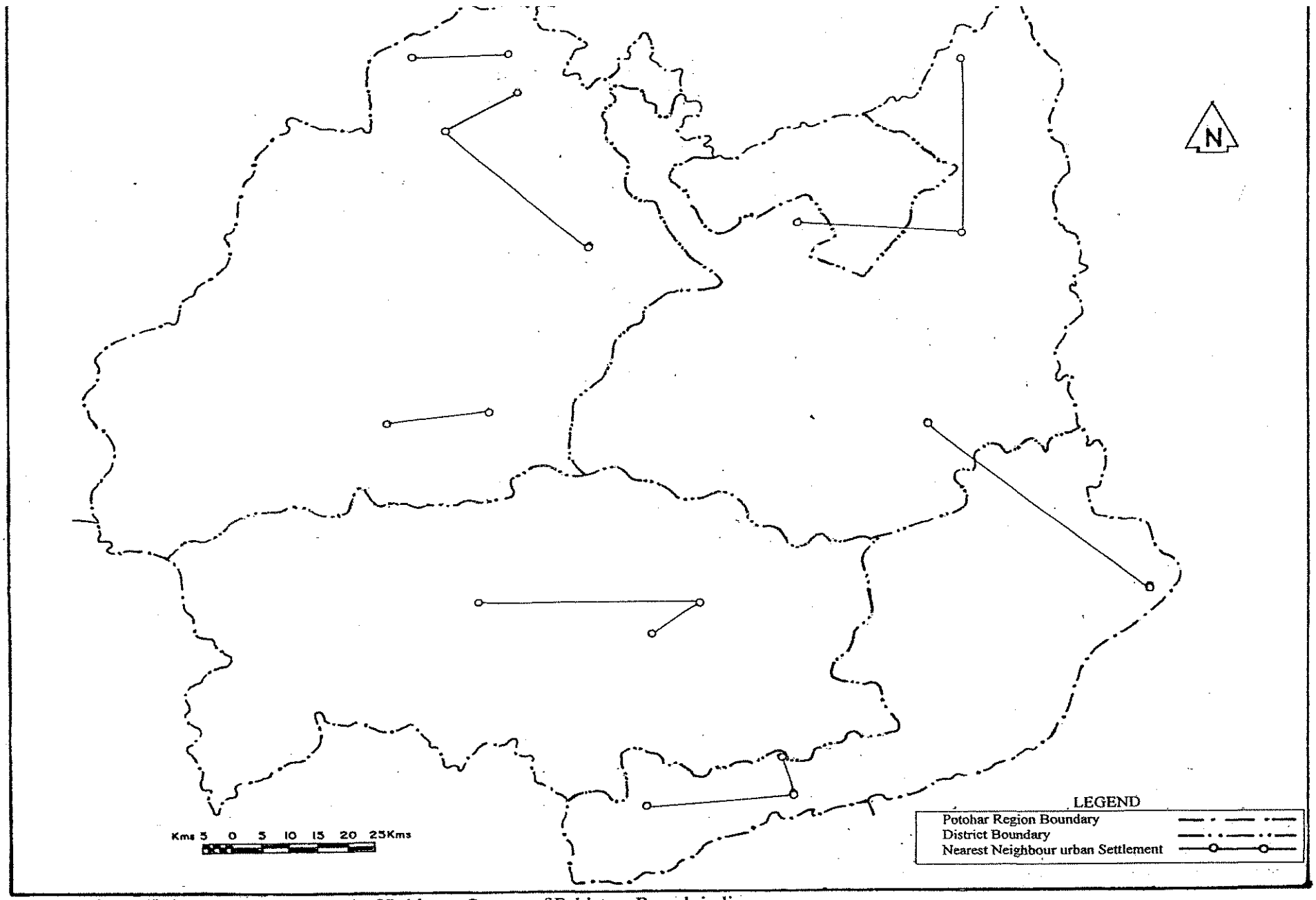
ii) Measure the actual distance as was done for the calculation of rA (Appendix-7.3).

iii) Calculate the percent deviation of actual values from the hypothetical distance. If the actual values equalized the hypothetical value, then there would be no concentration. (P.J Clark and F.C Evans, 1954). In other words values giving hundred percent indicates maximum dispersion and value 0.00 percent would indicate minimum dispersion are given in the Table-7.15 & 7.16, seen on (Map-7.2, 7.2.1-7.2.4).

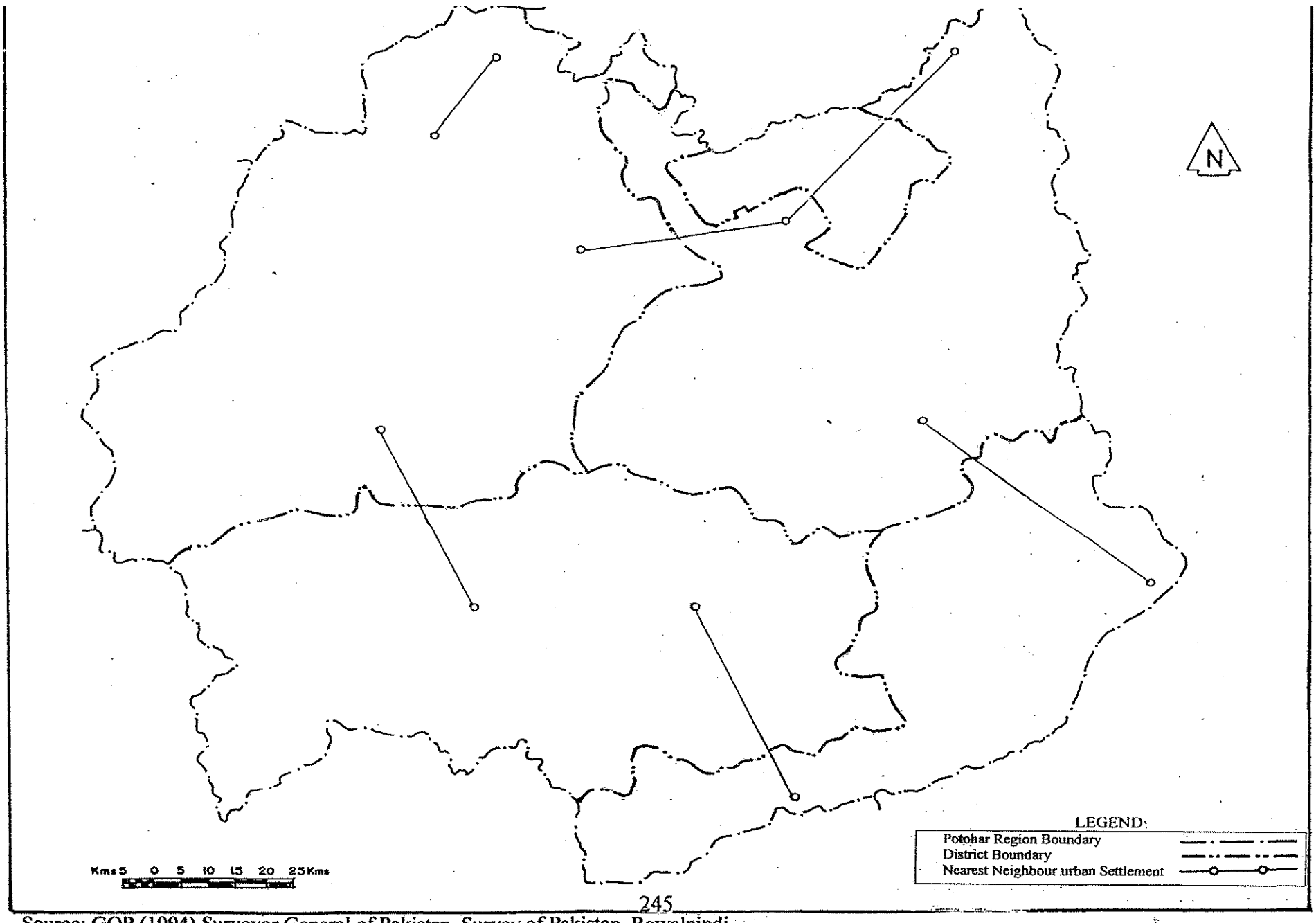
Table-7.15. Potohar Region: Nearest neighbour analysis for the spatial distribution of urban settlement in 1951-98

Abbreviation	Years				
	1951	1961	1972	1981	1998
N	14	21	24	22	26
A	23,160	23,160	23,160	23,160	23,160
Potohar Region	0.0006044	0.0009067	0.0010362	0.00094991	0.0011226
rA	20.5714	17.0476	11.5833	12.6818	12.1153
2 Potohar Region	0.0491727	0.0602240	0.643822	0.0616413	0.0670111
rE	20.3364	16.3583	15.5322	16.2287	14.9228
R	1.0118	1.0421	0.7457	0.7813	0.8254
Nature of Distribution	Completely Random	Completely Random	Random	Random	Random
NP	0.0919	0.1379	0.1577	0.1445	0.1708
rA-rE	0.233	0.688	-3.948	-3.548	-2.807
CrE	2.84	1.89	1.65	1.80	1.52
C	0.08	0.36	-2.39	-1.96	-1.84

Source:-
G.O.P.1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 1 & 2 Population Census Organisation, Islamabad.

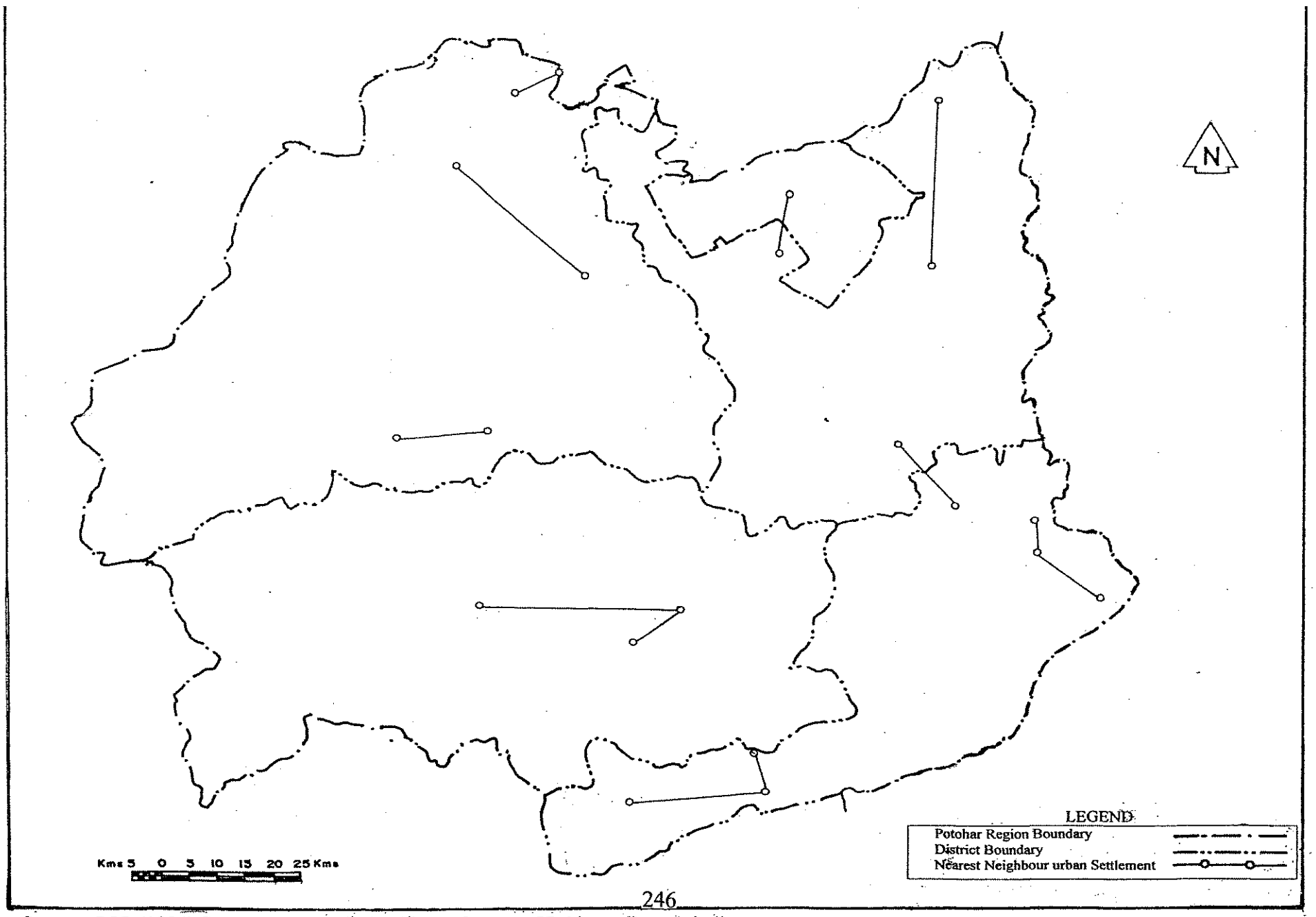


Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.



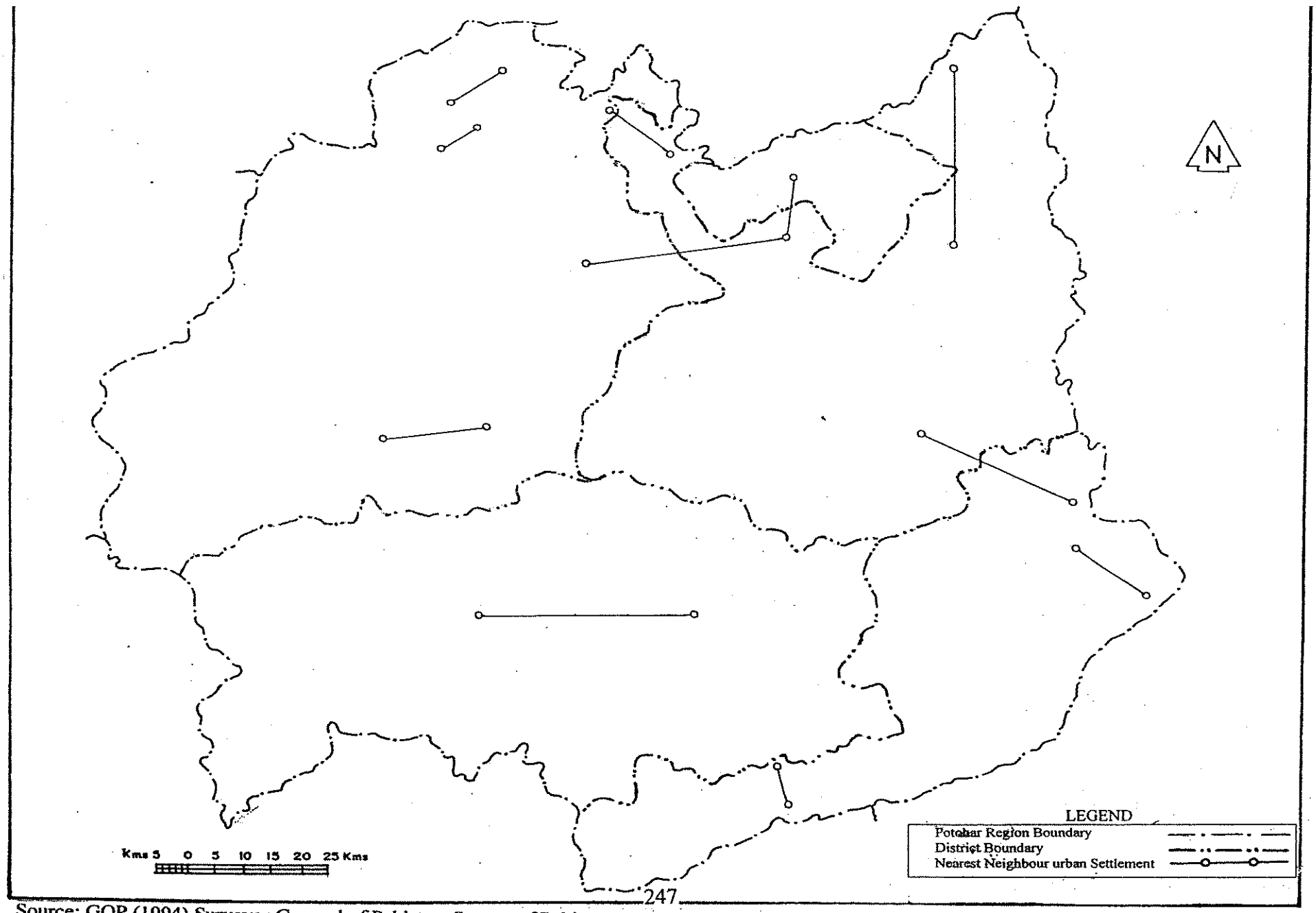
Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

NEAREST NEIGHBOUR URBAN SETTLEMENT (1961)



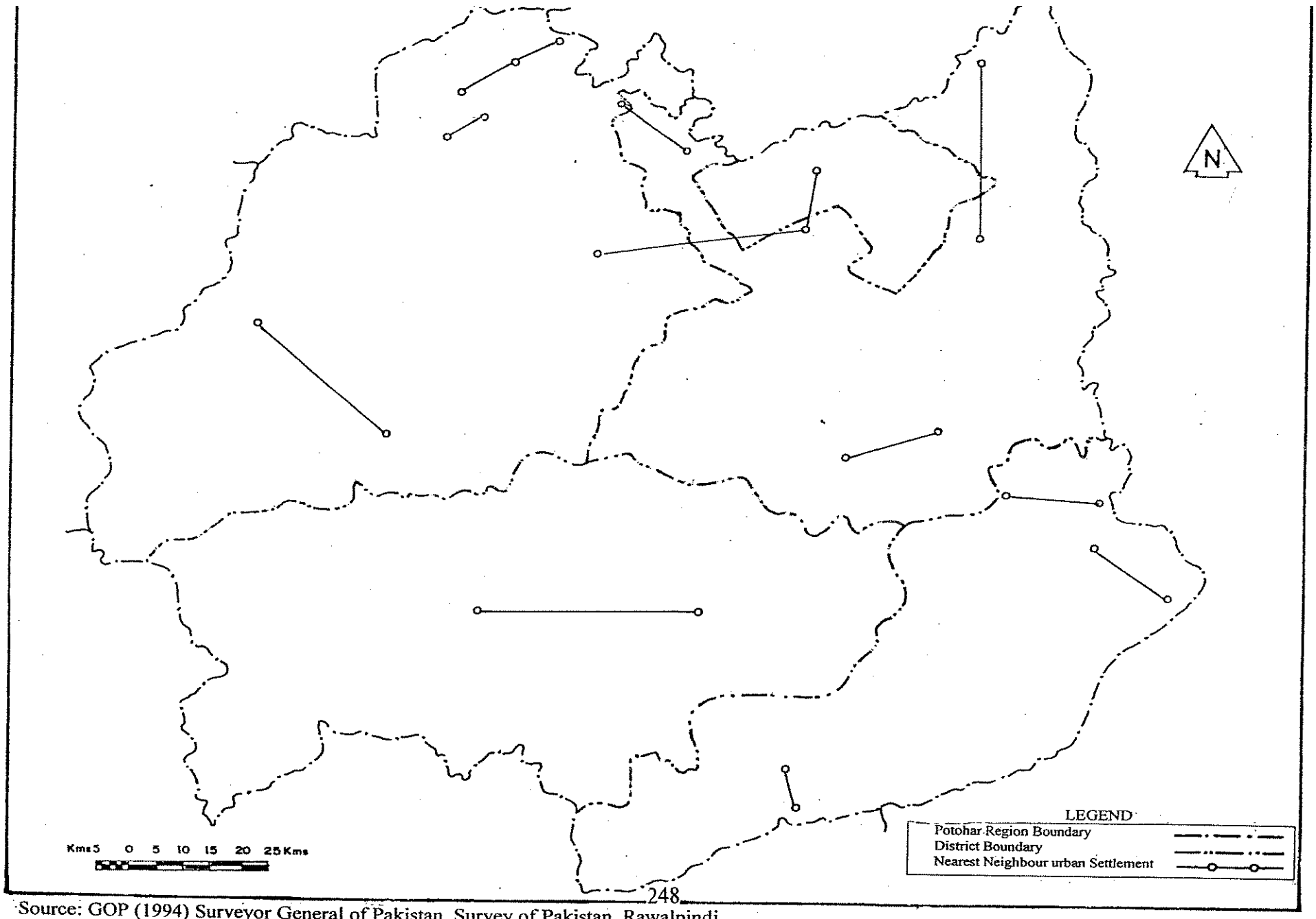
Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

NEAREST NEIGHBOUR URBAN SETTLEMENT (1972)



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

NEAREST NEIGHBOUR URBAN SETTLEMENT (1981)



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

NEAREST NEIGHBOUR URBAN SETTLEMENT (1998)

7.4.3.1 RESULT AND DISCUSSION

The result of Table-7.15, indicates that in, the pattern of urban settlement was approximately uniform. In that year, few urban settlement (14) in 1951 census and they appear to be regularly spaced. However, in 1951, 1961, 1972, 1981 and 1998 census the pattern was random. The calculated value of 'R' in 1951 it is 1.01, in 1961 it is 1.04, in 1972 it is 0.74, in 1981, 0.78 and in 1998 value is 0.82. From these data it is concluded that Walter Christallar's theory of central places which gives the uniform distribution of urban centres is not found valid in our Potohar region.

Table-7.16. Potohar Region: Spacing regularity of urban settlement in 1998

Sr. No.	Name of urban area	Average observed distance (Km)	Average Deviation of Urban Locality from Regional Means (Km)
1.	Rawalpindi	11.4	5.2
2.	Islamabad	11.4	5.2
3.	Wah	12.0	4.6
4.	Jhelum	16.0	0.6
5.	Chakwal	35.2	-18.6
6.	Attock	11.0	5.6
7.	Taxila	12.0	4.6
8.	Gujarkhan	15.2	1.4
9.	Kamara	11.0	5.6
10.	Dina	9.6	7.0
11.	Hasanabdal	4.6	12.0
12.	Talagang	37.6	-21.0
13.	Pindi Ghib	32.0	-15.4
14.	Khewara	9.2	7.4
15.	Hazro	10.2	6.4
16.	Fateh Jang	28.0	-11.4
17.	Murree	33.2	-16.6
18.	Kahuta	33.2	-16.6
19.	Pind Dadan Khan	8.0	8.6
20.	Jand	32.0	-15.4
21.	Ghurgushti	10.0	6.6

22.	Mangla	9.6	7.0
23.	Sohawa	9.6	7.0
24.	Choa-Sadian Shah	9.2	7.4
25.	Daultala	15.2	1.4
26.	Sanjwal	6.2	10.4
Average observed distance Sum		43.3	229.0
Average observed distance Mean		16.6	8.8

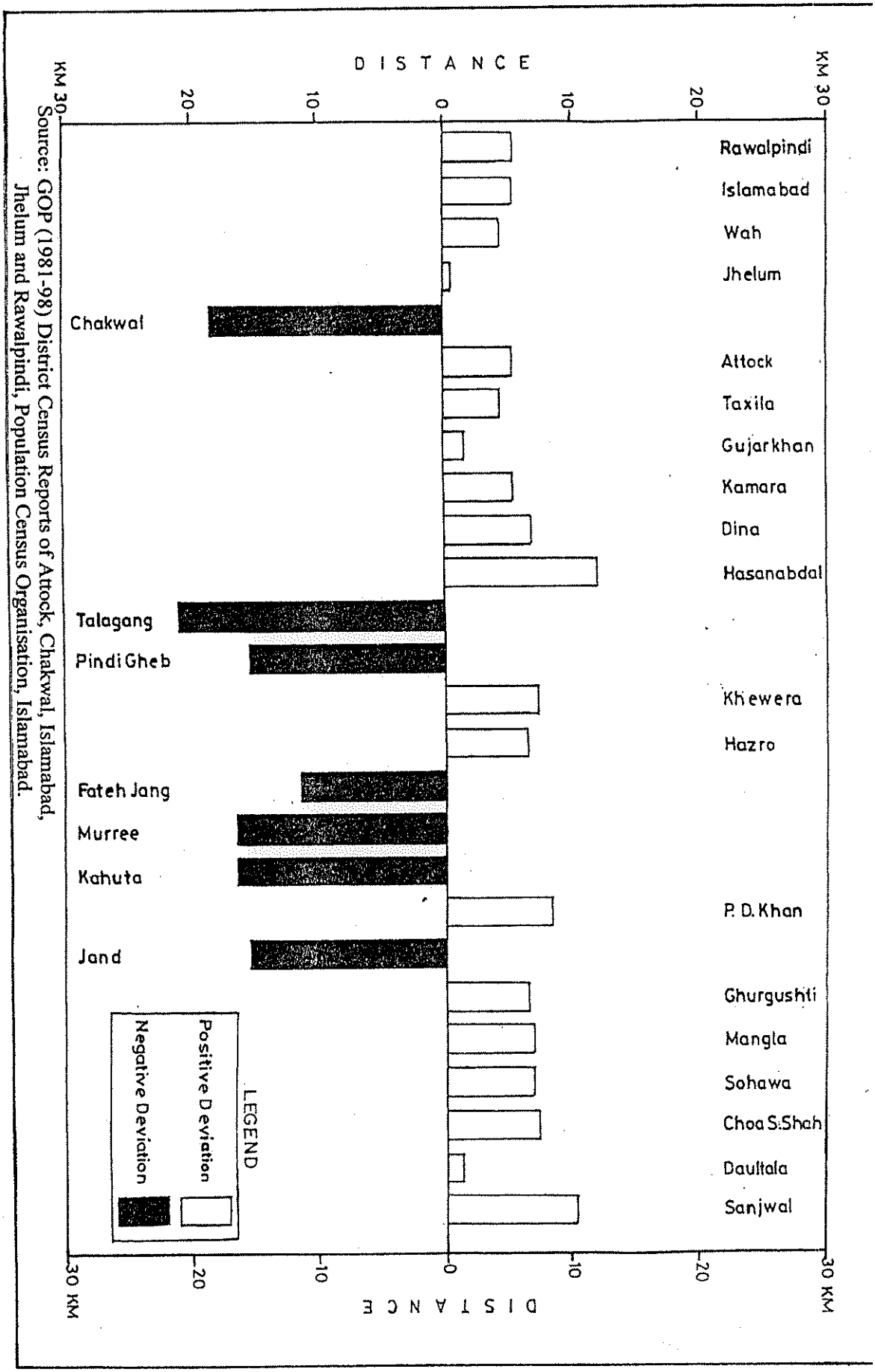
Source:-

G.O.P.,1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 2, Population Census Organisation, Islamabad.

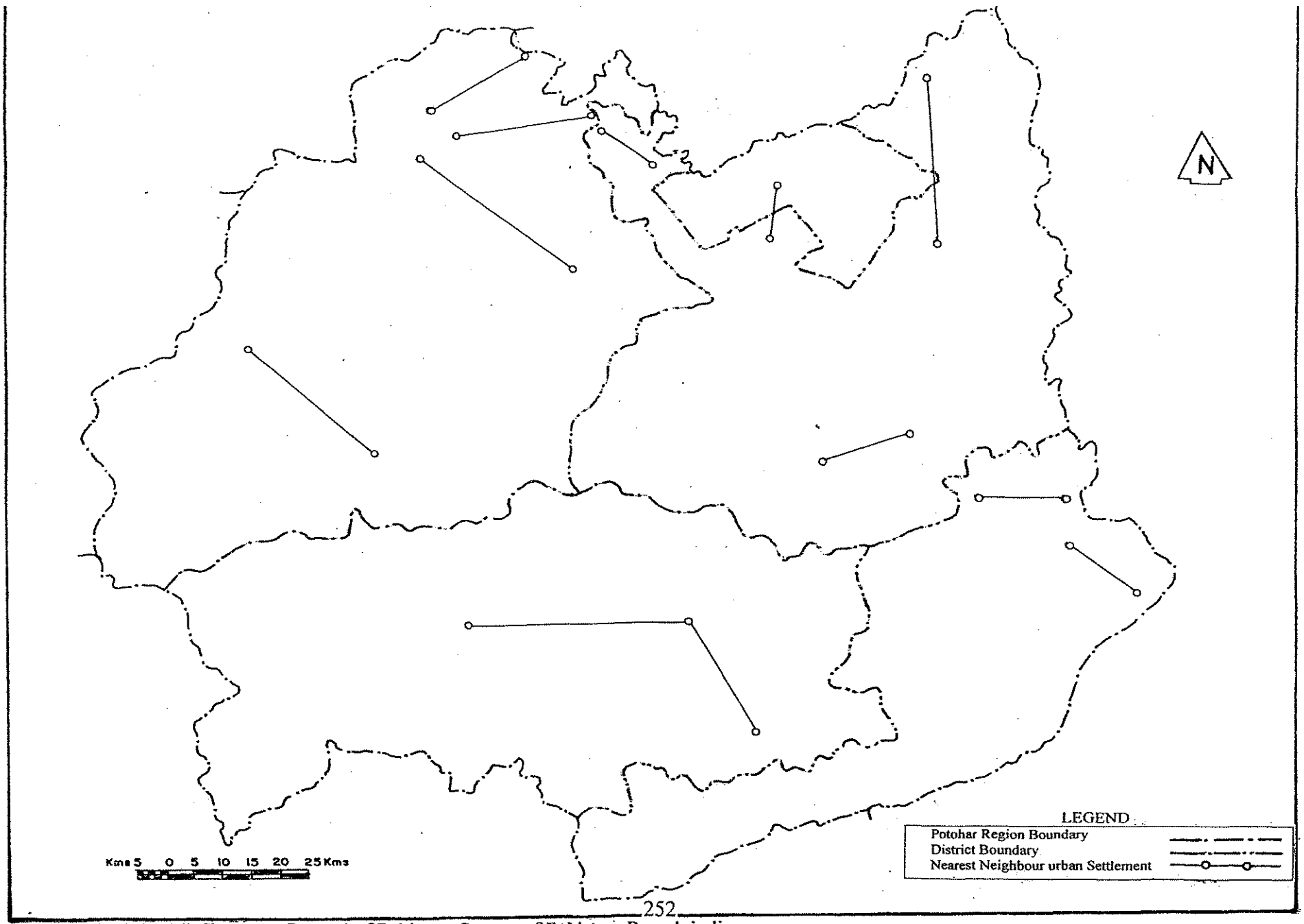
Table-7.16 gives the spacing regularity. It is illustrated in (Fig-7.13). The continuous line shows mean observed distance for the study area; mean deviation of the observed nearest neighbour distances of each urban settlement are shown by bars. The results reveal that there are prominent deviations of observed distances from the regional mean. This suggests that there is no spacing regularity of urban settlement in the region and that they are more close to randomness.

Table-7.16 shows the (average observed) distance deviation of each urban settlement from the regional mean, which is the last figure 8.8 in the same column. It is clear that they are close to the regional average deviation of urban settlement. However, there is an exception in case of Pind Dadan Khan, Choa Sadian Shah; Mangala, Khewara, Dina, Sohawa and Sanjwal. They have greater deviation from the regional average observed distance (structure). The main reason for such a deviation is that they are comparatively localised at far off distance from their neighbours and consequently their observed distances are also greater than the other urban settlement in the list.

Table-7.17 gives the nature of settlement distribution in various districts of Potohar in 1998. The result shows deviation from the regional distributional pattern i.e. instead of random, aggregated/concentrated shown on (Map-7.3).



Source: GOP (1981-98) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

MAP 7.3 POTOHAR REGION: DISTRIBUTION OF NEAREST NEIGHBOUR DISTRIBUTION OF URBAN SETTLEMENT BY DISTRICT (1981)

Table-7.17. Nearest neighbour analysis for the spatial distribution of urban settlement in districts of Potohar Region 1998

Abbreviation formula	Districts of Potohar Region			
	Rawalpindi + Islamabad	Attock	Jhelum	Chakwal
N	8	9	6	3
A	6,192	6,857	3,587	6,524
P	0.0012919	0.0013125	0.0016727	0.0004598
rA	10.00	12.66	6.5	22.66
2 / P	0.07188	0.072457	0.08179	0.04288
rE	13.91	13.80	12.22	23.32
R	0.718	-0.917	0.531	0.971
Nature of Distribution	Aggregated	Aggregated	Aggregated	Aggregated
NP	0.10166	0.10868	0.10018	0.0371400
rA-rE	-3.91	-1.14	-5.72	-0.66
CrE	2.57	2.40	2.60	7.03
C	-1.52	-0.475	-14.872	-4.639

Source:-
G.O.P.1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 2, Population Census Organisation, Islamabad.

Table-7.18, gives the percent aggregation for each district. In the Jhelum district, there is 23.94 percent concentration and is represents the highest concentration. For Chakwal district, it is 43.77 percent and it is the lowest concentration.

Table-7.18. Potohar Region: Concentration of urban settlement

By districts in 1998

Abbreviation	Name of Districts			
	Rawalpindi + Islamabad	Attock	Jhelum	Chakwal
N	8	6	3	9
A-(sq.km)	6,192	3,587	6,524	6,857
rA	10.00	6.5	22.66	12.66
Hd [7]	30.88	27.14	51.76	30.63
A/N	27.82	24.45	46.63	27.60
Actual mean distance [7] in Percent of Hd	32.38	23.94	43.77	41.33

Source:-

G.O.P.1951-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

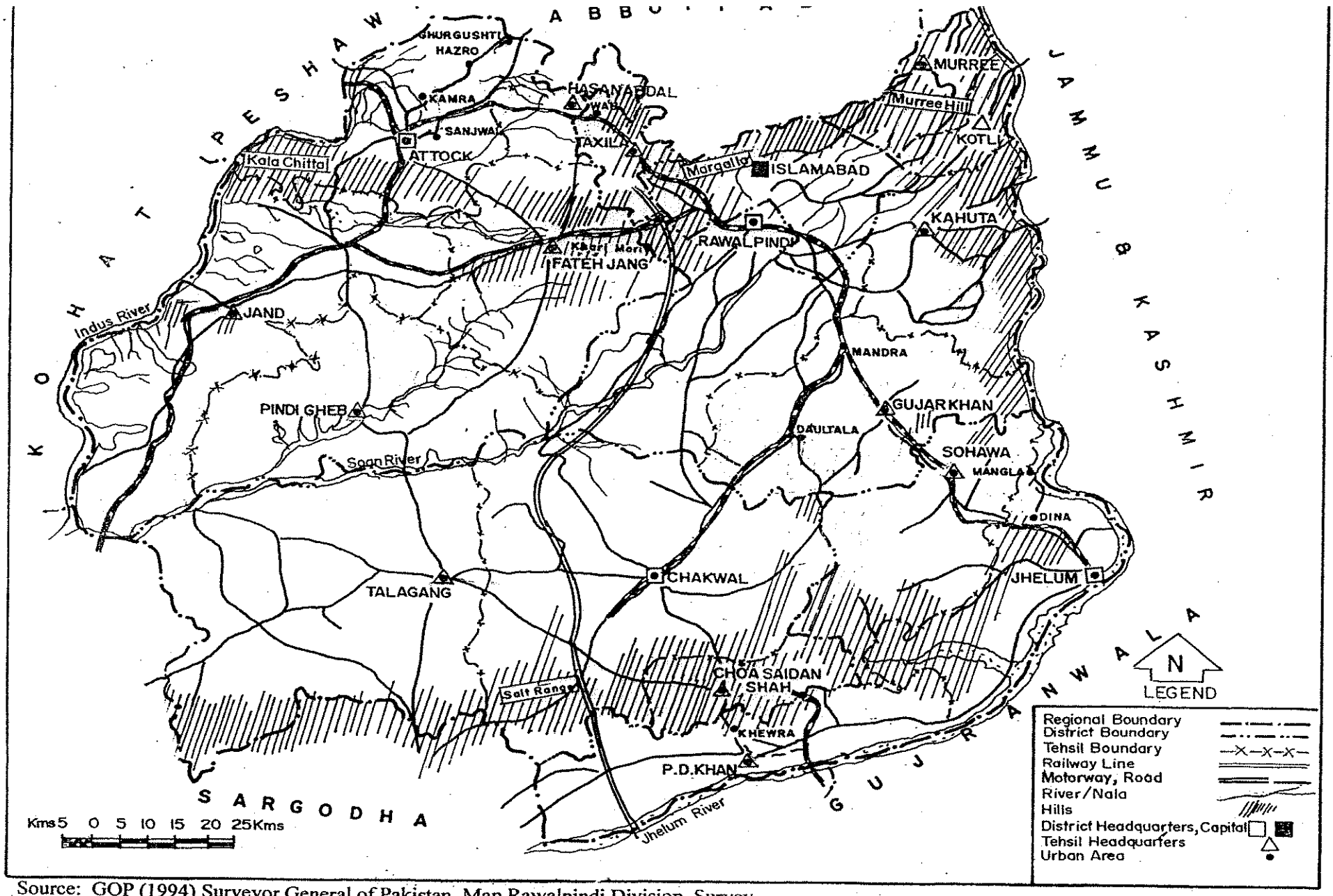
The urban settlement 1951-1998 reveals that the urban settlement are not aggregated at one place but they are dispersed in such a manner that two, three or more urban centres are close to each other. In Attock district Attock, Sanjwal and Kamara, Hazro, Gurgushti, Hasanabdal and in Rawalpindi, Wah are located quite close to each other. Moreover, in Chakwal and Jhelum districts, Choa Saidan Shah, Khewra and Pind Dadan Khan are closely located. Similarly, in Jhelum district Sohawa, Dina, Mangla and Jhelum make another such group.

There are various reasons for closer location. Firstly, the physiography has played an important role and indirect influence. The influence is quite visible in the layout of main national

highway/main mettled roads and main railway line, communication lines, along which are aligned most of the urban settlement shown on (Map-7.4) .

Foot note:-

[7] Actual mean distance in Percent of Hd rA/Hd x 100.



Source: GOP (1994) Surveyor General of Pakistan, Map Rawalpindi Division, Survey of Pakistan, Rawalpindi.

SETTLEMENT (1998)

Secondly, the concentration of urban settlement in the specified area seems to be determined by the availability of water resource. The water has not only provided the needs of the towns, but it has also given incentive to Barani agriculture of the area which is the back bone of the socio-economic base of considerable number of towns in Potohar region.

Thirdly, the urban settlement are mostly located in the hearts of the Barani agriculture area. The prosperous agriculture accompanied with easy access tended the urban centres to aggregate in suitable areas. Such areas are found located mostly in the Northern parts of the Potohar. Observations show that not only the conditions of sub-soil water are good, but they also receive more rainfall as compared to the southern area of the Punjab Province.

Fourthly in certain parts mineral deposits have played an important role in the closer location of settlement. This is significantly noticeable in Khewara, Pind Dadan Khan in Jhelum district, Khur, Pindi Gheb in Attock district, Chakwal, Choa Sadian Shah in Chakwal district, Baheer, Ratial, Adhi, Missa Kaswal, Jatli and Qazian in Gujarkhan tehsil in Rawalpindi district.

7.5 *SUMMARY/CONCLUSIONS*

During the last few decades, urban population has shown a rapid increase. The urban population of Potohar increased from 0.1 million in 1941 to 0.4 million in 1951 and to about 1.6 million in 1981 i.e. a fourfold increase. In 1998, 32.8 percent of the population of Potohar region was living in urban areas and of this, a significant proportion was residing in large cities.

The average growth rate of the four largest cities 3.23 Rawalpindi, 5.42 Islamabad, 2.73 Wah and Jhelum 1.82, in 1981-1998 census was as high as 8.78 (percent) in 1951-61 falling to 7.08 (percent) in 1961-72, and slightly recovering to 4.08 (percent) in 1972-81 and 4.42 (percent) in 1981-1998. In the later two decades, the urbanisation of other urban areas became substantially lower than the four large cities suggesting new growth foci. Islamabad experienced a spurt in its growth and became the fourth, largest city of the Potohar region. The high rate of growth of this city is likely to continue in future.

In the Potohar region 20 urban areas came up in a period of a hundred years. Still the proportion population of Potohar region, in class-1 cities (1,00,000 and above) has increased. However, there has been no-change in pattern of urban concentration with respect to city size i.e. the trend set-up after 1951 has continued and the four large cities occupy key positions.

Potohar had a low degree of urbanisation, as there were a few urban localities (Rawalpindi, Jhelum) in the 1881 census. The process of urbanisation increased with passage of time and the number of urban localities multiplied. The process changed the previous urban pattern and trend. Some of the conclusions drawn from then study in this respect are as follows:

The Potohar urban population in 1901 census was 9.6 percent, which increased to 32.8 percent in 1981, and 39.9 percent in 1998. The degree of urbanisation of Potohar remained lower than those of the Punjab until 1961 and then increased suddenly during the period 1961-98.

During all the twelve census years from 1881 to 1998, Rawalpindi district was the most urbanised area in the Potohar followed by Islamabad, Wah and Jhelum districts. Among the tehsil, Rawalpindi tehsil remained the most urbanised tehsil of

the region during all the census years. It was followed by Islamabad and Taxila tehsil. Kahuta tehsil was not urbanised at all until 1951. It became urbanised in 1961.

The per annum growth rate of urban population of Potohar 4.43 in 1951-61 and 3.57 during the period 1981-98 was slightly increase than that of the Punjab 3.19 and Pakistan 3.33. The growth rate of urban population of the districts of Potohar region was almost 1.7 to 5.4 percent per annum in 1981-98. The growth rate of Islamabad district (5.9 percent per annum) than those of Rawalpindi district (3.2 Percent per annum) and Jhelum district (1.9 percent per annum).

The population of Rawalpindi district was above 50 percent of the total urban population of the entire region. In 1881, there were only 8 urban centers in Potohar. Their number increased to 17 in 1951 and 31 in 1998 in Rawalpindi, Islamabad, Attock, Jhelum and Chakwal districts.

The distribution pattern of urban localities in Potohar according to rank size rule. Rawalpindi is the primate city, which has shown a disproportional rate of urban growth during the last five decades.

The distribution pattern in districts deviates from the regional pattern. Which shows that the urban localities in the districts are located some what close to each other.

The degree of urbanisation in Potohar increased from 33.2 percent in 1981 census to 39.9 percent in 1998 census. Among the various areas Federal Capital Islamabad experienced the highest degree of urbanisation 65.7 percent, followed by Rawalpindi 53.2 percent, Jhelum 27.7 percent, Attock 21.3 percent and Chakwal 12.2 percent.

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CHAPTER EIGHT

MIGRATION: ITS DIRECTION AND EXTENT

8.1 INTRODUCTION

Besides births and deaths – the major factors of change in population size, migration has also played an important role in demographic history of Potohar. Migration is of three types viz, i) from one district to another district in the region or same province, ii) from one province/region to another province region in the country and, iii) from one country to another i.e. immigration. Accordingly the present analysis of migration covers movements of people from one district to another district within the Potohar area as well as other districts of Pakistan.

8.1.1 MIGRATION

Unlike natural growth (births/deaths), which occurs slowly and takes considerable time to have an effect, migration can be very rapid in its consequences by transferring a large number of people from one area to another area in a short time. Population movement over time is historical phenomenon. The importance of migration in affecting the growth and decline of a population and in modifying the demographic characteristics of the area of origin and the area of destination has long been recognized (Shryock, Jacob S.Siegel 1975). The migration currents in their size, source, destination, are also affected by the economic and social conditions of the region. There is a mutual interrelationship among fertility, mortality, migration, population size, structure of population and the socio-economics and other factors such a politics and natural disasters in the region (KDavis 1951),(J.Coale and Paul, 1966), (S.Lee.E, 1966) (S.Gosal G, 1961), (Bouge and Zachariah, 1962) (GreenWood Michael, 1975).

Migration brings in its wake a number of changes in social, economic, political and characteristics of both positive and negative characteristics. The implications of migration caused/induced changes are far reaching and of interest to students of several disciplines, especially to those from the field of urban planning as migration associated phenomena/issues more visible as in urban localities. Therefore, migration situation in the study area is studied at length in the present chapter. The study is based primarily on census data.

Three major historical events have affected migration trend in Potohar region. First, the partition of the subcontinent and the emergence of Pakistan as an independent state in 1947 resulted in immigration of over 1,00,000 persons from India to Potohar region

(Population Census Organisation, 1961 and Nasreen Abbasi 1951-81). Pakistan has been receiving migrants from other parts of the India subcontinent (Karim and Robertson 1986). The second major socio-economic/political event was shifting of the capital of Pakistan from Karachi to Islamabad (Potohar region) in 1959. The third major political event was the Soviet invasion Afghanistan at the end of 1980, which caused more than 100 thousand Afghan refugees to flee from their homeland to take shelter in Potohar area (Population Census Organisation, Census of Afghan 2005). Although the Afghan have spread throughout Pakistan, a significantly large and visible number of them have settled in rural and urban areas in the Potohar region (East West population institute, 1982). It is not clear how long their stay will be here. The mass migration, related to these three events effect and their human settlement and population characteristics of the study area is however not the subject of this study it is mentioned only to serve as background for this research on migration in Potohar. Here the focus is primarily on voluntary, peacetime migration, both internal and international, and attempt is made to analyse some of its possible socio-economic and cultural consequences, which ultimately affect the population and human settlement characteristics (East West population institute, 1982). The analysis is based on censuses of 1961, 1981 and 1998. Other secondary sources, including government publications and earlier research works, are also used.

8.1.2 MIGRATION PATTERN AND TREND IN 1961, 1981 and 1998

The 1961 census recorded net out migration of 1,20,952 persons from the Potohar region. The inflow as well as the out flow were numerically fairly large, 1,06,599 and 2,27,551 respectively, indicating that a large number of households and localities were exposed to push and pull factors which in its turn signifies significant socio-economic changes in the affected places and households are shown in (Appendix-8.1-8.3). The out flow current was stronger exceeding the inflow by as much as 1,20,952 persons Table-8.1.

Table-8.1: Potohar Migration Pattern (1961, 1981 and 1998)

Census	Potohar		Inter-censal Net migration
	In-migrants[1]	Out-migrants[1]	
1961	1,06,599	2,27,551	- 1,20,952
1981	5,22,231	5,44,827[2]	-22,596
1998	1,2,93,081	2,41,187	1,0,52,715

Source:-

1.G.O.P.1961 Census of Pakistan M/O Home and Kashmir affair Vol. 3, table 8, Karachi.
2.G.O.P.1981-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 17 & 19, Population Census Organisation, Islamabad.
3.G.O.P.1981-98 District Census Reports of NWFP, Punjab, Sindh and Balochistan table 19, Provinces of Pakistan Population Census Organisation, Islamabad.

The persons moving in and out of the study area during 1961-81 were much larger than recorded in 1961. While in-migration registered a five fold rise over the previous level (1961), out-migration increased only twofold but was still more than in-migration in absolute terms 22,596 persons and thus the pre-1961 trends was maintained, though the rate of population loss due to out migration declined. The 1981-98 period witnessed reversal of the migration trend. While the in-migration's figure in 1998 more than doubled over the 1981 level, the out flow figures were 44 percent of the previous level (1981) resulting in net inflow of 1,0,52,715 persons which more than off-set the entire outflow of the past few decades (Fig-8.1).

Foot note:-

[1] Person born in other Provinces/Regions but enumerated in Potohar. Every move is an out-migration with respect to the area of origin and in-migration with respect to the area of destination. Every migrant is an out-migrant with respect to the area of departure and an in-migration with respect to the area of arrival.

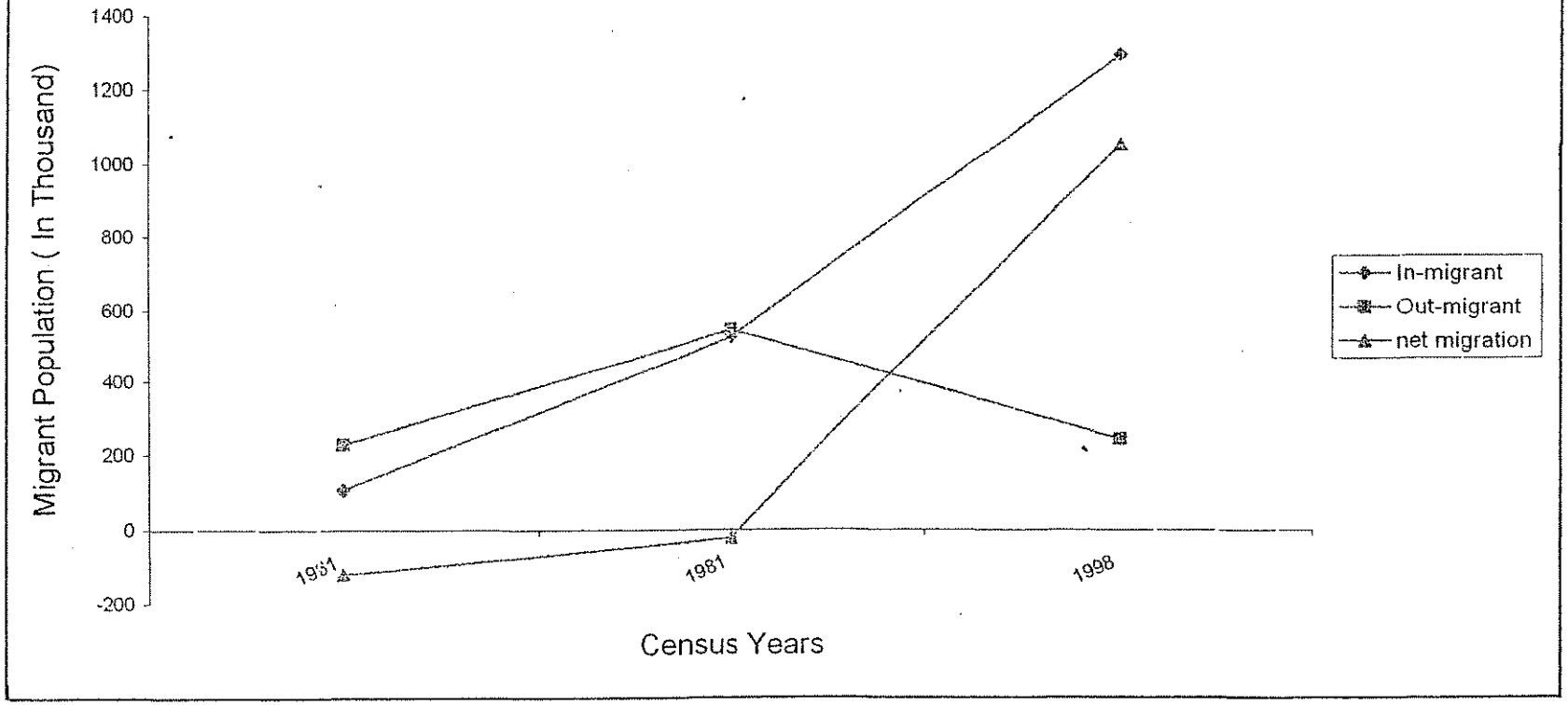
a) Persons born in Potohar but enumerated in other Provinces/Region. Out-migration person, who enters a migration-defining area by crossing it's a person, who enters immigration-defining area by crossing its boundary from some point out side the area but within the same region,/country. He or she is to be distinguished from an "immigrant" who is an international migrant entering the area from a place out side the country. An out migrant is a person, who departs from a migration – defining area by crossing its boundary to a point outside, it but within the same Region/Country. He or She is to be distinguished from an emigrant who is an international migrant departing to another country by crossing international boundaries.

b) Inter censual-migration is the difference between in-migration and out-migration, during the period between the censuses. Net migration is the difference between in-migration and out-migration. If in-migration exceeds out-migration, the net gain to the area is identified as net in-migration and indicated by appositive sign. In the opposite case, there has been out-migration, which in indicated by a negative sign with respect to a particular area, the total number of in-migration and out-migration is considered gross migration.

c) In-migration population internal provinces of Pakistan, AJK, Northern Areas not reported and other countries.

[2] Includes other continuous 71,944 population out-migrants in 1998.

FIG. 8.1 POTOHAR REGION: MIGRATION PATTERN 1961, 1981 & 1998



Source: GOP 1961,81 & 98, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

8.1.3 DESTINATION OF POTOHAR'S OUT-MIGRATION IN 1981 and 1998

The destinations of out migrants from Potohar are numerous. As will be seen in Table-8.2, migrants Potohar origin were recorded in 72 districts of Pakistan in 1981, while the corresponding figures were 112 for those recorded in 1998. In 1981 within N.W.F.P. Abbottabad districts was the single largest recipient of out-migrants of Potohar are shown in (Appendix-8.3 & 8.4), while the corresponding position was held by Lahore district in Punjab Province, Karachi in Sindh and Quetta in Balochistan Province Province-wise distribution of data is given in Table-8.2, Shown in (Fig-8.2).

Table-8.2. Distribution of Out-Migrants Potohar by Provinces in 1981 & 1998.

Sr. No.	Locality	Out-Migrants of Potohar [3] enumerated in			
		1981		1998	
		Population	percent	Population	percent
1	N.W.F.P.[4]	94,252	19.9	11,594	4.8
2	Punjab	2,27,727	48.1	1,45,222	60.2
3	Sindh	1,33,804	28.3	78,087	32.4
4	Balochistan	17,100	3.6	6,284	2.6
Total:-		4,72,883	100.0	2,41,187	100.0

Source:-

1.G.O.P.1981 tabulation plan computer tape (IN-OUT Migrant)[3] District Census Report Attock, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

2.G.O.P.1981 tabulation plan computer tape (IN-OUT Migrant)[3] N.W.F.P, Punjab, Sindh and Balochistan Provinces Population Census Organisation, Islamabad.

3.G.O.P.1998 Provincial Census Reports N.W.F.P, Punjab, Sindh and Balochistan table 19, Population Census Organisation, Islamabad.

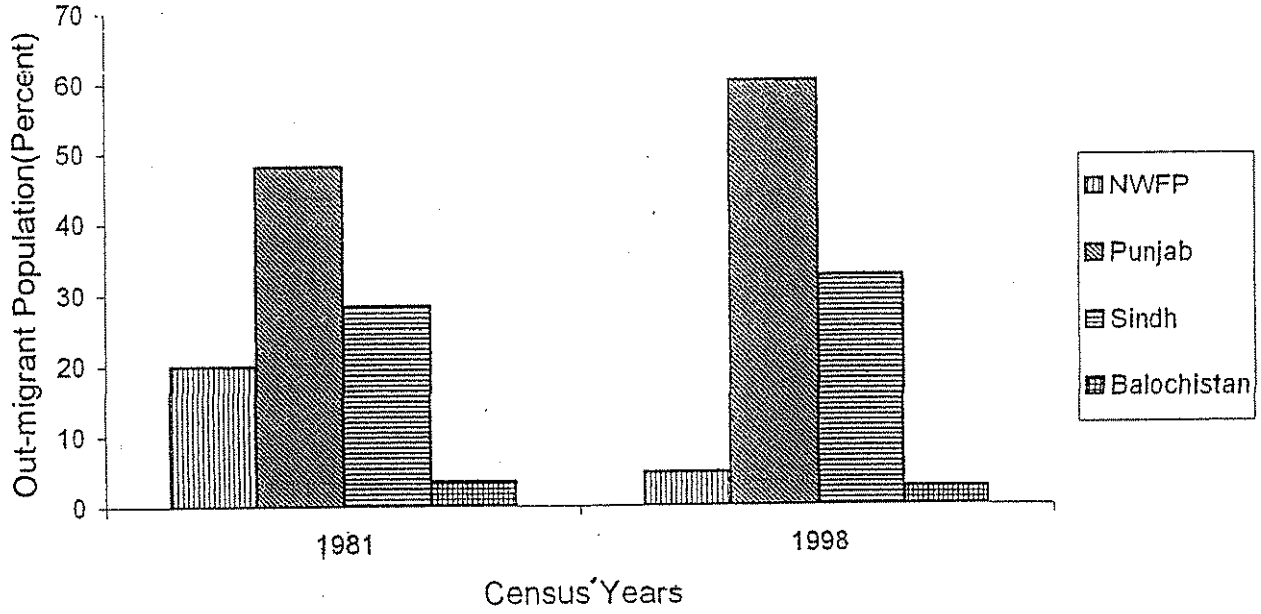
Foot note:-

[3] Five districts of Potohar out migration data are not available but sample count data workout from computer tape 1981 census Population Census Organisation, Islamabad.

[3] Islamabad District data is added in Rawalpindi district in 1961.

[4] FATA in-migrant data is added in N.W.F.P., province in 1981 & 1998 census.

FIG. 8.2 POTOHAR REGION: OUT-MIGRANTS BY PROVINCES 1981 & 1998



Source:

1. GOP 1981 & 98, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organization, Islamabad.
2. GOP 1998, Provincial Census Reports NWFP, Punjab, Sindh and Baiochistan Table-17 & 19, Population Census Organisation, Islamabad.

8.1.4 SPATIAL PATTERN OF INTERNAL MIGRATION

In 1998 the spread of out migrants from Potohar was much wider than 1981. The relative shares of different districts also registered a noticeable change in that census (1998) is given in Table-8.3 and Shown in (Fig-8.3). The relative share of leading Abbottabad, Peshawar and Kohat in the out migrants from Potohar registered a steep decline during 1981-98 the same case Karachi However, the percentage share districts of Gujranwala, Sargodha and Faisalabad decline during 1981 and 1998 are shown in (Appendix-8.4).

Table-8.3. Distribution of Potohar's Out-Migrants over selected districts in 1981 and 1998

Sr.No.	District/ Divisions[5]	Out-Migrants			
		1981		1998	
1.	Abbottabad	Population	%	Population	%
2.	Peshawar	34,793	7.4	7,079	2.9
3.	Kohat	29,286	6.2	8,390	3.5
4.	Sargodha	23,049	4.9	192	0.1
5.	Faisalabad	24,972	5.3	14,482	6.0
6.	Gujranwala	16,246	3.4	8,722	3.6
7.	Gujrat	19,081	4.0	19,021	7.9
8.	Sialkot	17,683	3.7	12,188	5.0
9.	Lahore	21,978	4.6	10,318	4.3
10.	Multan	51,712	10.9	33,196	13.8
11.	Muzaffagarh	19,163	4.1	994	0.4
12.	Dadu	14,934	3.2	408	0.2
13.	Hyderabad	5,729	1.2	4,332	1.8
14.	Karachi division[5]	8,270	1.7	10,761	4.4
15.	Quetta	1,04,559	22.1	32,524	13.5
16.	All other districts	6,668	1.4	1,609	0.7
Total	4,72,883	74,760	15.8	7,6971	31.9
			100	2,41,187	100

Source :-

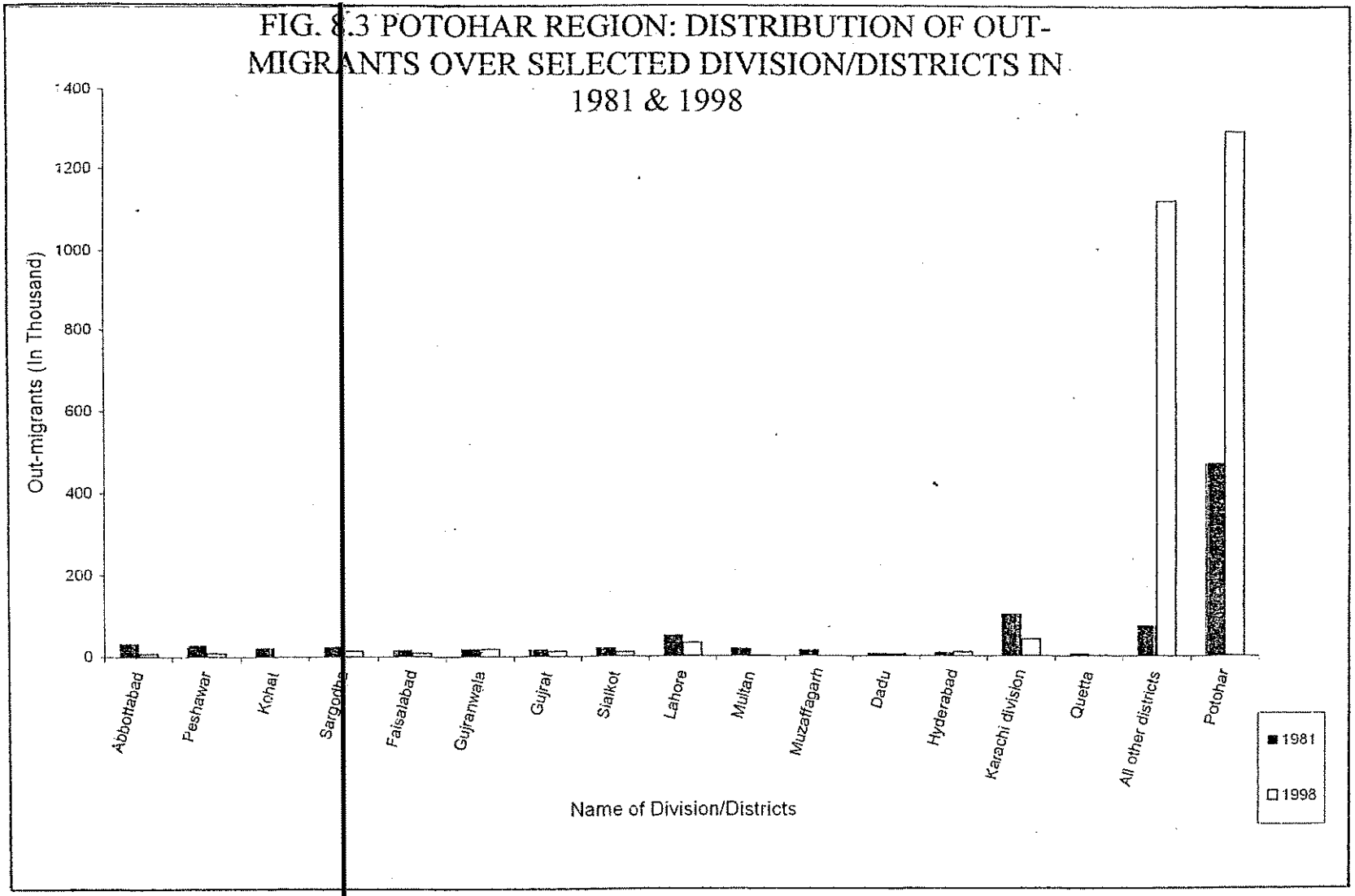
1.G.O.P.1981 tabulation plan computer tape NWFP, Punjab, Sindh and Balochistan Provinces Population Census Organisation, Islamabad.

2.G.O.P.1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 19, Population Census Organisation, Islamabad.

Foot note:-

[5] Karachi Division consist of 5 districts namely East district, West district, South district, central district, and malir district.

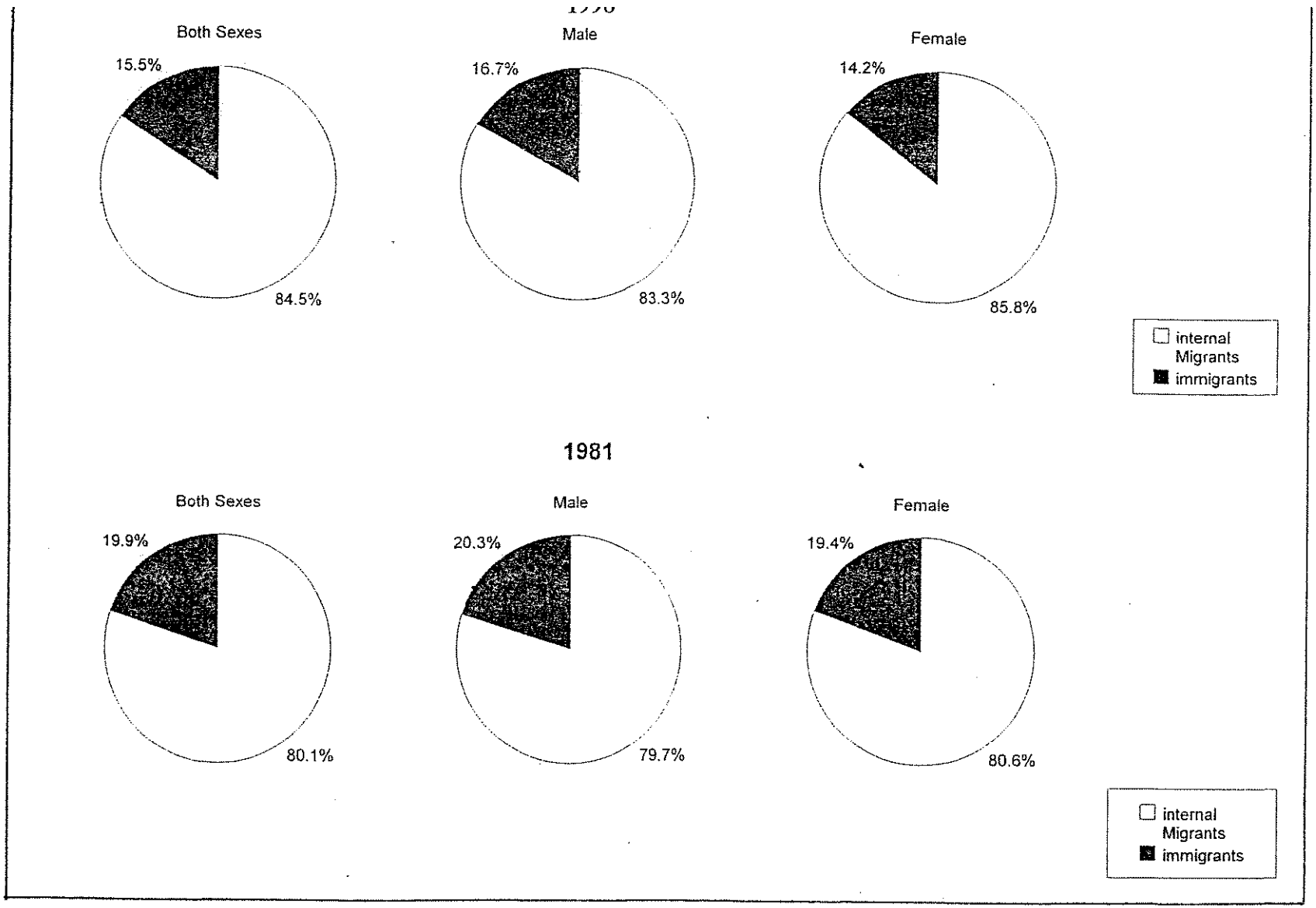
FIG. 8.3 POTOHAR REGION: DISTRIBUTION OF OUT-MIGRANTS OVER SELECTED DIVISION/DISTRICTS IN 1981 & 1998



Source: GOP 1981-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-17 & 19, Population Census Organisation, Islamabad.

8.1.5 DIRECTIONS OF INTERNAL MIGRATION AND IMMIGRATION

Rawalpindi district accounted for the largest number of migrants in the Potohar region, 59 percent in 1981 and 55 percent in 1998 are shown in (Appendix-8.1 & 8.2). Islamabad district's corresponding figures are 22 percent in 1981 and 31 percent for 1998. In the 1998 census, these two districts accounted for 86 percent of Potohar's total in-migration from within and outside the country. A host of factors explain this concentration. Immediately after the independence in 1947, Rawalpindi received a large influx of refugees from India. Later on, the shifting of capital from Karachi to Islamabad and the impetus to development activity that came in its wake and in the eighties the influx of Afghan refugees are the major factors that explain this pattern is given in Table-8.4, (Fig-8.4).



Source: GOP 1981-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-17, Population Census Organisation, Islamabad.

SEX 1981 & 1998

1998

8.2 SEX COMPOSITION OF MIGRANTS

The male/female ratios as recorded for the internal-migrants (within country) and immigrants (international immigrants) are much higher than the corresponding ratios for the total population taken in general. This is attributable to the fact that in the initial stages mostly the males migrate, their females follow after the males have settled down, and normally the settling down process takes quite a long period. Many in-migrants especially those from within the country and area in close proximity of migrant receiving places, may shift their whole family to their new abodes (Population Census Organisation, 1998).

The sex patterns of lifetime migrants at the district level are largely similar to the regional patterns. The sex ratio indicates the excess of males in two reference period of life migrants in all the districts. The highest sex ratio of immigrants (156) was shown by Islamabad district in 1981 and the lowest by (109) Attock district in 1981. While in 1998 the order changed and Chakwal male population and female population recorded a higher figure (340) than Rawalpindi male population 1,41,831 ans female population 1,05,284 (146) and Jhelum male population 25,192 and female population 20,223 (90). In the case of internal migrants, Attock district male population 3,266 and female population 35,313 (140) and Islamabad district male population and female population (128) recorded higher figure than Rawalpindi in 1981 (Population Census Organisation, 1981). The highest internal migrants Attock 140 recorded and followed Islamabad (128) Rawalpindi (111) in 1981 (Population Census Organisation, 1998). As will be seen in Table-8.4, Attock district's male/female ratio for in-migrants was 140 in 1998. The corresponding figure for Islamabad was 128, while Rawalpindi lagged behind with 111.

Table-8.4. Potohar: Internal Migration by Sex 1981 & 1998

Enumeration Districts	Internal Migrants[6]				Immigrants[7]				Total Migrants			
	1981	%age	1998	%age	1981	%age	1998	%age	1981	%age	1998	%age
Both Sexes												
Attock	23,236	5.6	82,558	7.5	8,008	7.7	6,368	3.2	31,244	6.0	88,926	6.9
Chakwal	-	-	27,141	2.5	-	-	2,575	1.3	-	-	29,716	2.3
Islamabad	1,02,473	24.5	3,50,237	32.1	10,671	10.3	47,494	23.6	1,13,144	21.7	3,97,731	30.7
Jhelum	45,415	10.9	50,810	4.6	24,527	23.6	15,094	7.5	69,942	13.4	65,904	5.1
Rawalpindi	2,47,115	59.0	5,81,554	53.2	60,786	58.4	1,29,250	64.4	3,07,901	58.9	7,10,804	55.0
Potohar	4,18,239	100.0	1,0,92,300	100.0	103,992	100.0	2,00,781	100.0	5,22,231	100.0	1,2,93,081	100.0
Male												
Attock	13,676	5.7	48,179	8.2	4,191	6.9	3,523	3.0	17,867	5.9	51,702	7.3
Chakwal	-	-	11,955	2.0	-	-	1,991	1.7	-	-	13,946	2.0
Islamabad	59,665	24.8	1,96,540	33.5	6,500	10.6	27,811	23.7	66,165	21.9	2,24,351	31.9
Jhelum	25,192	10.5	24,389	4.2	14,911	24.4	7,159	6.1	40,103	13.3	31,548	4.5
Rawalpindi	1,41,831	59.0	3,05,529	52.1	35,480	58.1	76,710	65.4	1,77,311	58.8	3,82,239	54.3
Potohar	2,40,364	100.0	5,86,592	100.0	61,082	100.0	1,17,194	100.0	3,01,446	100.0	7,03,786	100.0
Female												
Attock	9,560	5.4	34,379	6.8	3,817	8.9	2,845	3.4	13,377	6.1	37,224	6.3
Chakwal	-	-	15,186	3.0	-	-	584	0.7	-	-	15,770	2.7
Islamabad	42,808	24.0	1,53,697	30.4	4,171	9.7	19,683	23.5	46,979	21.3	1,73,380	29.4
Jhelum	20,223	11.4	26,421	5.2	9,616	22.4	7,935	9.5	29,839	13.5	34,356	5.8
Rawalpindi	1,05,284	59.2	2,76,025	54.6	25,306	59.0	52,540	62.8	1,30,590	59.1	3,28,565	55.7
Potohar	1,77,875	100.0	5,05,708	100.0	42,910	100.0	83,587	100.0	2,20,785	100.0	5,89,295	100.0

(Male per 100 Female)

Name of Districts	SEX RATIO											
Attock		143		140		109		124		134		139
Chakwal		-		79		-		340		-		88
Islamabad		139		128		156		141		141		129
Jhelum		124		92		155		90		134		92
Rawalpindi		135		111		140		146		136		116
Potohar		135		116		142		140		231		119

Source:-

1.G.O.P.1981 tabulation plan computer tape Provincial Census Reports N.W.F.P, Punjab, Sindh and Balochistan Population Census Organisation, Islamabad.

2.G.O.P.1981-98 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 17, Population Census Organisation, Islamabad.

3.G.O.P.1981 tabulation plan computer tape District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

Foot note:-

[6] Internal Migrants means within country.

[7] Immigrants means other country.

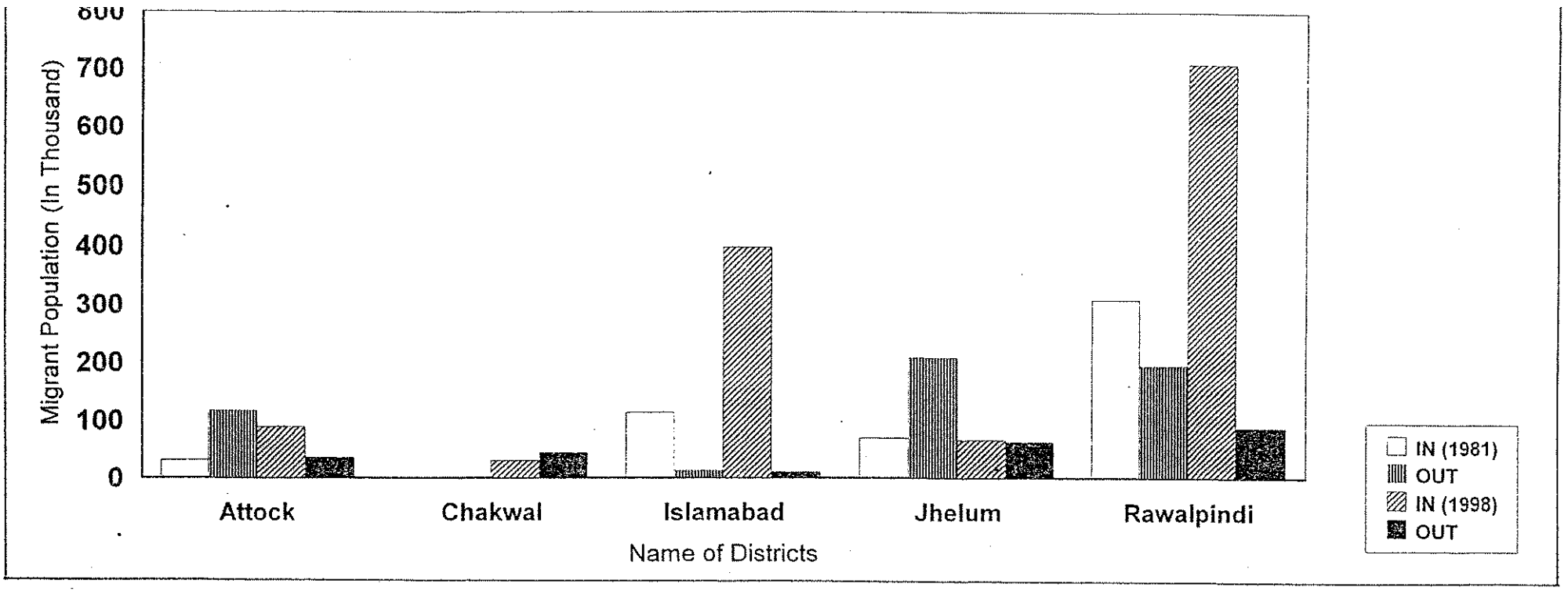
8.3 INTER-DISTRICT MIGRANTS: RELATIVE INCIDENCE AND RATE

Share in migration may be high or low compared to population size of a region. In order to set a comparative view of the districts. In-out migrants in relation to their total population table 8.5 provides an Index Relative Representation (IRR). The index contrats examining their share of inter – provincial /Regional in and out migrants. To complete the IRR, the percent share of migrants (in and out) is weighted by the population in each province/region (times100). The IRR of more than 100 implies that the relative share of in – out migration of the province/region is higher than its representation in the country/region population. On the other hand IRR lower than 100 reflects that the relative of in-out migration of the province/region is lower than its representation in the region/country population (Raja Muhammad Amin Khan, 1983).

8.3.1 INDEX OF RELATIVE REPRESENTATION

The Index of Relative Representation (IRR) of migrants (in and out) is weighted by the population of each district. The IRR of more than 100 implies that the relative share of in or out migration of the district is higher than its share in the respective districts population. The IRR of less than 100 implies the opposite are shown in (Appendix-8.1-8.4).

In 1981, Islamabad registered the highest IRR of in-migrants (305) while Attock held this position in respect of out migrants (129). Islamabad retained its lead in 1998 with IRR of 284 while Jhelum emerged the leader in respect of out-migrants with IRR of 208 in 1998 is given in Table-8.5 shown in (Fig-8.5).



Source: GOP 1981-98, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-17, 18 & 19, Population Census Organisation, Islamabad.

OUT MIGRANTS POPULATION IN 1981-98

Table-8.5: Potohar Region population size share of districts in life time In-Out Migrants in 1981 and 1998

Name of districts	Population 1981	Migrants 1981		Index of relative[9] Representation Migrants 1981		Population 1998	Migrants 1998		Index of relative[9] Representation Migrants 1998	
		In	Out	In	Out		In	Out	In	Out
Attock	8,76,667 18.4	31,244 6.0	1,29,430 23.7	32.6	- 128.8	1,2,74,935 17.1	88,926 6.9	36,038 15.0	40.3	87.7
Chakwal[8]	-	-	-	-	-	3,3,63,911 45.1	29,716 2.3	43,940 18.2	5.3	40.3
Islamabad	3,40,286 7.1	1,13,144 21.7	12,393 2.3	305.6	32.4	8,05,235 10.8	3,97,731 30.7	10,387 4.3	284.2	39.8
Jhelum[8]	1,4,34,612 30.1	69,942 13.4	2,08,658 38.3	44.5	127.2	9,36,957 12.5	65,904 5.1	62,674 26.0	40.8	208.0
Rawalpindi	2,1,21,450 44.4	3,07,901 58.9	1,94,346 35.7	132.6	80.4	1,0,83,725 14.5	7,10,804 55.0	88,119 36.5	379.3	251.7
Potohar	4,7,73,015 100.0	5,22,231 100.0	5,44,827 100.0			7,4,64,763 100.0	1,2,93,081 100.0	2,41,187 100.0	-	-

Source:-

1.G.O.P.1981 tabulation plan computer tape District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

2.G.O.P.1981 tabulation plan computer tape NWFP, Punjab, Sindh and Balochistan Provinces Population Census Organisation, Islamabad.

3.G.O.P.1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 17 & 19, Population Census Organisation, Islamabad.

4.G.O.P.1998 Provincial Census Reports NWFP, Punjab, Sindh and Balochistan table 17 & 19, Population Census Organisation, Islamabad.

8.4 DURATION OF CONTINUOUS RESIDENCE OF MIGRANTS BY DISTRICTS IN 1981 AND 1998

The data of duration of continuous residence at the place of enumeration provides additional support to the above analysis Table-8.6. Over half of the life time migrants in Potohar were living at the places of enumeration for more than ten years, As expected, in the two smaller districts most of migrants are of shorter duration, the reverse is true in respect of the two larger districts are shown in (Appendix-8.5).

Foot note:-

[8] Chakwal District created after 1981 census, however, In-out migrants data added in Jhelum districts in 1981.

[9] Index of Relative Representation Percent $\frac{\text{of in-out migrants}}{\text{Percent share of population}} \times 100$

When the duration of over ten years is excluded from the data, as in second panel of Table 8.6 the above inter-districts variation largely disappears (Fig-8.6). This confirms that (excluding long-duration-migrants, many of whom were immigrants) migration in the Potohar as a whole has been gaining momentum only in recent times.

Potohar as a whole has been gaining momentum only in recent times.

Table-8.6. Potohar: Distribution of life time migrants by duration at the place of enumerated by Total, Rural and Urban in 1998

Duration of Continuous Residence (in year)	Migrants in 1998					
	Attock	Chakwal	Islamabad	Jhelum	Rawalpindi	Potohar Region
Total:-	**88,926**	**29,716**	**3,97,731**	**65,904**	**7,10,804**	**1,2,93,081**
Maximum 5 years	51,162	14,408	1,40,178	20,296	2,69,533	4,95,577
Maximum 10 years	11,513	4,339	68,864	7,495	1,05,009	1,97,220
10 years and above	26,251	10,969	1,88,689	38,113	3,36,262	6,00,284
Rural:-	**30,029**	**21,124**	**85,091**	**18,924**	**75,262**	**2,30,430**
Maximum 5 years	19,076	11,280	34,400	4,867	21,966	91,589
Maximum 10 years	3,089	2,808	18,588	2,266	9,359	36,110
10 years and above	7,864	7,036	32,103	11,791	43,937	1,02,731
Urban:-	**58,897**	**8,592**	**3,12,640**	**46,980**	**6,35,542**	**1,6,62,651**
Maximum 5 years	32,086	3,128	1,05,778	15,429	2,47,567	4,03,988
Maximum 10 years	8,424	1,531	50,276	5,229	95,650	1,61,110
10 years and above	18,387	3,933	1,56,586	26,322	2,92,325	4,97,553

Source:-

G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 19, Population Census Organisation, Islamabad.

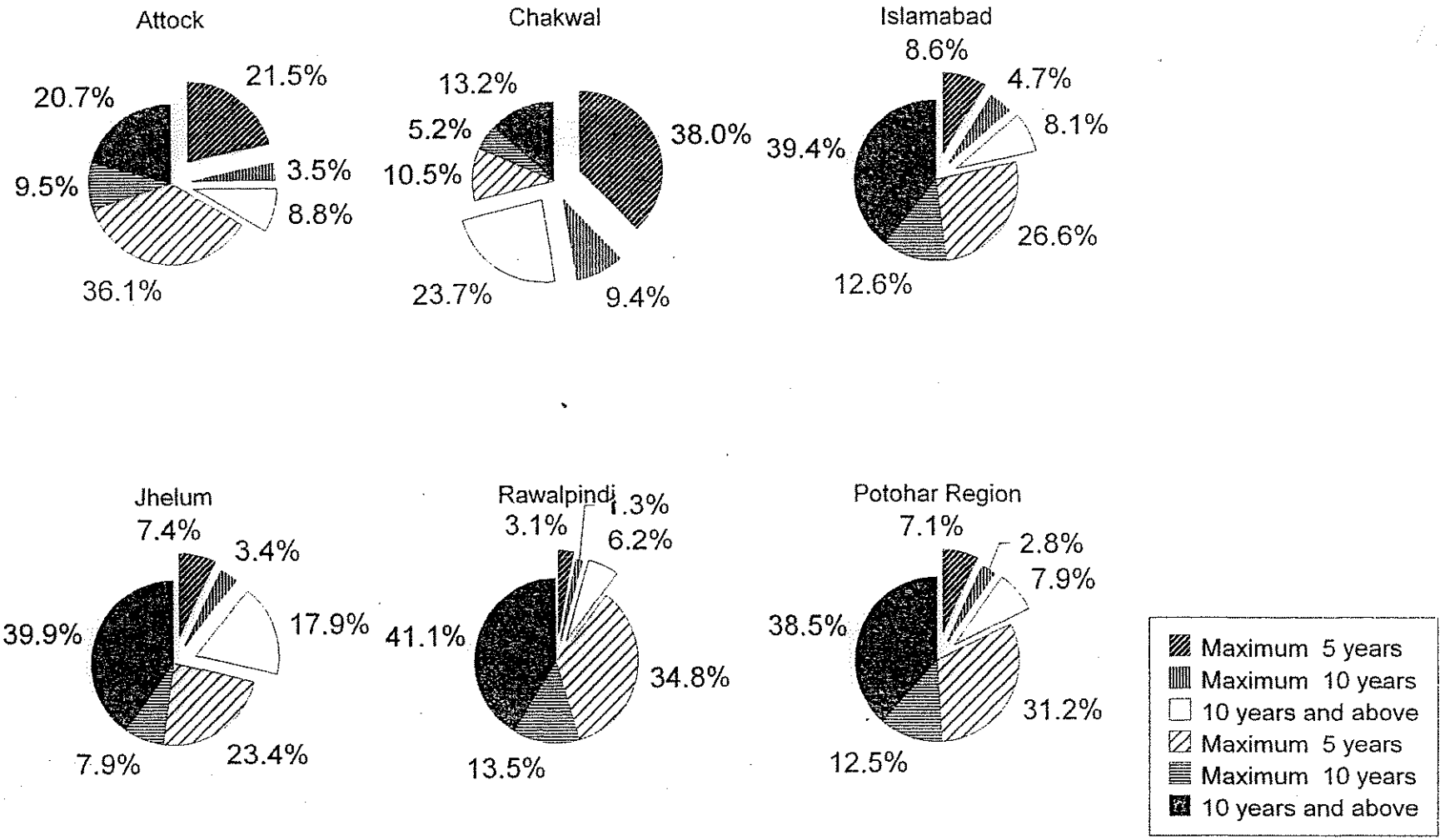
8.5 ANALYSIS OF MIGRATION STREAMS

The Punjab province itself is the single largest recipient of migrants from, as well as sender migrant to Potohar area. While within the Potohar area, the Rawalpindi district is the single largest recipient of migrants from and sender to other places in Pakistan and abroad. The other countries figured prominently in the migration stream–as origin/destinations, in the 1981 census, but their share was considerably lower in 1998. Relevant data are given in Tables 8.7 & 8.8 and analysed in some detail as follows (Appendix-8.1 - 8.2).

8.5.1 IN-MIGRATION

In 1981, about 47.7 percent of the total in-migrants to Potohar region were from the Punjab Province, followed by N.W.F.P. (F.A.T.A.) province 65.5 percent and other

FIG. 8.6 POTOHAR REGION: DISTRIBUTION OF LIFE TIME MIGRANTS BY DURATION OF CONTINOUS RESIDENCE — URBAN/RURAL AREA IN 1998



Source: GOP-1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Table-17 & 18, Population Census Organistion, Islamabad.

countries with 13.7 percent in 1981 and almost 59 percent of the total in-migrants were accounted for by the Rawalpindi district in 1981. The 1998 pattern was different. Punjab Province retained, and rather improved upon, its first position with 57 percent share N.W.F.P (F.A.T.A) province but the other countries slipped down and their share was only 21 percent and 5.8 percent as compared with 17.8 & 13.7 percent in 1981. N.W.F.P (F.A.T.A.) emerged in 1998 as the second largest source of Potohar's in-migrants. Rawalpindi district retained its position as the chief recipient of the latter; is given table 8.7, (Map-8.1 & 8.2).

Table-8.7. Potohar Region: Distribution of life time In-migrants in a particular Sending Provinces of Pakistan and Other Countries in 1981-1998 (Percent)

Receiving Area	Sending Area 1981							
	Punjab	N.W.F.P. & FATA	Sindh	Balochistan	Not Reported	AJK & N/Area	International [10] immigrants	Total
Attock	12,878 5.2	7,138 7.7	941 7.7	74 2.3	2,205 3.64	992 3.0	7,016 9.8	31,244 6.0
Islamabad	61,983 24.9	18,767 20.2	3,161 25.8	409 12.6	18,153 30.0	4,115 12.6	6,556 9.2	1,13,144 21.7
Jhelum	30,346 12.2	5,424 5.8	1,816 14.8	498 15.4	7,331 12.1	9,597 29.5	14,930 20.9	69,942 13.3
Rawalpindi	1,44,016 57.8	61,683 66.3	6,321 51.6	2,259 69.7	32,836 54.3	17,832 54.8	42,954 60.1	3,07,901 59.0
Potohar	2,49,223 47.7	93,012 17.8	12,239 2.3	3,240 0.6	60,525 11.6	32,536 6.2	71,456 13.7	5,22,231 (100)
Receiving Area	Sending area 1998.							
	Punjab	NWFP & FATA	Sindh	Balochistan	Not Reported	AJK & Northern Areas	International [10] immigrants	Total
Attock	45,953 6.2	32,137 11.8	3,751 5.4	517 4.4	200 4.2	2,553 2.0	3,815 5.0	88,926 6.9
Chakwal	21,109 2.9	4,062 1.5	1,697 2.4	273 2.3	821 17.5	1,754 1.4	821 1.1	30,537 2.3
Islamabad	2,41,977 32.9	79,148 29.1	26,143 37.5	2,969 25.6	-	26,122 21.0	21,372 28.3	3,97,731 30.6
Jchlum	42,689 5.8	5,608 2.1	2,199 3.2	308 2.6	6 0.1	8,298 6.6	6,796 9.0	65,904 5.1
Rawalpindi	3,83,473 52.1	1,51,025 55.5	35,835 51.5	7,549 65.0	3,672 78.1	86,484 69.1	42,766 56.6	7,10,804 55.1
Potohar	7,35,201 56.8	2,71,980 21.0	69,625 5.4	11,616 0.9	4,699 0.4	12,5211 9.7	75,570 5.8	1,2,93,902 (100)
	47.7	17.8	2.3	0.6	11.6	6.2	13.7	(100)

Source:-

1.G.O.P., 1981 tabulation plan computer tape Provincial Census Reports N.W.F.P, Punjab, Sindh and Balochistan Population Census Organisation, Islamabad.

2.G.O.P., 1998 Provincial Census Reports N.W.F.P, Punjab, Sindh and Balochistan table 17, Population Census Organisation, Islamabad.

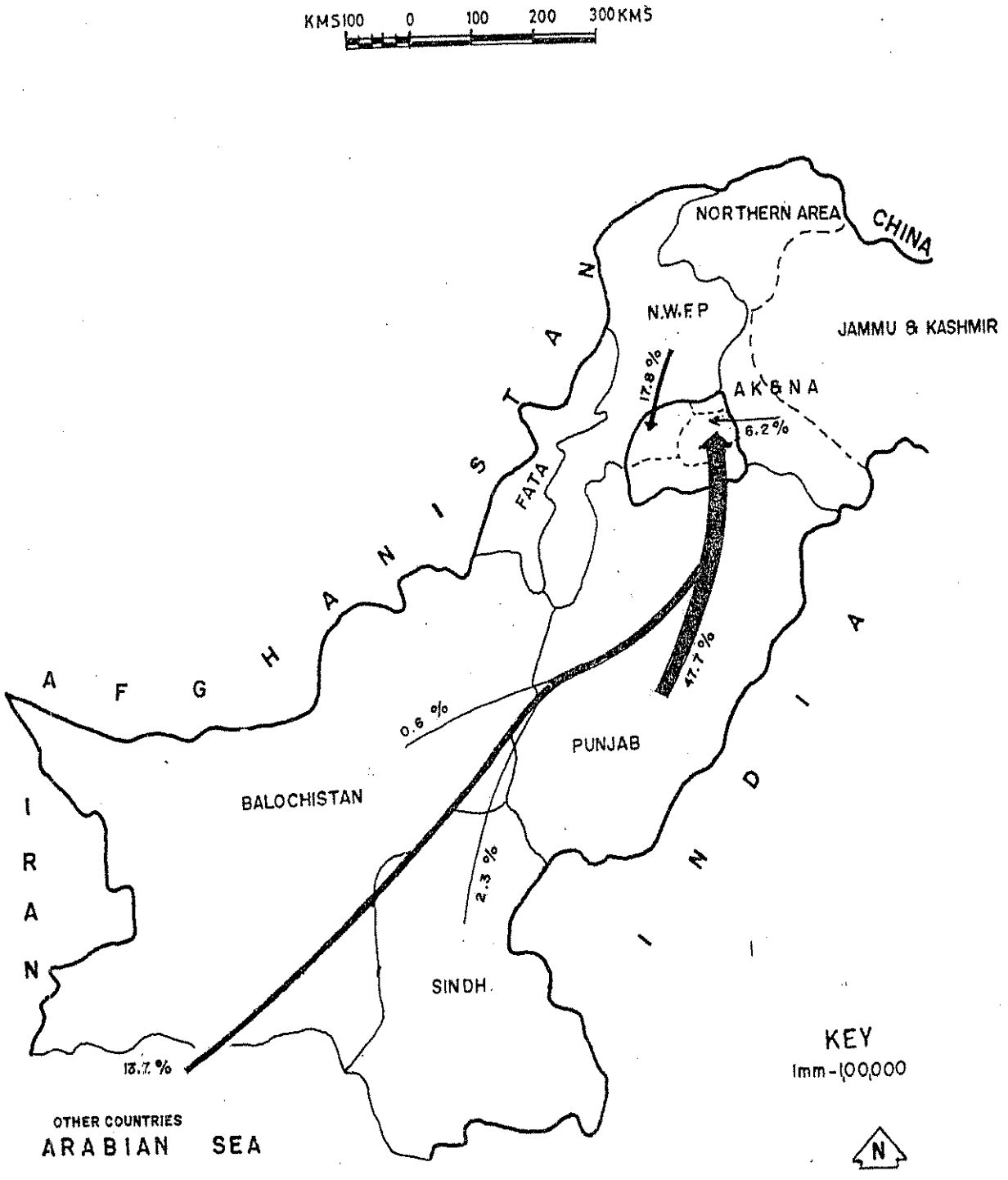
3.G.O.P., 1981 tabulation plan computer tape District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

4.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 17, Population Census Organisation, Islamabad.

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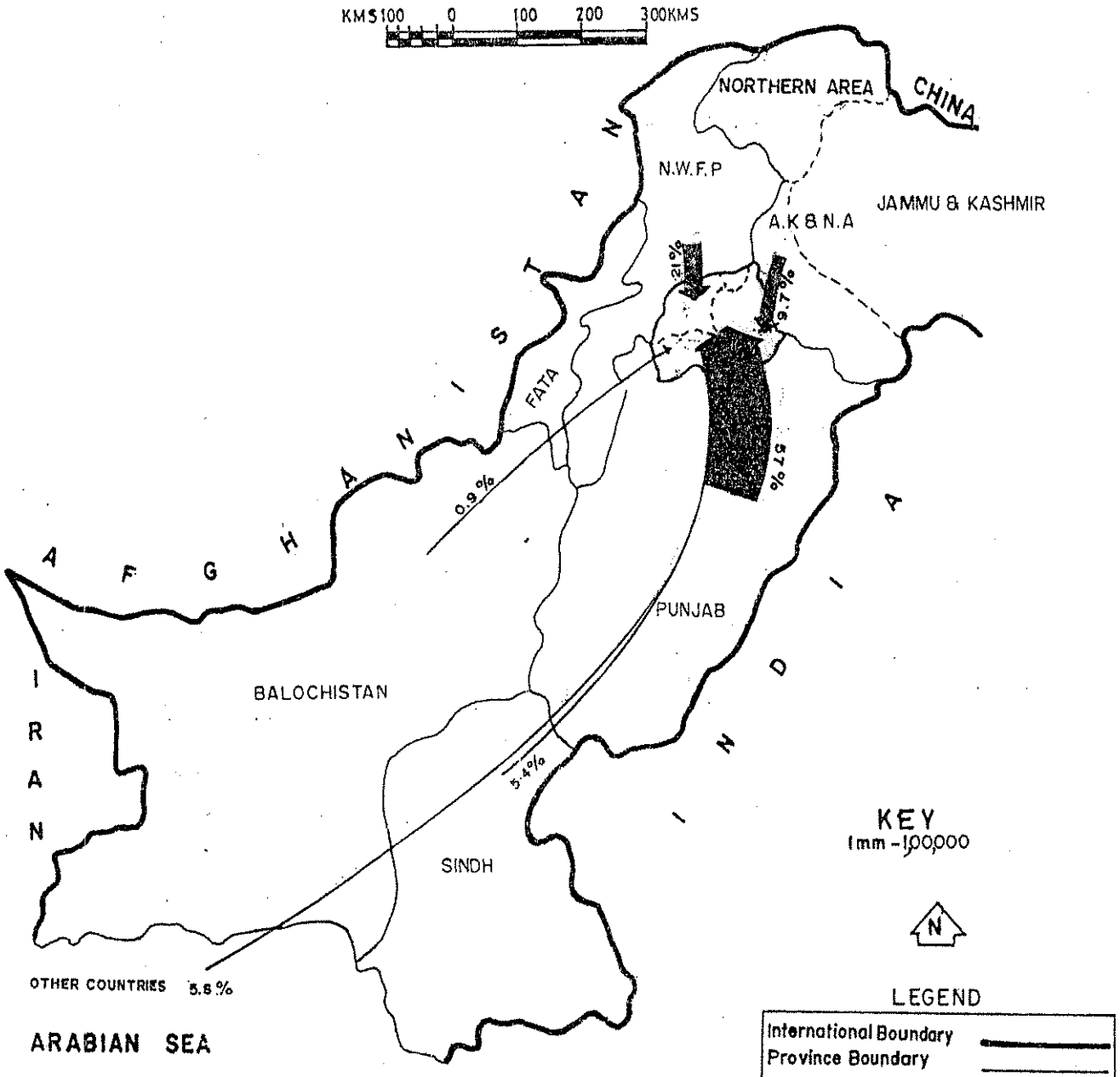
[10] Other Country/immigrants means International immigrants.

MAP 8.1 POTOHAR REGION: DISTRIBUTION OF LIFE TIME IN MIGRANT BETWEEN PROVINCES/REGIONS OF PAKISTAN AND OTHER COUNTRIES (1981)



Source: 1. GOP (1997) Surveyor General of Pakistan, Atlas of Pakistan, Survey of Pakistan, 2nd Edition, Rawalpindi.
2. GOP (1981) District Census Reports of Attock, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

MAP 8.2 POTOHAR REGION: DISTRIBUTION OF LIFE TIME IN MIGRANT FROM PROVINCES/REGIONS AND OTHER COUNTRIES (1998)



Source: 1. GOP (1997) Surveyor General of Pakistan, Atlas of Pakistan, Survey of Pakistan, 2nd Edition, Rawalpindi.

2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

8.5.2 OUT-MIGRANTION

In the out-migration stream, the single largest share (41.8 percent) was of the Punjab Province in 1981, which increased to 60.2 percent in 1998. The Sindh Province occupied the second position with 24.3 percent in 1981 and 32.4 percent in 1998. The share of N.W.F.P F.A.T.A declined from 17.3 percent in 1981 and 4.8 percent in 1998 (Appendix-8.3). It is rather attention striking that in 1981, 13.2 percent of the Potohar out-migrants went to other countries but in 1998 census, no such data is given in Table-8.8 and shown on (Map-8.3 & 8.4).

Table-8.8: Potohar Region: Distribution of out-migrants in a receiving Province of Pakistan in 1981 & 1998

Sending Area	Receiving Area 1981					
	Punjab	NWFP&[11] FATA	Sindh	Balochistan	Other Countries[13]	Total
Attock	44,285 19.4	24,844 26.3	44,288 33.1	3,221 18.8	12,792 17.8	1,29,430 23.7
Chakwal[12]	_	_	_	_	-	_
Islamabad	2,805 1.2	1,376 1.5	3,632 2.7	142 0.8	4,438 6.2	12,393 2.3
Jhelum[12]	1,08,022 47.4	22,235 23.6	38,660 28.9	7,638 44.7	32,103 44.6	2,08,658 38.3
Rawalpindi	72,615 31.9	45,797 48.6	47,224 35.3	6,099 35.7	22,611 3.14	1,94,346 35.7
Potohar	2,27,727 41.8	94,252 17.3	1,33,804 24.3	17,100 3.1	71,944 13.2	5,44,827 100.0
Sending Area	**Receiving Area 1998**					
	Punjab	NWFP&[11] FATA	Sindh	Balochistan	Other[13] Countries	Total
Attock	19,070 13.1	1,451 12.5	14,361 18.4	1,156 18.4	-	36,038 14.9
Chakwal[12]	29,622 20.4	1,226 10.6	12117 15.5	975 15.5	-	43,940 18.2
Islamabad	2,824 1.9	4,035 34.8	3,292 4.2	265 4.2	-	10,387 4.3
Jhelum[12]	50,213 34.6	1,066 9.2	10,546 13.5	849 13.5	-	62,674 26.0
Rawalpindi	43,493 29.99	3,816 32.9	37,771 48.4	3,039 48.4	-	88,119 36.5
Potohar	**1,45,222 60.2**	**11,594 4.8**	**78,087 32.4**	**6,284 2.6**	-	**2,41,187 100.0**

Source:-

1. G.O.P., 1981 tabulation plan computer tape Provincial Census Reports N.W.F.P, Punjab, Sindh and Balochistan Population Census Organisation, Islamabad.
2. G.O.P., 1981 tabulation plan computer tape District Census Reports Attock, Chackwal, Islamabad, Jhelum and Rawalpindi tables Population Census Organisation, Islamabad.
3. G.O.P., 1998 Provincial Census Reports N.W.F.P, Punjab, Sindh and Balochistan table 17 &19, Population Census Organisation, Islamabad.
4. G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 19, Population Census Organisation, Islamabad.

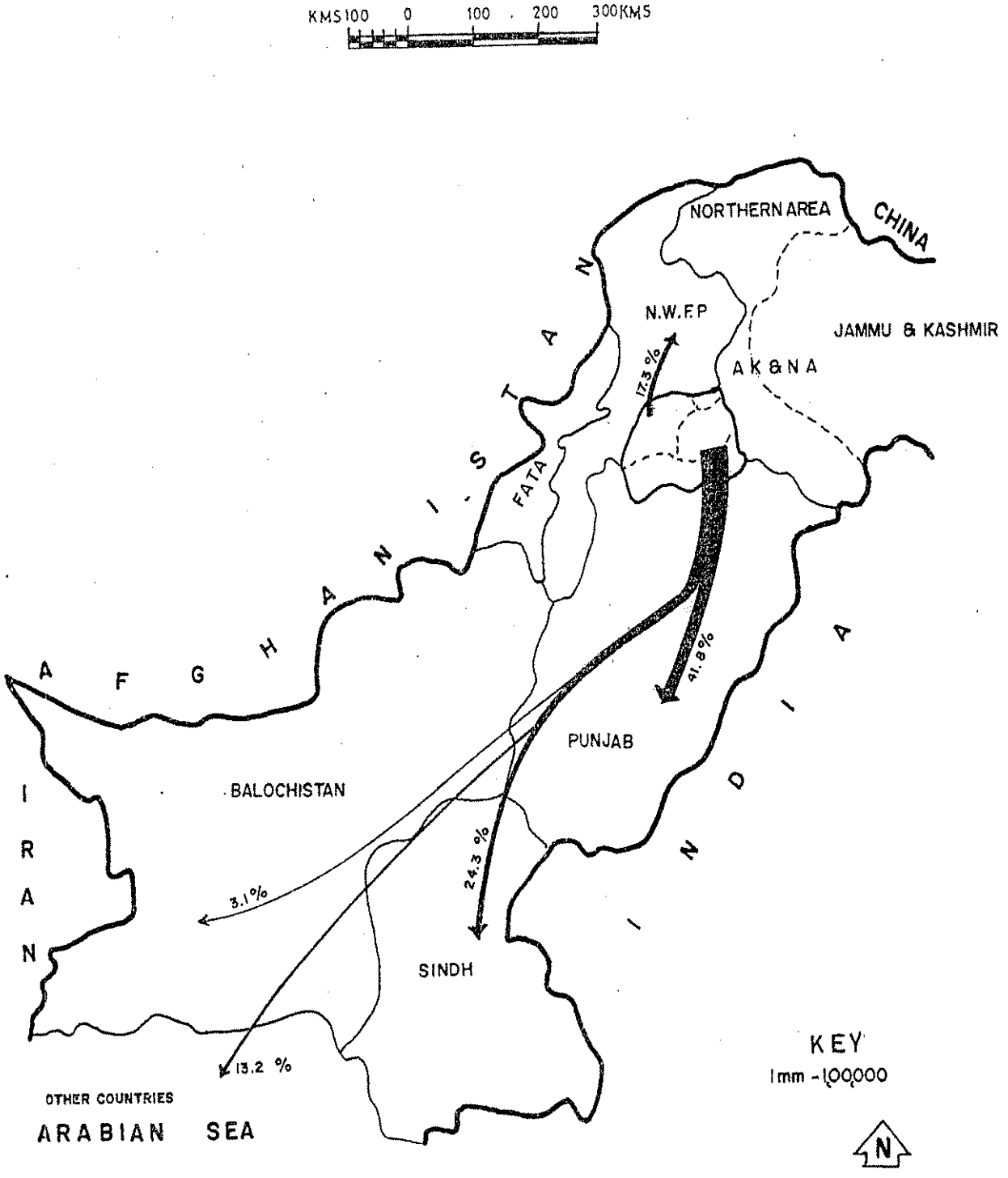
Foot note:-

[11] FATA and FR population counted in NWFP province in 1981& 98 Census.

[12] Chakwal District out-migrant population data includes in Jhelum District in 1981.

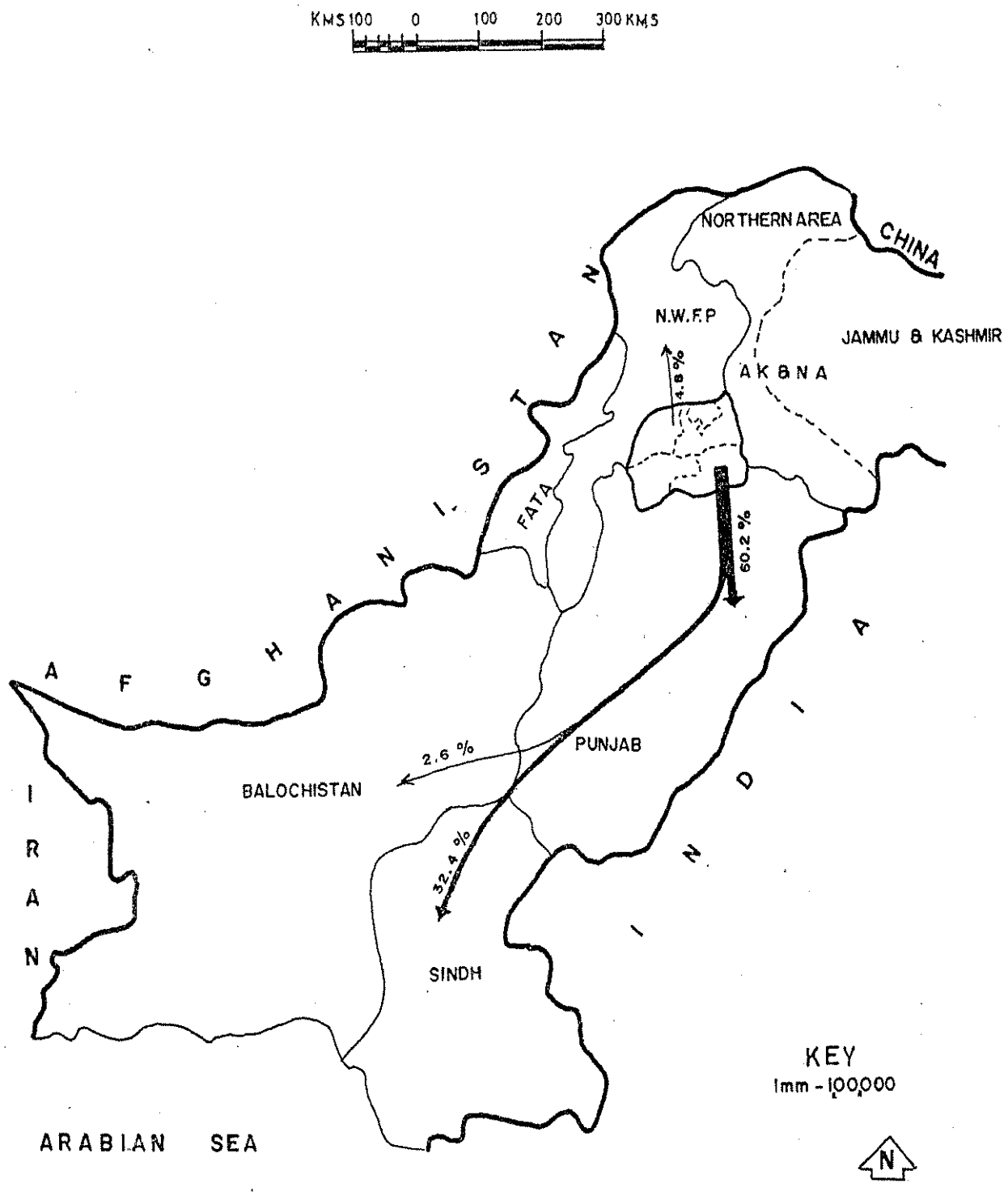
[13] Potohar out-migrant population data other countries not available in 1998 Census.

MAP 8.3 POTOHAR REGION: DISTRIBUTION OF LIFE TIME OUT MIGRANT TO PROVINCES/REGIONS AND OTHER COUNTRIES (1981)



Source: 1. GOP (1997) Surveyor General of Pakistan, Atlas of Pakistan, Survey of Pakistan, 2nd Edition, Rawalpindi.
2. GOP (1981) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

MAP 8.4 POTOHAR REGION: DISTRIBUTION OF LIFETIME OUT MIGRANT TO PROVINCES/REGIONS AND OTHER COUNTRIES (1998)



Source: 1. GOP (1997) Surveyor General of Pakistan, Atlas of Pakistan, Survey of Pakistan, 2nd Edition, Rawalpindi.

2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

During 1981-98, the total population of the region increased 2,692 thousand. The population of all districts of Potohar varied in terms of growth rate and districts did not have uniformed pattern of growth. As a result there was some are re-distribution of population in during 1981-98, there was a considerable variation in the percentage of male and female population of Potohar region.

Rawalpindi has consistently been reported as a great recipient of migrants in Potohar. It is the centre of heavy commercial/industrial opportunities, Army General Headquarters (GHQ) and further more airport is situated in Rawalpindi which facilities transport, business and provides services opportunities to the in-migrants.

The composition of the labour force is directly affected by the migrants. The result of this study also illuminates the fact that there was not only high in-migration in Rawalpindi district, but there was also net-migration. These phenomena suggest that people tend to return to their place of origin at the end of life cycle. It seems that increased volume of out migration to Sindh and in-migration in twin city (Rawalpindi-Islamabad) should be considered by planners and policy makers while formulating policies for development programme for the region. The government needs to make a strong policy for inter provincial/regional migration and should establish development planning programmes to encourage people to remain in their places of origin and to prevent this rapid flow of migration. Moreover, for the provinces/region, which gained in population migration, more job opportunities to prevent unemployment should be provided for migrant persons. Furthermore additional housing, health and mother care centres, education and basic facilities should be established for the migrants and their dependents. Net migration affects the population growth in each province/region/districts.

The demographic data of the region indicates wide variations in the distribution of area, population and development level of the region. The districts of Rawalpindi and Islamabad population size due to better agricultural and industrial resources, higher level of education urbanization and higher per capita income and job opportunities as compared to Attock and Jhelum. These variations and heterogeneity generate differential forces of "Push" and "Pull" and give rise to migratory stream of various types and within the districts/regions/provinces. With this background, the study identified some major trends of migration utilizing the place of birth and period of migration data from the census of 1961, 1981 & 1998 and the study has been handicapped by a number of limitations of data sources. The sources did not provide information on the motive and forces behind migration and detailed characteristics of migrants. The district and regional level precluded adequate explanation of migration process. Due to inadequate tabulation, the period migration data could not yield estimates of rural to rural and urban to rural migrants. The 1998 census data provide birth by provinces and give break down by districts.

In the analysis of overall trends of migration in Potohar, the role of influx of refugees after independence in 1947 is important. Thus in the present study refugees from India have been referred to as immigrants, with markedly different migration motives and patterns compared to internal migrations. The choice of timing, direction and destination involved in the process of refugees movements viz-a-viz internal migration have been significantly different in the present context.

The Potohar region district migration indicates that 57 percent are from Punjab and 20.9 percent from NWFP. Proportion of the other two provinces - Sindh and Balochistan has always been low ranging between 5.4 percent and 0.9 percent in 1998 census. The duration of continuous residence at the place of enumeration also indicates the above pattern. When duration over 10 years, the variation among the four districts disappears and the

overwhelming majority seems to have moved during the post 1981 period. This indicates that the regions as a whole have been gaining momentum during recent years.

The study reveals that during 1981-98, N.W.F.P received 17.3 percent in 1981 and 4.8 percent in 1998 of Potohar out-migrants while 17.8 percent in 1981and 21.0 percent in 1998 of Potohar's in-migrants came from them. The corresponding figures for Sindh are 24.3 percent in 1981 and 32 percent in 1998 and 2.3 percent in 1981and 5.4 percent in 1998 respectively. The fact that N.W.F.P has been losing Potohar's migrants and that Sindh is gaining in this respect is largely explained by the economic factors. The Sindh province has an edge over NWFP in this respect, and the pull-factor operating there an attracting the greater part of Potohar's migrants.

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PART THREE

HUMAN SETTLEMENT CHARACTERISTICS

CHAPTER NINE

SECTION I

HUMAN SETTLEMENT

9.1 INTRODUCTION

This chapter is divided into four sections. The first section is a brief introduction of location, of settlement[1], criteria of evaluation, ancient history, origin of name place distribution of urban/rural settlement in 1998, pattern & spacing of human settlement, population size growth & functional, natural/human factors of water availability, distribution of road and transport network and product moment correlation coefficient & settlement. The second section gives detailed population with different densities, twin cities Rawalpindi & Islamabad, population density in 1998 and human settlement density 1998. Third section is devoted to analysis of population density gradient around metropolitan city in Potohar region, Potohar agriculture land use density 1998, population potential of selected human settlement and proposed location of growth pole. In the fourth section to carry out detail analysis development point of view functional infrastructure, central place analysis of human settlement, population growth and accessibility.

9.1.1 LOCATION OF HUMAN SETTLEMENT

The study of locational characteristics of human settlement, their density, growth and functions is very important for planning regional development. In this section the locational characteristics are studied. The metropolitan cities, large cities, large towns, intermediate towns and small towns are also included in the scope of this research.

The small towns perform low functions. They are more in number and relatively located near to each other while the large cities perform more functions, are few, and located apart from each other.

Foot note:-

[1] Human settlement means sample village/*mauza* having population 5,000 and above in the study area, (Human settlement 147 in rural area and 26 in urban area are selected in the study area (urban centre within the boundaries of M. Corp/MC & cantonment boards of two adjacent urban settlement centres are treated one urban settlement) out of total number of 2,798 village/*mauza* in the Potohar region.

In the study area in spite of lack of basic infrastructure many of these large intermediate and small towns have economic base broader than just servicing educational, agricultural and industrial services. But still these towns/settlement are inadequate in performing the basic required role of rural development and the quality of life (F.K Khan, 1991) has classified all towns of 25,000 - 99,999 inhabitants as intermediate cities. Large cities and large towns have important role in urban structure of Potohar. In Pakistan, the national human settlement policy classifies the urban localities according to the population size into the following six classes/grade are shown in (Appendix-9.1), Table-9.1. (Amir Khan, 1980)

Table-9.1 Potohar: Human settlement structure 1998.

Categery of Grade	Type of Human Settlement	Population Range
1st	Metropolitan cities	5,00,000 +
2nd	Large cities	1,00,000 – 4,99,999
3rd	Cities	50,000 – 99,999
4th	Large Town	25,000 – 49,999
5th	Intermediate Town	10,000 – 24,999
6th	Small Town	5,000 – 9,999

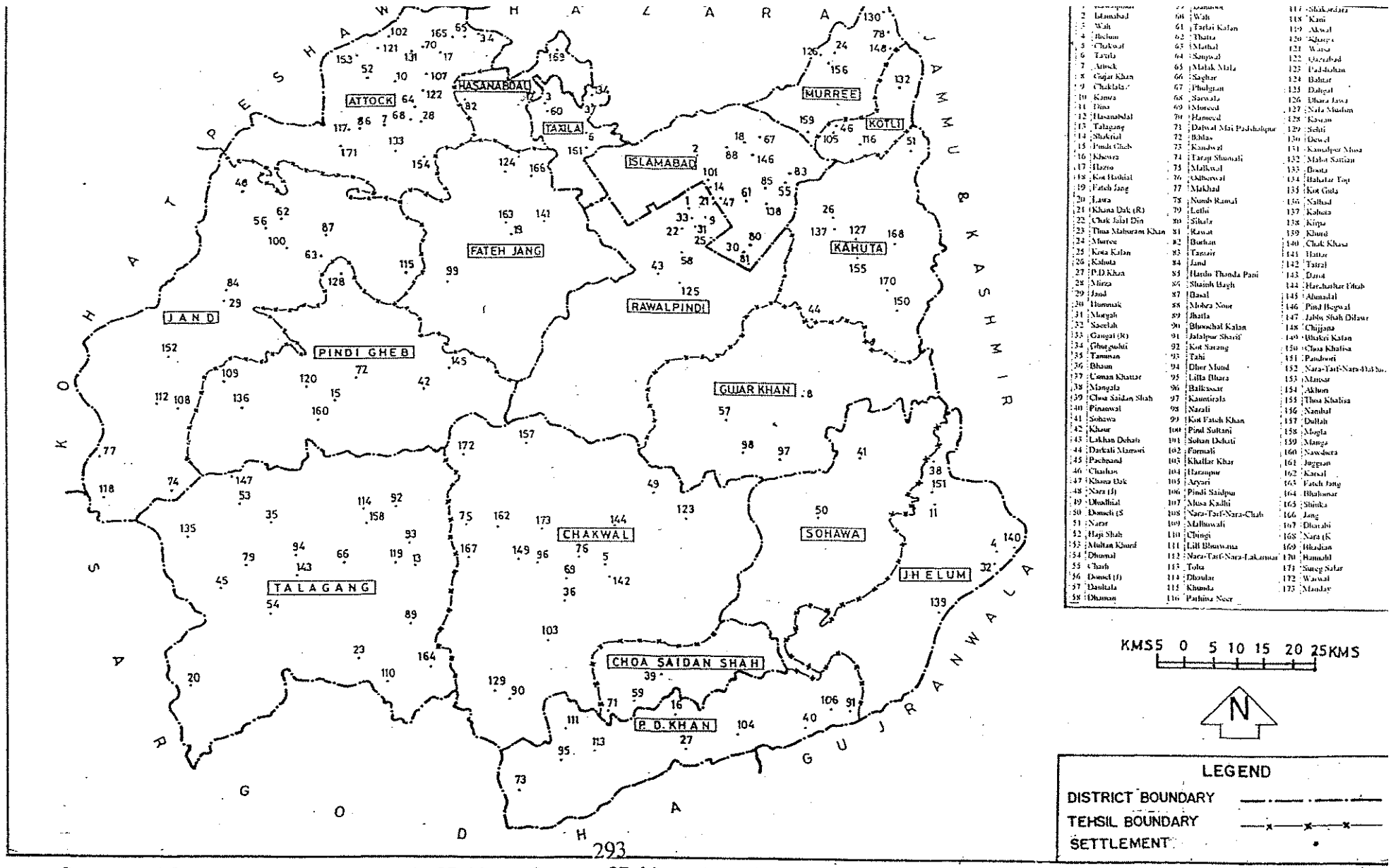
Source:-
G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Table 39 & 40, Population Census Organisation, Islamabad.

9.1.2 CRITERIA OF EVALUATION

The study was undertaken to find out the distribution pattern of human settlement. For this purpose it was not practicable to include all rural settlement of Potohar in the study. Only the human settlement[2] having population 5,000 and above (1998 census) are included in the analysis. In all 173 human settlement out of total 2,798, urban/rural settlement reported in 1998 census are covered by this study. The study focuses on distribution pattern, population density, growth and individual human settlement of Potohar. These 173 human settlement are located on a (Map-9.1) of scale of RF 1:2,50,000.

9.1.3 ANCIENT HISTORY OF HUMAN SETTLEMENT

The ancient history of the Potohar region had not been written before the arrival of Alexander the great. That is why it is very difficult to examine ancient historic path of the Urban/Rural settlement of this region. After the arrival of Alexander, we find a few references



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Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

of some important human settlement/Urban and Rural. The names of the settlement as given in historical records have not changed. However, from the limited literature as available on this subject, we can generally analysis the historical development of the settlement.

Potohar is particularly credited with the preservation of rich people-cultures of about two millions years duration on its surface deposits, which range from river gravel conglomerates, alluvial silt, to wind blown deposits and evidence of the pioneer good gatherers crossing the Potohar valleys slope, nallahs, canyons, and ridges chasing the predators. This movement was made possible with the help of metal imported from central Asia about two hundred years B.C. The metal also made it possible to make plough for effective cultivation of land and concentration of settlement in the form of village (Amir Khan, 1980) (Plate No. 9.1).

These early village folks are believed to be Aryans who lived in joint families. But with the growth of population, the families multiplied and new forms of villages came into existence. Further details regarding the growth of human settlement is lacking (Plate No. 9.2) (Robertson, 1887).

Potohar attract pilgrims from China and Tibet. H. Suan Tsang recorded about 1,400 monasteries in the Region during his visit in 629 A.D. He pointed out that the settlement was established. Top Mankiala, Sirkap and Julian located near Taxila District Rawalpindi were also important religious and social centres in that period (Thsang H, 630 A.D.). Later on due to change of political centre, during Buddhist, Mughal (Muslims) Hindu, Ghakkar and modern period, diffusion of settlement might have taken place and they spread out over whole of the Potohar region.

Foot note:-

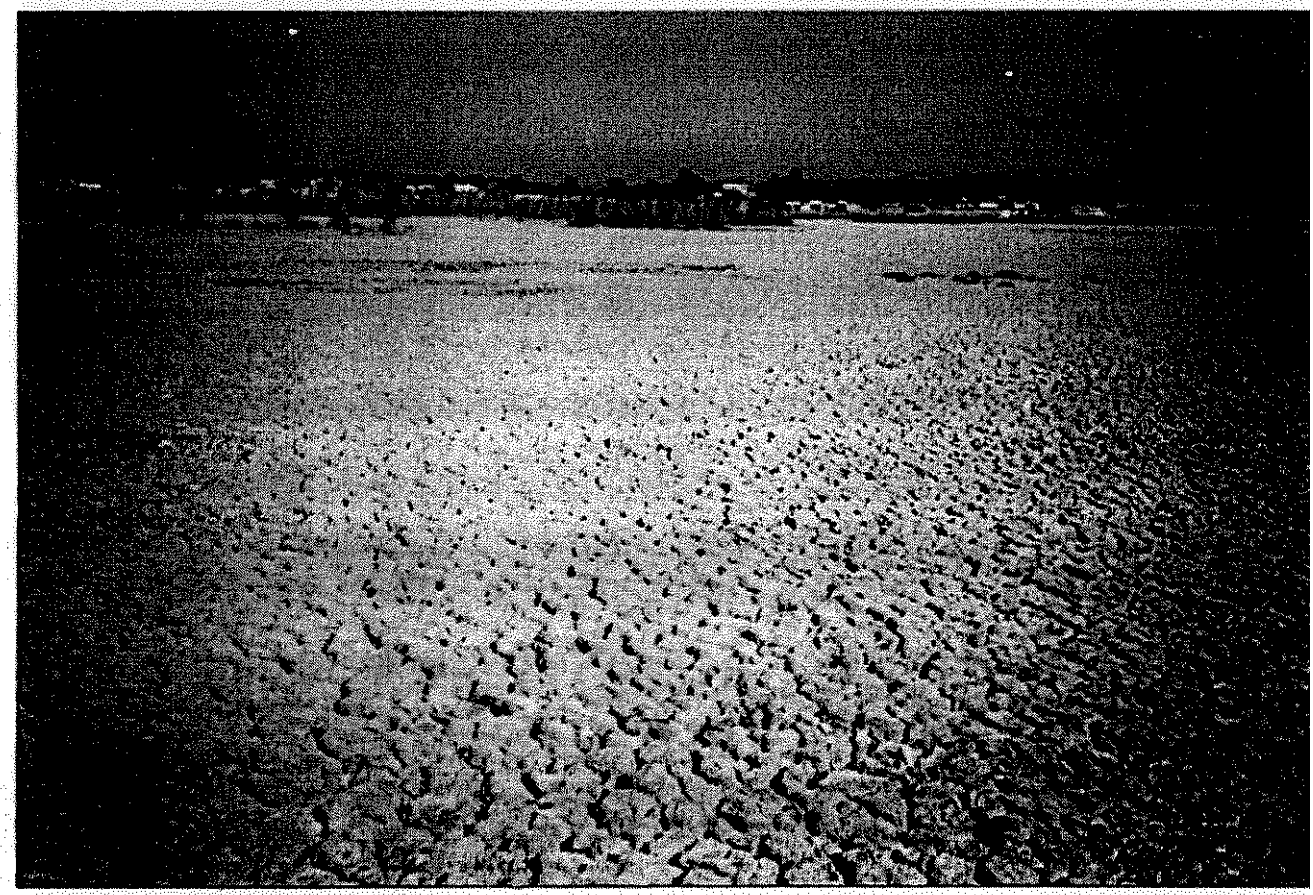
[2] Human settlement/urban localities (Existing) Notified area, by the Local Govt. and rural Development Dept., Govt. of Punjab Lahore.

- Cantonment boards Directorate of Military Land M/O Defence G.O.P., Islamabad. Islamabad locality notified after 1972 census (Capital Development Authority) M/O interior Govt. of Pakistan Islamabad.

Plate No 9.1: Human Settlement

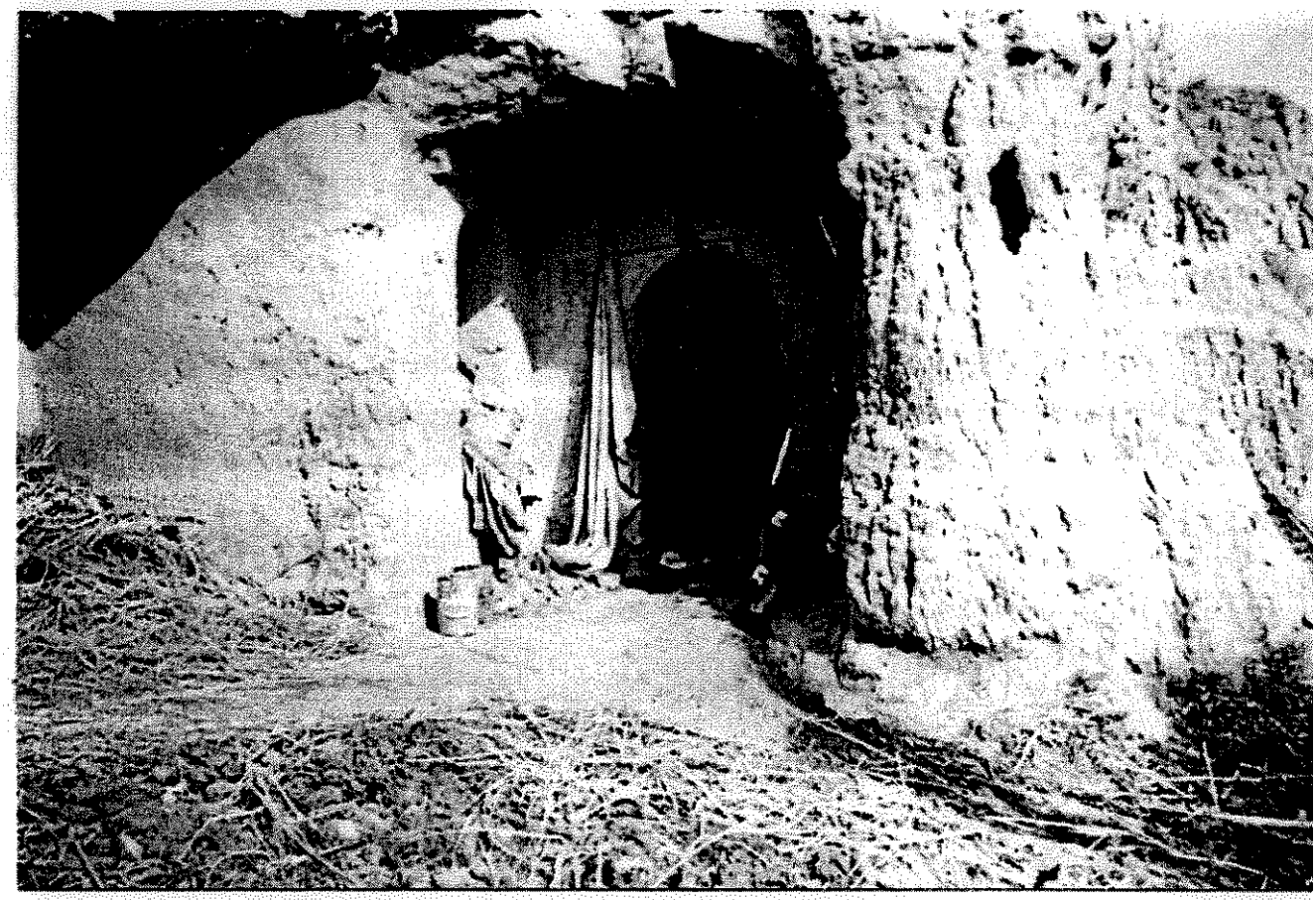


Islamabad A general view of Soan Settlement

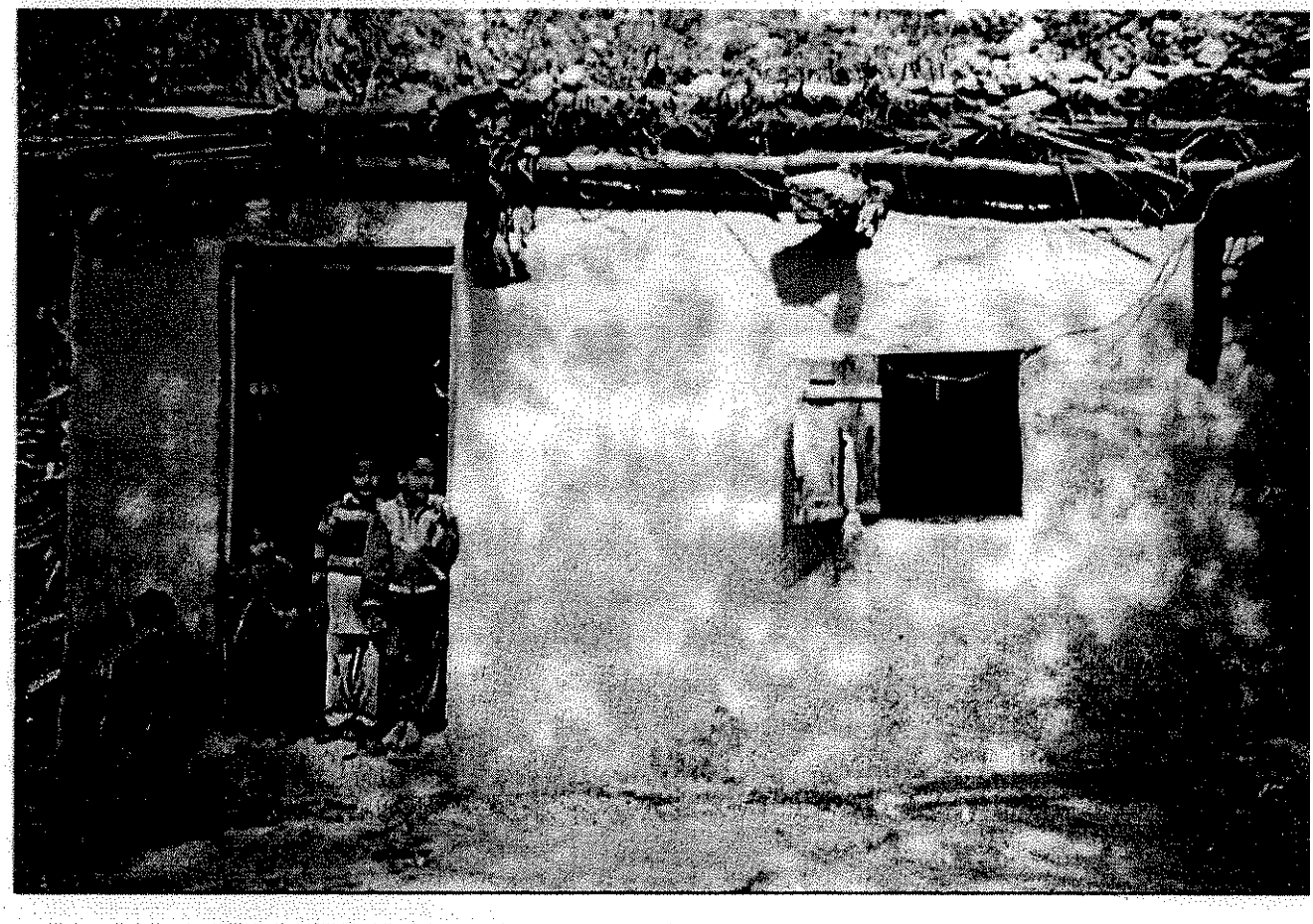


Chakwal A general view of Kallar Kahar settlement

Plate No 9.2: Potohar Social Life



Gujarkhan A view of 'Cave' Gujarkhan Settlement



Kotha Kalan (Rawalpindi) A view of Rock Shelter Cave

Some important archaeological sites are also found near the Kallar Kahar settlement in district Chakwal that is itself also of historical importance. But the other important human settlement-Rawalpindi, Jhelum and Attock are very old in their origin. Over all impact of the history of the Potohar on the human settlement pattern is not very strong, because political cultural and socio-economic changes that have occurred during these centuries have completely changed the arrangements of human settlement.

At the end of Kushan Empire period in 17th century A.D. there was a great political upheaval in the Potohar region, which adversely affected the cottage industries, trade, transport, telecom and communication. The new invaders and rulers did not care for the eco-prospects and economic development of the region (Amir Khan, 1980). From the early 13th century to the conquest of Mughals in the middle of 16th century overland trade throught this region had ceased (Amir Khan, 1980). During Muslim rule prior to the Mughal dynasty, it seems that little effective authority was exercised over the Potohar region (Amir Khan, 1980). The Mughals, however, in spite of their main interest in central India reopened the trade route through this region. Wheat, *Atta Chakki* and oilseeds crushing (*Ghani*) are the most important features of the human settlement (Plate No. 9.3). A few small shops, a mosque, school, and a police post/*chowki* are other features within various human settlement.

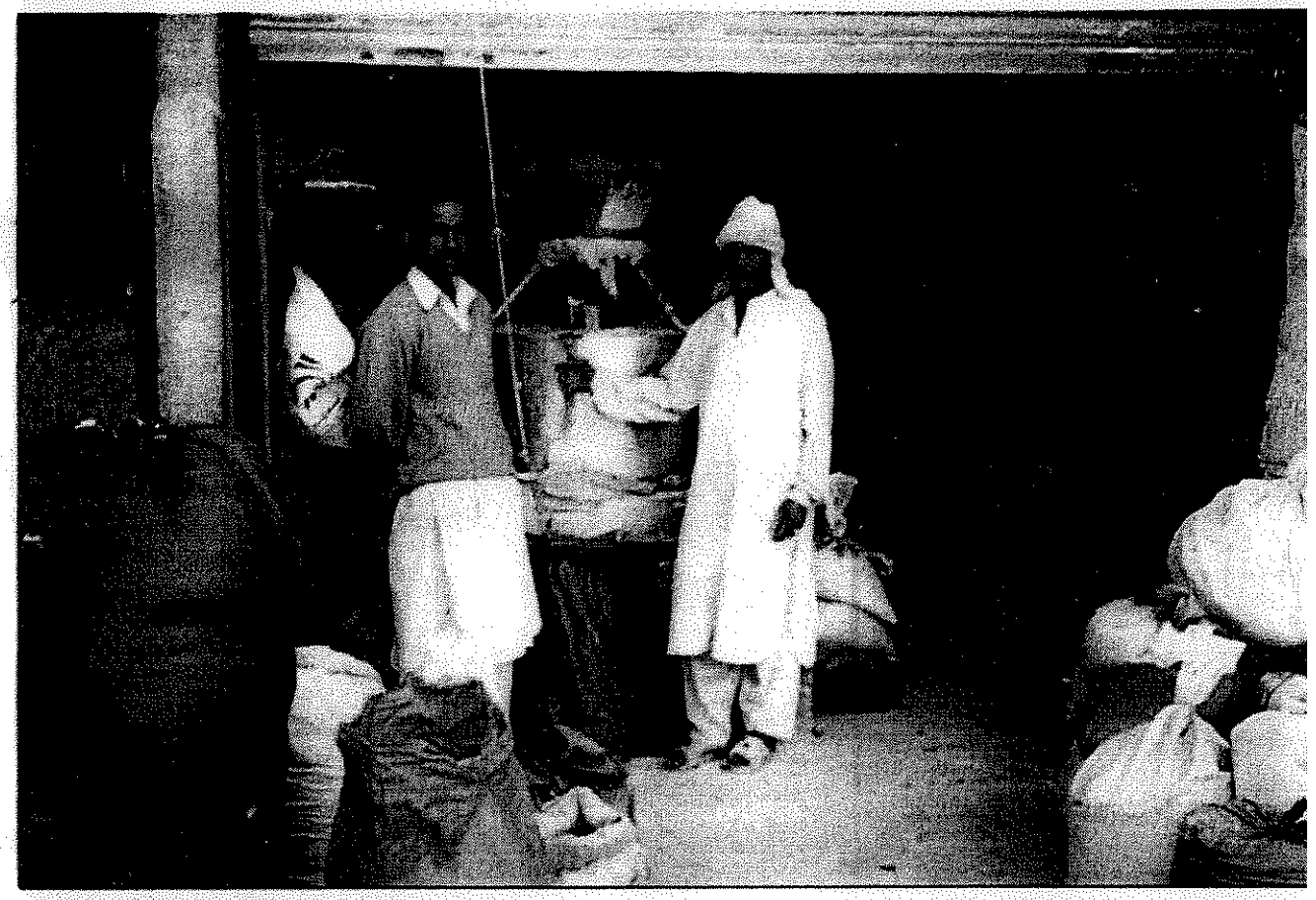
The culmination of Mughal Rule was followed by Sikh and Hindu occupation, which resulted in the shattering of the revitalised economy once again (Amir Khan, 1980). During the subsequent British rule, the new settlement pattern followed their strategic designs. Some of them were located in the Potohar region. Also there was an indirect impact on the growth of settlement due to the natural water resources, draining by improvement of roads, transportation network, construction of main dams and broken land levelled in the Potohar area.

9.1.4 ORIGIN OF HUMAN SETTLEMENT IN POTOHAR

On the basis of excavations carried out by (D.N Wadia, 1922) archaeologist, the existing historical record, the land records, folk stories and archaeological department, the origin of human settlement is divided into six major phases are shown in (Appendix-9.2).

(i) Ancient (proto historic) (2500-1300 B.C)	(ii) Buddhist (265-238 B.C)	(iii) Hindu (265B.C-1007 AD)
(iv) Mughal (Muslim) (1007 AD-1738 AD)	(v) British (1849 AD-1947 AD)	(vi) Modern period (1947 AD To dated)

Plate No 9.3: Important Features of Human Settlement Rawat



A view of Atta Chakki



A view of Cotton Jinning Machine

Modern period is the main phase of growth of settlement. A classification of this settlement is given in Table-9.2 and (Map-9.2).

Table-9.2 Potohar Region: Origin of human settlement upto 1998

Category of Grades	Major Phase Type of Human Settlement								
	Ancient (Proto histric)	Buddhist		Mughal/ Muslim	British Era	Modern Period	Rural Human Settlement	Urban Human Settlement	Total No. of Human Settlement
		Buddhist	Hindu Period						
1st Grade	-	-	-	1	-	1	-	2	2
2nd Grade	1	-	-	1	-	-	-	2	2
3rd Grade	1	1	-	2	-	-	-	4	4
4th Grade	-	-	7	4	-	-	3	8	11
5th Grade	-	-	15	22	1	-	29	9	38
6th Grade	5	1	51	57	2	-	115	1	116
All Grades	7	2	73	87	3	1	147	26	173

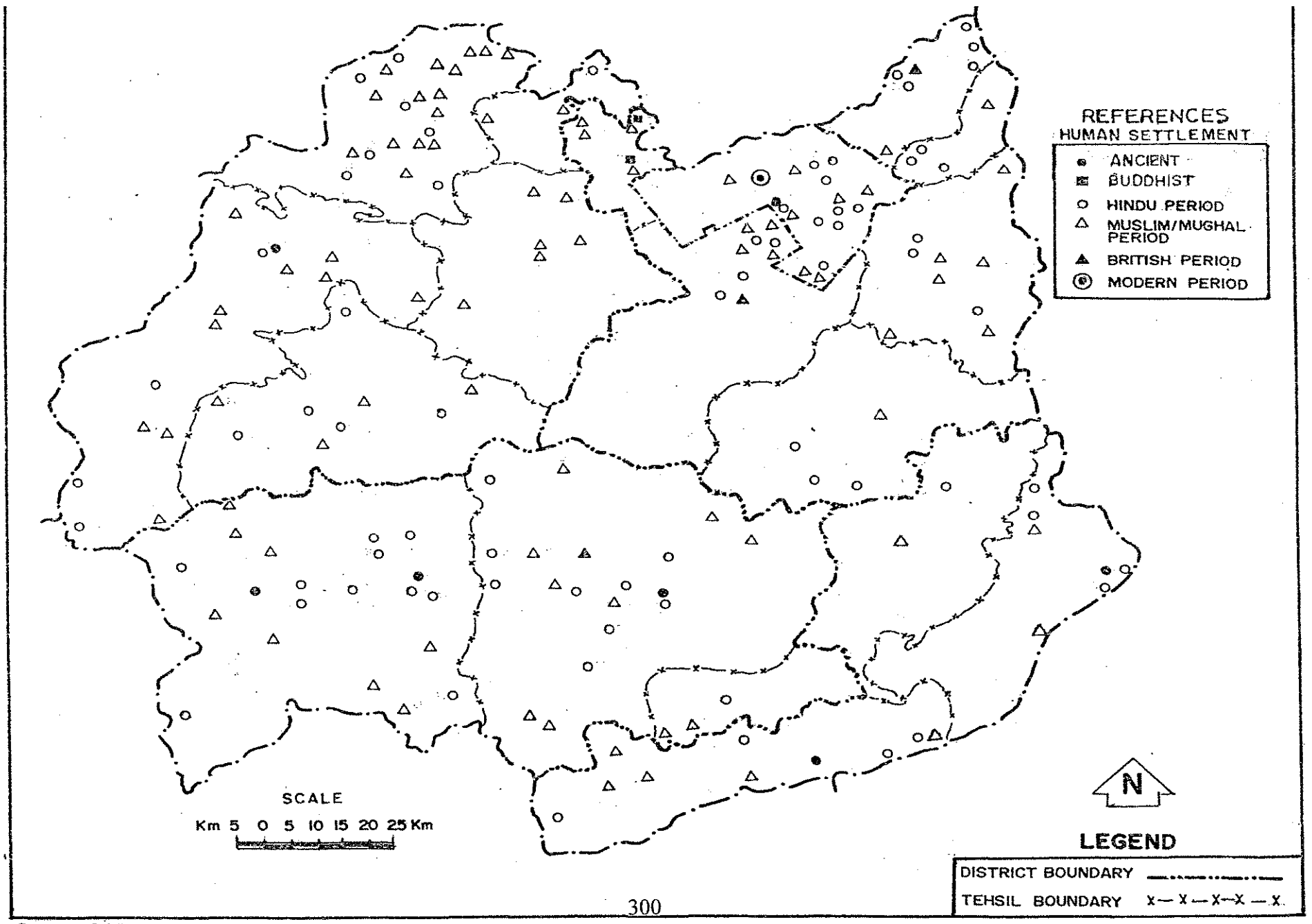
Source:-

1.Field Survey 1999-2000.

2.G.O.P.,1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 39 & 40 Population Census Organisation, Islamabad.

9.1.5 NAMES OF HUMAN SETTLEMENT

In table 9:3 the understudy human settlement are categorised by the genesis of their names. Out of these 173 settlement the single largest number (42) of settlement is named after their founder, closely followed by settlement (28 in number) named after their tribe and then bearing Sanskrit names (27 in number). Local names and Quranic name of settlement are also prominent number.



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

Table-9.3 Potohar Region: Name place of human settlement 1998

Category of Grades	Name Place of Classes									
	Founder	Tribes	Local Name (Language)	Arabic/ Persian	Holy name/ (Quranic)	Sanskrit language	Un-known	No.of human settlement		
								Urban	Rural	Total
1st Grade	-	1	-	1	-	-	-	2	-	2
2nd Grade	-	-	2	-	-	-	-	2	-	2
3rd Grade	-	2	-	-	-	2	-	4	-	4
4th Grade	3	1	-	1	-	3	3	8	3	11
5th Grade	11	6	11	-	4	4	2	9	29	38
6th Grade	28	18	10	2	18	18	22	1	115	116
Total settlement	42	28	23	4	22	27	27	26	147	173

Source:-

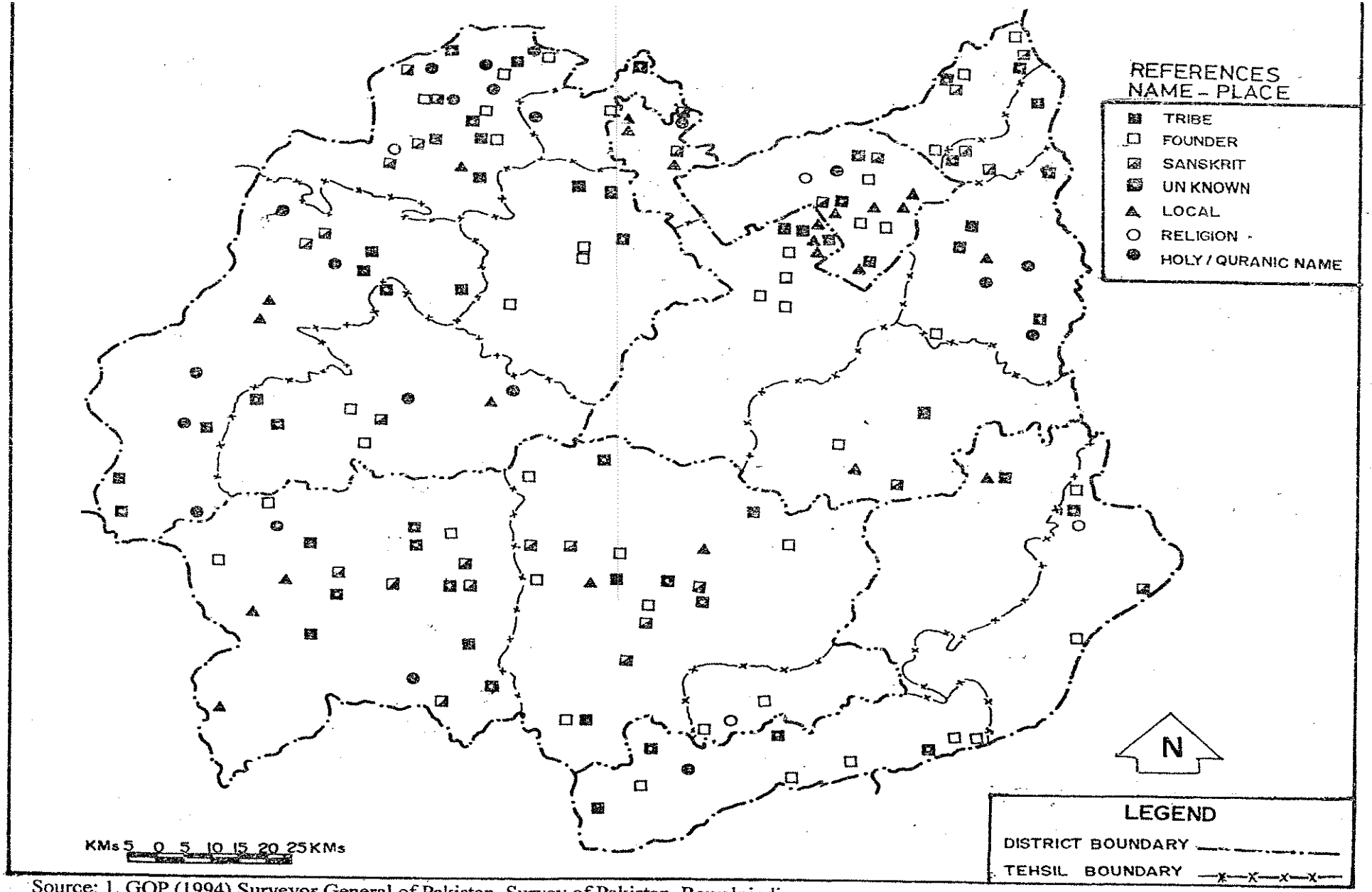
1.Field Survey 1999-2000.

2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Population Census Organisation, Islamabad.

Human settlement have been demarcated and shown (Appendix-9.3) & (Map-9.3) updated on the basis of 1998 census. The demarcation or addition of human settlement on the maps through field survey is essential for further planning in respect of setting of educational institutions, health facilities, drinking water, transportation, communication, road and link road, electricity, commercial utility centre/store. In the field survey essential information regarding number of schools, colleges, universities, cultivated land in each settled human settlement, number of education institutions, number of households, hospitals, dispensaries, banks, veterinary hospitals, Post office, police station, water, number of semi *pacca* and *kachha* houses, link to main roads, of each human settlement data was collected through field survey in 1999-2000.

9.1.6 DISTRIBUTION OF HUMAN SETTLEMENT

Distribution of settlement is not uniform in the Potohar because of physical environment. In hilly fertile plains areas and broken land of Potohar under study, where transport network and where water is available we find concentration of settlement which are evenly distributed as in most of the plain area of Rawalpindi, Gujarkhan, Attock, Chakwal and Jhelum tehsil. There large villages are located at a long distance of each other.



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

In this study each human settlement in the Potohar is considered a pin-point on a two dimensional surface and the analysis is done to point-out pattern of human settlement. Settlement pattern is defined as the arrangement in the spacing of human settlement on a geographical surface. To describe the human settlement pattern, only selected human settlement is taken in the analysis to find out the relationship between the particular pattern and the controlling factors. Study of human settlement has both practical and theoretical importance. It is helpful in determining the main factors which control the location of human settlement. Many factors viz. agriculture, transportation, topography, industry, cultural ties and sectional pride have contributed to Potohar diverse regional characteristics. For many years writers and politicians referred to the Potohar region as the Northern Punjab.

9.1.7 URBAN AND RURAL SETTLEMENT IN 1998

1. Class 1st Metropolitan cities each having a population of 5,00,000 and above persons were only two in number namely Rawalpindi and Islamabad. They constituted only 65.1 percent of the Potohar region population.

2. Class 2nd large cities constituted 11.6 percent of the total population of the Potohar region. These had a size ranging between 1,00,000 - 4,99,999 persons. There were only two such cities (Wah Cantt and Jhelum) in the Potohar region.

3. The class 3rd cities having a population size between 50,000-99,999 persons contribute 9.4 percent of the human settlement population. All are urban settlement.

4. In class 4th fall the Large Towns having population of 25,000-49,999 persons. In this category there were 9 urban settlement and 3 rural settlement in Potohar region. In this class, Urban/Rural settlement' population distribution was 70.3 percent and 29.7 percent respectively.

5. In the 5th class fall, all the Intermediate Towns having a population size between 10,000-24,999 persons. In this class there are 38 human settlement, nine urban and twenty nine rural. The population share was 25.3 percent Urban and 74.4 percent rural settlement of Potohar region.

6. Class 6th small Towns have population ranging from 5,000-9,999 persons. In this class population share was 0.3 percent urban settlement and 59.3 percent. This class has one urban and one hundred fifteen rural settlement of Potohar region.

9.1.8 PATTERN AND SPACING OF HUMAN SETTLEMENT

The pattern of human settlement in Potohar region is useful to know so as to understand the process and factors that have produced such pattern. It is also useful to find whether there exists some regularity in the arrangement of human settlement or not. Point pattern analysis consists of a set of techniques, which describes such spatial analysis in terms of the degree of clustering randomness or regularity displayed with respect to an area defined by the investigator.

As we study human settlement pattern we want to know, whether they are evolved by the interaction of various factors or purely by one factor that may be natural/human factor. Where the factors or processes are random, human settlement are located randomly over the space. If the factors are spread uniformly and the same processes are involved everywhere, the resulting pattern of human settlement will be dispersed or uniform as shown in table 9.4.

Table-9.4: Processes and selection of human settlement

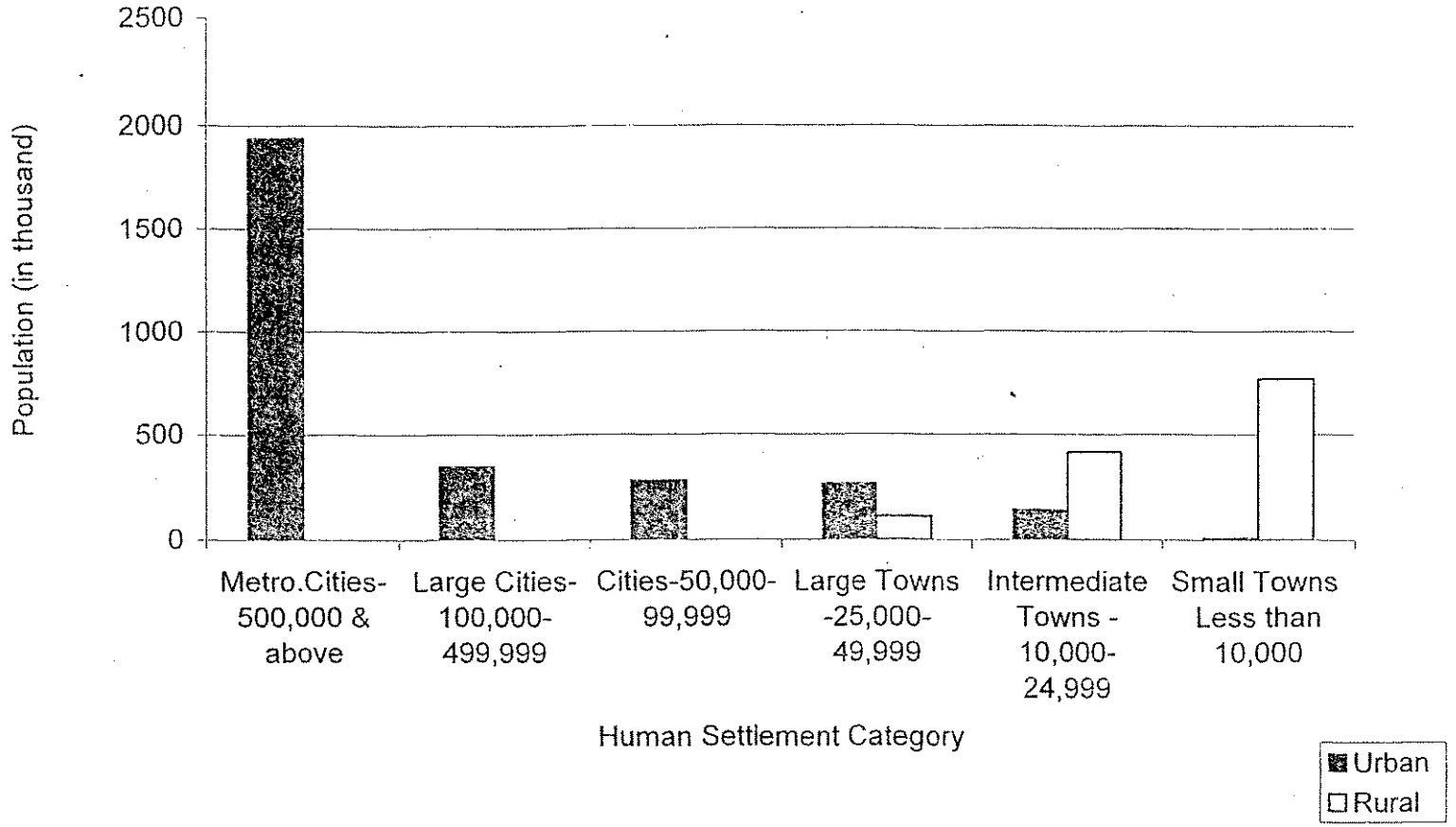
Sr.Nos.	Process	Pattern	Predicted Pattern of Selection
1.	Competitive	Dispersed	Regular Triangular Lattice
2.	Random	Random	No specific spacing pair of point
3.	Contiguous	Clustered	Neighborhood effect

Source:-

P.J. Taylor, 1977 Quantitative Methods in Geography Houghton, Mifflin Co Boston, p.135 & 141.

In the Table 9.5 the population of Potohar region in 1998 is distributed over six categories of human settlement. The categories are made in terms of population range of the human settlement. The largest size is category 1st grade. Human settlement having population of 5,00,000 and above are called Metropolitan cities. At the bottom is the 6th grade human settlement with population of 5,000–9,999(Appendix-9.1& 9.8). The population in absolute and percentage terms by the size types of settlement are given in Table-9.5 & (Fig-9.I).

FIG. 9.1 POTOHAR REGION: POPULATION DISTRIBUTION OF HUMAN SETTLEMENT BY CATEGORYWISE URBAN/RURAL 1998



Source: GOP 1998, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpdindi Table 39 & 40, Population Census Organisation, Islamabad.

Table-9.5: Potohar Region Human Settlement Population by urban/rural 1998

Grade/ Class	Category of settlement and Population Range	Urban Settlement	Rural Settlement	Human Settlement total Population
1st I	Metropolitan Cities 500000 or more	1,9,38,948 (65.1%)	-	1,9,38,948
2nd II	Large Cities 100000-499999	3,46,283 (11.6%)	-	3,46,283
3rd III	Cities 50000-99999	2,79,218 (9.4%)	-	2,79,218
4th IV	Large Towns 25000-49999	2,64,625 (8.9%)	1,11,530 (8.6%)	3,76,155
5th V	Intermediate Towns 10000-24999	1,41,387 (4.7%)	4,17,042 (32.1%)	5,58,429
6th VI	Small Towns Less than 10000	9,106 (0.3%)	7,70,190 (59.3%)	7,79,296
All Grade		2,9,79,567 (69.6%)	1,2,98,762 (30.4%)	4,2,78,329

Source:-

G.O.P.,1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 39 & 40 Population Census Organisation, Islamabad.

9.1.9 POTOHAR: HUMAN SETTLEMENT DENSITY BY TEHSILS WISE IN 1998

Human settlement density is a simple measure to know the number of human settlement per unit area in the whole Potohar and also in different parts of the region (Appendix-9.4). Potohar area is quite large, while the number of human settlement (small) is resulting in low density as shown in Table -9.6.

Table-9.6 Potohar Region: Number of human settlement density per 100 Km^2 by tehsils wise in 1998

Sr. Nos.	Name of Tehsil by Districts	Human Settlement		
		Area in Km^2	Human settlement Nos.	Density per 100 Km^2
	ATTOCK DISTRICT	6,857	55	0.80
1.	Attock Tehsil	1,350	22	1.62
2.	Hasanabdal Tehsil	350	3	0.85
3.	Fatehjang Tehsil	1,249	6	0.48
4.	Pindi Gheb Tehsiil	1,865	9	0.48
5.	Jand Tehsil	2,043	15	0.73
	RAWALPINDI DISTRICT	5,285	41	0.77
6.	Rawalpindi Tehsil	1,682	11	0.65
7.	Texila Tehsil	312	6	1.92
8.	Kahuta Tehsil	1,096	9	0.82
9.	Murree Tehsil	434	8	1.84
10.	Kotali Sattian Tehsil	304	3	0.98
11.	Gujar Khan Tehsil	1,457	4	0.27

	JHELUM DISTRICT	3,587	19	0.52
12.	Jhelum Tehisl	1,062	7	0.65
13.	Sohawa Tehsil	1,258	2	0.15
14.	P.D. Khan Tehsil	1,267	10	0.78
	CHAKWAL DISTRICT	6,524	43	0.65
15.	Chakwal Tehsil	3,120	18	0.57
16.	Talagang Tehsil	2,932	22	0.75
17.	Choa Sadian Shah	472	3	0.63
	ISLAMABAD DISTRICT	906	15	1.65
18.	Islamabad Tehsil	906	15	1.65
	Potohar Region.	23,159	173	0.74

Source:-

1.Field Survey 1999-2000.

2.G.O.P.,1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi part IV table 1, 39 & 40 Population Census Organisation, Islamabad.

The total number of human settlement covered by this study is 173 which have average density of 0.74 per km^2. Table 9.6 shows slight variation of human settlement density from district to district and tehsil to tehsil. Highest density is found in Islamabad district which has 1.65 human settlement per km^2; and Taxila tehsil where the density is 1.92 per km^2 according to the 1998 census closely followed by Murree Tehsil with 1.84 human settlement per km^2. The lowest human settlement density is found in Sohawa Tehsil, 0.15 per Km^2 which is below the Potohar region's over all human settlement density, see on (Map-9.4).

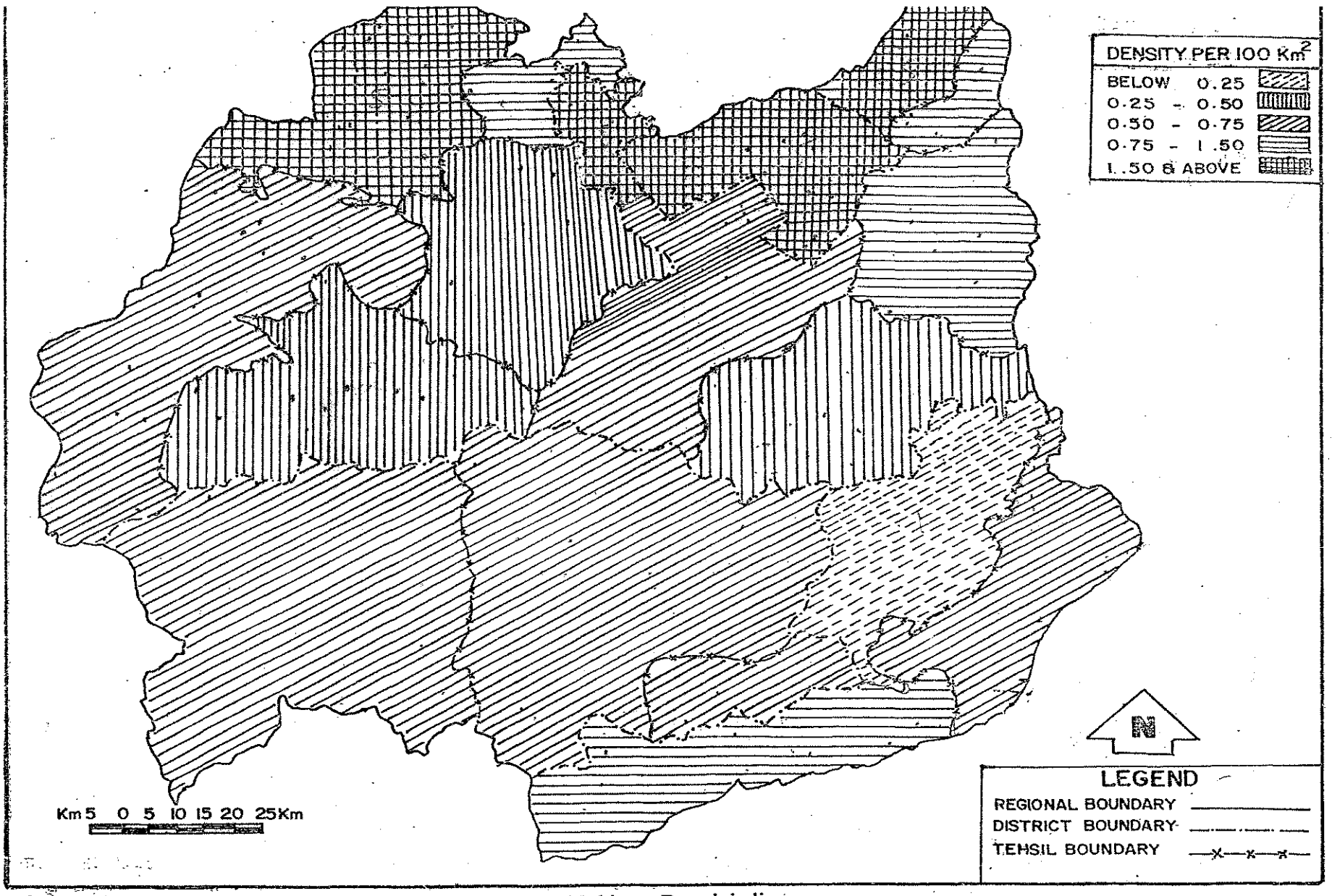
This analysis shows (Appendix-9.5) that human settlement are not uniformly distributed over the Potohar area. They are rather more clustered in southern parts of the region than in the north western side. Tehsil wise human settlement are located in more clustered form in the marginal areas. Taxila is situated in northern part and Murree which is the northeast portion of Potohar has well distributed settlement. Growth pattern 1951-98 of each of the 173 human settlement under study is given in Table-9.7, (Map-9.5).

Table-9.7 Potohar: Growth pattern of Sample human settlement 1951-1998

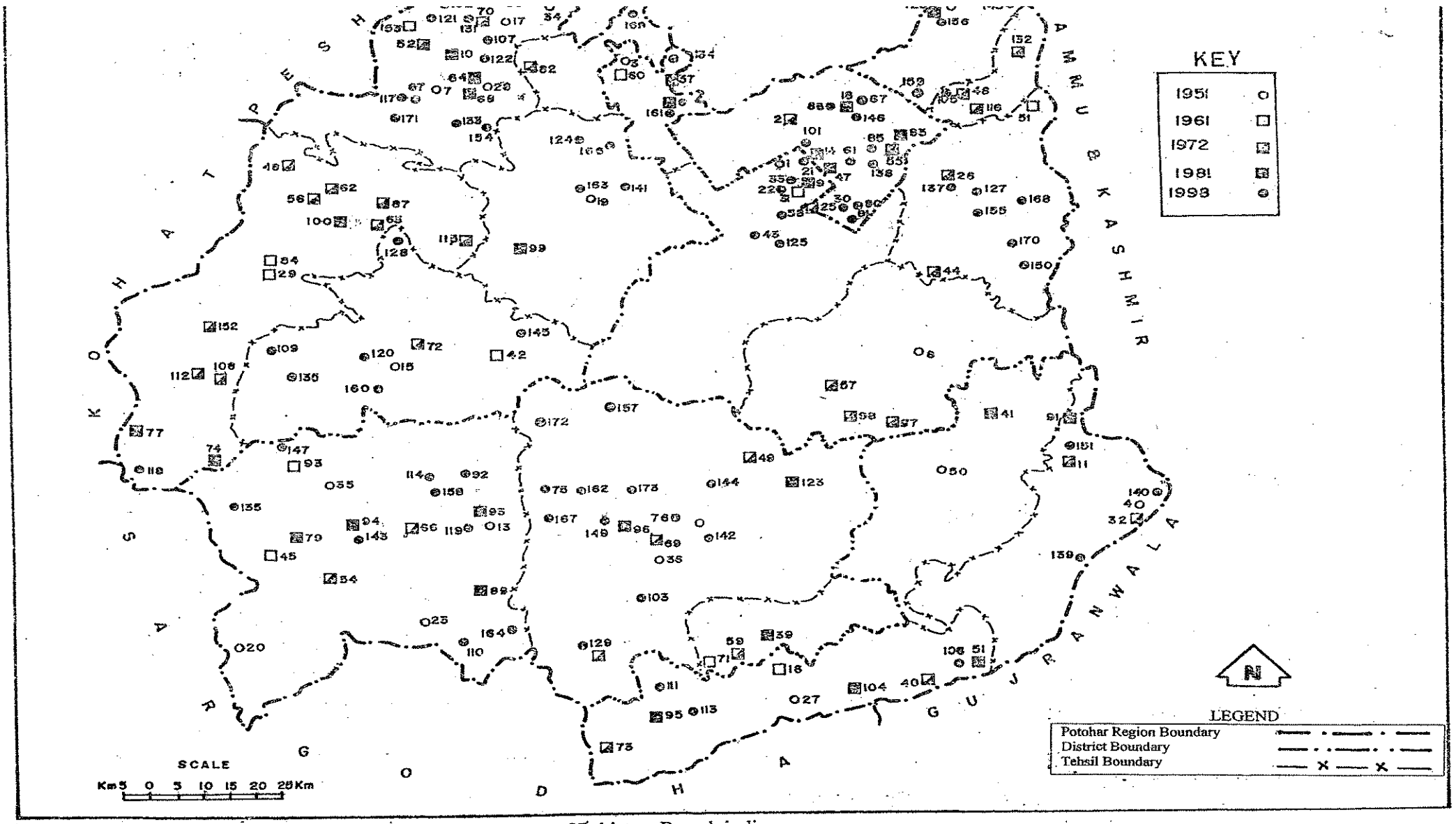
1951		1961		1972		1981		1998	
No.of Human Settlement	Population	No.of Human Settlement	Population	No.of Human Settlement	Population	No.of Human Settlement	Population	No.of Human Sample Settlement	Population
20	4,43,132	31	6,73,155	64	1,4,48,448	94	2,0,57,877	173	4,2,72,329

Source:-

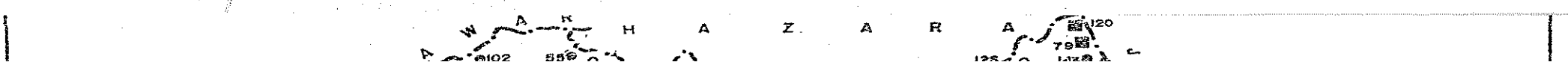
G.O.P., 1998 District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables No. 39 & 40 Population Census Organisation, Islamabad.



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1951-98) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.



9.1.10 NATURAL FACTORS OF HUMAN SETTLEMENT DISTRIBUTION

In the previous sections pattern of distribution of human settlement was described by using different measures. These measures show that the human settlement is unevenly distributed. In this sub-section we analyse the natural factors as they control or affect human settlement distribution in the region. These natural factors include drainage/source of water and climate of human settlement.

9.1.10.1 WATER AVAILABILITY

Availability of water throughout the year is a very important determinant of the location of human settlement, simply because water is a vital need of living beings. Thus we find a close correlation between the distribution of the main source of water and the human settlement distribution. The Potohar region is endowed with surface water-rivers, streams, nallahs, ground water wells, springs, etc. In Potohar both sources of water are utilized, but there is a different situation with respect to their availability in different parts of the region. On the whole, ground water is most preferred for drinking purposes, because surface streams are usually silted. In the mountainous Siwalik Hill tracts of Murree and Margalla hills, ground water is available in the form of springs while in the central plains and southern part of Potohar hand pumps and wells are used to obtain ground water. In the dry season water level of these wells goes down 15 to 20 meters (Michael Bunce, 1982). Due to insufficient supply of drinking water people of the Potohar have to depend upon the nearby streams and ponds in the summer and winter season.

Streams of the region are mostly seasonal-found in its northern and central parts, while the south-eastern part of Potohar has a few important streams. These streams join the Jhelum River. Main local rivers of this region are Soan and Haro which emerge from the southern slope of Murree hills and with their many other important tributaries, ie *Korang*, *Leh* and Sil, these streams join Indus river in the west of Talagang tehsil, Chakwal, district[3].

The drainage pattern of human settlement reveals the fact that human settlement is located mostly near to the rivers, streams, (Nallah, *Kass* and *Kassi*[4]). In the region local

Foot note:-

3 Tehsil, District and Province are set up of administrative unit.

4 Streams means Nallah, *Kass* and *Kassi*.

and important Soan and Hero rivers represent a dendrite drainage pattern, while in the Southern part of the region, there is a lack of surface water sources. That is why mostly human settlement are found where the ground water is available.

In the mountains and hilly track, the human settlement are not located necessarily near streams, tributaries. They are located where spring water is easily available. Mountainous/Hilly area receive large amount of rain and snow fall and therefore springs are charged through the years.

9.1.10.2 THE SOAN RIVER

The Soan rises just below Murree and runs the first five Kms of its course at a steep gradient down picturesque valley till it reaches the plain near Cherah. It cuts through the Narrar spur 833 Meters above sea level and 267 meters above the river level making very shrinking wild and rocky gorge one km in length at the eastern end of which is still to be seen the picturesque old Gahkkher Fort of Poharwala. This gorge divides Kahuta from the Islamabad/Rawalpindi tehsils.

The Soan river subject to very heavy flood, not only in the rainy season in July-August, but also in the winter rains of January and February and these floods prevent the construction of permanent irrigation work. The Soan banks are mostly low stretches on one side with cliffs on the other formed of sand stone and clay; and thick pebbles river deposits are common in its neighbourhood. It has many small tributaries but none of any great individual importance. The Soan drains a great part of the Murree, Kotali Sattian, Islamabad and Rawalpindi tehsils, a portion of Kahuta tehsil, the Western portion of Gujarkhan tehsil plain and the Southern portions of Fateh Jang, Jand and Pindi Gheb tehsils. Its principal tributaries are the *Khorang* nallah and Rawal nallah, rising in the hills of Murree and Kotali Sattian tehsils and the *Leh*-which rise in the Margala range and run in past Islamabad/Rawalpindi city.

9.1.10.3 THE HARO RIVER

The second main local river of Potohar is Haro, which originates from the Hazara hills near Khanpur and enters Rawalpindi across the Attock passing south of Attock and finally discharging its waters into the Indus. The bed of the river is generally stony.

9.1.10.4 *KANSHI* STREAM

Another important stream of this region is the *Kanshi* stream (Nalla) rising in the low hill of the Kahuta tehsil following past Kaller Sayyadian and out through a considerable portion of the Gujarkhan tehsil and finally discharging into the Jhelum river.

9.1.10.5 *KAHAN* AND *BUNHA* (NALLAH)

In the Potohar area the important seasonal streams are *Kahan* and *Bunha Sauj, Gabhir, Ankar* and other streams falling into the Soan and so to the Indus. These are all hill torrents which overflow after heavy rains and at other times remain practically dry.

9.1.11 CLIMATE AND HUMAN SETTLEMENT

Average annual rainfall of Potohar region is only 609 millimetres but in North East it is above 939 millimetres and in South West it remains only 381 millimetres annually (Muhammed Maqbool Bhatti, 1949). Murree-hilly area above 518 centimetres also receives snowfall in winter. Southern and North Western low laying areas are hot in summer and cool in winter, while hilly areas above 1,524 meters are moderately warm in summer and cold in winter.

These climatic differences have a great impact on human settlement distribution. The impact of climate is mostly indirect. Climate-especially rainfall, affects vegetation and agriculture, which in turn have a controlling effect on human settlement distribution.

Over 95 percent agriculture of this Region is *Barani* (dry farming) dependent on rain and ground water level also depends on the amount of rainfall. As far as climate is concerned, because of great amount of rainfall it is favourable in mountain hilly tracts for the dense human settlement distribution. Because of low temperature and high precipitation Potohar region is thickly vegetated and crops can also be profitably grown on the slopes. As we have seen in the human settlement density map mountain/hilly tracks and north east and north west have high human settlement density.

In the central part of the Potohar human settlement are more sparsely distributed, because of the lack of population holding capacity of this part due to its climate situation.

9.1.12 INFLUENCE OF HUMAN FACTORS DISTRIBUTION OF HUMAN SETTLEMENT

Relationship between natural factors and the human settlement distribution was analysed in the previous sections. The present section is aimed at analysing the influence

of historical cultural and economic factors in determining pattern of human settlement distribution.

According to (Michael Bunce, 1982) cultural factors are stronger than the natural factors in forming the pattern of human settlement. (Michael Bunce, 1982) says that cultural influences play perhaps the strongest role. The way in which society is organised, its ideals, its objectives and its traditions determine the form of human settlement organisation and the system of land division. This occurs through both institutional and individual decisions on whether this notion of the geographer is true or not in our region is yet to be decided on human factors include historical, political cultural, social and economic aspects of the society (Michael Bunce, 1982).

In some cases human settlement pattern is affected by one powerful influence at a particular span of time. At the same time population pressure and political ideology occur in particular regional and temporal contexts. These factors are so inter-related to each other, that no one can be said to be solely responsible for the human settlement.

9.1.13 ROADS AND TRANSPORTATION NETWORK

Transportation network plays an important role in socio-economic development. Without good transportation facilities no region/area can achieve any agro-industrial progress. Since very early period this region was on the main route of traders and invaders coming either from west or from the north proceeding to the sub-continent in the southeast. Potohar area also plays an important role of a halting station between the mountains hills areas of the north east and the vast plain southern parts of the Potohar region. Since very early period Potohar was on the main route of traders and invaders. During the Mughal period, Sher Shah Suri built the Grand Trunk Road. It passes through Attock, Kamra, Hasanabdal, Taxila, Rawalpindi, Gujarkhan, Sohawa, Dina and Jhelum. The region was also connected with the main Pakistan Railway line parallel to the main highway roads (G.T. Road). Attock and Rawalpindi were connected with Lahore city in 1867 (Robertson, 1887). Later on it was extended up to Peshawar. All important regional towns are linked with the provinces of Pakistan, through communication network National Highway (G.T. Road) and Motorway M-2 (Islamabad to Lahore). The international airport of Islamabad provides all these facilities to this region. These modern transportation facilities have brought revolution in the socio-economic life of Potohar. The region has remained on the main route of invaders and traders coming either from west or from the

north proceeding to the Sub-continent's South-east. On account of this flow of Population many settlement have been created along this route and flourished with the passage of time (Plate No. 9.4 & 9.5).

Table-9.8 gives over all pictures about the road density in the Potohar region taken as a whole and also district-wise. Over all road density of the region is 25 kilometers (per 100 km^2). While district Attock has 15 km per (100 km^2) minimum road density. Jhelum district is 33.3 km per 100 km^2. While highest (maximum) road distance is recorded in Islamabad, which is 72.5 kms (per 100 km^2) while Rawalpindi district also has 33.8 km density per 100 km^2. Table-9.8 gives a clear cut picture that more than half human settlement are located on the main transportation route lines. There is seen no direct link between the railway track and human settlement distribution, According to the table-9.8, per 100 km^2 density of Railway also varies from the average Railway density in the whole Potohar region are shown in (Map-9.6 & 9.7).

Table-9.8 Potohar: Road and Railway density by districts (1997-98)

Name of District	Area in km^2	Length of Road in Km.	Density of Road (per 100 km^2)	Length of Railway in Km.	Density of Railway per 100 km^2.
Attock	6,857	1,042	15.2	235	3.4
Rawalpindi	5,286	1,789	33.6	128	2.4
Jhelum	3587	1,196	33.3	137	3.8
Chakwal	6524	1,196	18.3	40	0.6
Islamabad	906	657	72.5	41	4.5
Potohar Region	23160	5,880	25.4	581	2.5

Source:-

1.G.O.P., 1998 Statistical Pocket Book of the Punjab table 152, Bureau of Statistics Lahore.
2.G.O.P., 2000 Surveyor General Guide map sector wise Survey of Pakistan Rawalpindi.
3.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 1, Population Census Organisation, Islamabad.

As will be seen in Table 9.9, as many as 63.6 percent of the selected human settlement are located within 0-2 km distance from the main road. This clearly highlights the impact of roads on the pattern of human settlement. As the distance from the main road increases the concentration of human settlement declines (Appendix-9.6). The longest distance from main road, is above 12 km, and at this distance only 2.9 percent of the 173 human settlement are located, which is the lowest concentration shown in Table-9.9.

Plate No 9.4: Road and Transport Network



Rawat Traffic Block Obstructing movement on National Highway

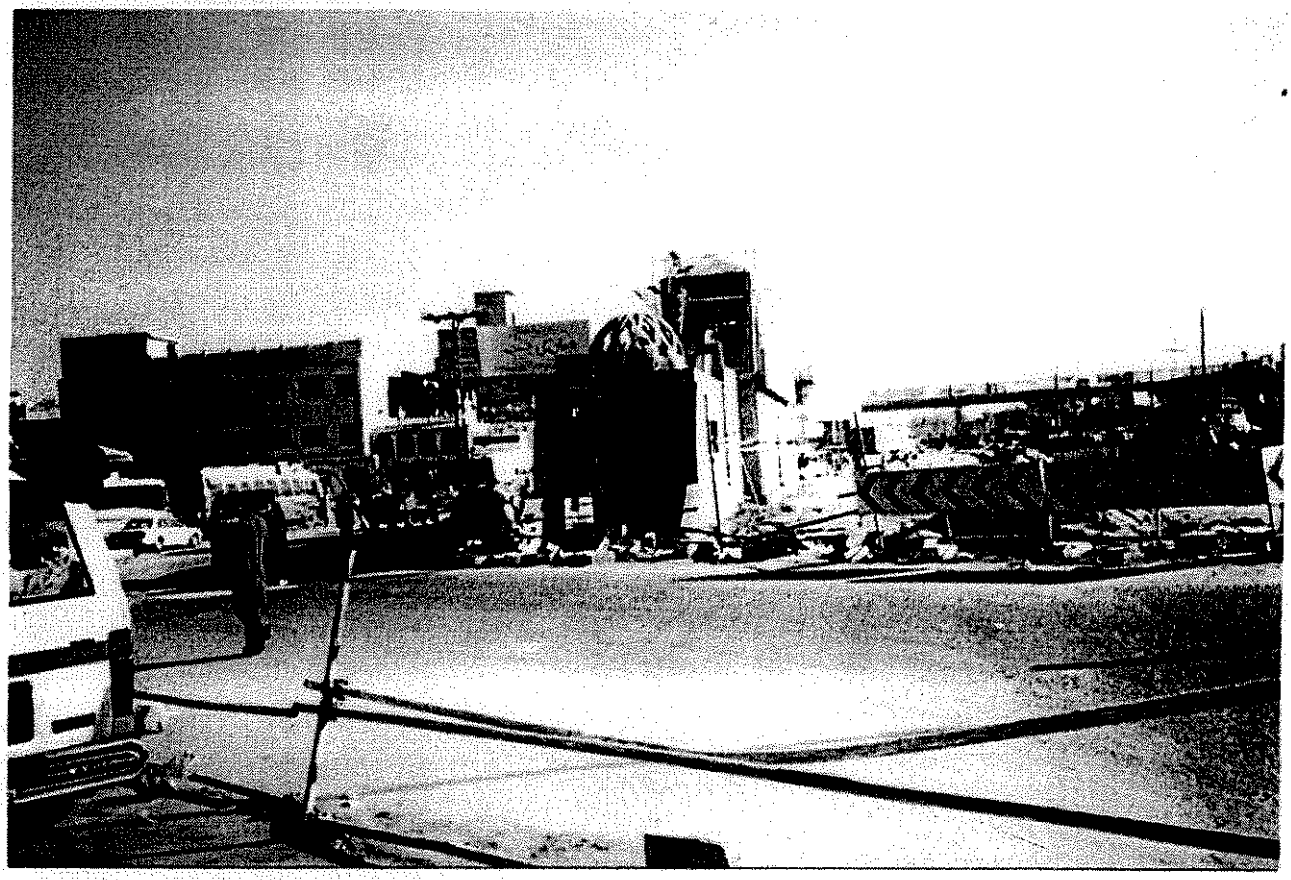


A view of main road Chakwal Settlement

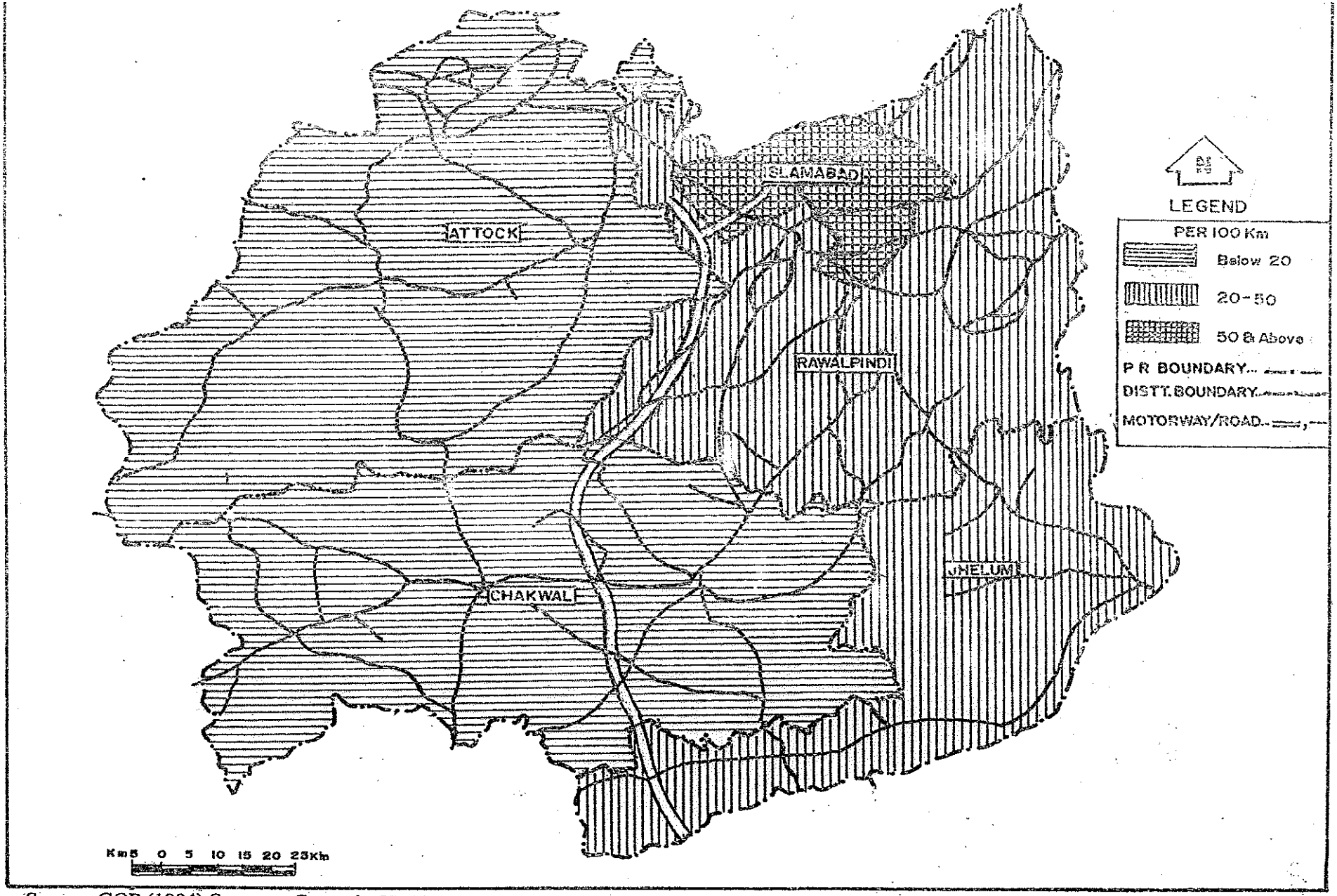
Plate No 9.5: Road and Transport Network Gujarkhan



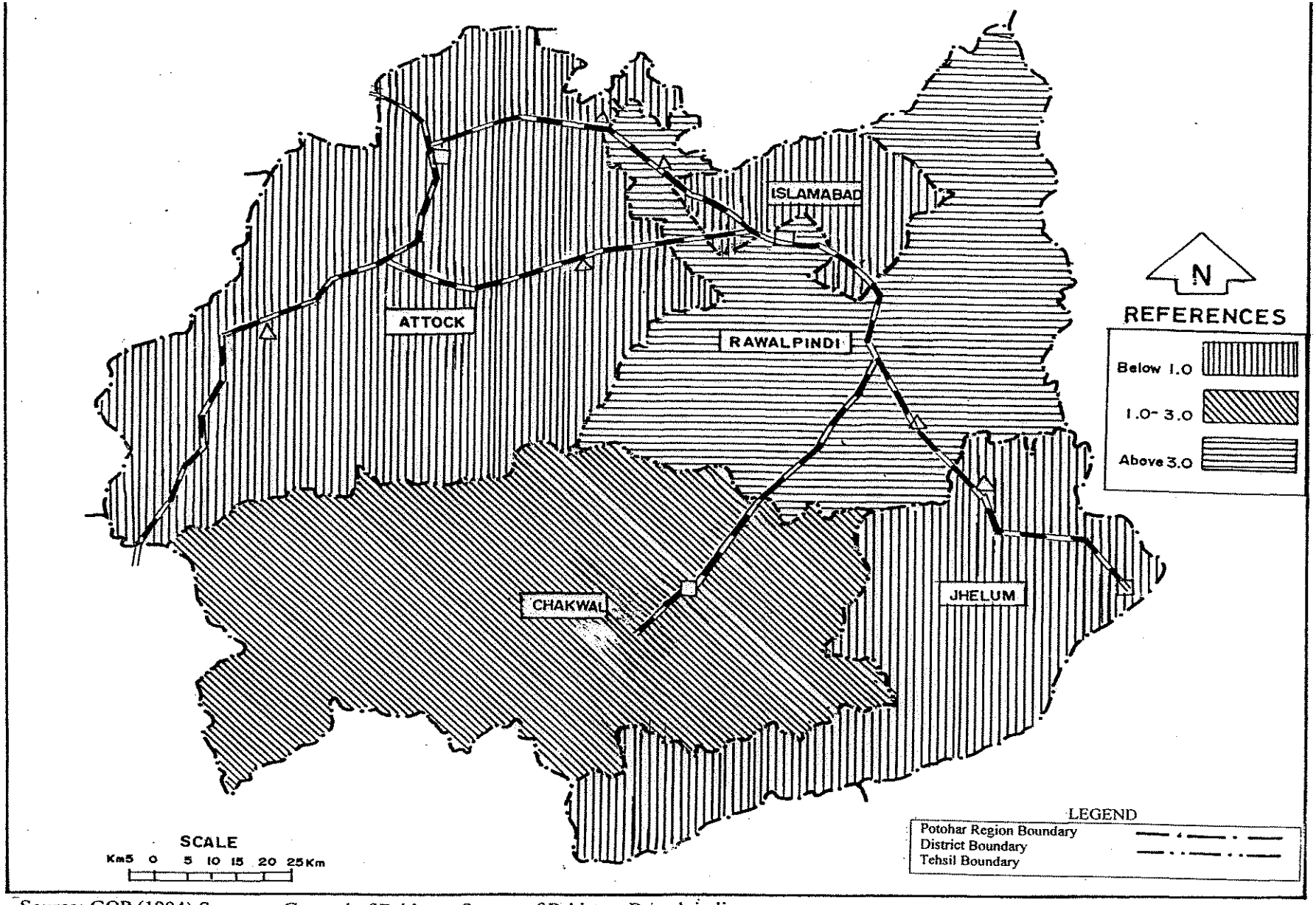
Construction work in progress on National Highway



Underpass construction work in progress near bus stop



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

DISTRICT (1998)

Table-9.9 Potohar: Distance of human settlement from main roads

Distance from the main road (in km)	Number of Human Settlement 1998	Percentage of Human Settlement
0 – 2	110	63.6
2 – 4	36	20.8
5 – 6	5	2.9
7 – 8	10	5.8
9 – 10	5	2.9
11 – 12	2	1.1
Above 12	5	2.9
Total	173	100.0

Source:-

1.Field Survey 1999-2000.

2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 39 & 40, Population Census Organisation, Islamabad.

9.1.14 PRODUCT MOMENT CORRELATION COEFFICIENT

Product moment correlation coefficient is a very important measure of correlation between two variables. Correlation may be positive or negative. For example between the amount of annual rainfall and the crop yields there is a strong association. Here association means that the fluctuations in the values were sufficiently regularly (though not invariably) matched to make it unlikely that this was a chance association. Correlation values ranges from + 1.0 that shows perfect positive correlation to -1.0 perfect negative correlations. If the association of two variables is at random the coefficient will be near 0. To find the product moment correlation coefficient the following formula was used:

$$r = \frac{i/nE\ (a-a)\ (b-b)}{Qa\ .\ Qb}$$

Source:- (R. Hammond & P.S.M.c Cullangh 1947).

where r is denoted correlation co-efficient a, b are two variables while a, b is obtained by the division of the number and pairs n. Qa & Qb are the standard deviations.

We will find the sum of variations from a & b dividing by the number of pairs. Then this correlation coefficient relation is divided by the product of two standard deviation. After computing the formula our result r is -0.71 which is near to perfect negative correlation (Appendix-9.6 & 9.7). This shows that there is negative correlation between the road distance and the number of human settlement in Potohar region and with the increasing distance from the road number of human settlement are decreased, detail is given in Table -9.8 & 9.9.

SECTION II

9.2 DENSITY OF HUMAN SETTLEMENT POPULATION

9.2.1 INTRODUCTION

This section is devoted to study of density of human settlement population, which is highlighting the spatial changes of the density of human settlement in 1951-1998 and projected population (2011-2021) by class size categories of human settlement of the Potohar region.

9.2.2 TWIN CITIES (RAWALPINDI AND ISLAMABAD)

The metropolitan cities of Rawalpindi and Islamabad are, taken together, a major centre of the Potohar. Due to location it is a leading centre of transportation in the region. Twin cities to act as a collecting and marketing centre of the Barani agriculture and agro industrial products of the Potohar, on the one hand, and distribution of goods from the leading developed parts of the country to the tributary demand area of the cities/towns, on the other hand. This link between human settlement cities/Towns and its surrounding areas make it an important urban centre in the structure of the Potohar region. The total area of the twin cities is about 326 km^2 and its population in 1998 was 1,938,948 persons, giving a population density of 5,955 persons per km^2. It is located at elevation from 500 to 600 metres above sea level.

9.2.3 POPULATION DENSITY IN 1998

The special structure of surrounding area has been studied in terms of population sample settlement density. This involved construction of map of Potohar at a scale of RF: 1:2, 50,000.

The 1998 census revealed on average a population density of 676 persons per Km^2 for the human settlement of Potohar. It reflects the magnitude of increasing strain on the regions limited resources. Similarly it points to the magnitude of efforts and resources required to arrest decline in standard of living and check the population slipping below poverty line. Among the six types of human settlement classified by size, class size 1st tops in terms of density with 5,955 persons per Km^2 followed by class size 2nd with 5,950 persons per Km^2. As can be seen in Table-9.10 & 9.11.

Table-9.10 Potohar : Population density of sample human settlement[5] by urban/rural 1998

Class size	Categories of Human settlement	Areas in Km^2	Population 1998	Population Density (person per km^2)
1st	Metropolitan	325.6	1,9,38,948	5,955
2nd	Large cities	58.2	3,46,283	5,950
3rd	Cities	85.9	2,79,218	3,250
4th	Large town	203.1	3,76,155	1,853
5th	Intermediate Town	1574.5	5,58,429	355
6th	Small Town	4079.6	7,79,296	191
Potohar all categories		6326.9	4,2,78,329	676

Source:-

1.Field Survey 1999-2000.

2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 39 & 40 Population Census Organisation, Islamabad.

Easily qualifies as one of the densely populated regions of Punjab province (Appendix-9.9) However, keeping in view the average population density, the following four types of density area may be recognised on (Map-9.8).

i) Area of highest density having of more than 5,950 person per km^2.

ii) Area of high density having more than 3,250 persons per km^2.

iii) Area of moderate density having 1,853 persons per km^2.

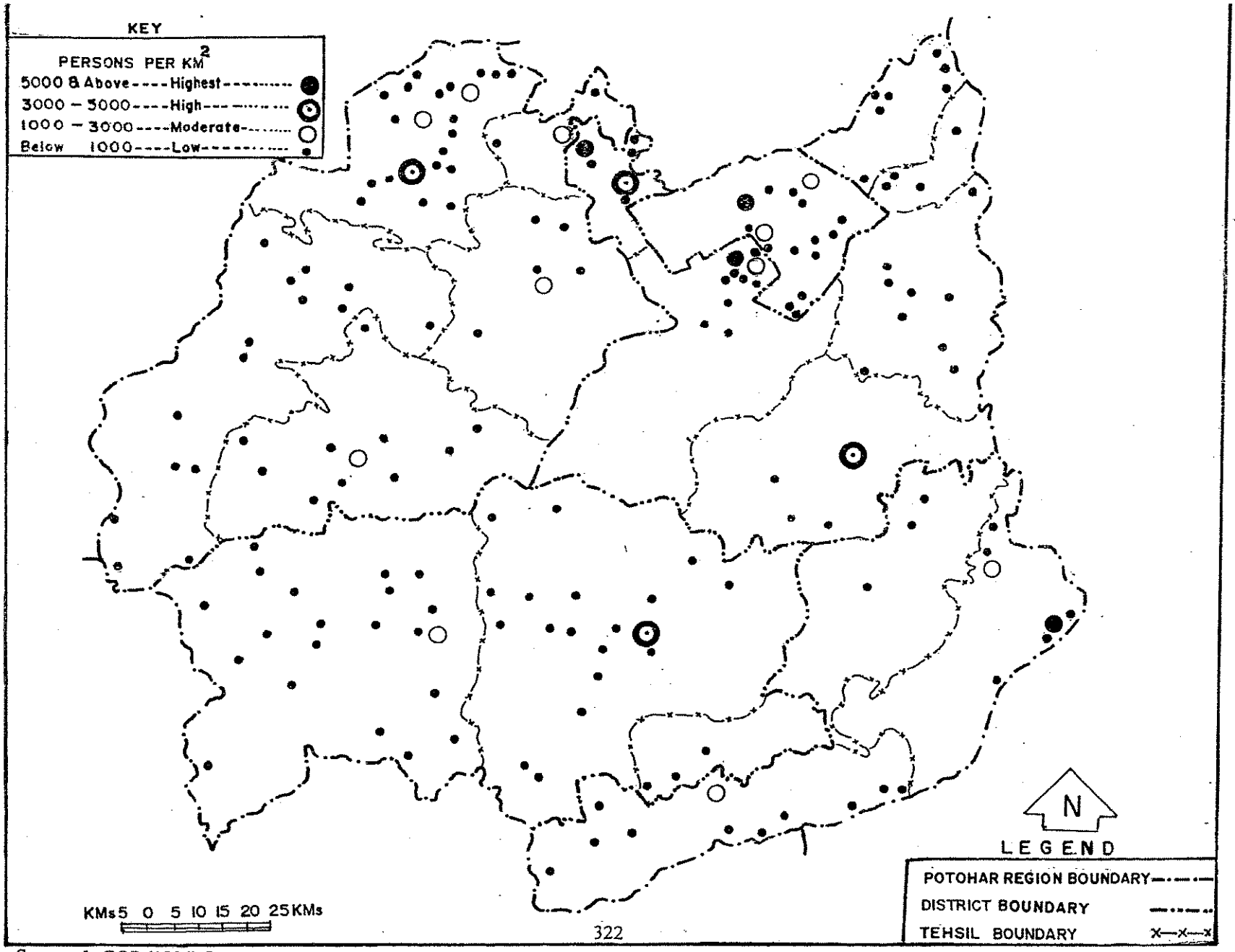
iv) Area of low density having less than 355 persons per km^2.

9.2.3.1 AREA OF HIGHEST DENSITY

Population density of more than 5,900 persons per km^2 was observed in over 8 percent of the total human settlement, in class I metropolitan cities Rawalpindi and Islamabad, class II large cities, although, in Wah, population density is recorded at 5,449 person per km^2 and Jhelum; population density out-come worked out 6,792 person per km^2. The density over here largely urban development have a resulted urban concentration of high order in both cities due to availability of cheap labour and employment opportunities are easily available, high density of these settlement is the a massive in-migration which in turn is explained by availability of growing employment opportunities and other pull factors in the area.

Foot note:-

5 Human settlement means sample area settlement consist of urban and rural area in the study area (Potohar).



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad

HUMAN SETTLEMENT BY CATEGORY WISE (1998)

9.2.3.2 AREA OF HIGH DENSITY

Density of more than 3,250 person per Km^2 was observed in over 6.5 percent of the total human settlement of Potohar. Cities falling in class-III are Chakwal, Taxila, Attock and Gujar Khan with population density (in 1998) of 4,473, more than 6,000, 6,197, 1,549 and 5,053 person per Km^2 respectively. These human settlement are belong to the old period. During the last 30 years they developed fact as a result due to rural population's migration to settled urban areas due to availability of employment opportunities and availability of basic services/facilities such as education, health, etc.

9.2.3.3 AREA OF MODERATE DENSITY

Moderate density of more than 596 to 1,850 persons per km^2 obtained, in 1998, in this category of human settlement. Class IV (Large towns) consists of Chaklala, Kamara, Dina, Hasanabdal, Talagang, Shekrial, Pindi-Ghib, Khewera, Hazro, Kot Hithial and Fateh Jang with population density of 7,566, 3,223, 5,463, 2,170, 4,721, 19,000, 532, 505, 1,097, 3,540 and 4,331 persons per km^2 in 1998 census respectively. These human settlement were transitional between the high and the low density area. More than 50 percent human settlement are located near to the national high way and motor-way (M-2) shown on (Map-9.10). The moderate densities are characteristic of the Potohar region, displaying moderate density of population.

9.2.3.4 AREA OF LOW DENSITY

In all there were 38 human settlement in category/class V intermediate towns consisting of nine urban settlement and twenty nine rural settlement. In this category the average population density was 355 persons per km^2 in 1998 census, shown on Table-9.10.

The lowest population density settlement has 191 persons per km^2. In class-VI the human settlement displays extremely low densities. They also suffer from serious low level of facilities i.e. education, medical services, scarcity of water, poverty, soil erosion, etc. Unevenness of concentration is the typical feature of Potohar population distribution.

Rapid and concentrated character of cities growth in study area; some urban centres continue to grow at a growth rates averaging about 5 percent annually. If population grew at present growth rate then their population will double almost every fourteen years; the metropolitan area of twin cities namely Rawalpindi-Islamabad population 1,410 thousands and 530 thousands respectively in 1998 census.

Declarations concerning the need for comprehensive planning to deal with this phenomenon abound but one finds remarkably little evidence of progress towards the application of such planning. Even national decisions of policy economic planners and physical planners continue to go their separate ways. Municipal legislation and administrative systems/become more complicated but are not reformed systematically. Programmes for regional planning intended to meet specific problems such as the universal housing, lack of shortage of facilities in human settlement of the rural areas, are embarked upon once irresistible pressure is built up, but without reference to either economic or physical regional planning criteria.

Integrated regional planning/development policy with multi sector could be the solution to address Islamabad and Rawalpindi, in order to reduce the gap between the rapid growing population and densely populated cities, with emphasis on creation of more job opportunities, in the study area. The peoples migration along with their family members to the cities will exert extra pressure on the existing cities infrastructure, housing other utilities and services. However, due to rapid development of the cities of Potohar region environmental repercussions are profound. The demand of sewage waste disposal, transportation and general utilities services increases, shortage of houses, fresh drinking water, problem of urban, industrial pollution waste generation and general congestion motor vehicle are some of the issues which need to be addressed by the government at all levels.

Population density has a dependable correlation with physical and cultural factors like rainfall, soil irrigations, food resources employment and other socio-economic activities. In the Potohar region human settlement population density of 73 person per Km^2 was recorded in 1951, 111 person per Km^2 in 1961, 229 person per Km^2 in 1972, 348 person per Km^2 in 1981 and 676 person per Km^2 in 1998.

9.2.3.5 PROJECTED POPULATION AND DENSITY

By the year 2011 the average density of 1,228 persons per Km^2 is projected for the region. Was against shown in table 9.11. An addition of 430 persons to each per Km^2 area of the region in a short span of a decade is really alarming. This ultimately will put huge stress on the environment of the Potohar, are already grown beyond their carrying capacities.

Table-9.11. Potohar Region: Population density of human settlement 1951–1998 and projected density of 2011 & 2022

Name of Area	1951			1961			1972			1981		
	Area in km^2	Pop.	Density persons per km^2	Area in km^2	Pop.	Density persons per km^2	Area in km^2	Pop.	Density persons per km^2	Area in km^2	Pop.	Density persons per km^2
Potohar region	**1,192**	**4,43,132**	**372**	**1623.3**	**6,73,155**	**415**	**3680.9**	**1,4,48,448**	**393**	**4495.4**	**2,0,57,877**	**458**
				Projected Population Density								
Name of Area	1998			2011			2022					
	Area in km^2	Pop.	Density persons per km^2	Area in km^2	Pop.	Density persons per km^2	Area in km^2	Pop.	Density persons per km^2			
Potohar region	**6326.9**	**4,2,72,329**	**676**	**6225.3**	**7,6,48,011**	**1,228**	**6179.2**	**13,4,10,465**	**2,170**			

Source:-

1.G.O.P., 1951-81 Population of *mauzas* District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 39 &40, Population Census Organisation, Islamabad.

Although rural to urban migration is not the only nor necessarily the main cause of urban population increase in the region, it is often singled out as the main contributor to urban population pressure problems.

9.2.4 HUMAN SETTLEMENT DENSITY 1998

Human settlement[6] density was computed for each class of cities/towns shown on (Map-9.9) and the result are shown in table-9.11.

Table-9.12 Potohar: Human settlement density 1998

Class size	Areas in km^2	Nos. of Human settlement	Human settlement density per km^2
1st	325.6	2	0.01
2nd	58.2	2	0.03
3rd	85.9	4	0.05
4th	203.1	11	0.05
5th	1574.5	38	0.02
6th	4079.6	116	0.03
All classes Potohar	6326.9	173	0.03

Source:-

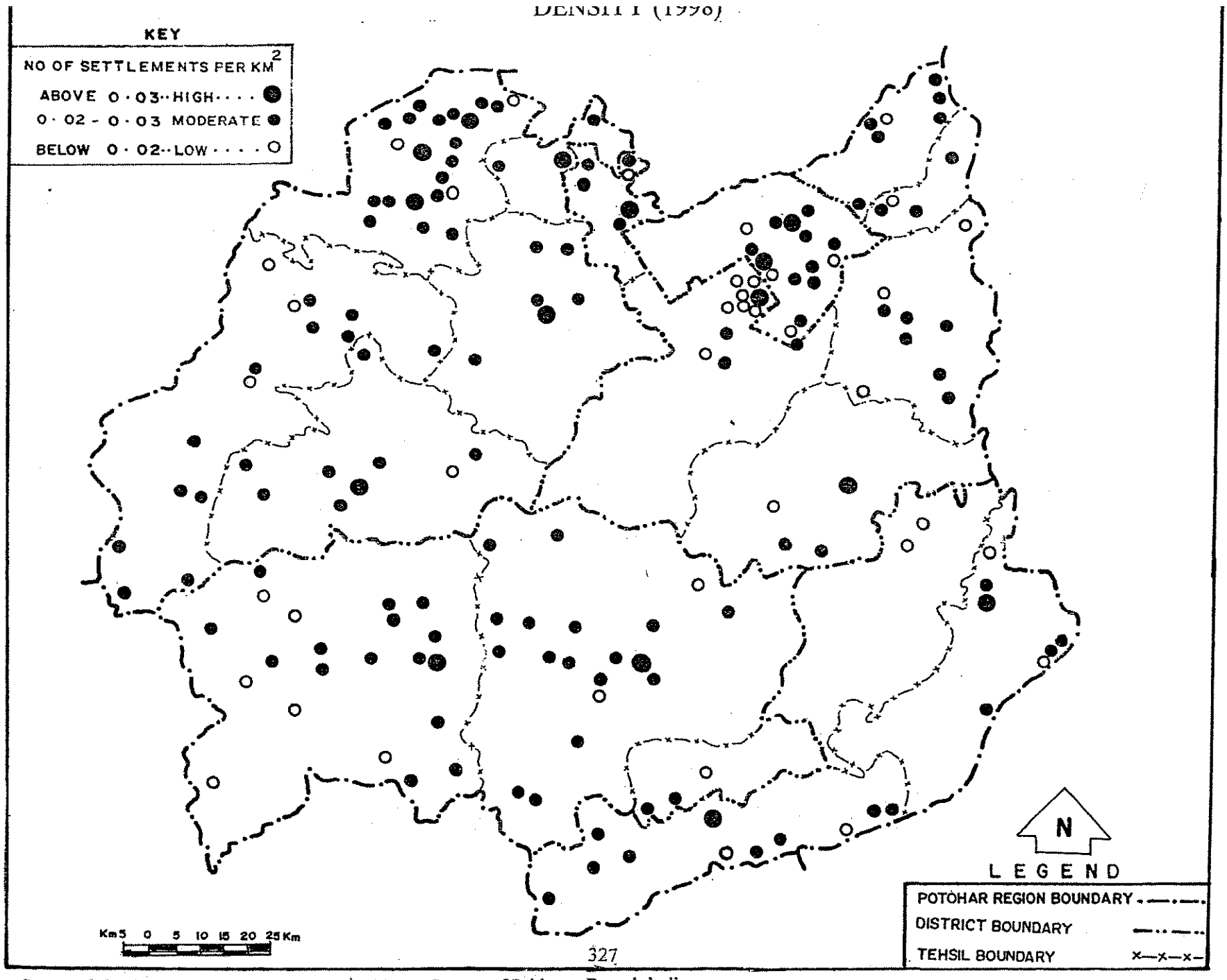
1.Field Survey 1999-2000.

2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 18, 39 & 40 Population Census Organisation, Islamabad.

The overall human settlement density is $0.03/km^2$. It is the lowest in class-I, (metropolitan) human settlement ($0.01/km^2$) and the highest ($0.05/km^2$) in class III & IV, human settlement are shown (Appendix-9.10). These latter classes comprise cities, large towns of the Potohar Region and have been growing in number due to in-migration and a lot of socio-economic pull factors.

Foot note:-

[6] Human settlement (173) means sample villages/*mauzas*/area are selected having population 5,000 and above in 1998 census.



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

MAP 9.9 POTOHAR REGION: HUMAN SETTLEMENT DENSITY (1998)

SECTION III

9.3 DENSITY GRADIENT AND POPULATION POTENTIAL

The city of Rawalpindi due to its location, is a leading centre of transportation, circulation and interaction in the region. This has led the city to act as a collecting and marketing centre of the agricultural and industrial products of the region one the one hand and distribution of goods from various parts of the country to the tributary areas of the city on the other. Rawalpindi city in particular central position bith economically and socially with in the whole region.

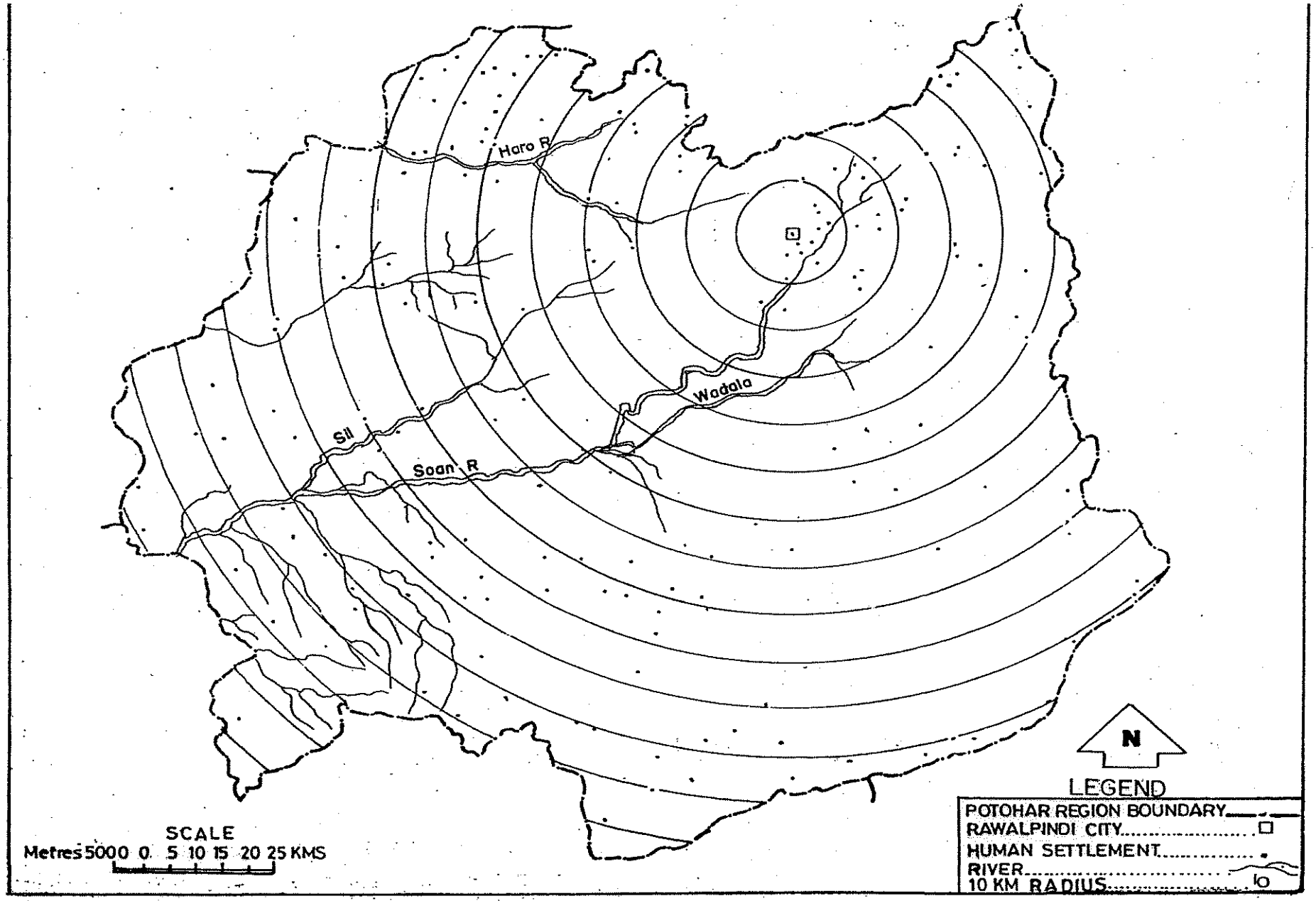
9.3.1 INTRODUCTION

An attempt has been made in this section to study the gradient population density around metropolitan city in the Potohar region, human settlement density, population potential of human settlement and proposed growth poles. It is based on the analysis of high services within the category or exceptional human settlement (of high score) in the area of low ranking category.

9.3.2 GRADIENT POPULATION DENSITY AROUND METROPOLITAN CITY IN THE POTOHAR REGION

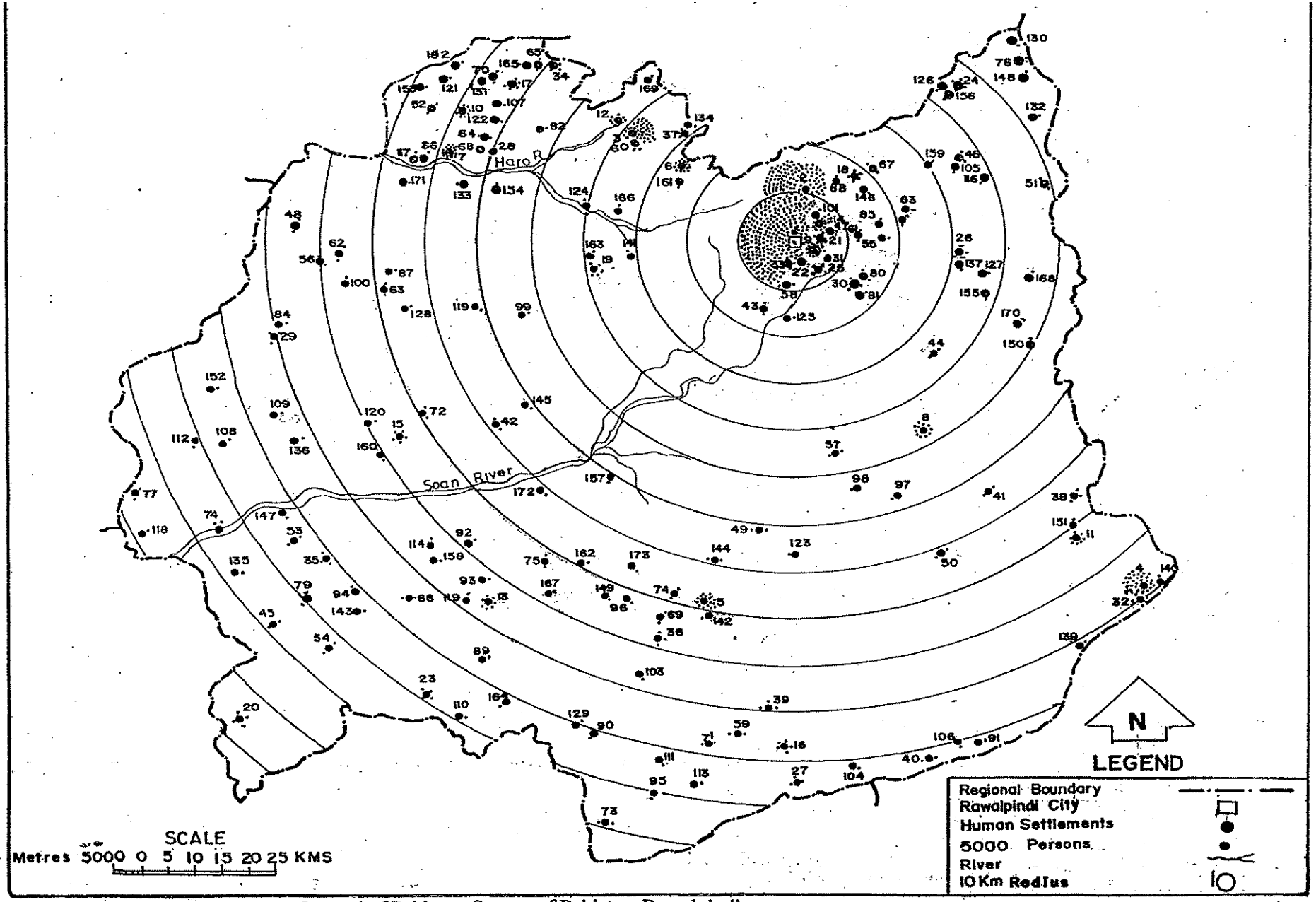
The central city of Rawalpindi, due to its regional topographical formation of land and location, is a leading center of transportation network. It connects the tributary area with each other and area near the rest of the country. It is the region's administrative headquarters, the regions centre of trade and commerce, and the major centre of military service. This main central link between the Cities/Towns and its surrounding areas makes it important to study, the structure of the Potohar Region around the city and impact of city location on this structure. The spatial structure of the surrounding areas has been studied in terms of population density, human settlement density and intensity of cultivated land. The methodology adopted involved construction of map on scale of RF.1:2,50,000 of Potohar Region showing the distribution of population, human settlement and cultivated land density. Concentric circular/zones at the interval of ten Km's radius were drawn around the metropolitan city on these (Maps-9.10- 9.12) and respective analysis of gradients have been given in tabular form.

It can be seen from the (Map-9.10) that there are fifteen concentric zones drawn around the Metropolitan city. The cultivated land analysis is based on the concentric



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

RAWALPINDI CITY (1998)



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

GRADIENT (HUMAN SETTLEMENT) FROM RAWALPINDI CITY (1998)

circular/Zones interval in Km's. The area, population and densities of population of these circular/zones are given in the Table-9.13.

Table-9.13 Potohar Region: Population density (gradient) around Metropolitan Rawalpindi City 1998

Concentric zones around Rawalpindi (in Km)	Area (in Sq.Km)	Population 1998	Population Density
0-10	170.9	1,6,18,000	9467.52
10-20	395.2	6,43,000	1627.02
20-30	106.6	1,29,000	1210.13
30-40	227.8	3,19,000	1400.35
40-50	189.6	1,81,000	954.64
50-60	178.4	75,000	420.40
60-70	496.0	2,91,000	586.69
70-80	441.1	2,09,000	473.81
80-90	568.3	1,64,000	288.57
90-100	458.1	2,95,000	643.96
100-110	276.3	81,000	293.15
110-120	1828.2	1,83,000	100.09
120-130	498.5	53,000	106.31
130-140	151.4	15,000	99.07
140-150	340.5	22,000	64.61
Potohar Region	6326.9	4,2,78,000	676.16

Source:-

1.Field Survey 1999-2000.

2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 39 & 40 Population Census Organisation, Islamabad.

The over all gradient/slope of the population density has been worked out with the help of regression coefficient expressed by the formula:-

$$Y = a + bx$$

Where y = the sum of population densities

x = the sum of distances

a = constant

b = gradient of slope

Source:- Sher Muhammad, 2003Introducation to Statistical Theory Illmi Kitab Khana Urdu Bazar Lahore Part I, p. 422.

Using the above formula, the over all density gradient or slope calculated comes out to be –1.32. The negative value of "b" shows that the population density is inversely

proportional to distance from the point of origin-the Rawalpindi Metropolitan City. Due to uneven distribution of population, human settlement density and population density have been further discussed and analysed by fixed and chain based as given in Table-9.14. (Appendix-9.11 & 9.12). The relative changes in density by circular zone drawn at ten kms interval from Metropolitan Rawalpindi city have also been analysed, using both fixed base and chain base methods, by using the following formula:-

9.3.2.1 FIXED BASED

$$X_n = \frac{P_n}{P_i} \times 100$$

Where X_n = gradient

P_i = population density of the central zone

P_n = population density of nth zone

However contrary to the fixed based method which compares the population density of all circular/zones with central circle/zone, the chain base method compares the density of each circular/zones with its respective inner circular/zones e.g. zone 2nd with zone 1st, zone 5th with zone 4th zone, 6th with 5th and so on the 15th zones. It is calculated as in Table-9.14.

9.3.2.2 CHAIN BASED

$$X_n = \frac{P_n}{P_x} \times 100$$

Where P_n = population density of the nth zone

P_x = population density of zone that fall inside the nth zone

The results obtained from the use of above methods have been shown (Appendix-9.11), Table-9.14.

Table-9.14 Potohar Region: Comparative density gradients around Rawalpindi metropolitan city by fixed based and chain based method in 1998

In concentric circular zone around Rawalpindi City (in Kms)	Population Density	Comparative gradient by fixed based index method	Comparative gradient by chain based index method
0-10	9467.52	100.0	100.0
10-20	1627.02	17.2	17.2
20-30	1210.13	12.7	74.3
30-40	1400.35	14.7	115.6
40-50	954.64	10.0	68.1
50-60	420.40	4.4	44.0
60-70	586.69	6.1	139.5
70-80	473.81	5.0	80.7
80-90	288.57	3.0	60.9
90-100	643.96	6.8	223.1
100-110	293.15	3.0	45.5
110-120	100.09	1.0	34.1
120-130	106.31	1.1	106.2
130-140	99.07	1.0	93.1
140-150	64.61	0.6	65.2

Source:-

G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 39 & 40 Population Census Organisation, Islamabad.

The analysis indicates that there is an obvious spatial relationship between the human settlement population densities and distance from the centre of Rawalpindi Metropolitan City. The densities gradually descend as one moves out from the central circle/zone as given in Table-9.14.

These changes in the population densities around Metropolitan Rawalpindi City can be attributed to several factors. The two main important factors among others are the human settlement density and intensity of cultivated land. Therefore, in the onward spatial analysis gradient of human settlement density and intensity of cultivated land has been related to the gradient of population density.

9.3.3 POTOHAR: SAMPLE HUMAN SETTLEMENT DENSITY

The analysis of the density of human settlement around, the Metropolitan City of Rawalpindi is undertaken in the section (Appendix-9.11). The human settlement density was computed from each circle/zone as can be seen from the (Map-9.10) and analysis results are given in Table-9.15.

Table-9.15 Potohar Region: Settlement density around Metropolitan city Rawalpindi – 1998

Sr.No.	Circular/zones Rawalpindi City (in Kms)	Area (in Km^2)	Number of sample village (Settlement) in 1998	Sample village (Settlement) Density
1.	0-10	170.9	11	0.06
2.	10-20	395.2	12	0.03
3.	20-30	106.6	7	0.06
4.	30-40	227.8	14	0.06
5.	40-50	189.6	13	0.06
6.	50-60	178.4	10	0.05
7.	60-70	496.0	22	0.04
8.	70-80	441.1	18	0.04
9.	80-90	568.3	14	0.02
10.	90-100	458.1	14	0.03
11.	100-110	276.3	8	0.01
12.	110-120	1828.2	21	0.01
13.	120-130	498.5	6	0.01
14.	130-140	151.4	2	0.00
15.	140-150	340.5	1	0.02
All circles of the Potohar Region		6326.9	173	0.02

Source:-

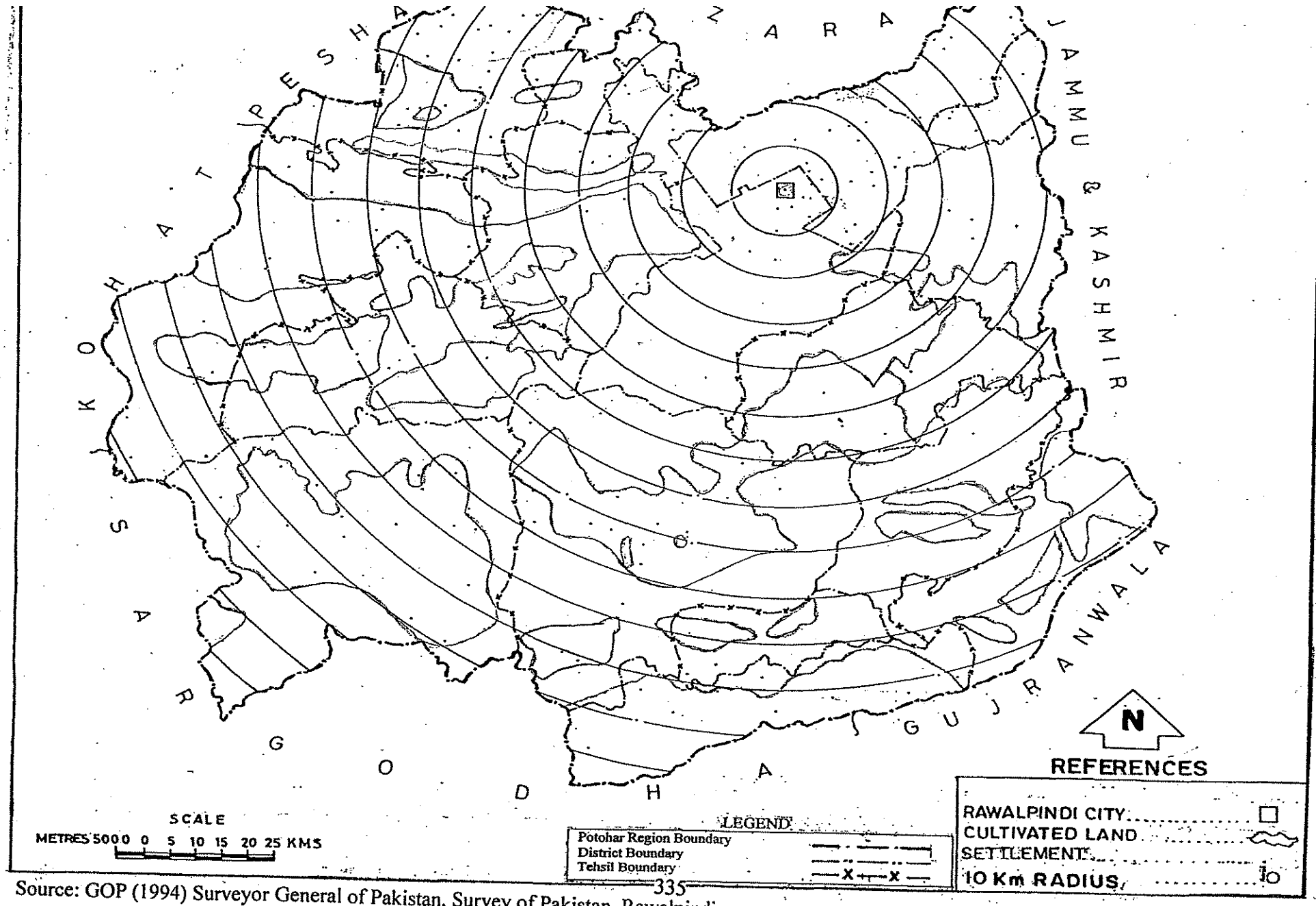
1.Field Survey 1999-2000.

2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 39 & 40 Population Census Organisation, Islamabad.

It can be seen that like population, the human settlement density also declines as one moves away from Rawalpindi city up to 2nd zone. The highest density human settlement of 1st 3rd 4th and 5th circular zone. The pattern is disturbed in 5th circular zone and then gradually decreases. The low density of the 11th 12th 13th 14th circular zone is due, to concentration of a number of human settlement and areas.

9.3.4 POTOHAR: DENSITY GRADIENT OF CULTIVATED LAND

The gradient intensity of cultivated land from Rawalpindi Metropolitan City has been worked-out in table 9.16 & 17, and compared with the density gradients shown on (Appendix-9.11). The analysis is based on the same concentric zones/circular in the table 9.16. The proportion of cultivated land in total area (percentage) as well as the population/cultivated density has been calculated from all the circular/zones are shown on (Map-9.12).



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

Potohar region cultivated land decreases away from the central zone till one reaches the 5th zone beyond, which it gradually descends due to variation of population in the various zones. There is also uneven variation of population land densities.

Table-9.16 Potohar Region: Cultivated land around Rawalpindi Metropolitan city 1998

Inconcentric zone around Rawalpindi (in Km)	Cultivated land acres 1998	Proportion in cultivated land in total acres in percentage	Population 1998	Sample Villages Population cultivated land density
0-10	10,442	1.7	1,6,18,317	155.0
10-20	22,399	3.8	6,43,386	28.7
20-30	10,509	1.8	1,29,501	12.3
30-40	33,815	5.7	3,18,772	9.4
40-50	23,704	4.0	1,80,994	7.6
50-60	27,329	4.6	75,050	2.7
60-70	46,547	7.8	2,91,316	6.3
70-80	63,409	10.6	2,08,698	3.3
80-90	72,232	12.1	1,63,530	2.3
90-100	58,996	9.9	2,94,572	5.0
100-110	36,336	6.1	80,902	2.2
110-120	1,02,269	17.1	1,82,654	1.8
120-130	51,663	8.6	53,416	1.0
130-140	10,598	1.8	14,759	1.4
140-150	26,590	4.4	22,480	0.8
Potohar Region	5,96,838	100.0	4,2,78,329	7.2

Source:-

1.Field Survey 1999-2000.

2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 39 & 40 Population Census Organisation, Islamabad.

It is apparent that the amount of cultivated land high increase away the central zone (Rawalpindi) till one reaches the 1st zone beyond which it gradually decline. Due to variation of population in the various zones, there is also variation in the population/cultivated land densities (Appendix-9.11). The population/cultivated land densities have been further analysed by using fixed and chain based methods and the analysis results are shown Table - 9.17.

Table-9.17 Potohar Region: Density gradient Around Rawalpindi Metropolitan City 1998

Inconcentric circular zones around Rawalpindi (in Km)	Population/Cultivated land density (persons per acres)	Comparative gradient by fixed based method	Comparative gradient by chain based method
0-10	155.0	100.0	100.0
10-20	28.7	18.5	18.5
20-30	12.3	7.9	42.8
30-40	9.4	6.1	76.4
40-50	7.6	4.9	80.8
50-60	2.7	1.7	35.5
60-70	6.3	4.1	23.3
70-80	3.3	2.1	52.4
80-90	2.3	1.5	69.7
90-100	5.0	3.2	217.4
100-110	2.2	1.4	44.0
110-120	1.8	1.2	81.8
120-130	1.0	0.6	55.5
130-140	1.4	0.9	140.0
140-150	0.8	0.5	57.1

Source:-

1.Field Survey 1999-2000.

2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 39 & 40 Population Census Organisation, Islamabad.

The table indicates that there is variation in population/cultivated land density. This variation has been compared with the gross density gradients of population, human settlement densities and proportion of cultivated land by each zone as shown in the Table-9.18.

Table-9.18 Potohar Region: Gross density gradient and proportion of cultivated land Around Metropolitan City Rawalpindi 1998

In concentric zone around Rawalpindi city (in Km)	Gross population Density	Gross Human Settlement Density	Proportion of cultivated land in total (in percent)
0-10	9467.52	0.06	1.7
10-20	1627.02	0.03	3.8
20-30	1210.13	0.06	1.8
30-40	1400.35	0.06	5.7
40-50	954.64	0.06	4.0
50-60	420.40	0.05	4.6
60-70	586.69	0.04	7.8
70-80	473.81	0.04	10.6
80-90	288.57	0.02	12.1
90-100	643.15	0.03	9.9
100-110	100.09	0.01	6.1
110-120	106.31	0.01	17.1
120-130	99.07	0.01	8.6
130-140	64.61	0.01	1.8
140-150	676.16	0.00	4.4

Source:-

1.Field Survey 1999-2000.

2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 39 & 40 Population Census Organisation, Islamabad.

The analysis in table 9.18 suggests some close relationship between population density, settlement density and intensity of cultivated land for all the zones/circles around the Rawalpindi metropolitan city. The precise correlation between these variables have been shown in (Appendix-9.11), Table -9.19.

Table-9.19 Potohar: Correlation values between Density Gradients Around Rawalpindi Metropolitan City - 1998

Density/Intensity	Population density	Cultivated Land ratio	Human settlement density
Population density	1	–	–
Intensity of cultivated land	0.14	1	–
Humane settlement density	0.06	1.74	1

Source:-

Sher Muhammad Chuadery,1982 Introduction to Statical theory Illmi Kitab Khana urdu bazar Lahore, pp. 197-207.

The table 9.19 indicates a much closer relationship between human settlement density and intensity of cultivated land compared with other variables.

The F test (Sher Muhammad Chaudhry, 1982) used for finding the significance of correlation between the variables revealed the results are shown in (Appendix-9.8, 9.14, 9.15), table-9.15.

Table-9.20 Potohar: F Calculated values for correlations between density gradients around Rawalpindi Metropolitan City – 1998

Sr.No.	Population Density	Cultivate Land Ratio	Human Settlement Density
Population density			
Cultivated land ratio	2.43		–
Human settlement density	3.52	2.29	–

Source:-
G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 39 & 40 Population Census Organisation, Islamabad.

These calculated values have been compared with F tabulated values of 4.96 and 0.4 at –01 (1,10) and 5 (1,10) levels of significance respectively (Sher Muhammad Chaudhry, 1982). The large value of F (75.91) suggests that the human settlement density and intensity of cultivated land are much more highly correlated than the rest of variables.

9.3.5 POPULATION POTENTIAL

The study of population potential of human settlement provides insight into the spatial activity pattern in the context of potential surface, which are an important tool in the scientific analysis of a real distribution. It is also a valuable basic indicator of Geographical variations of socio-economic phenomena and can also serve as a main tool in various types of development planning and rational allocation of resources.

The concept of population potential was introduced to the geographers for the first time by (Johan Q. Stewart, 1947) a physicist by training some 28 years ago. (Preston E.James, 1931 & 1954) study recognised the importance of "Challenging" paper of Stewart, 1947 as a device for uncovering some kind of theoretical order in the processes leading to the distribution of people. Stewart, presents three primary concepts based on Newtonian physics. Following the formula for gravitational force, Stewart defines demographic force as a constant times the product of two masses divided by the square of the distance separating the masses (Johan Q. Stewart, 1947 and W. Warntz, 1966).

The human settlement population potential is the measure of the nearness of people to a human settlement. It can also be calculated as measure of general accessibility or as a measure of human influence at a different distance.

In population potential, the accessibility is inversely proportional to distance (John I. Clerk, 1969). The population potential has no special direction and is, therefore, a scalar quantity. At a given human settlement. The sum of the reciprocals of the distance of all the human settlement from the human settlement. With the help of population potential, the discrete distributional data is generalised by converting it, at an abstract level, into a continuous distribution. The highest potential of a human settlement indicates the core of activity of a human settlement. The population potential PJ of a human settlement, "J" is calculated by the following formula.

$$E^N \quad \frac{Mi}{d_{ij}}$$

Source:- John I. Clerk, 1969 Population Geography, Pergammon Press Ltd, Headington Hill Hall Oxford 4 & 5, Fitzory Square London w.1- p. 30.

where M_i is the population potential at the ith (human settlement). (i=1(i=1,2,3,4.....N) and dij is the distance between human settlement i and jth.

The population potential p_j of a human settlement can also be calculated by the following formula which is an adoptation of the above formula:

$$Pj = \sum_{i=1}^{n} \frac{(Pi)}{(ri)}$$

OR

$$Pj = \frac{Pi}{ri} + \frac{P_2}{r_2} + \frac{P_3}{r_3} \ldots\ldots \frac{P_n}{r_n}$$

Source:- Usman Ali, 1987 settlement Swat Unpublished Ph.D. thesis department of geography university of Peshawar, pp. 206-213.

This technique has been used to analyse the spatial interaction population potential of human settlement in the Potohar region.

For this purpose a generalised accessibility matrix was prepared for the urban & rural human settlement having population 15,000 & above in 1998 census, which are linked with roads. The population potentials for thirty eight human settlement have been selected and calculated detail is given (Appendix-9.16-9.18), in while the isopleths of potential (equipotential lines) have been shown in Table-9.21.

Table-9.21 Potohar: Potential population

Sr. No.	Name of human settlement	Population 1998	Population[7] Potential
1	Rawalpindi	1,409,768	3,815,179
2	Islamabad	529,180	967,245
3	Wah	198,891	495,964
4	Jhelum	147,392	472,727
5	Chakwal	80,508	103,733
6	Taxila	71,882	210,852
7	Attock	69,729	149,533
8	Gujar Khan	57,099	114,446
9	Chaklala	49,937	486,506
10	Kamra	39,005	120,935
11	Dina	38,790	91,902
12	Hasanabdal	37,976	200,538
13	Talagang	37,766	62,462
14	Shakrial	34,335	480,737
15	Pindi Gheb	29,850	70,124
16	Khewra	27,826	67,118
17	Hazro	27,426	94,629
18	Kot Hathial	27,258	185,304
19	Fateh Jang	25,986	100,941
20	Lawa	22,480	32,495
21	Khana Dak (R)	21,768	394,172
22	Chak Jalal Din	21,652	317,032
23	Thua Mahuram Khan	21,447	40,156
24	Murree	21,375	66,262
25	Kota Kalan	21,357	303,728
26	Kahuta	19,207	100,126
27	P.D.Khan	18,766	54,764
28	Mirza	17,854	103,053
29	Jand	17,284	43,516
30	Hummak	16,309	161,044
31	Morgah	16,143	440,210
32	Saeelah	16,093	152,059
33	Ghurgushti	14,730	95,505
34	Mangala	13,848	67,381
35	Choa Saidan Shah	13,418	54,628
36	Sohawa	12,708	64,803
37	Daultala	10,051	76,386
38	Sanjwal	9106	90,655

Source:-

G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi tables 1, 39 & 40 Population Census Organisation, Islamabad.

Foot note:-

7 Population Potential for 38 human settlement (Urban and rural settlement) having population 15,000 and above are selected according to the census1998.

The results of potential surface indicate a highly localised spatial activity with most of the interaction concentrated at a few privileged human settlement. Rawalpindi city due to its locational advantages as a central point and its functional characteristics has the highest population potential in the area and is, therefore, maintaining a highest order of spatial activity around itself. Away from Rawalpindi the spatial activity means (population potential) decreases and a stage is reached where the spatial activity is the lowest beyond which there is no spatial interaction (Plate No. 9.6).

The population potential or spatial activity pattern in Potohar is largely influenced by resource distribution/availability, physical and socio-economic environments. The physical environment of the hilly part (Northeast) has resulted lack of an efficient transportation system which has consequently reduced the spatial interaction, seen on (Map-9.13).

Variation in the socio-economic environment of the Potohar region has caused variation in the distribution and densities of population which has greatly influenced, the spatial interaction are shown on (Map-9.14).

Potohar region map it is apparent that density of population varies which is due to variation in relief and the availability of resources. The highest densities are concentrated to the lower middle Potohar region, owing to the large amount of *Barani* agricultural land and developed means of roads transport network and modern telephonic (mobile) system of communication technology.

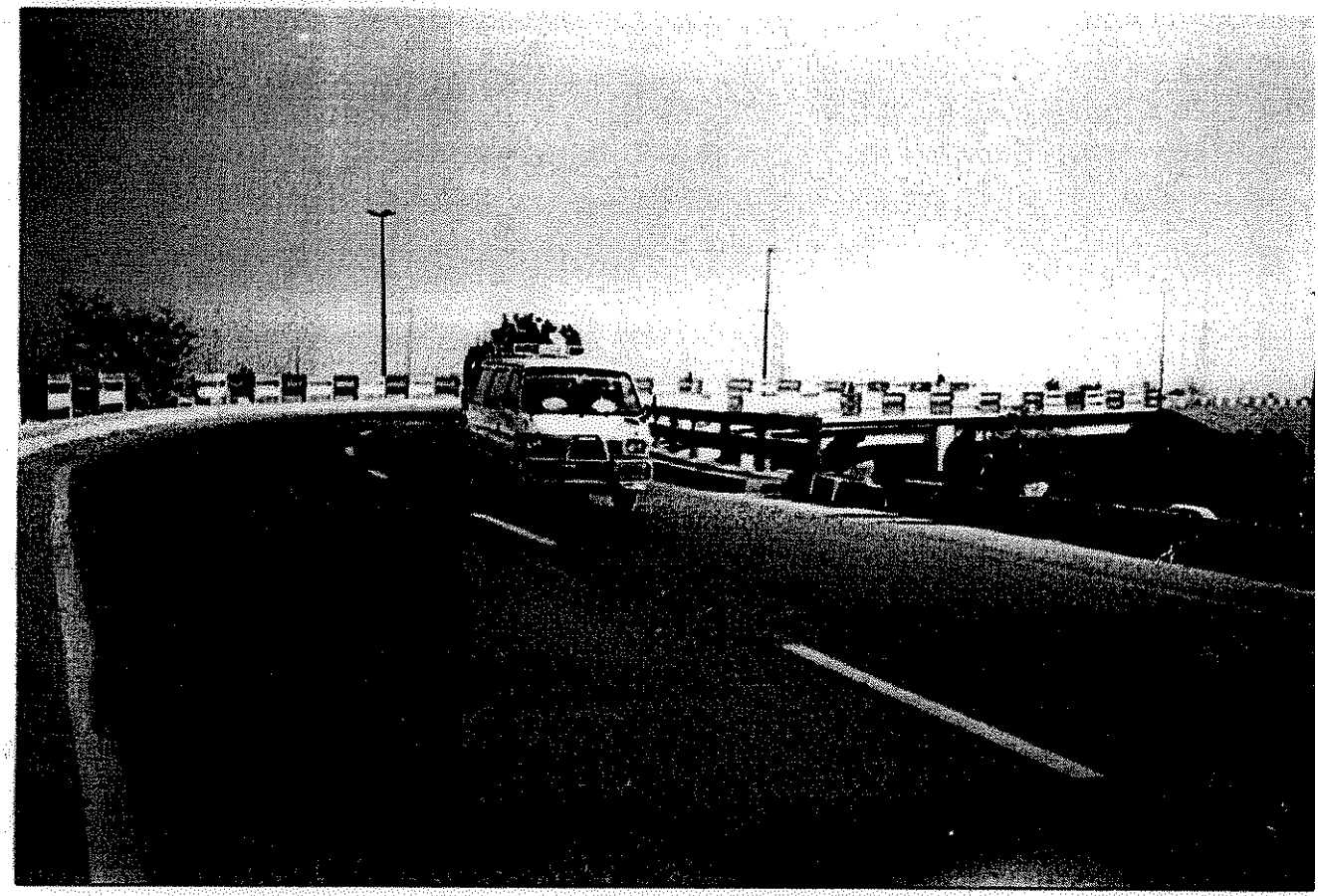
9.3.6 PROPOSED LOCATIONAL GROWTH POLES

With a view to achieve dispersal of industry, the demographic analysis in the Potohar region identified locational growth poles in the region tehsil wise and by districts where reasonable social and physical infrastructure are already available for establishment of industrial units (Appendix-9.21). The tehsil wise growth poles are shown in Table-9.22.

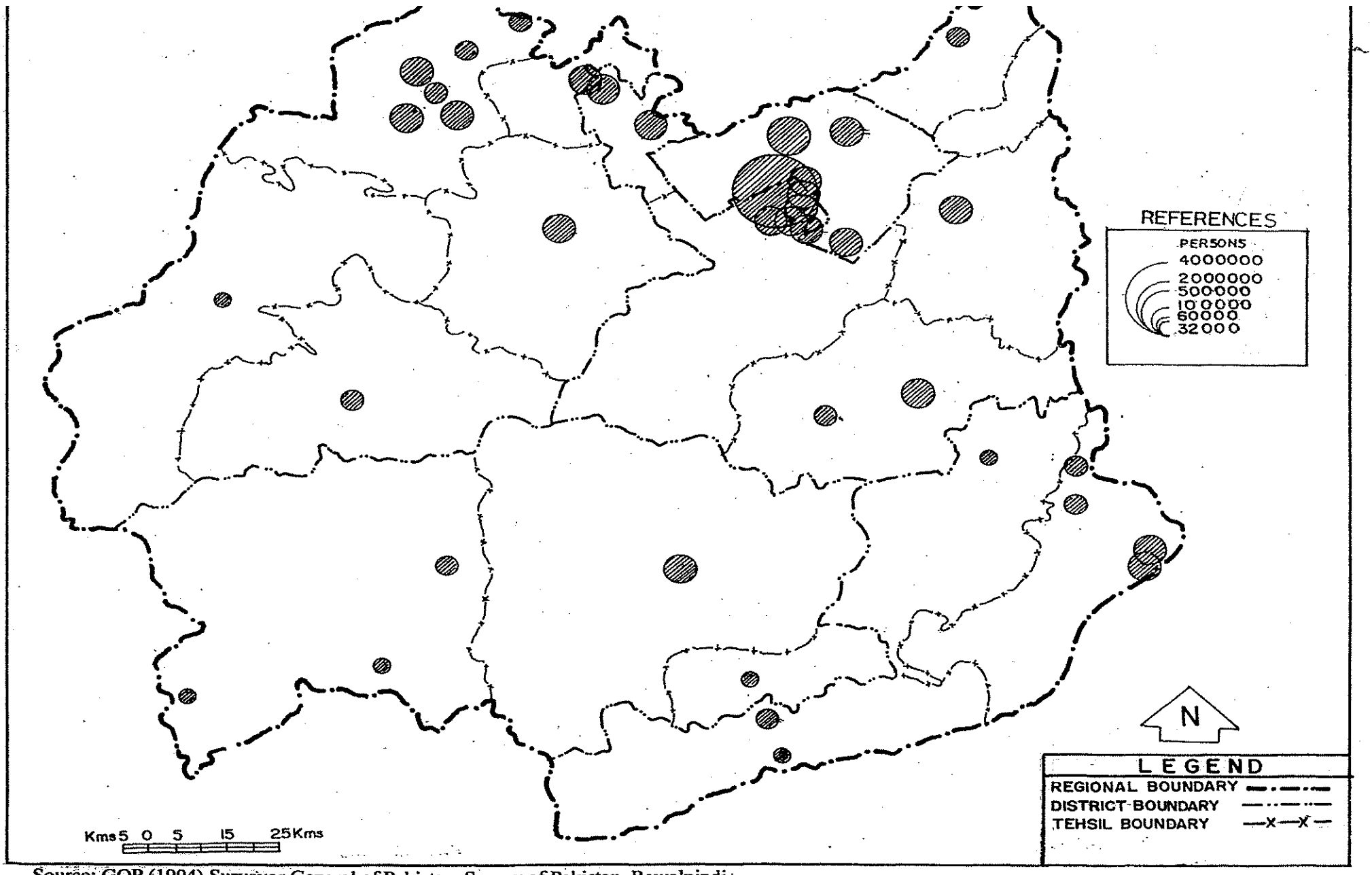
Plate No 9.6: Spatial Activity Rawalpindi



A view of private bus service 'VARAN' Faizabad bus stop

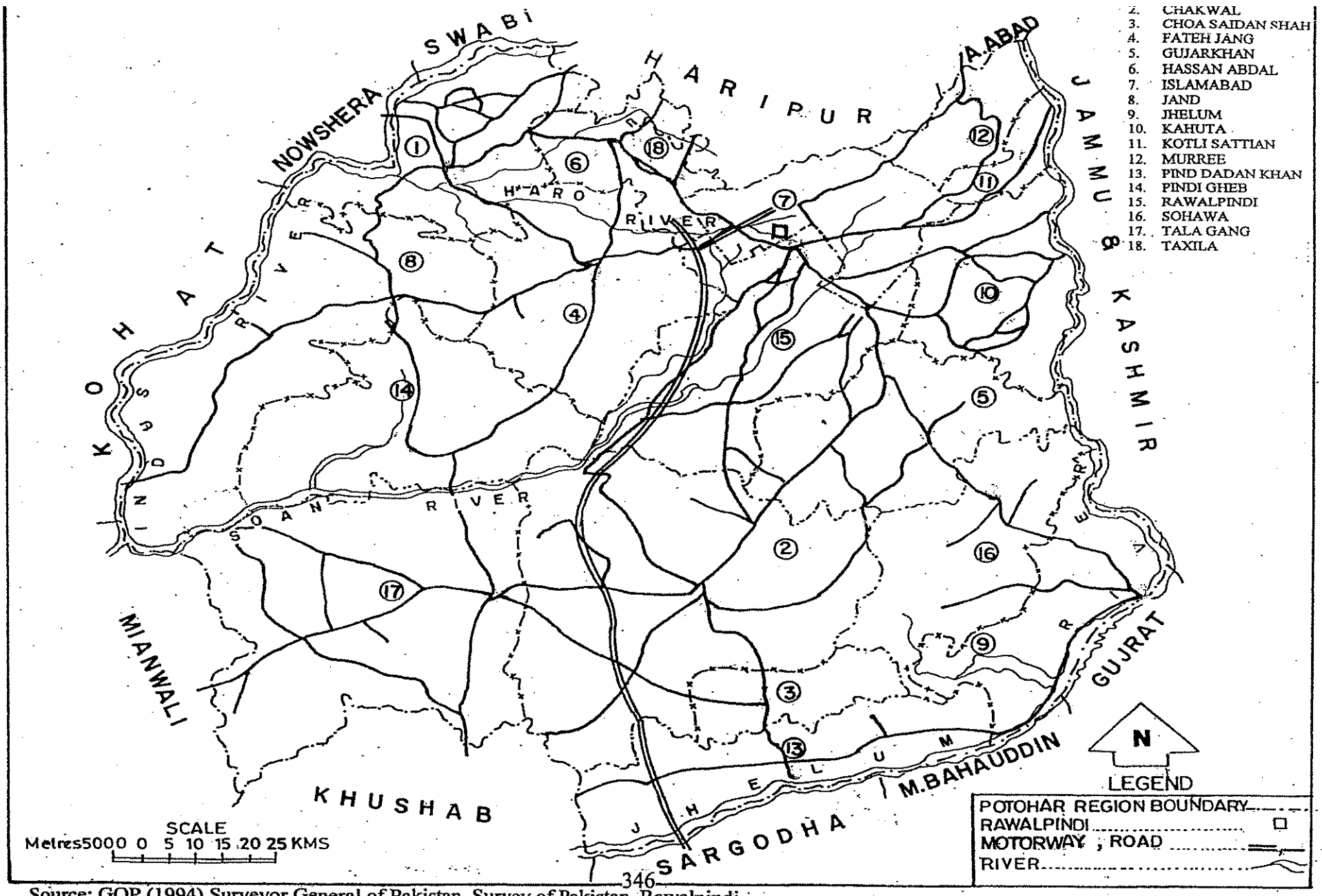


A general view of a mini bus/Toyota Hiace service



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

OF SELECTED SETTLEMENT (1998)



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

Table-9.22 Potohar Region: Growth Poles

Sr. Nos.	Name of		
	Districts	Tehsils	Growth Poles
1.	Attock	i) Attock ii) Fateh Jang iii) Hasan Abdal iv) Jand v) Pindighib	Hazro, Ghurgushti Fateh Jang Hasan Abdal, Burhan Jand Pindighib
2.	Chakwal	vi) Chakwal vii) Choa Sadian Shah viii) Talagang	Dhudhial, Boochal Kalan, Balkassar, Kallar Khar Choa Sadian Shah Talagang
3.	Islamabad	ix) Islamabad	Sihala, Rawat
4.	Jhelum	x) Jhelum xi) P.D.Khan xii) Sohawa	Dina P.D.Khan, Khewra Sohawa, Domeli
5.	Rawalpindi	xiii) Gujar Khan xiv) Kahuta xv) Murree xvi) Rawalpindi	Daultala Kahuta, Choa Khalisa Murree Khana Dak

Source:-

1.Field Survey 1999-2000.

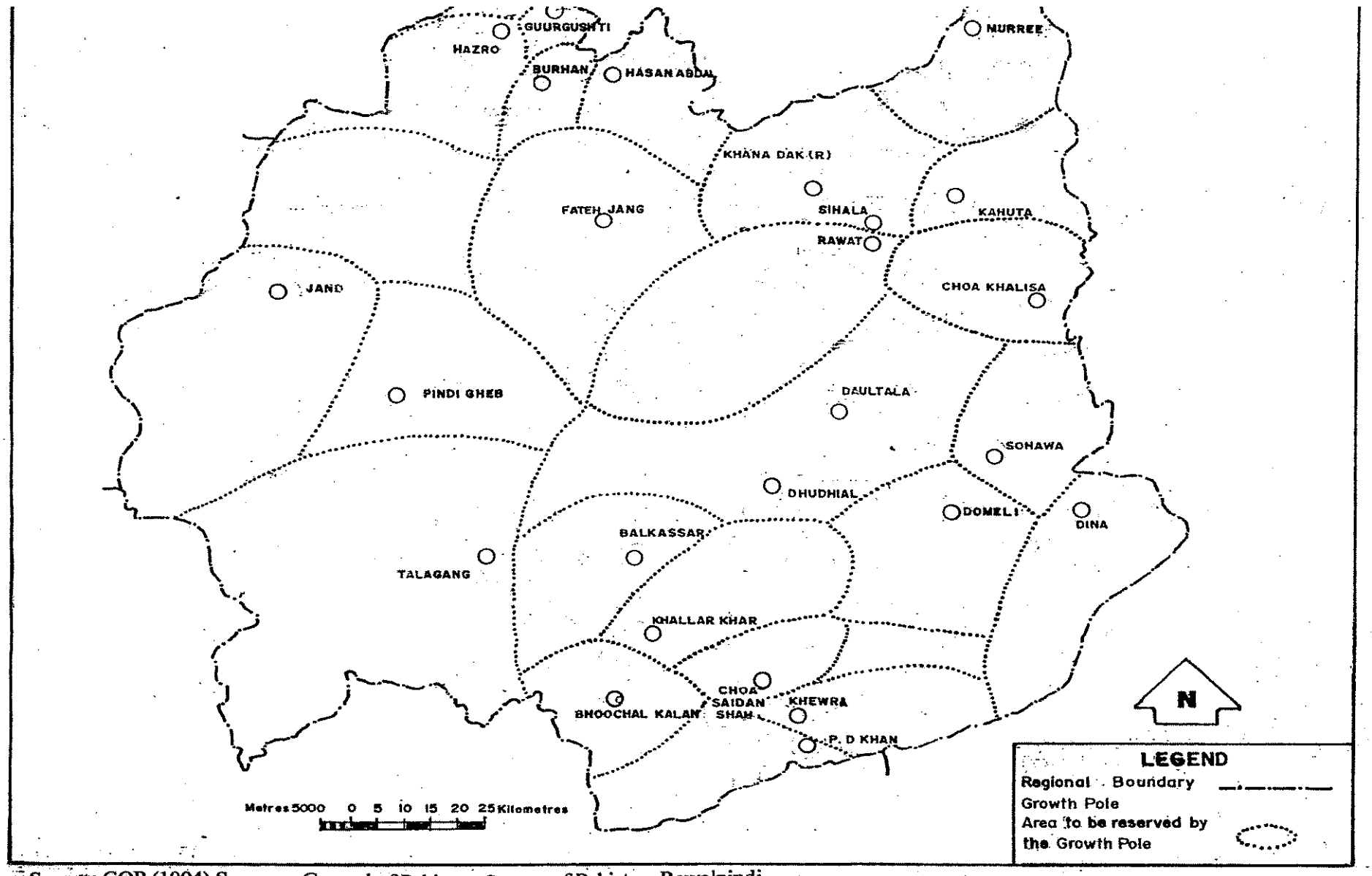
2.G.O.P., 1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 1, 39 & 40 Population Census Organisation, Islamabad.

The high services of human settlement criteria:-

i) High rank within the category or exceptional human settlement in the area of low ranking category.

ii) Centrality of location having least distance with the neighbours.

(Map-9.15), shows the location of such growth poles in the area under study. In the Potohar area growth pole will be in a position to serves services (John Glasson, 1985). However, a few cases a distance is not measured due to difficulty of accessibility. The 125 growth poles that have merged thus seems to be well placed serving human settlement ranging in number from 5 thousand to above 1,400 thousand. The average distance from the growth poles to be serviced human settlement is generally less than 4 kms from the main road. It may be kept in view that in a dissected hilly area distance is an important factor and initially the growth poles have to be densely located (Muriam K. Elahi, 1975).



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

POLE (1999-2000)

SECTION IV

9.4 CENTRAL PLACE ANALYSIS

A "central place" consists in part of a cluster of service funcations located at the point most accessible to the maximum "profit area" which can be commaned. Each type of central place tends to have a hinterland coterminous with this profit area, although such hinterland vary in areal extent because certain localities are more intensively used than others and thus yield more profits. Trade areas for community facilities within cities are much smallerthan rural trade areas for the community-type facilities that smaller towns provide. Centers of "lower order" tend to "nest" within the hinterlands of centers of the next "higher order." They depend on these centers of higher order for the functions of greater complexity which they cannot provide profitably for their more restricted hinterlands. This sybiotic nesting relationship of higher- and lower-order centers defines the so-called "hierarchy of central place."(Allen K.Philbrick, R. H. Brown 1957 & A. E. Larimore 1958) Each higher-order center performs all the functions that lower-order centers perform for lower-order hinterland, plus a group of more complex functions for a larger hinterland that encompasses several lower-order centers and their immediate hinterlands. Related to the hierarchic arrangement of centers is a characteristic spatial pattern of centers, hinterland, and transportation routes by which they are interconnected. Also, when central-place type of function constitute the major economic bases of cities, discrete population levels characterise the centers of each order or level, modified only where noncentral-place types of functions are significant (Harold M. Mayer, 1965).

9.4.1 INTRODUCTION

This section focuses the central place pattern and detailed analysis of annual growth of the human settlement.

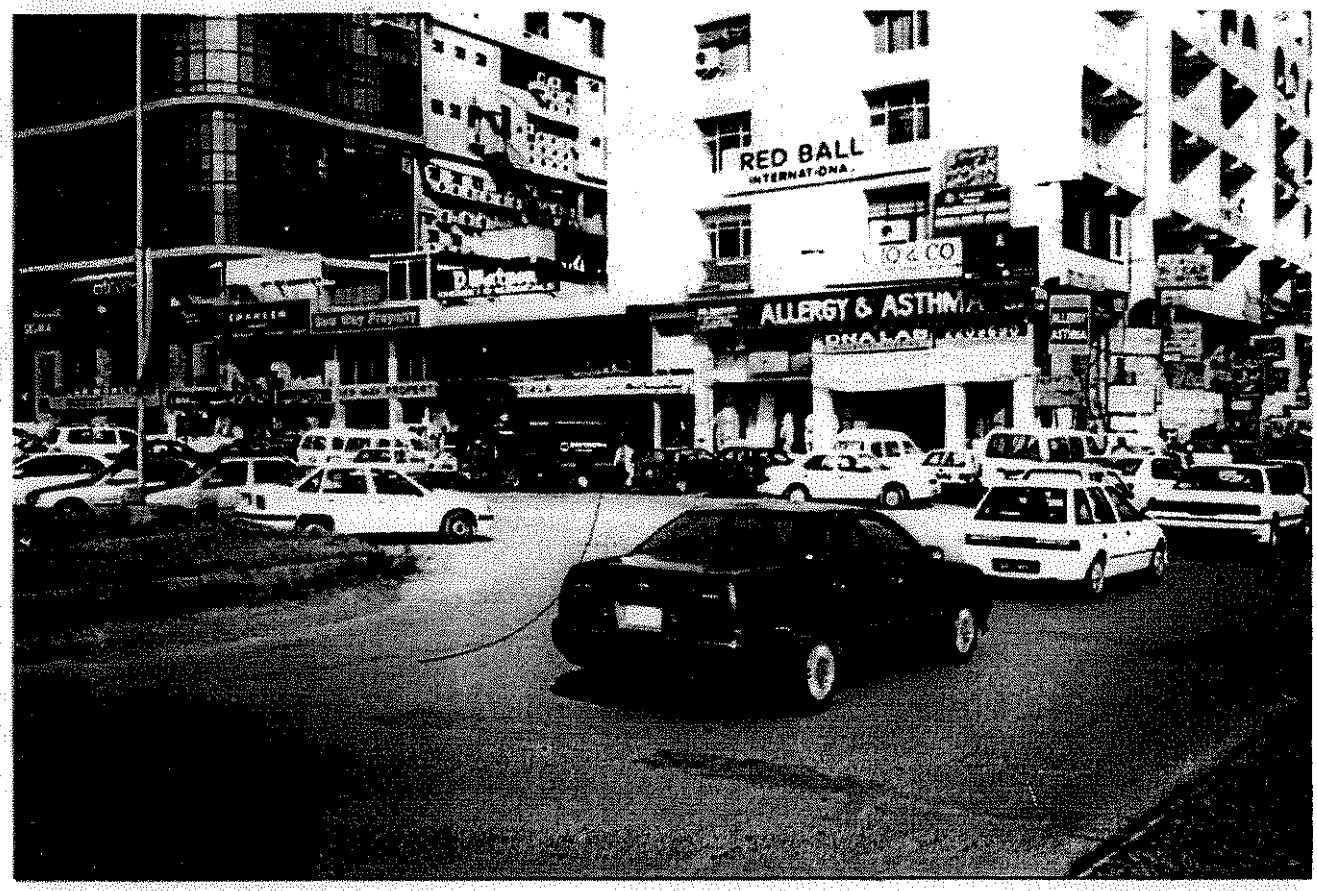
The bases of the Central Place Theory were laid before World War-II by German Geographer (Christallar W, 1966) and Economist Alexander (Losch, 1954). Many authors have applied the theory propounded by them, to analyse the size, spacing and functional structure of the service centres. (Berry J.L, 1958) contends that whatever may be the purchasing power (goods) and whatever be in open countryside or within metropolitan cities, a hierarchical spatial structure of central places supplying central

goods will emerge. Walter Christaller in his pioneer study had used human settlement as centres and population as the main variables to measure the importance or centrality of human settlement. But the concept of centrality has undergone considerable change during the course of years. The term "Centre" which was used originally to refer to a human settlement is now also applied to a shopping (of goods or service) centre within a city, while the term 'Size' or a "Centrality", is referred more in terms of the main functional institutional equipment of a services centre i.e. the total number of shops and utility services present in human settlement of the study area.

9.4.2 POTOHAR: HUMAN SETTLEMENT FUNCTIONAL CHARACTERISTICS

In this study of hierarchy or ranking size of various human settlement relative to one another has been made on the basis of centrality score measured by presence or absence of various functions. Amongst certain types of index features used for measuring centrality, the most important in the area are educational institutions, colleges such as universities and professional technical training institutions, post offices and telegraphic office's/hospitals dispensaries, family planning centres, veterinary hospitals, dispensaries for animals and banks services (Plate No. 9.7 & 9.8). They were assigned score on the basis of their importance as given in Table- 9.23.

Plate No 9.7: Potohar human settlement functional institutions



Islamabad A general view of City Bank/Medical Store Service



Gujarkhan A general view of Shopping centre

Plate No 9.8: Medical Services



Islamabad A view of Pakistan Institute of Medical Sciences (PIMS)



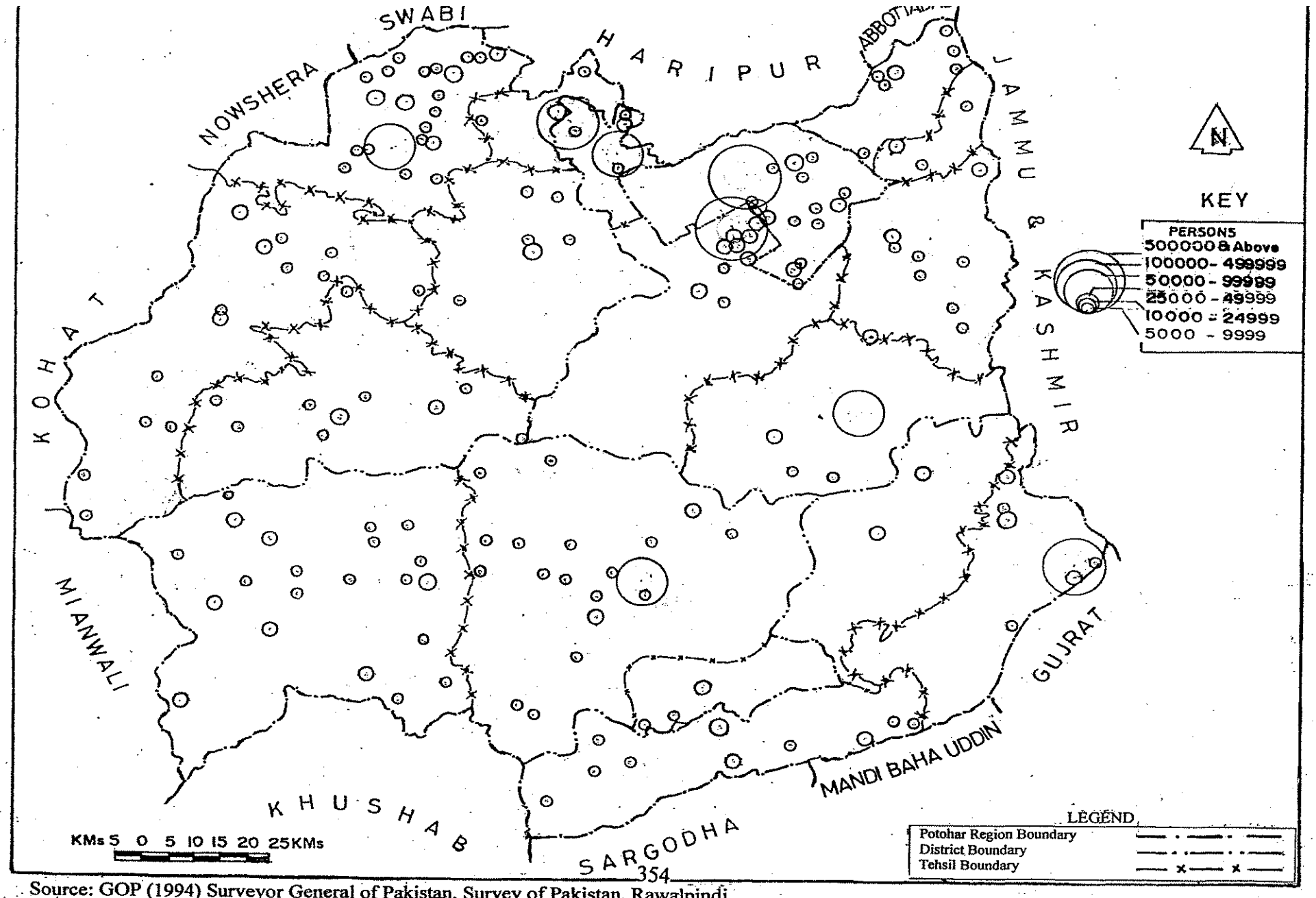
Gujarkhan A view of Trama Centre under-construction

Table-9.23 Potohar Region: Functional Infrastructure

Sr.No.	INSTITUTIONS		SCORE
1	*Maktab*	Schools	1
2	Primary School		3
3	Middle School		4
4	Technical Training Centre/Institute		2
5	Secondary School		5
6	Higher Secondary School		6
7	Inter Colleges	Colleg	7
8	Graduate Colleges		8
9	Post Graduate Colleges		9
10	Universities		10
11	Hospital	Health Centre	10
12	Dispensaries		5
13	Rural Health Centre		4
14	Basic Health Unit		3
15	Family Planning Office Flahi Centre		2
16	Vet Hospital		4
17	Vet Dispensaries		3
28	Post Offices	Services	5
29	Telegraph/Telephone office/Exchange		6
20	Police Station		3
21	Police Post/*Chowki*		2
22	Electricity		4
23	Natural Gas		3
24	Potable Water		2
25	Agriculture Office/Centre		1
26	Commercial Bank (Bank)		5
27	Agriculture/Cooperative Banks		6
28	Utility Store		6
29	Total waitage index		

Source:-
Field Survey 1999 - 2000.

There are 2,767 rural and 26 urban settlement in the Potohar region, out of which 173 human settlement with at least major central function each were surveyed to record the type of basic functions present within them. Scores assigned were allocated to these functions, in the human settlement. The aggregate scores for each of these 173 human settlement shown in (Appendix-9.20) were then plotted on a graph, classes identified were used to major groups of human settlement into different orders. In all six such groups shown on (Map-9.16) were identified with the following frequency Table -9.23.



Source: GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.

By close analysis it is revealed that gross population density, gross human settlement density and proportion of cultivated land density ascends through all the circle/zones in Potohar region irregularly because of topographical formation of the land.

Table-9.24 Potohar Region: Grades of Central places 1998

Grade	Range of Centrality score	Frequency of occurrence
1st order	2,162 – 3,186	2
2nd order	286 - 522	2
3rd order	228- 353	4
4th order	16 – 282	11
5th order	6 – 183	38
6th order	4 – 74	116

Source:-
Field Survey 1999-2000.

The table-9.24 indicate that there are two first order human settlement. They are twin cities (Rawalpindi/Islamabad) which due to their pre-historical inertia and administratively functions respectively have become most important focal point. Majority of the human settlement area become very important, due to their locational advantages, i.e. they are located in the Potohar region near to the National Highway & Roads. Grade 5th and 6th order human settlement are located near plain area. However, broken land and hilly areas of Tehsils Murree, Katali Sattian, Kahuta, P.D. Khan, Jand, Taxila, Fateh Jang, Choa Saidan Shah & Gujarkhan which have a small amount of productive land and majority of the settlement have less developed communication shown in (Appendix-9.18). These human settlement are not very important both in functions as well as in population size seen on (Map-9.16). The population range of the varied order human settlement is given in the Table 9.25.

Table-9.25 Potohar Region: Population range of varied order central places human settlement 1998

Grade/Class	Population Range
Ist order	5,29,180 –1,4,09,768
IInd order	1,47,392 – 1,98,891
IIIrd order	57,099 – 80,508
IVth order	25,986 – 49,937
Vth order	10,051 – 22,480
VIth order	5,006 – 9,941

Source:-

1.Field Survey 1999-2000.

2.G.O.P., 1998 District Census Reports, Attock, Chakwal, Islamabad, Jehlum, and Rawalpindi Population Census Organisation Islamabad.

It can be observed that all the human settlement in Potohar region of higher grade have relatively very high range of population size. Nevertheless, some human settlement, as indicated by the Table-9.25, have lower population but higher functional importance (Plate No. 9.9).

9.4.3 HUMAN SETTLEMENT GROWTH OF POPULATION

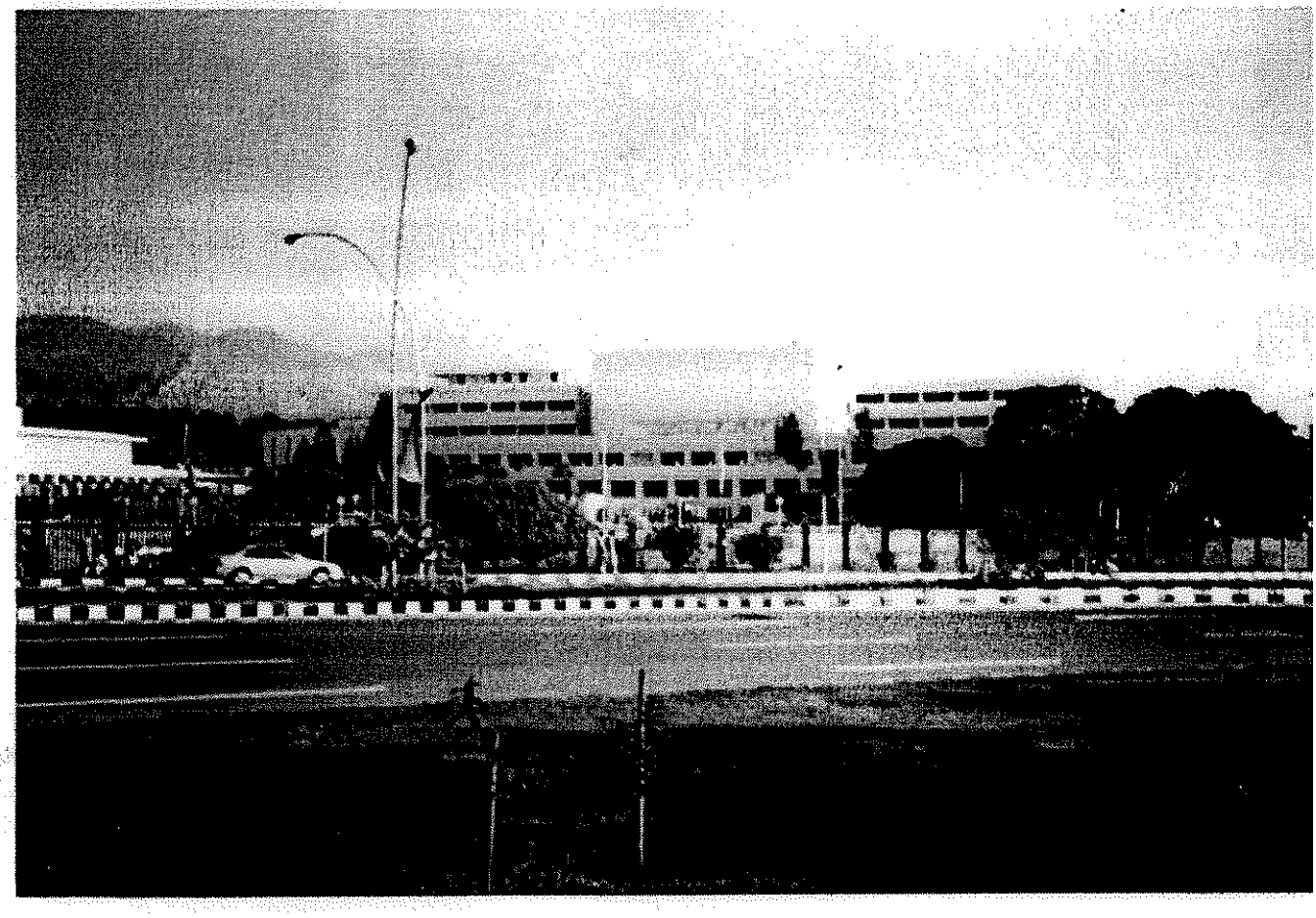
Population growth of the study area is the outcome of the net natural increase and migration. In the study area, the annual growth rate is the most potent component of the population growth, Net migration with a few exceptions has played a minor role. Data on birth and death was not available, because of incomplete or lack of vital registration.

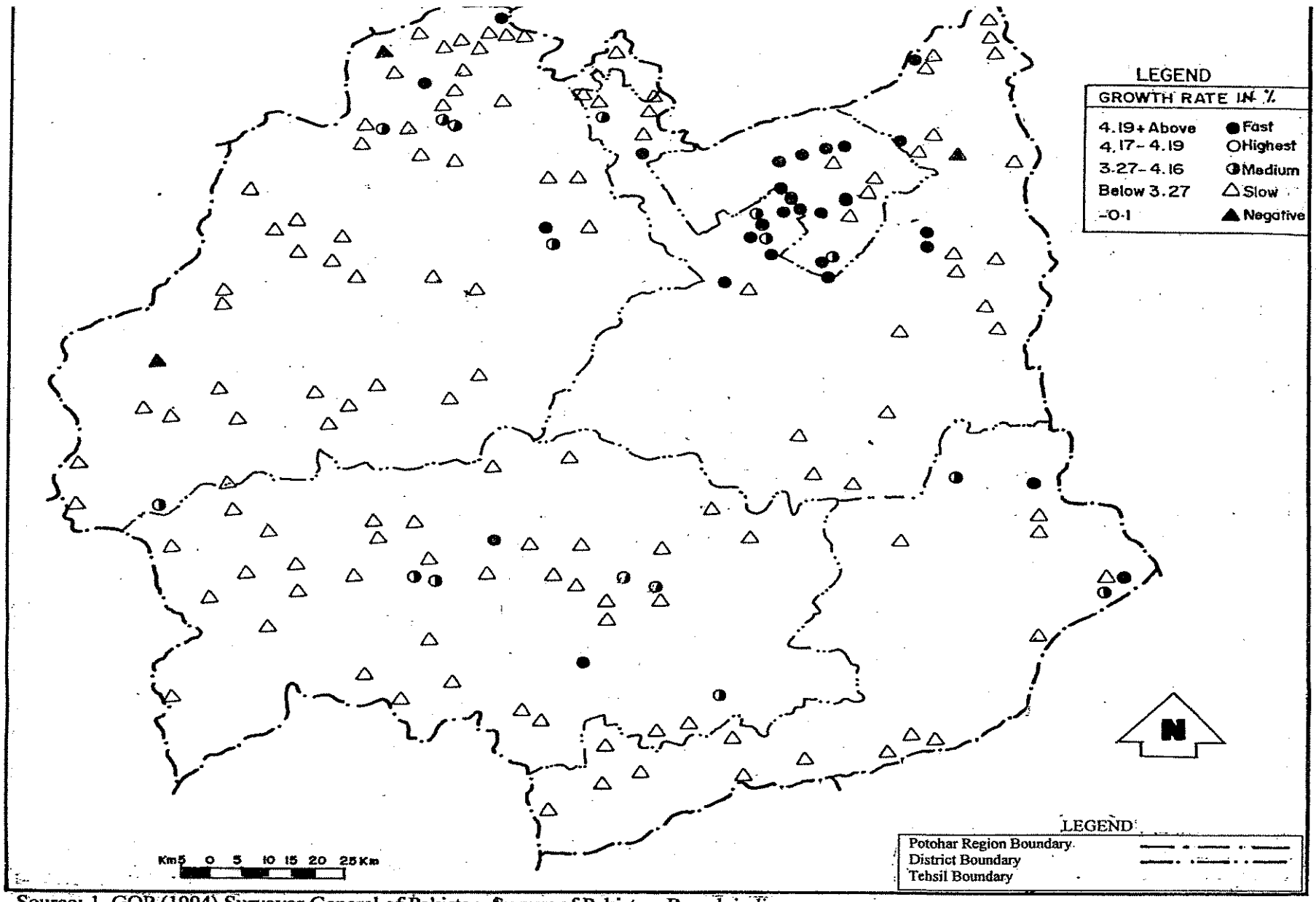
The average annual growth rate of human setellement of centre places have been divided into five major categories of human settlement for the purpose of detailed growth rate analysis. These human settlement were growing faster than the national growth rate of 4.17 percent, the Punjab Provincial growth rate of 4.19 percent and the Potohar region annual growth rate of 3.27 percent are shown in (Appendix-9.21). The total number of human settlement in each grade category has been cross-tabulated against the above classified growth rates are given in Table-9.26. Human settlement are grouped with the following five classes average annual growth rate by population size grade (Map-9.17).

Plate No 9.9: Human Settlement Islamabad



A general view of Prime Minister's House





Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1981-98) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

GROWTH RATE OF SAMPLE SETTLEMENT (1981-1998)

i) Fast growth human settlement with annual growth rate of above 4.19 percent.

ii) High growth human settlement with annual growth Rate 4.17 to 4.19 percent.

iii) Medium growth human settlement with annual growth Rate 3.27 to 4.17 percent.

iv) Slow growth human settlement with annual growth Rate below 3.27 percent.

v) Negative growth human settlement with annual growth Rate -0.01-2.00 percent.

Table-9.26 Potohar Region: Average annual growth rate (1981-1998) of the settlement by grades

Grade	Average annual growth rate in percent 1981–1998					
	Total	Fast	High	Medium	Slow	Negative
		Above 4.19	4.17–4.19	3.27–4.17	0.01- 3.27	-0.01–2.00
1st	2	1	-	1	-	-
2nd	2	-	-	-	2	-
3rd	4	-	-	1	3	-
4th	11	4	-	2	5	-
5th	38	9	-	5	24	-
6th	116	14	-	7	91	4
Potohar region	173	28	-	16	125	4

Source:-

G.O.P.1998 District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi table 39 & 40, Population Census Organisation, Islamabad.

Potohar demographic scene witnessed significant changes human settlement Islamabad (urban) during the (1972-98) period, due to the increasing control over abnormal deaths caused by epidemics famines etc. The economy developed with a view to improving general conditions of sanitations and medical facilities were improved significantly bringing down the mortality rates.

On the other hand, the urban human settlement, particularly the big industrial centres capital and the district headquarters were experiencing large scale in migration and hence were recording rapid population growth. Its leading to an encroachment of good agricultural land, emergence of urban slums, inadequacy of social amenities and environmental damage through pollution. In a way, big cities of the Potohar were facing all the problems of over crowding inadequacy of housing, and other amenities of urban life.

Analysis of data collected through field survey in 1999-2000 on range of functions present in different grades of human settlement Table-9.27 & 9.28 reveals that higher grade order functions such as Universities, Colleges, Professional Vocational and Technical/Training Centres, Higher/High/Middle/Primary Schools and *Maktabs* Schools, Hospitals, Dispensaries, Animal Husbandry Hospitals, Dispensaries, Banks, Potable Water Supply, Electricity, Telephone, Post Offices, Market Centres occur in all categories of central places. Details of educational institutions, socio-economic functions by grade order central places are shown in (Appendix-9.22).

Table-9.27 Potohar Region: Educational institution structure of varied order central places of human settlement in 1998

Grade/ Class	*Maktab*		Primary School		Middle School		TTC/ Institu-Tion		High School		Higher.S. School		Inter College		Degree College		Post Graduate College		Univer-sities	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
I	2	1.1	140	20.2	67	29.6	19	21.6	179	41.2	25	47.2	2	10.5	54	67.5	14	82.3	8	80.0
II	10	5.4	24	3.4	12	5.3	10	11.4	25	5.8	2	3.8	1	5.3	4	5.0	1	5.9	-	-
III	10	5.4	36	5.2	23	10.2	7	19.3	26	6.1	-	-7.5	1	5.3	7	8.7	1	5.9	1	10.0
IV	18	9.7	58	8.4	16	7.1	15	17.0	22	5.1	4	18.9	4	21.0	8	10.0	-	-	-	-
V	79	42.7	224	32.3	34	15.0	18	20.5	58	13.5	10	22.6	8	42.1	7	8.7	-	-	-	-
VI	66	35.7	212	30.5	74	32.7	9	10.2	119	27.7	12	100	3	15.8	-	-	1	5.9	1	10.0
All Grades Potohar	185	100	694	100	226	100	88	100	429	100	53		19	100	80	100	17	100	10	100

Source:-
Field Survey 1999-2000.

Table-9.28 Potohar Region: Socio-economic (characteristics) functions in varied order central places of human settlement in 1998

Grades/ Class	Hospital		Disp. Medical Center		Rural Health Center		Basic Health Center		Family Planning Hosp./ Center		Post Office	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
I	16	32.7	48	66.6	–	–	–	–	53	32.3	120	42.6
II	5	10.2	6	8.3	–	–	–	–	6	3.7	18	6.4
III	6	12.2	8	11.1	–	–	–	–	14	8.5	16	5.7
IV	8	16.3	4	5.6	4	8.7	3	4.0	8	4.9	12	4.3
V	10	20.4	4	5.6	16	34.8	8	10.7	33	20.1	36	12.8
VI	4	8.2	2	2.8	26	56.5	64	85.3	50	30.5	80	28.4
All Grades Potohar	49	100	72	100	46	100	75	100	164	100	282	100

Grade/ Class	Telephone/ Exchange Office		Police Station		Police Post		Agri. Office/ Center		Comm. Bank		Agri. Bank	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
I	7	7.5	23	40.4	10	32.3	2	2.5	293	53.3	5	17.2
II	2	2.2	3	5.3	5	16.1	1	1.2	50	9.1	2	6.9
III	5	5.4	8	14.0	3	9.7	4	4.9	46	8.4	7	24.1
IV	8	8.6	7	12.3	2	6.5	7	8.6	55	10.0	7	24.1
V	23	24.7	10	17.5	6	19.3	22	27.2	65	11.8	8	27.6
VI	48	51.6	6	10.5	5	16.1	45	55.6	41	7.4	–	–
All Grades Potohar	93	100	57	100	31	100	81	100	550	100	29	100

Source:-
Field Survey 1999-2000.

The nearest neighbour index for all grades of centres, indicates an over all dispersed pattern, but when applied to respective grades it gives a more clustered pattern with highest level of clustering in grade 1st centres of Rawalpindi & Islamabad which have really become a twin city Rawalpindi and Islamabad.

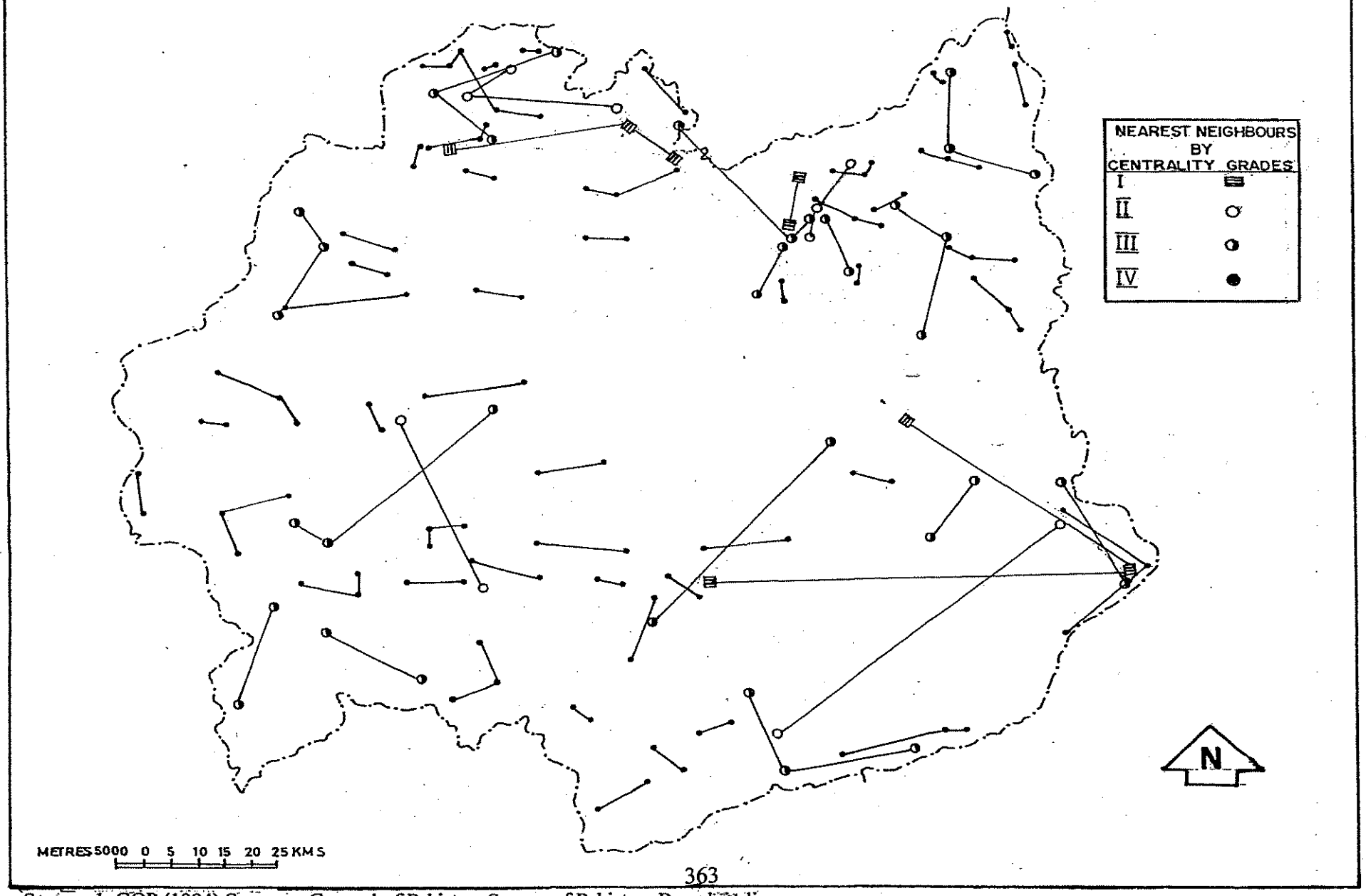
R, Values analysed the functional structure of various grades/order human settlement. It remains now to analyse their distribution in space. This has been given in the Potohar Region (Map-9.18). The size and spacing of human settlement of various order in the Potohar does not conform with the rigid hexagonal pattern suggested by (Christallar W, 1966) in his Central Place Theory. In order to analyse the pattern the Michael F.Dacay's index of nearest neighbour was applied to each of the six grades of human settlement separately and results are shown in (Appendix-9.23) and in Table-9.29.

Table-9.29 Potohar Region: Nearest neighbour index of central places in human settlement 1998

GRADE	'R' VALUE'S
1st Order	0.96
2nd Order	0.83
3rd Order	0.90
4th Order	0.75
All Grades	1.46

9.4.4 ACCESSIBILITY

The areas having higher level of accessibility to and from the other areas have more concentration of cities/towns. Without transport and accessibility, cities/towns have not developed. Many areas along road side, river crossing/functions become cities/towns/site, because they are the focal points of transport network and major trade



Source: 1. GOP (1994) Surveyor General of Pakistan, Survey of Pakistan, Rawalpindi.
2. GOP (1998) District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

PATTERN (NEAREST NEIGHBOURS) BY CENTRALITY GRADES (1998)

routes, which gives them maximum accessibility to their hinter land for example cities/towns located in Rawalpindi and Islamabad area.

The road density is given in table-9.30 shows that in general the road density in the area is very low 25.4 per 100 km in the Potohar. The standard for developing countries areas is 0.5 (100) Km (Nasreen Aslam, 1986).

Table-9.30 Potohar Region: Road density 1998

Name of area	Area in sq.km.	Road length in Km.	Road density per (100) Sq.Km.
Attock	6857.0	1,042	15.2
Chakwal	6524.1	1,196	18.3
Islamabad	906.0	657	72.5
Jhelum	3586.4	1,196	33.3
Rawalpindi	5286.0	1,789	33.8
Potohar region	23159.5	5,880	25.4
Punjab	2,05,345	37,654	18.3
Pakistan	7,96,096	2,28,206	28.7

Source:-

1.G.O.P., 2001 Motorway data processing centre, National Highway (data record) PWD record office Districts Attock, Chakwal, Islamabad, Jhelum and Rawalpindi.

2.Road maintenance Directorate, CDA Office, Islamabad.

3.Govt. of Punjab 1998 Bureau of statistics, table 158 Statistical Pocket book of the Punjab LHR.

Rapid accessibility now enables farmers to free themselves from self-sufficiency and the subsistence small farming and a lot of socio-cultural and economic changes are occurring after the construction of the highway. The *Barani* farming was the main and military services primary occupation of the population of the region. Capital shift from Karachi to Rawalpindi Islamabad had very positive impacts on the development. Now the farmers can sell their cash crops products like ground nuts, tobacco, potatoes, onion and vegetables etc. in the markets of Rawalpindi, Islamabad, Jhelum, Attock and Chakwal and other large and small towns.

Farmers are now using new technology, tractor, thresher and new inputs like chemical fertilizers, new varieties of seeds, new generic crops, mechanization, pest control etc. Moreover other activities such as small roadside bazaars, micro enterprises, heavy and small-scale industries and industrial zones are developing.

9.5 *SUMMARY/CONCLUSION*

This study on human settlement characteristics in Potohar region reveals that the area had been settled since the Proto historic time (2400-1300 B.C). The evolution which pattern in the region can be divided into six distinct phases; the ancient most, the ancient Buddhist, the Hindu, the Mughal Muslim, the British and the modern phase. The Ist phase began in the year 2400 B.C and lasted till 326 B.C. Human habitation during the period started in cave/rock shelter cave.

The 2nd phase in the evolution of human settlement started in the year 326 B.C with the dawn of Buddhism and continued till 1023 A.D. During this period, the Taxila became an important centre of Buddhism, when a number of monasteries were established. Many of these attracted pilgrims a by-product of which was the promotion of trade and commerce in the region. A a few settlement were established during this period such as Manikiala *Stupa*, *Bullar Stupa*, Shah Dheri, Shah Allah Ditta, and Saidpur.

The 3rd phase in the evolution of settlement began with the invasion of the region by Sultan Mahmood Ghaznavi in 1023 A.D. This phase is noted for the institution of 'Wesh' system that involved periodic redistribution of land and settlement amongst the people of the region with mass shift of population from one settlement to another. A few human settlement originated during this period.

The 4th phase in the evolution and diffusion of mauza/human settlement marks the abolition of 'Wesh' system of settlement in 1901 and continues to 1904. The peace and tranquility of the period along with progress in economy contributed to a construction of large mauza/human settlement, which total number 2,956 in 1951, 2,958 in 1961, 2,962 in 1972, 2,965 in 1981 census. The total number of mauza/human settlement in the region was 2,798 in 1998 census.

The study of distribution and size of settlement in the area, indicates that settlement with less than 9,999 population are predominant in the region area, accounting for 67.1 percent of the total human settlement. The pattern of distribution and size of settlement in the region has been affected by physical social as well as socio-economic

factors. Among the, physical factors the important ones are altitude (relief and elevation), land, and water supply. The altitude exercises the strongest effect. The region varies in relief/elevating from 68 meters to 119 meters. Majority of the human settlement (60 percent) are located near the National Highway and main roads.

The availability of water is another major factor influencing the distribution of human settlement in the region. More than half (63.6 percent) of the human settlement are located at a distance of less than two km. of service of water supply. Similarly 20.8 percent of human settlement is located at a distance of 2-4 km from community (water supply). This indicates that majority of the human settlement have Public Health Engineering/Community Water Supply Schemes.

In the region on the whole Nearest Neighbour Analysis indicated more than random distribution. Human settlement density also varies from 0.15 to 1.65 settlement per 100 sq km in different parts while average density was 0.74 settlement per 100 sq km. The analysis revealed that some factors have close relationship, some have weak association and some have no impact on the distribution pattern of human settlement. That is why it is very difficult to pin point any one human or natural factor for this pattern. Both groups of factors act together to determine the pattern of human settlement distribution. However, in some cases natural factors seem more dominant while at other places human factors including cultural and political are seen relatively more deterministic in the pattern of human settlement.

Natural factors mostly do not act directly. They act in combination with human factor. Economic and technological development, cultural and political background make the human factors more important for human settlement distribution. In this region government, effect on human settlement distribution is only found in a limited area and on the whole government has had no direct influence on the human settlement pattern. So the human settlement exist where natural and human factors are more suitable and not at preplanned points.

At places where these factors are sparsely distributed human settlement are also randomly distributed and they are often controlled by a single factor. But if we compare the natural factors with human factors today human factor are more important because

due to modern technology man has become able to control many natural problems. Man is changing the face of the earth to solve its present time problems and on coming future needs.

The human settlement typology and size, class of population also display great variation in the region. Accordingly they have been classified into six categories/class size i.e. metropolitan, large cities, cities, large town, towns and small towns. The small towns have a population of 5,000-9,999 persons. They are also usually located away from roads and near springs/streams. The intermediate towns have a population range of 10,000-24,999 persons. They are mostly connected by roads and the shops occupy both sides of the roads. These settlement contain water, houses of elites, shrines, graveyards, open cattle sheds and stagnant pools of water, pond. The large town settlement have a population ranging 25,000-49,999 persons. They are all connected by well developed transport network and have '*bazzar*' along the main road. These settlement are in the continuous process of expansion. The new houses are usually constructed along the roads.

There are eight large towns namely Rawalpindi, Islamabad, Jhelum, Wah, Gujar Khan, Chakwal, Taxila and Attock with population 99,999 and above. They are located at nodal points and are the centres of market, trade, commerce, transport, health, education re creation and district/tehsil, municipal administration headquarters.

The varied physical, social, economic and cultural factors have not only affected the size form and internal characteristics of human settlement, but also the type and plan of houses in the area. Three types of housing structure are formed in the region on basis of cultural and socio-economic grouping; they include *pacca*, semi-*pacca* and *kacha* houses numbering are 6,17,872, 27,802 and 51,745 respectively.

Apart from house type some variation were also observed in the functional structure of human settlement. The central place analysis brings out six grades/classes of human settlement with respective frequency of 2, 2, 4, 11, 38 and 116. The distribution of centres does not conform to the rigid hexagonal arrangement of Christaller. The pattern of population growth of these human settlement indicate faster growth in the higher grade

centres. Most of the central places are rural in character. Only 31 human settlement have been notified as urban in 1998 census.

The growth of settlement in the region until now has taken place without planning intervention except Islamabad city. As a result, the human settlement face multi-facial problems and if this situation is not checked their magnitude would increase several fold. Apart from lack of sanitation, water supplies, and human resources, majority of human settlement lack in basic services. Moreover, other problems which need immediate attention are the problems of housing in urban area, transportation, and uncontrolled population growth. In order to solve these and other problems, it is suggested that ministry of environment and rural development should look after the human settlement and work for their improvement on modern and scientific lines. In addition, it is imperative to create an urban development environment authority for streamlining the urban growth and density of Rawalpindi-Islamabad and other urban areas, where problems are emerging, because of rapid urban sprawl.

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CHAPTER TEN

PROBLEMS OF HUMAN SETTLEMENT

10.1 INTRODUCTION

The human settlement of Potohar region, like any other area of Pakistan, suffer from a number of problems. They are relatively more acute in rural settlement as compared with the urban and are encountered almost in all spheres of life including housing, health, education, income level, environments etc. The nature and extent of these problems, as revealed by the survey of human settlement for this study, forms the subject of the present chapter.

10.1.1 HOUSING

In the 173 surveyed settlement, there are 6،97،419 houses in all of which 4،88،001 or (69.97 percent) are in urban settlement and 2،09،418 (30.02 percent) rural settlement (Population Census Organisation, 1998). Of these 6،97،419 houses, 51،745 (7.41 percent) are *kacha* and 645،674 (92.58 percent) are pacca or semi-*pacca* (Population Census Organisation, 1998). Due to bad structural conditions the *kacha* houses do not give any protection from vagries of weather conditions and in a number of cases they are unsafe for human living (Field Survery, 1999-2000). The rainy season is particularly hazardous for *kacha* houses and collapse of stone walls and mud bricks walls during rains is a common phenomenon. In rainy days seepage from *katchi* roof also occurs frequently. Many times the termite ridden wooden beams and *baileys* used for supporting roofs for example collapse causing injuries and loss of human life (The News, 2006). Roof of a school in a maira badia G-12 area of Islamabad collapsed causing to 12 children and teacher.

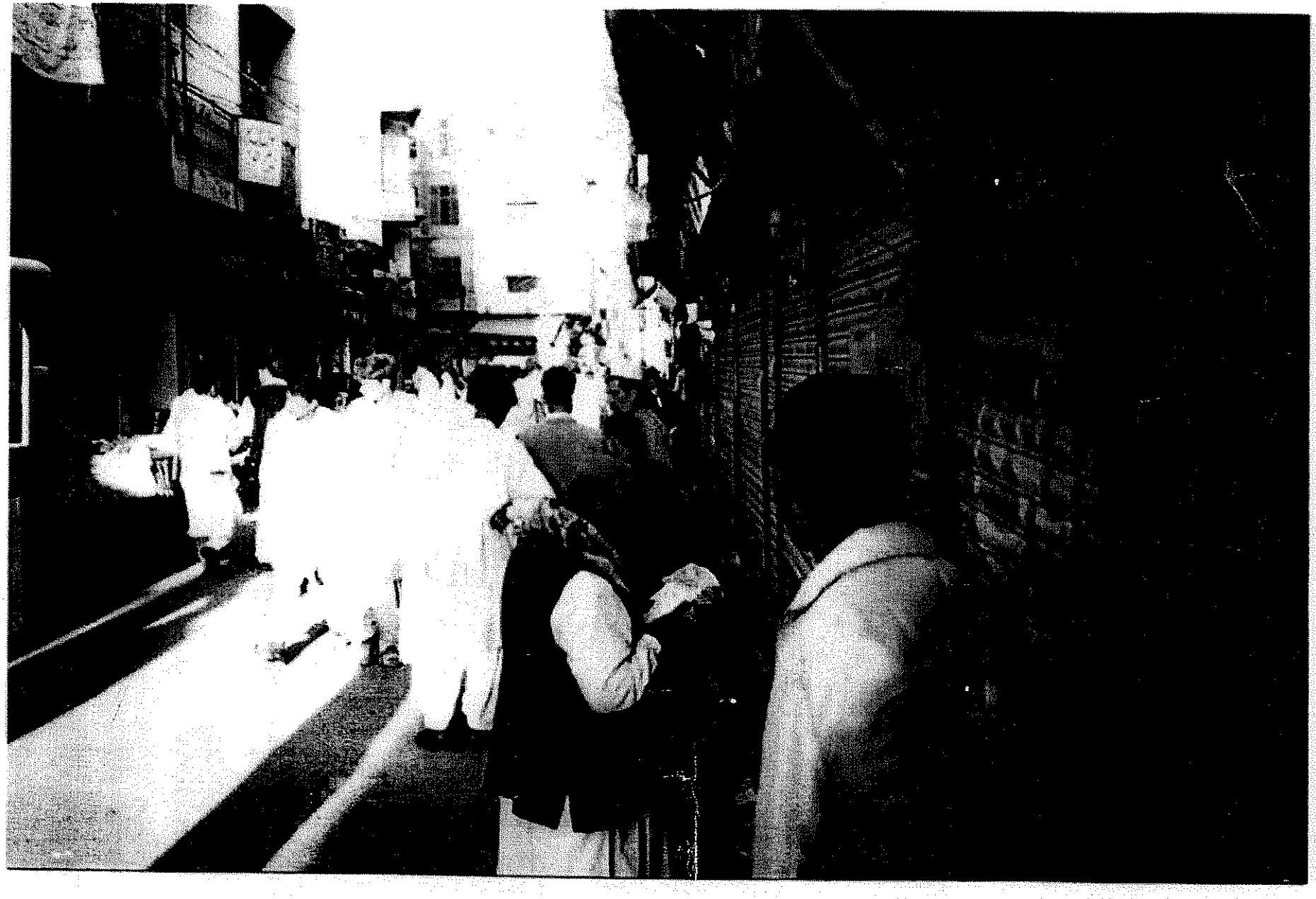
The layout of houses in rural areas is not conducive to privacy and most houses are exposed to in sanitary environment as both humans and animals live close by. Separate rooms for animals is a rarity in rural areas. Similarly room for members is mostly inadequate and deteriorating with time (Plate No. 10.1).

The urban settlement are better placed in terms of housing structures and house layout. But in these settlement too, house inmates living space ratio is not satisfactory and is deteriorating fast (Gazetter, District Rawalpindi, 1893-94).

There is an overall shortage of houses (The News, 2006) twin cities Rawalpindi-Islamabad. And it is increasing with every passing year with the consequent problems of over crowding, insanitation etc.

A general view of Bazzar

Plate No 10.1: Basic Services Gujarkhan Settlement



10.1.2 POVERTY

Poverty blights the lives of thousands of people all over the Potohar region. They are unable to live as human beings; deprived of the basic needs of food, clothing and shelter. Poverty is a daunting problem facing rural and urban area of Potohar (rural areas) (The News, 2005). It is accompanied by persistent high unemployment and social decay and without any safety nets for the poor (Sadaf Najaf, 2004).

Due to persistent poverty-which most people inherit, a major part of the population cannot financially afford to construct big houses rural area in Potohar region (The News, 2006). In winter season cattle live under the same house with human being and unhygienic living condition results in such *kacha* houses and many types of diseases are contracted by the humans from the animals (Plate No. 10.2).

10.1.3 LACK OF SERVICES

The necessary basic services which are required in human settlement are primary/middle schools dispensaries/medical centres banks, post office recreational facilities etc. The situation with respect to availability of these and other services in the human settlement of the area as assessed from a field survey is given in the table 10.1 shown (Fig-10.1).

Table 10.1 Potohar Region: Frequency of occurrence of basic services
Sample area Human Settlement in 1999-2000

Sr. No.	Type of services	Availability by number of Human Settlement (Out of 173)
1	*Maktab*	63
2	Technical Training institute	31
3	Primary School	154
4	Middle School	98
5	Secondary School	123
6	Higher S. School	22
7	Intermediate College	13
8	Graduate College	16
9	Post Graduate College	5
10	University (Public & Private Sector)	13
11	Hospital	27

12	Dispensaries	16
13	Basic Health Unit	47
14	Rural Health Centre	71
15	Family planning Hosp/Centre	95
16	Veterinary Hospital	22
17	Veterinary Dispensaries	95
18	General/Post/Sub Post office	137
19	Telephone/Telegraph/Exch office	92
20	Police Station	29
21	Police Post/*Chawki*	15
22	Electricity	163
23	Natural Gas	77
24	Potable Water	160
25	Agr. office/centre	67
26	Bank Commercial	64
27	Bank Agri/Cooperative	18
28	Utility Store	65

Source:-
Field survey 1999-2000.

The table-10.1 shows that the lower order services are present in large number of human settlement but higher order and even some of middle order services exist in very few human settlement. Thus, primary and secondary schools, post offices, electricity, portable water supply, exist in over 3/4th of the surveyed settlement. Higher education facilities, higher level medical units – hospitals, BHUs, RHUs, family planning units are available to far fewer settlement. The same is the case with natural gas, banks, agricultural extensions etc. On the whole, the availability of the basic services is not quite satisfactory considering that the study area houses the country's capital and is the centre of growing economic activity. Its profile in respect of basic services should have been much better.Inadequacy of educational and health services is particularly noteworthy are shown in (Appendix-10.1).

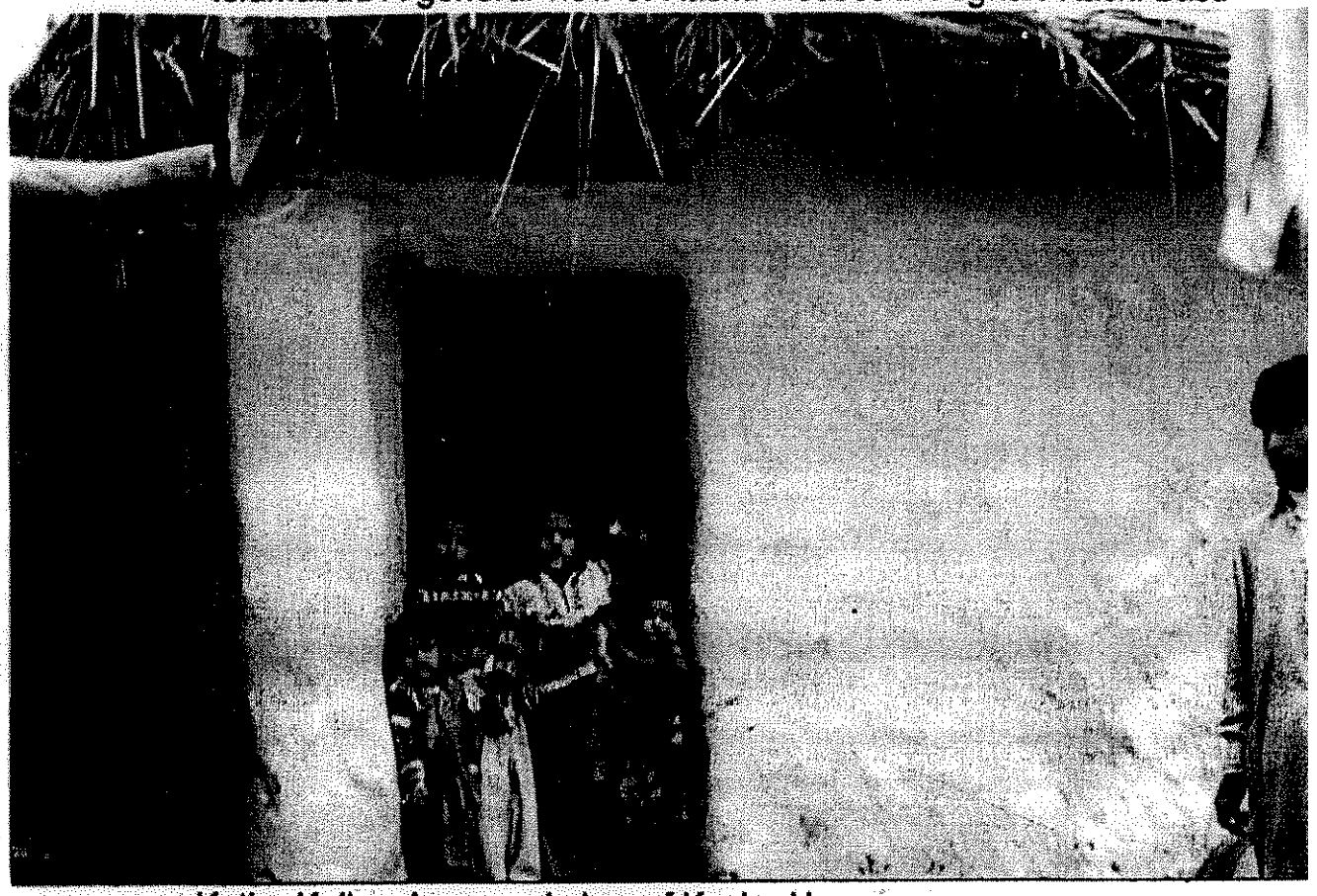
10.1.4 UTILITIES SERVICES

The peoples views and experiences of these services are not studied in this study, but view regarding some of the essential services can be ascertained from the National

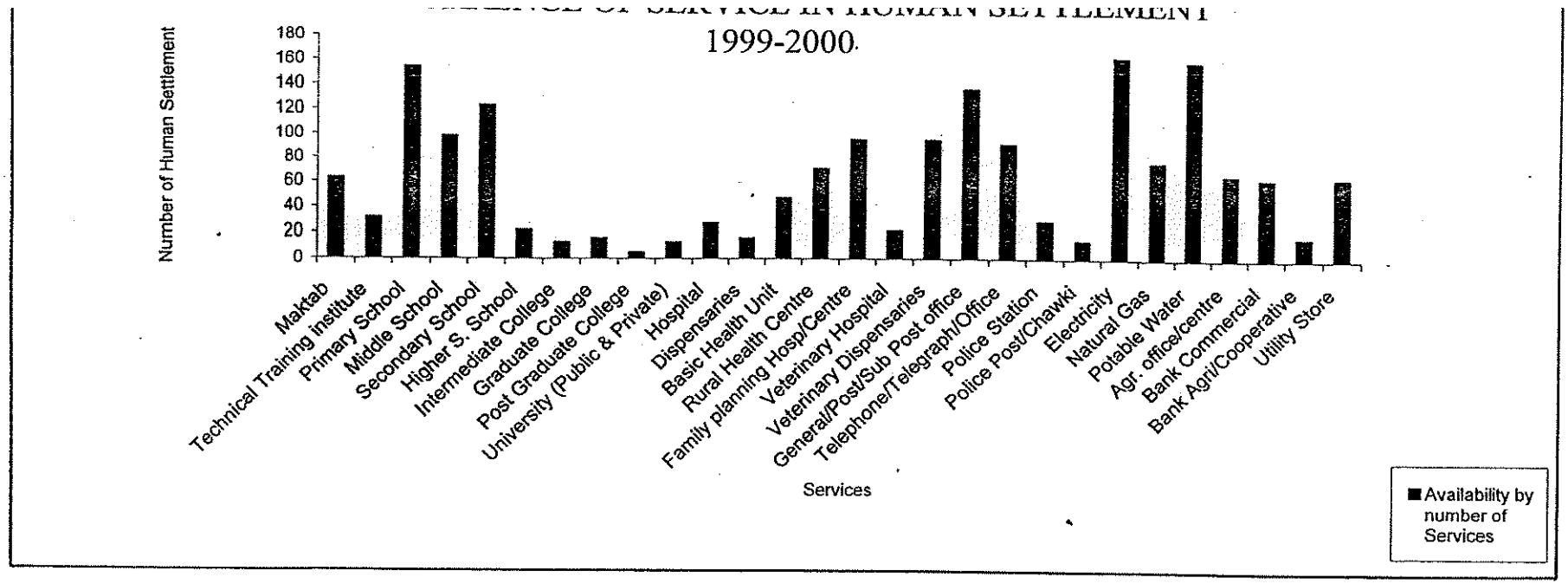
Plate No 10.2: Housing Structure-Islamabad Kotha Kallan settlement



Islamabad A general view of Kacha Houses in Afghan Kachi Basti



Kotha Kallan A general view of Kacha House



Source: Field Survey 1999-2000

FIG.10.1. POTOHAR REGION: FREQUENCY OF OCCURRENCE OF SERVICE IN HUMAN SETTLEMENT

Reconstruction Bureau, 2002 recent survey of social audit of governance and delivery of public service, (A Cockroft, N. Anderson, K. Omer, N. Ansari, A. Khan, U.U Chaudhry, CIET, 2002). According to this source 40.98 percent houses have domestic portable water supply connections in the study area. Those with hand pump are 23.06 percent while 29.60 percent households draw water from wells and 6.36 percent from other sources in the Potohar region. The quantum of water available from domestic water pipes is not satisfactory in most cases. Similarly much labour is involved-mostly on the part of women and children, in fetching water from sources outside the houses in the urban and rural area Potohar region.

The drainage sanitation is even worse. Only fifteen percent of the human Settlement have a satisfactory drainage and sanitation system in the Potohar region. Even here most of the drains are *Kacha*. In majority of cases this released directly to the streets. In the rural areas dung is dumped on the street in front of the houses. The condition becomes worse during the rainy season when the streets become heaps of mud. Water of tap, well, stream, canals/community is mostly extremely muddy and unhealthy, due to release of domestic waste into it

In order to maintain water supply new pipelines and storage tanks should be constructed in the Human Settlement both urban and rural, and water should be brought from the dams, streams and wells to these tanks filtration system may be adopted ensuring continuous and clean supply of water throughout the year.

10.1.5 ACCESSIBILITY

As already stated the survey covered 173 human settlement (of 5,000 population more). Out of these, 160 settlement are connected with the main roads/highways through main roads. Rest of the 13 settlement have *katchi* access roads to the main roads/highways. The main problems are, however, with the distance from the main roads. A good 34 percent of the surveyed settlement are more than the 2 kilometer roads are shown in (Appendix-10.2). The main problem is the poor condition of the access roads, and not the distance itself. (Plate No. 10.3) Hardly any access road is in proper shape and no satisfactory arrangements exist for road maintenance. The detail is given in table-10.2, shown (Fig-10.2).

Table-10.2. Potohar Region: Distances of human Settlement from the main roads 1999

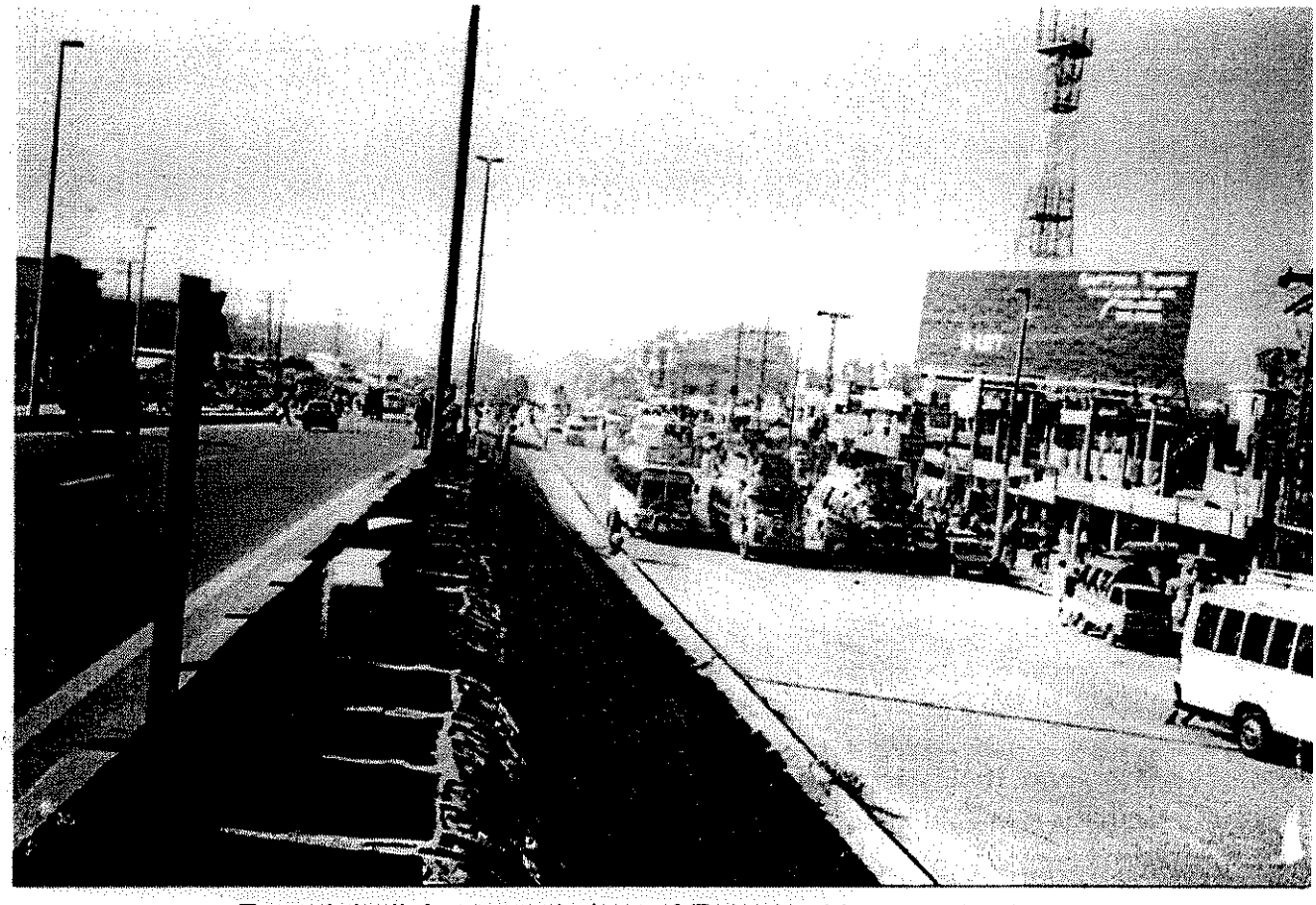
Distance from the Main Road (in KM)	Nos. of human Settlement	Percentage
1 – 2	110	63.6
2 – 4	36	20.8
5 – 6	5	2.9
7 – 8	10	5.8
9 - 10	5	2.9
11 – 12	2	1.1
Above 12	5	2.9

Source:-
Field Survey 1999-2000.

Plate No 10.3: Transportation

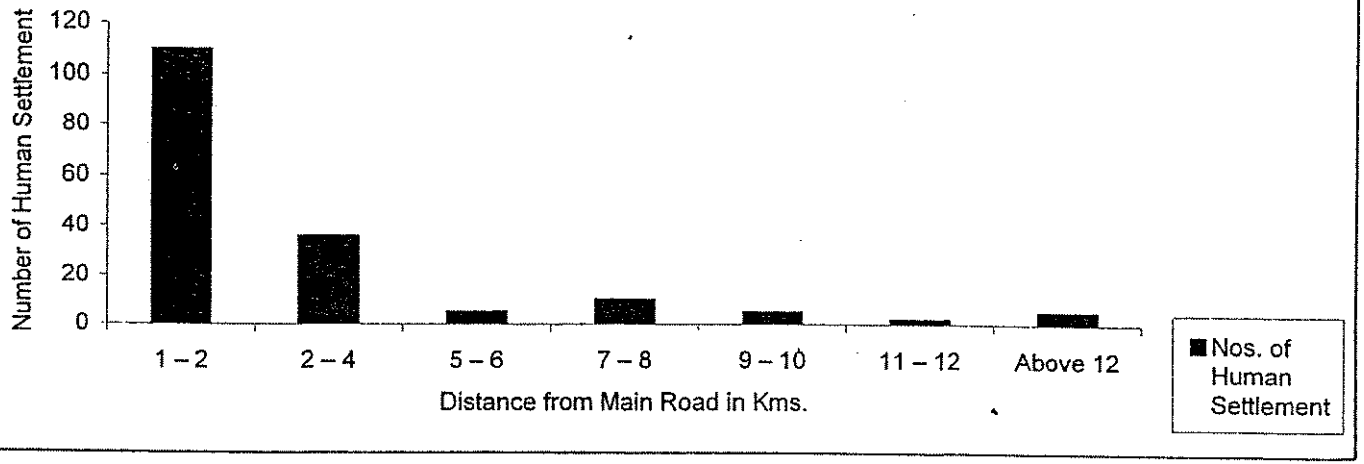


Rawalpindi A general view of Raza Shah Pehalvi/Murree Road



Rawalpindi A general view of Faizabad bus station/stop

FIG.10.2. POTOHAR REGION: DISTANCE OF HUMAN SETTLEMENT FROM THE MAIN ROAD 1999-2000



Source:-

1. Field Survey, 1999-2000.
2. GOP 1998, District Census Reports of Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad.

10.1.6 STRUCTURAL CONDITION OF BUILDINGS

The Rawalpindi town - (an ancient city) was in the form of Rawal town in 1867. Its population was 28,586 in 1881 census which contained 4,764 Households.

By 1901 the housing units increased to 14,615 of which 13,446 (92 percent) were comprised of *Kacha* and the remaining 1,169 (8 percent) were pacca houses (Census of India, 1931). In the next one hundred year/millennium between 1901-1998 the houses increased to 2,12,429 of which 2,06,426 (97.2 percent) were pacca and the balancing 6,003 (2.8 percent) were *kacha* houses. The pucca houses are situated in all areas of city. In this period the pucca houses increased in number comparatively and occupied the fringe area which was built in 1901. The period between 1901-1998 has observed a tremendous increase in the housing units of Rawalpindi. The old houses were demolished and reconstructed according to the modern type.

The original residential area of the city has predominantly *Kacha* houses which are more than one hundred year old. Similarly the settlement of *Bagh-e-Sardaran*, Satellite Town, City-Saddar, *Babu* Mohallah and Trunk *Bazar* which had been merged into the city in 1951, 1961, 1972 and 1981 also possess predominantly *Kacha* houses which are also more than a hundred year of age. All these oldest and *Kacha* houses in the surrounding area portrayed the picture of poverty and poor maintenance (Robertson, 1887).

10.1.7 OVER POPULATION

The population of Rawalpindi city is increasing at a rate of 3.5 percent annually. It is due to the main functional characteristics of the cities which play a major role in the socio-economic development. The people are migrating to the cities primarily in response to economic motives. The city also offers the specialised public utility, services to attract population from various areas of the regions and province, country. The increasing growth of

population has created social problems and great housing shortage. This increase in the population has resulted into increase in the house-hold size from 5.8 in 1981 to 6.1 in 1998 as well as increase in the average room per housing unit, while density of housing of the Potohar remains more or less same from 2.2 persons in 1981 and 2.1 rooms per housing unit in 1998. Therefore, rural - urban migration should be checked so that the city is saved from the population inflow which at the present is very high link alarming number.

10.1.8 EDUCATION

An urban settlement should be provided with sufficient facilities of health education and recreation. Rawalpindi city possess some of these facilities, but they are insufficient and they are placed. For example the schools are administrated by provincial and central government and Cantonment Garrison (Army Education Directorate), are established in old city.

10.1.9 HEALTH

Similarly the health services and play grounds are concentrated in the southwest and north of the Rawalpindi city while in the rest of city, the availability of these services are very scattered. However, the offices of the administrative machinery for the district, provinces and national level are concentrated in the city. Therefore, these functional institutions should be developed according to the needs of the city in the light of modern town planning principles.

10.1.10 WATER SUPPLY

In the Rawalpindi city the quality of fresh sweet drinking water is a major problem. The Rawalpindi Municipal Corporation and Cantonment tube wells are not sufficient for its population. More tube wells should be constructed by the Water and Sanitation Authority for the continuous and regular supply of water from Khanpur Dam and Rawal Dam to the increasing population. The sanitary and hygienic conditions are unsatisfactory in the Rawalpindi City. According to field survey only 62 percent houses have latrines 61 percent separate, 33 percent shared (43,800) and 6 percent (7,943). Therefore the inhabitants should be educated and motivated to construct deep pits in their houses for the garbage and refuse disposals.

The drainage and sewerage conditions are good in the Rawalpindi city, about 94 percent of the drains are pucca and 6 percent of the drains are *Kacha* open. However, in a

number of localities in the city, the drains are *kacha* and not in good repair and, therefore, water flows in the streets. Heaps of garbage can also be found in many parts of the city.

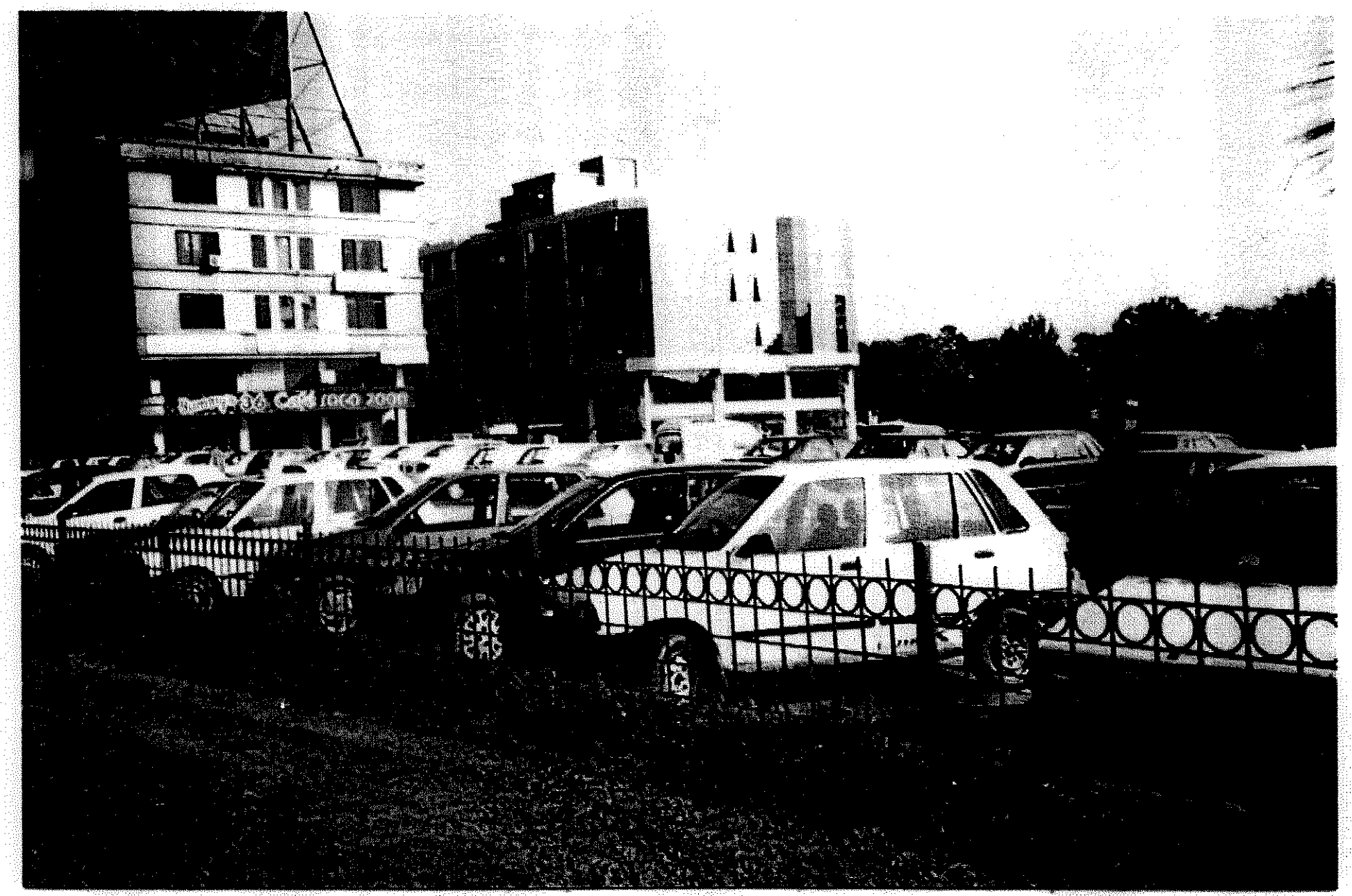
10.1.11 DISTRIBUTION OF URBAN SERVICES

Urban services in Rawalpindi Metropolitan city, like other Metropolitan size cities of Pakistan, manifest glaring inconsistencies and contradictions. On the one hand, some areas have high standard of infrastructure and community facilities such as regular electricity, natural gas, water supply, road, street, sewerage and refuse disposal garbage, education, health, telephone, security facilities etc. On the other hand, in the surrounding/bordering settlement of city, majority of city population are forced to live in the most overcrowded condition with oppressive and dangerous living environment without good water supply, sewerage, drainage and sanitation and other services which are essential to human existence. There are a number of reasons for the present skewed distribution of services, but most important of these is economic one. In the cities/towns and the rural area of the Potohar region there are living three types of people rich and poor. The rich are the industrialists, landlord political leaders, bureaucrats and businessmen and army officers. While the middle class are servicemen, agriculturists, and shopkeepers. The poor are landless-non agriculture, labourers and daily wage men. Due to this class difference, there are differences in the distribution of urban services favouring the posh localities where rich people live and ignoring the localities where the relatively poor ones reside. (Plate No. 10.4)

10.1.12 COMMERCIAL FACILITIES

There is irregular distribution of commercial facilities in Rawalpindi. Some areas such as Raja *Bazar*, Commercial Market, Gulistan Colony, Saddar *Bazar*, Murree Road, Lalkurti Tench Bhata, Saidpur Road, Bunni have majority of multi functional shops/stores, banks, medical stores, hotels and bakery shops. While other localities (Dhok Khaba, Dhok Sayyidian, Gulistan Colony, Adhila Road, Dhamial Camp, Gurja Road, Cha Sultan, Kuttrian) are lacking such facilities. Similarly the whole sale fruit market and vegetable market and meat markets are concentrated in 1) Raja *Bazar* 2) Saddar *Bazar* and 3) Commercial Market (Satellite Town), which creates great problem in accessibility. Rawalpindi and Islamabad is rapidly growing both demographically and spatially. In the wake of its rapid growth are emerging a number of problems.

10.1.13 PEOPLES PERCEPTION OF PROBLEMS



Islamabad A view of Entertainment Centre and Car Parking

Plate No 10.4: Entertainment Centre/Parking

Field survey was conducted to find out peoples perception of pressing problems in human Settlement are shown in (Appendix-10.1). The priority rating of these problems is given in the table-10.3, shown (Fig-10.3).

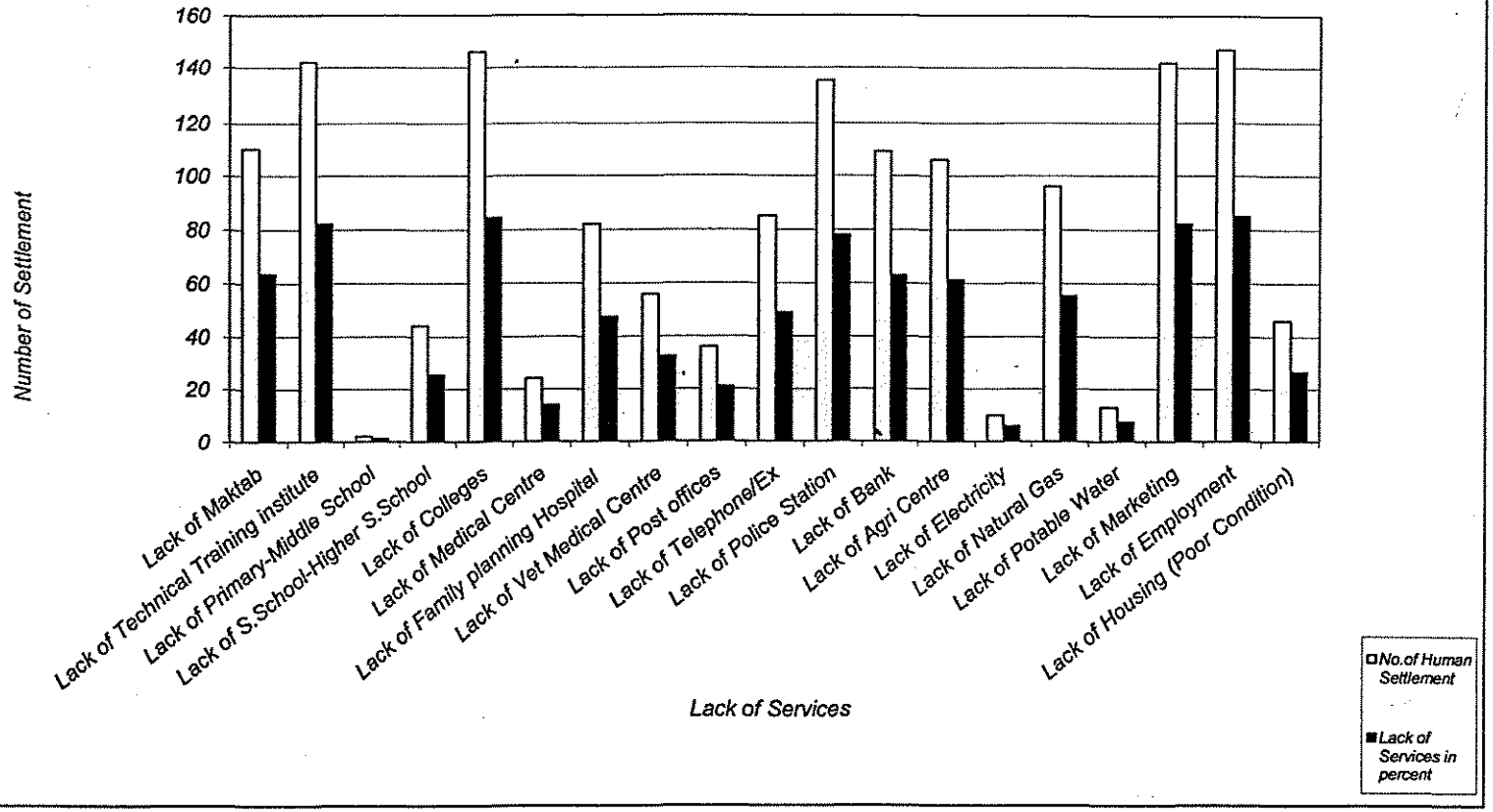
Table 10.3 Potohar Region: Rating of Human Settlement problems in 1999

Sr.No.	Problems	Services not available in Settlement	In percent
1	Lack of *Maktab*	110	63.6
2	Lack of Technical Training institute	142	82.1
3	Lack of Primary-Middle School	2	1.2
4	Lack of S.School-Higher S.School	44	25.4
5	Lack of Colleges	146	84.4
6	Lack of Medical Centre	24	13.9
7	Lack of Family planning Hosp/Centre	82	47.4
8	Lack of Vet Medical Centre	56	32.4
9	Lack of Post offices	36	20.8
10	Lack of Telephone/Ex	85	49.1
11	Lack of Police Station	135	78.0
12	Lack of Bank	109	63.0
13	Lack of Agri Centre	106	61.3
14	Lack of Electricity	10	5.8
15	Lack of Natural Gas	96	55.5
16	Lack of Potable Water	13	7.5
17	Lack of Marketing	142	82.1
18	Lack of Employment	147	85.0
19	Lack of Housing (Poor Condition)	46	26.6

Source:-
Field Survey 1999-2000.

Dissatisfaction with living condition

Fig-10.3. POTOHAR REGION: RATING OF HUMAN SETTLEMENT LACK OF SERVICES IN 1999-2000



Souce:- Field Survey 1999-2000

The human settlement survey covering 173 locality, recorded reasons for people's dissatisfaction with there living conditions. Availability of the building construction material was reported as the major cause of dissatisfaction in 85 percent settlement, unemployment was the second most widely reported came-found in 67 percent settlement followed by poor housing conditions lack of health services, as reported in table-10.4, shown (Fig-10.4).

Table 10.4 Potohar Region: Reasons of Dissatisfaction with living conditions

Sr.No.	Reasons	Number of Human Settlement dissatisfaction			
		Urban	Rural	Total	Percentage
1.	Non-availability of building construction material	–	147	147	85.0
2.	Poor housing condition	1	45	46	26.6
3.	Poverty	–	24	24	13.9
4.	Diseases/Lack of Health Services	–	33	33	19.1
5.	Unemployment	17	98	115	66.5
6.	Others	–	19	19	11.0
		Total Settlement = 173			

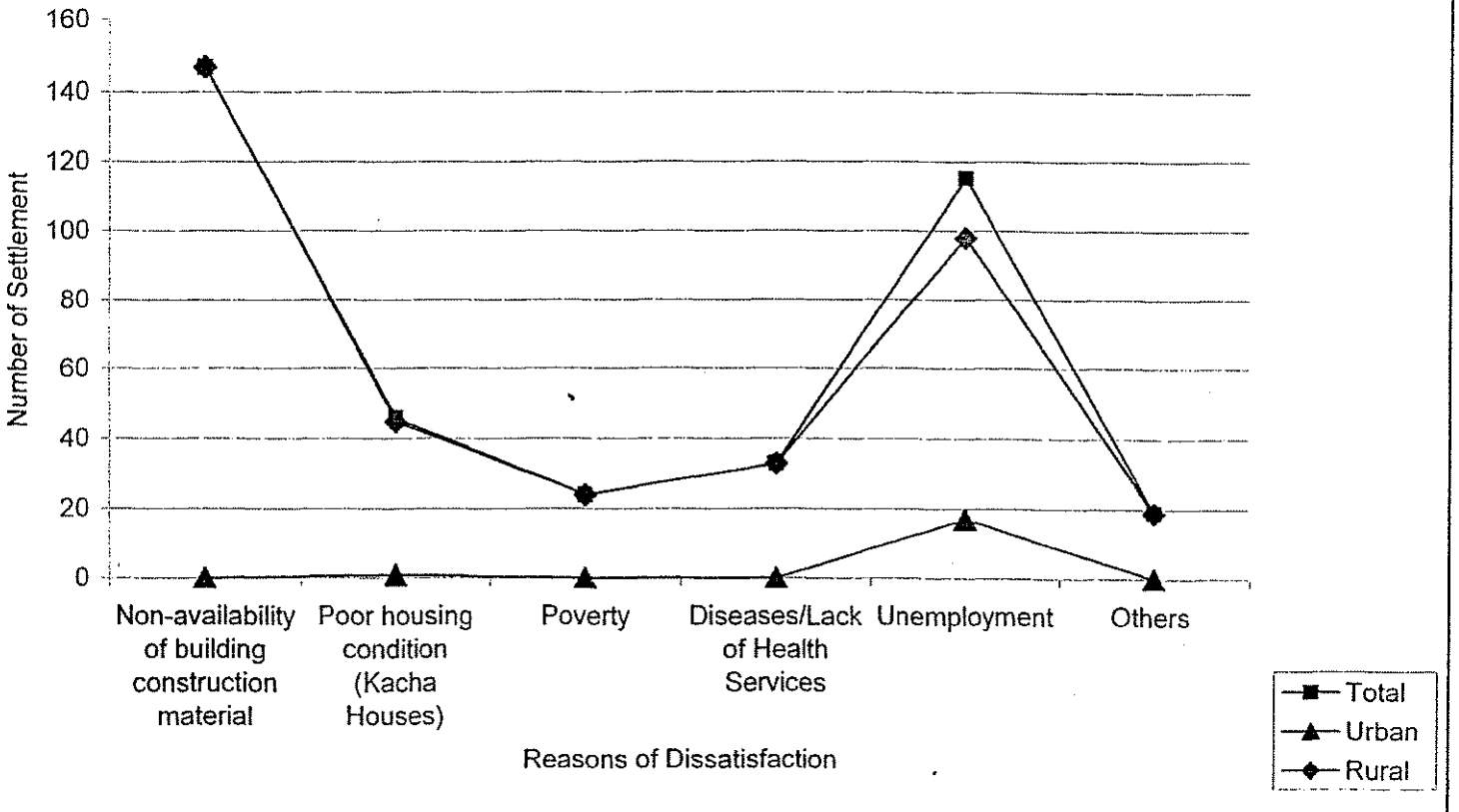
Source:-
Field Survey 1999-2000.

The above mentioned problems call for immediate attention; otherwise they will become unsolvable in the future. This can be done by the District *Nazim*, *Nazim* Tehsil Council and *Nazim* Union Council and regional planning department, in consultation with the local people of the area. The social welfare department should develop institutions, which should able to improve the sewerage, drainage and sanitation condition of the rural settlement. These institutions should be headed by District and Tehsil *Nazim*/member of union councils, MPA, MNA, Senators or other important persons of the human Settlement.

10.1.14 TRANSPORTATION FACILITIES

Transportation facilities have enabled an increasing number of people to seek the socio-economic and cultural opportunities provided by urban living but paradoxically the larger urban centres have grown to the point where they threaten to strangle the transportation system that made their growth possible. It is becoming increasingly difficult to arising in commuting and work in large cities. The problem has become very acute in Metropolitan Twin cities of Rawalpindi-Islamabad and in the major urban centres like Gujar Khan, Wah, Jhelum, Sohawa, Kahuta, Attock, Chakwal and Taxila transport facilities and continuously

FIG.10.4. POTOHAR REGION: REASONS OF DISSATISFACTION WITH RESIDENTIAL ACCOMMODATION 1999



Source:- Field Survey 1999-2000

growing pressure in the Potohar region have created great difficulties mostly to the disadvantage of the common man. The current methods to cope with these problems offer little relief. Bus is the major mode of transport for the poor in the cities, but the number of buses is inadequate. Rawalpindi for example had a bus population ratio of 1.2500 in 1998 (Nasreen Aslam, 1984). while the generally accepted standard is 1.1500 (Nasreen Aslam, 1984). In Lahore the Ratio was 1.18000 (P.U.T.C) (1980) and the city had only 272 buses against an estimated requirement of 1,280 in 1981 (Pakistan Times, 1981). The main defects of the urban transport system are inadequacy of the fleet, its operational insufficiency, poor maintenance and bad behaviour of staff. The result is gross under utilization of capacity in Rawalpindi and Islamabad. Only 40 percent of private and public sectors buses and wagons were road worthy in 1999 (Field survey, 1999-2000). Growth in transport facilities for poor is quite slow while the number of cars increased by 45 percent and motorcycles by 30 percent in twin cities, Rawalpindi and Islamabad between 1997-98 (Bureau of Statistics Lahore, 1998). The twin-city has circular railway system which plays an important role in daily commuting traffic. It is currently over loaded during the morning office hours and closing hours.

There are thousands of busses, wagons, cars, motorcycles and other types of vehicles in Rawalpindi and Islamabad and also in other urban centres of the Potohar regions. They side by side with animals pulled carriages. The overall situation is chaotic some tremendous efforts will be needed to overcome this problems which is growing fast in volume as well as severity. Potohar region detail of bus services with major cities/towns of Pakistan is given in table-10.5, shown (Fig-10.5).

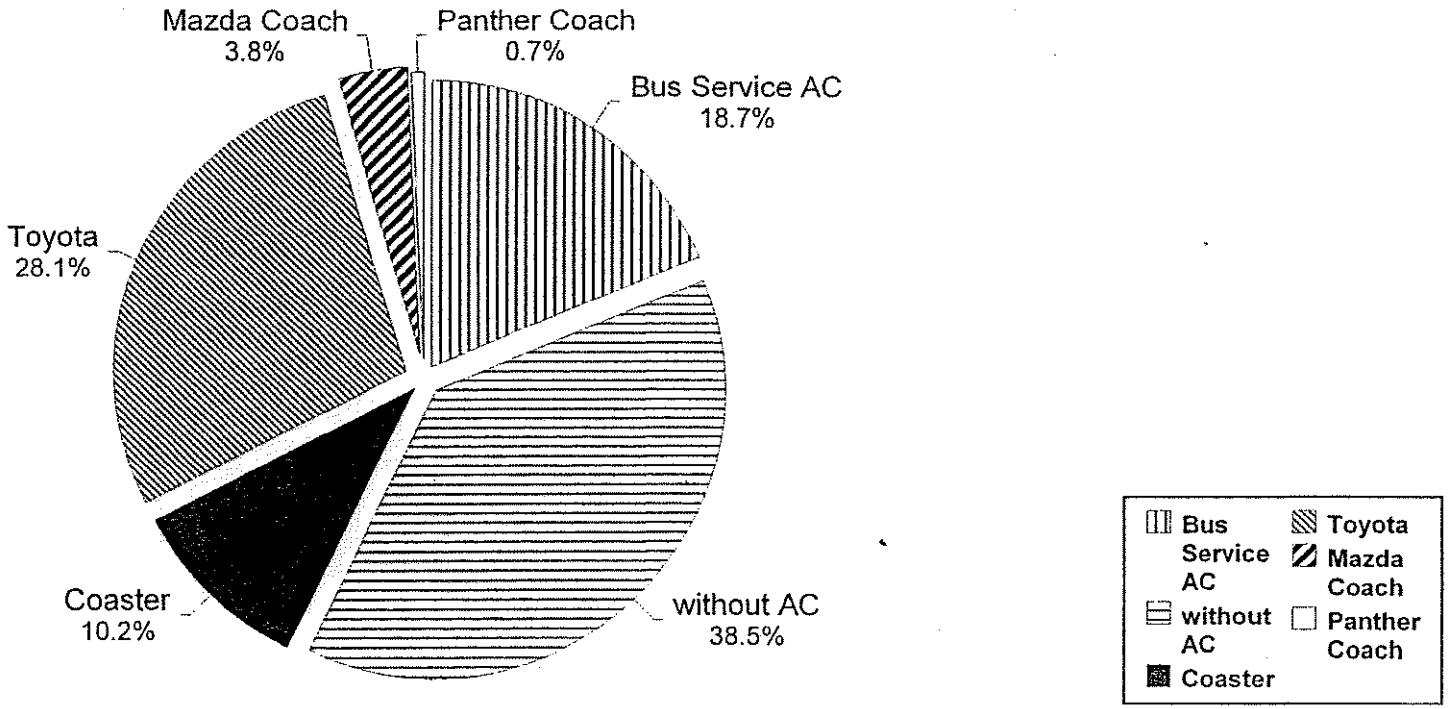
Table-10.5: Potohar Region Bus Service with major cities/Towns of Pakistan

Cities/Towns	Number of vehicles public & private transport services						Cities/Towns	Number of vehicles public & private transport services					
From Rawalpindi city to	Buses		Coaster	Toyota	Mazda Coach	Panther Coach		Buses		Coaster	Toyota	Mazda Coach	Panther Coach
	AC	Without AC						AC	Without AC				
Karachi	14	–	–	–	–	–	Kohat	–	–	–	25	20	–
Lahore	193	326	69	30	–	16	Vehari	–	–	7	20	–	–
Faisalabad	26	215	8	–	–	–	Mianwali	8	–	–	–	–	–
Gujranwala	–	–	–	60	–	–	Swabi	–	–	–	18	–	–
Multan	18	2	8	–	–	–	Haroonabad	2	–	–	–	–	–
Peshawar	27	70	18	41	–	–	Bhalwal	–	–	–	16	–	–
Quetta	8	–	–	–	–	–	Abbottabad	–	19	–	40	–	–
Sargodha	6	–	–	40	62	–	Shujabad	2	–	–	–	–	–
Sialkot	29	90	10	64	–	–	Mailsi	2	–	–	–	–	–
Bahawalpur	4	–	–	–	–	–	Depalpur	2	–	–	–	–	–
Gujrat	–	–	13	60	–	–	Narowal	–	25	–	–	–	–
Jhang	7	–	–	–	–	–	Mansehra	–	23	15	28	–	–
Mardan	–	39	8	34	–	–	Haripur	–	–	–	14	–	–
Sahiwal	2	–	–	–	–	–	Timergara	–	–	–	8	–	–
D.G.Khan	9	–	–	–	–	–	Bannu	–	2	–	25	–	–
Mingora	–	10	–	18	–	–	Lakki Marwat	–	–	–	7	–	–
Burewala	2	–	–	–	–	–	Minchinabad	2	–	–	–	–	–
Sadiqabad	13	–	–	–	–	–	Tank	–	–	–	2	–	–
Khanewal	2	–	–	–	–	–	Karak	–	–	–	15	–	–
Hafizabad	2	–	–	–	–	–	A.J.K.	–	8	13	40	–	–
Bahawalnagar	3	–	–	–	–	–	Northern Areas	15	–	51	–	–	–
Pakpattan	4	–	–	–	–	–							
Chishtian	2	–	–	–	–	–							
Total(A):-	371	752	134	347	62	16	Total(B):-	33	77	86	258	20	–
(A & B):-	404	829	220	605	82	16							
Grand Total:-	2,516												

Source:-

Field Survey 1999-2000.

CITIES/TOWNS/PROVINCES OF PAKISTAN 1999-2000



Source: Field Survey 1999-2000.

FIG-10.5. POTOHAR REGION: BUS SERVICE WITH MAJOR

10.1.15 PROBLEM OF POLLUTION

Different types of vehicles – buses, wagons, motor cars, rickshaw, motorcycles, six wheel trailer, trucks, vans etc. Run through the city roads, in thousands every day and release pollution in the form of fumes, dust etc and the atmosphere is polluted day by day like in other big cities of Pakistan. Similarly, the free release of horse refuse from *Tonga* service makes roads with smell as well as contributes to tetanus disease. The localization of industries inside the city makes the situation undesirable and polluted as they create noise and dust. In Rawalpindi some furniture units, CNG stations, the automobile stands and brick kilns are localized inside the residential and commercial area of city and some are situated along the roadside which create noise and problem for the city. The industry generates too much traffic and noise. (It is advisable to shift them into vacant land in the fringe of the Rawalpindi city).

The pollution problem being generated by ever increasing mass transport, public and private vehicles, is also alarming proportion. The exhaust containing large quantities of gasses sulphur, carbon mono-oxide, lead and nitrogen oxide in the urban atmosphere is not only a perpetual source of nuisance but a primary factor for increasing incidence of asthma chronic bronch and other diseases of the heart, lungs and skin (Amir Khan, 1994). The cities of Potohar region are faced with traffic pollution problems due to (i) faulty vehicles on the roads, (ii) deliberate use of inappropriate fuel mixture and (iii) tremendous increase in the number of motor vehicles. The results of field survey in twin cities show that the air is being of oxygen-Gas in twin cities of Potohar region and is simultaneously getting contaminated by Toxic and unwanted gases from auto mobile exhaust. Thousand of vehicles, run every day and railway engines run on and release the pollutants in the form of fumes, dust noise etc. There are also a lot of slums, *Katchi abadi* in different side in the twin cities an undesirable situation. The localization of industries inside the cities makes the situation undesirable and polluted as they create noise. Therefore, it is advisable to shift pollution providing industries to vacant land occurring in the fringe of the cities. The industries should also be shifted to the fringe of the cities like many others which have recently been constructed away from the central cities. Crushing plants industry in the out skirts of Margalla Hills are fast polluting atmosphere of twin city Islamabad – Rawalpindi. These crushing industries are also causing various kinds of disease especially lung diseases (The News, 2002). The continued blasting in the Margalla area of Islamabad city has destroyed historic relics at these hills. Most of the

people are digging and extracting precious historic relics in the cover of crush industries business (The News, 2002).

All localities especially the urban ones are facing pollution problems. This problem is most visible in large urban centres especially in Rawalpindi and the district headquarters. If left unchecked it would grow in size as well as severity with every passing day (Plate No. 10.5-10.6).

10.1.16 LACK OF INDUSTRIAL DEVELOPMENT

Potohar is industrially less developed as compared to other regions/provinces (The News, 2004). Factory industries could not develop in Potohar regions, due to lack of infrastructure, raw materials, unskilled workers, poor facilities (The News, 2004). Hence a very small percentage of civilian labour force, much below the provincial/national average are employed in industries (The News, 2004).

10.1.17 COMMUNICATION

Poor communication is one of the major factors for low level development of the region. The road system is not well developed. The eastern and western parts of the region are not well connected with the Rail-Road. Therefore, the flow of people and commodities through railways has been quite slow in the Potohar region. Road density (25.4 (100) km^2) and Rail density (2.5(100) km^2) of the region has been found below the provincial and national figure. Most of the Human Settlement of the region are hardly accessible.

10.1.18 SOME PROBLEMS SOLVING PROPOSALS

These manifold problems are of great concern to the people of Potohar region as well as the government. Proper solution of these problems is the urgent call of time. These problems are multiplying day by day because of rapidly increasing population in comparison to human/material resources. With a view to solving the above mentioned problems of the region, some suggestions have been forward, taking into account the provincial/national norms, after considering the projected population of human settlement figures as well as the future needs of the people up to 2011 & 2021 with regard to various resources and essential facilities.

Plate No 10.5: Problems of pollution

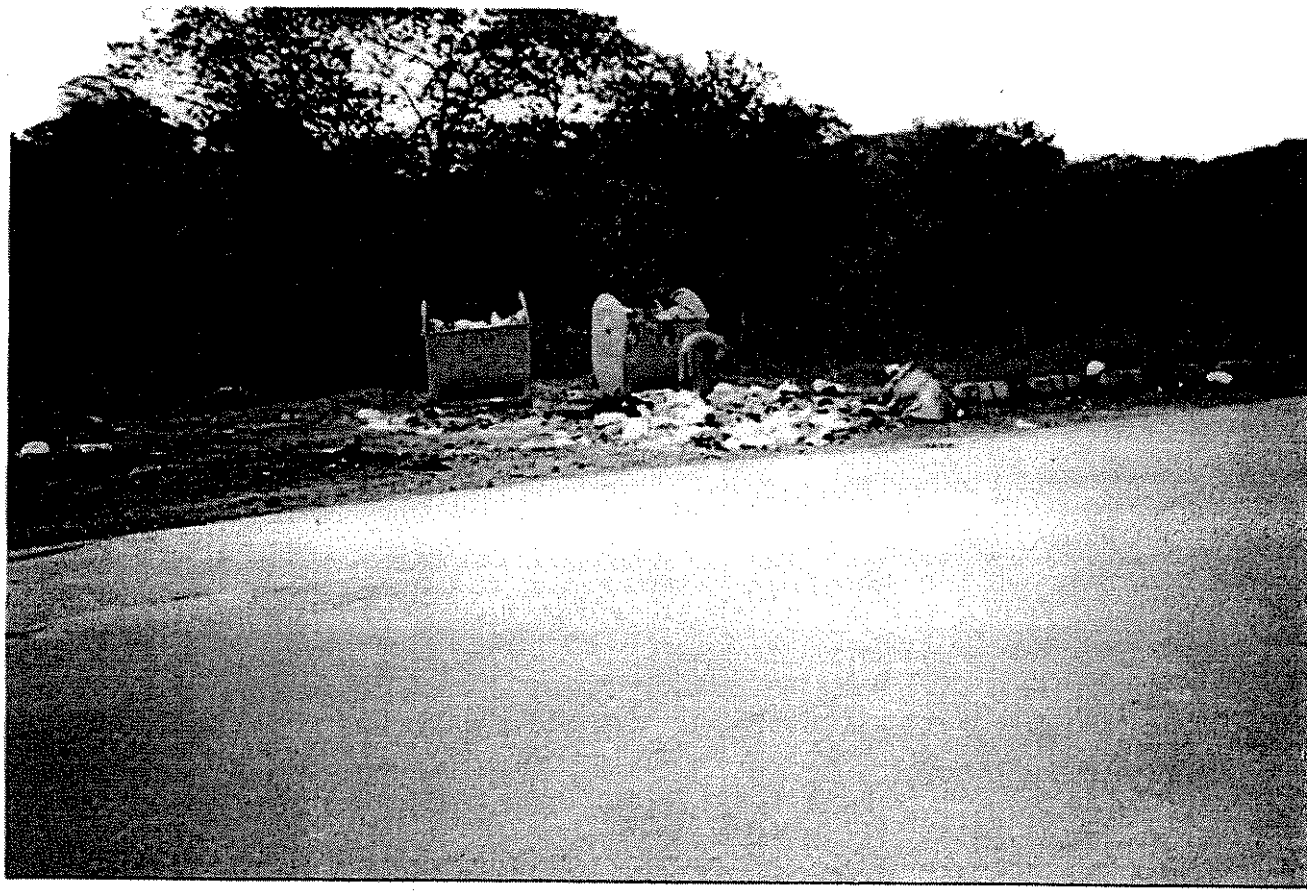


Gujarkhan Drain/polluted water standing main bazar



Morgah A view of Soan River polluted water

Plate No 10.6: Problem of Pollution



Islamabad Waste food lying Blue Area



Rawalpindi A Waste food/garbage lying public park Faizabad

10.1.18.1 IMPROVEMENT OF ECONOMY

Agriculture:

Improvement of agriculture, which is the main stay of the Potohar region, rural population, is most important. It is still traditional in nature. The area under *rabi* and *khrif* crops should be increased by improving irrigation system in the study area. Crop diversification is needed in favour of high value crops. Yield per acre need be enhanced. More investment need be made in livestock sector, as well as fisheries and farm forestry. There is an immense potential for development in the agriculture sector and all possible efforts should be made to capture it. Sustainable development of agriculture would contribute to the overall development of the region and help minimise the problem of rural urban migration environmental degradation, poverty (Plate No. 10.7).

10.1.18.2 SOCIAL FORESTRY

Social forestry has to be improved in the region. Deforestation has to be immediately stopped in the north eastern part of the region. That also helps in making the micro-climate of the area more favourable.

Industry:

No region/area can promote its economy to a considerable extent without industrial development. Potohar lacks in industries. There is ample scope for the development of agro-based, forest based and livestock industries like textiles, paper. In the region mineral resources, distributed throughout the hilly area are so not properly used for industrial units. Adequate provision of skilled labour, capital, and power for industrial developments in the region, need be made in development plan.

10.1.18.3 IMPROVEMENT OF RURAL DRINKING WATER SUPPLY

Improvement in human settlement urban/rural water supply is most necessary in Potohar region. In the rural area drinking water requirment 1000 thousand liters per day. drinking water 1,49,295 thousand liters per day will be needed in 2011. For this a large number of open wells, tubewells, and pumping sets are required. Although the provincial/national government has been seriously considering this problems, yet the development in this direction has not been satisfactory. Water supply provision, although

Plate No 10.7: Market Centre Islamabad



A general view of *Chabba Frosh* occupying public road and foot path in Sabzi Mandi, Pir Wadhai



Waste food/vegetable and fruit lying sabzi mandi Pir Wadhai

expensive, is the only solution to the problems of human settlement rural water supply of the Potohar region.

10.1.18.4 TRANSPORT PLANNING

Some parts of Potohar region are inaccessible due to absence of normal and all weather roads. These problems need be solved. The provision of double railway line (mainline) and single line central and western part of region Chakwal, Pindi Gheb, Choa Saidan Shah and Talagang tehsils, should be made. This is so farce absent in western part of the region. The north-eastern part of the region should be linked up by railways (Murree, Kahuta and Kotli Sattian). Means of land transport especially roads and railways lack integration and that is why human settlement rural/urban areas of the Potohar region, remain detached. Their development will foster the economy of the region and help the growth of industrial, trade and commerce.

10.1.18.5 IMPROVEMENT OF HELATH AND MEDICAL FACILITIES

Improvement of medical facilities is most necessary, especially in human settlement in rural areas of Potohar region. In order to maintain even the present population – health facility ratio the Potohar region will need 3،150 more doctors, 6،780 more hospital beds, and 50 more hospitals by 2011. And all round expansion in the medical facility is a pressing need of region as projected in table-10.6, shown (Fig-10.6).

Percent level of health services, although unsatisfactory, Potohar region will need 7،465 more doctors per thousand person and 100 more hospitals 74،648 person per hospital beds the ratio of population 1،730 per doctors and 916 bed per doctor has to be brought to 1،000 persons. By 2011, this ratio will again go down to 1: and 1: respectively and region requirement will go up of 3،150 more doctors and –50 more hospital bed.

Table-10.6: Medical facilities in Potohar Region 1999 & 2011

Medical facilities	Existing 1999—2000	Requirement	
		Present 2006—2007	Projected Future 2011
No. Of Doctors	4,315	5,471	7,465
No. Of Beds	8,149	1,131	14,929
Dispensaries	394	506	7,465
Primary Health Units	34	313	500
Basic Health Units	273	1,410	2,000
Maternity Child center	9	15	18
General Hospital	50	80	100

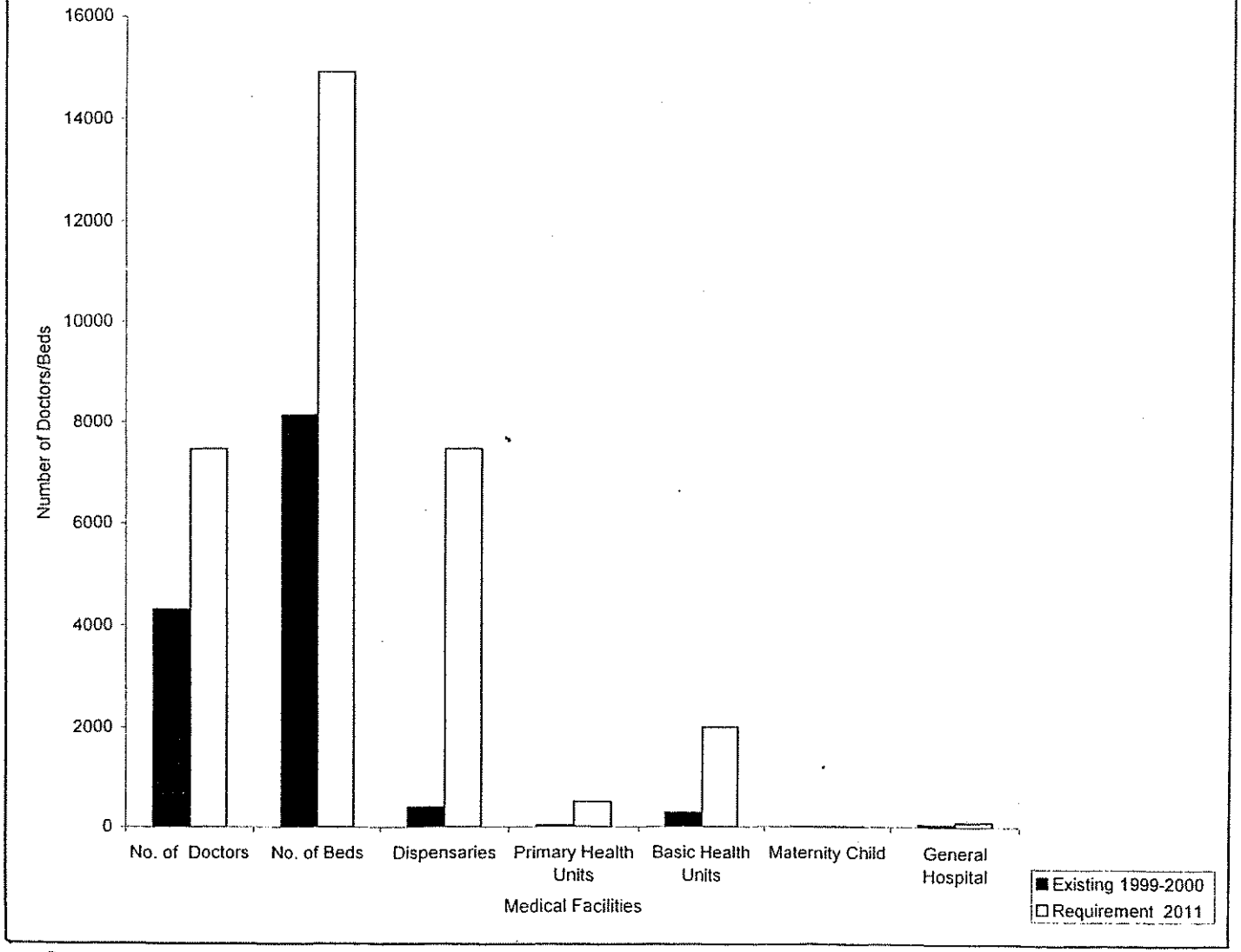
Source:-
Field Survey: 1999-2000.

Establishment of mobile dispensaries-one each among four or five human settlement, is most essential for improvement of human settlement of rural health facilities.

Concluding Note:

The Potohar region faces problems of varying intensity in almost all sphere of life-housing, transport, pollution, social services, environmental degradation etc. Simultaneous action is needed on all fronts. In the ultimate the problem is one of efficient and dynamic urban and region planning and enforcement of stringent controls and disciplines.

FIG.10.6. POTOHAR REGION: MEDICAL FACILITIES IN POTOHAR REGION 1999 & 2011



Source: Field Survey 1999-2000

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PART FOUR

MAIN FINDING CONCLUSION AND RECOMMENDATIONS

CHAPTER ELEVEN

MAIN FINDINGS, CONCLUSIONS, RECOMMENDATIONS

11.1 INTRODUCTION

The study, as stated in chapter 1, was undertaken to inquire into growth, distribution patterns, and characteristics of human population and settlement in Potohar region of Punjab province of Pakistan. The study attempts to explore and explain the path taken by the population and settlement in the study area in the past, especially in the post-1881 period, the determinates of their growth and distribution patterns, the likely shape of things in respect of human settlement in the near future and their implications for regional/urban planning and development policies. The study attempts, but is not restricted, to verify the following hypotheses:

i. The obtaining pattern of distribution-largely uneven, of population in the Potohar region is attributable to a host of factors-geographical, historical, demographic, cultural, environmental and socio-economic, among which the economic factor is the most important one.

ii. The location pattern of human settlement is primarily determined by geographical factors and governmental policy intervention.

iii. The urban centres have grown primarily by pull factors, reinforced by pro-urban biased governmental policies in the matter of provision of social services and economic infrastructure.

This study is the first of its kind in the context of Potohar region. Thus besides making a useful addition academic interest to the existing body of knowledge on the specific aspects of human population and human settlement covered by it, this study would be of practical interest to regional/urban planners in the particular context of Potohar. In the rest of this chapter, the study's findings, conclusions, and recommendations are given in that order.

11.2 MAIN FINDINGS

The Potohar region is situated in the northern part of Punjab province of Pakistan. It lies between 32° – 30" N to 34° latitude and from 71° – 45" E to 73° – 45" E longitude.

It is situated at an elevation of 472.2 to 609.6 meter above sea level. Physiographically, the region marks the border of Indo-Gengetic plain. It is the fifth largest region of Pakistan, covering 2.9 percent of the total area and 5.6 percent of the country's population. It has five administrative districts 2,767 villages and 31 urban centres.

Physiographically, Potohar can be divided into tow major unit – hilly area and plane areas. The region is bounded by the great river Indus in the west and Jhelum in the east. The natural slope of the region is from north to the south east.

Agricultural is the major sector of the region, accounting for more than 60 percent of its work force. About 47 percent of the total area is under cultivation. The area under forests is about 4,02,000 hectors.

The industrial sector is relatively less developed in the Potohar region as compared to other regions/provinces of Pakistan. It is, however, undergoing steady expansion. Prominent among the industrial units that exist in the region are cotton spinning, textile, woolen mills, heavy mechanical complex; soda ash; tobacco; cement; glass; four mills; feed mills; steel mill; gas filling stations etc.

POPULATION DENSITY/GROWTH

Variation in distribution and density of the regions population is explained largely, by physical environments, economic condition, and cultural and historical factors, these are interlinked, they influence each other, and similarly reinforce each other.

The region's rural population, which is 60 percent of its total population, is distributed over as many as 2,767 villages. The majority of rural population lives in a large number of small villages. The villages-small and big, are widely scattered over the entire region. Many of these are not accessible by vehicles.

About 40 percent population of the region lived in 31 urban centres in 1998. The urban population, too, is unevenly distributed. The major urban centres are the

twin cities of Rawalpindi – Islamabad accounting for 66.1 percent of the regions urban population in 1998.

Population density of the Potohar region is 322 persons per Sq. Km. in the Punjab province it is 358 persons Sq. Km. and in Pakistan 166 persons Sq. Km. District-wise populations density varies widely; Attock 186, Chakwal 166, Islamabad 889, Jhelum 261, and Rawalpindi 636.

During 1901-1998, the population of Potohar region increased 390 percent in aggregate. The corresponding figures are 225 percent for rural and 1,940 percent (19-fold increase) for the urban population. Periodic population was:

URBANISATION

Potohar had in the past a low degree of urbanisation as there were a few urban localities in the 1881 census. The process of urbanisation increased with passage of time and the number of urban localities multiplied, changed the previous urban pattern, and brought in vogue a new trend. Some of the conclusions drawn from the study in this respect are as follows.

i. In 1901, Potohar; urbanisation level was 9.6 percent which rose to 39.9 percent in 1998.

ii. The degree of urbanisation of the Potohar remained lower than that of the Punjab until 1961 and then increased sharply during the period 1961-1998.

iii. During all the eleven census years from 1881 to 1998, Rawalpindi was most urbanised area in the Potohar region followed by Islamabad, Wah and Jhelum.

iv. Among the tehsils, Rawalpindi tehsil remained the most urbanised tehsil of the Potohar during all the census years. It was followed by Islamabad tehsil.

v. Kahuta tehsil was not urbanised at all until 1956. It became urbanised in 1961.

vi. The per annum growth rate of urban population of Potohar (4.3 percent) during the period 1951-98 was slightly high than that of the Punjab (4.1 percent) and Pakistan (4.3 percent).

vii. The urban population of Rawalpindi district was about 48.3 percent of the total urban population of the entire region.

viii. In 1881, there were only eight urban centres in Potohar. Their number increased to 21 in 1961 and 31 in 1998.

ix. The distribution pattern of urban localities in Potohar according to rank size rule is primate. Rawalpindi is the primate city which has shown a disproportional rate of urban growth during the last five decades.

x. The distribution pattern of urban localities in districts deviates from the regional pattern. The urban localities in the districts are located some what close to each other.

xi. It is projected that the number of large cities in Potohar will increase from 4 from in 1998 to 9 in 2011. The new entrants will be Chakwal, Attock, Gujarkhan, Dina and Taxila.

xii. A number of rural mauza/village/settlement or expected to become urban areas by the end of 2011. These include Chaklala, Kot Hathial, Shakarial, Khanna Dak, Thua Moharam Khan, Kotha Kalan, Morgah, Hammak, Mirza and Saeelah. It seems that the distribution pattern of urban areas in the regions will become approximately uniform.

HUMAN SETTLEMENT

A major objective of this study was to inquire into the distribution pattern of human settlement and the factors responsible for their heterogeneous natural and human environments and implications of this heterogeneity. The study's main findings are as follows.

Human settlement analysis indicated an uneven distribution of settlement in the region. Large variation was found in the density of human settlement in different parts of the region. In the region, in each sub-division, tehsils and in each size category nearest neighbour analysis and Poisson distribution analysis indicated a moderately clustered pattern of distribution. Poisson distribution also indicated a multi-clustered distribution of human settlement. Analysis of the factors to influence the pattern of settlement distribution revealed that some factors have a close relationship, some have weak association with settlement distribution, while still some

others have practically no impact on the distribution pattern. Landforms, hydrology, land use, and population density were found particularly more influential in determining the distribution pattern. While elevation, climate, history, nearness to major settlement, government decisions etc, play some role in the distribution of settlement, but that role is not very prominent. Transportation network have practically no influence on the settlement distribution in the region. Whether the natural factors or the human factors influence distribution pattern of human settlement? This is difficult to decide and needs some discussion as follows.

Both groups of factors act together to determine the pattern of settlement distribution. However, in some cases natural factors seem relatively more deterministic in the pattern of human settlement, while in other cases human factors-including cultural, political and economic factors, seem more influential. Natural factors mostly do not act directly but act through human factors in determining human settlement pattern. In some cases the control of nature is more strong than in other cases. Where the human factors may not be that much subservient to nature and in which human factors are the product of not only the natural environment but also of the human efforts reflected in their economic and technology development, their culture, norms and political decision making, the human factors have a stronger control over human settlement distribution. How far the nature has controlled the human factors, is also reflected in the pattern of human settlement distribution. As just mentioned, here the extent to which natural factors will affect the human factors or in that terms to the pattern of human settlement, will depend upon the level of social and economic development of the society. Pakistan and for that matter Potohar region, is neither economically nor culturally very developed. On account of these characteristics of society, natural environment has a strong control on the distribution of human settlement. As against here, in the western European countries, developed societies or in the socialist societies, human control may seem to be more strong in determining human settlement pattern. In Potohar region, except for a limited area, the government has no control over the distribution or establishment of human settlement i.e. human settlement's distribution is not planned. So the human settlement exist where factors are more suitable and not at preplanned points.

Varying strength of natural and human factors also depends upon the natural characteristics of the area. Thus in the plains where homogeneous topography,

climate, soil fertility and sources of water are found, natural factors cannot be expected to play any important role in the distribution of human settlement, as each point has equal potential for the existence of human settlement.

As against this, region like Potohar which is characterised by a variety of natural characteristics of topography, soil, climate and water availability, control of natural factors on human environment, including human settlement distribution, becomes inevitable because each natural resource has a varying potential at different places. So the areas that posses more favourable natural conditions have a greater potential for the establishment of human settlement than areas which lack such favourable factors.

Human settlement are not created on the basis of any single of favourable factor, but a combination of factors produces the human settlement and hence pattern of their distribution. As the areas in which favourable factors have assembled together are found in a moderately clustered pattern. The distribution pattern of human settlement produced by these factors are also moderately clustered.

Study of the distribution pattern of growth of the human settlement revealed that landform, land use, transportational networks and nearness to major urban centres were not important in the distribution of human settlement but they play the most important role in the growth human settlement. Government decision making is also important role in such growth pattern.

If we compare the relative importance of natural and human factors in determining the growth distribution of human settlement, contrary to their role in the existence of human settlement, human factors seem to be more influential i.e. the growth potential of human settlement is more or less dependent upon their location in relation to transportation system. Potohar regional centres and land use pattern and other socio-economic activity.

The exercise on population potential in the region brings Rawalpindi at the focal point, with concentration of spatial activity in the lower parts of the Potohar region. It is due to concentration of large masses or density of population in these areas. However, away from Rawalpindi, the spatial activity decreases and a stage is reached, where there is no spatial interaction. The variation in population potential is the result of variation in relief, human resources and transportation in the area.

The spatial structure of the Potohar region studied in terms of population density, settlement density, gradient density, and intensity of cultivated land from the focal point of Rawalpindi city, indicates that he population density is the highest – 13,350 persons per km² at Rawalpindi and gradually declines with distance from the urban centre. The human settlement density and the intensity of cultivated land also decline with the distance from the city of Rawalpindi. This indicates a spatial relationship between population density, human settlement density and intensity of cultivated land around the Rawalpindi city. The correlation between these variables also shows strong affinity between human settlement density gradient density and intensity of cultivated land around the Rawalpindi city.

11.3 CONCLUSIONS

In the preceding part of this chapter, the main findings of the present study were presented. Alongside these finding the emerging conclusions were also presented on the main theme of this study. In the present section conclusion are restated in the particular context of the study's hypotheses.

HYPOTHESIS 1:

The obtaining pattern of distribution, largely uneven, of population in the Potohar region is attributable to a host of factors-geographical, historical, demographic, cultural, environmental, and socio-economic among which the economic factor is the most important one.

This hypothesis is not found wholly valid or alternatively it is broadly valid but subject to the qualification that these factors operate in group, inter-act on each other, and none of these is or can be singly, strong enough to independently shape or amend the distribution of human population or and human settlement. Therefore, the universality of dominant role of economic factors is discounted by the study's finding, which suggest that economic factor in itself is re-enforced or shaped by other factors.

A re-statement of the conclusion on the hypothesis under study seems necessary a follows

- Both natural and human factors determine human populations and settlement distribution pattern.

- ❖ Both of these factors influence each other and as such it is not appropriate to rank these in terms of strength or importance.
- ❖ These two factors operate with different force in different situation natural and man-made.
- ❖ For policy formulation purpose, this conclusion implies that in regional development planning decisions all factors should be incorporated, and that there is no universal, or fit-for-all situation set of criteria for development policy formulation in this sphere.

HYPOTHESIS 2:

The location pattern of human settlement is primarily determined by geographic factors and governmental policy intervention.

This hypothesis need be re-stated as in its present form it can not be clearly confirmed or rejected. One part of it relates to geographic/natural factor and one to government policy intervention. The two need be considered separately.

In so far as the geographic/natural factors role as primary determinant of location of human settlement is concerned, that is found valid by the present study. But that is subject to the set of reservations set out in the context of hypotheses one. That is, this factor is an important or even most important in certain situations but is not the only determinant of location of human settlement.

The hypothesis regarding role of government policy intervention as a determinant of location of human settlement is not clearly confirmed by the present study. This factor operates not independently but in the combination with several other ones. The governmental policy itself is determined by a host of natural and human factors, and by itself is not seen exercising influence strong enough to offset or neutralize the force of this factor (natural and human). The governmental policy however, can and does reinforce the influence of natural/human factors in respect of location of human settlement.

HYPOTHESIS 3:

The urban centres have grown primarily by pull factors operating in the urban area reinforced by conscious governmental policies with pro-urban bias.

This hypothesis is found valid in the light of finding of this study. While there has been a growing tendency for the social services and economic opportunities to concentrate in and around urban localities, the widely scattered rural habitats are faced with rapidly growing population, scarcity or absence of social services, and sluggish economy which have been instrumental in pushing the people out of the rural areas. Thus both pull factors-operating in urban areas, and push factors-operating in rural areas, reinforced by pro-urban bias in provision of social services and economic opportunities have been contributing to relatively faster growth of urban centres. This trend is expected to continue in the foreseeable future faster than before. The existing urban centre will continue to grow bigger and a number of rural centres are expected to acquire urban character and classification, resulting, as stated before, in a continuous rise in urbanity level in the region.

Is the current and expected, trend towards urbanisation is to be viewed as a desirable phenomenon? A categorical answer to this question is not possible as urban growth has both positive and negative socio-economic implications. The negative implications show up prominently when urban growth is unplanned, rapid, and haphazard, some prominent consequences of this trend area: emergence of slums, rising pollution, transport problems, mounting pressure on social services etc. which adversely affect all sections of the urban population, especially the poor an the middle class people.

11.4 RECOMMENDATIONS

The essence of findings and conclusions of this study is that there is a need to infuse order and rationally in the location and growth of human settlement especially the urban ones. The rapid and haphazard urban sprawl has to be checked. Urban and rural habitats have to be made livable and well provided with the amenities of life. They should be pollution free and well served with social services. How to achieve all that? This is a big subject in itself, but some recommendations to this end are as follows:

1. Regional Planning

Most of the existing problems are the outcome of neglect of the need for regional planning in which the remotest parts, and even the smallest habitats, of the country/provinces are given due attention. The need for implementing this approach

has never been stronger than now. Following the induction of the district government system under the devolution of governance authority to the district level, the implementation of regional planning model has become a realizable goal. In the plan for district development all the localities should receive equitable development allocation. Besides improving living conditions in villages and towns this approach would help minimize push-factor caused migration to big urban centres in and outside the Potohar region.

2. Economic Infrastructure

The Economic infrastructure should be more widely and fairly distributed over all parts of the region. This is pre-requisite for an equitable development of the region, and will also help check mass migration from rural to urban areas.

3. Social Services

All settlement, or groups of settlement, should be provided adequate social services or at least remaining with in limits imposed by scarcity of means, they should get equitable share in these services.

4. Wider spread of urban population

The current tendency towards concentration of urban population in a few cities must be checked. The rural-urban drift of population cannot be easily checked, it should be possible to diversity the drift to a larger number of urban centres. This calls for greater allocation of funds, and policy measures, for the development of existing small towns as well as for transformation of big villages into urban centres.

The recommendations given above do not exhaust the approaches/policy options available for achieving the targeted goal. These are only illustrative of what can be done to bring about improvement in human settlement. The problem lies in the broader domain of regional and urban planning. There is no escape from that serious, earnest, and concerted efforts need be made to implement the above recommended approaches.

PART FIVE

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Appendix-3.1 Questionnaire

Origin of Human Settlement

History Origin of *Mauzas*/human settlement Ancient Buddhist Hindu Mughal British Modern

i) Name of Human Settlement_____
ii) Archaeology Sites _____

- Growth Potential
  a) Location N------ S ------ E -------- W
  b) Name of Nearest urban place, stream, major/main road (Nearest)

  i) Distance in Km. _____
  ii) Direction North. _____

- Settlement Size
  i) Total Area _____
  ii) Cultivated Area _____

- Water Source Level/supply situation _____

- Special Features (H.S.)
  i) Place _____
  ii) Forest _____
  iii)Building/Industries _____
  iv)Lake _____
  v) Dam _____
  vi) Historical Place _____
  vii) Any Other _____

- Road

  _____

- *Mauzas*/human settlement type & Developments
  i) Planned _____
  ii) Unplanned _____

- Socio-Eco Database
  i) Agricultural Settlement

  _____

  ii) Commercial/Market Centre

  _____

  iii) Historical view point

  _____

  iv) Industrial centre

  _____

  v) Main side NHA/Motorway

  _____

- Transportation Network Centre
  - i) Military Area Cantts. _____
  - ii) Religious Centre _____
  - iii)Trade Route _____
  - iv) Any Other _____
  - v) Housing Facilities
  - vi) Average Household Size

- Housing Units
  - i) No. of Housing Units in the Human Settlement _____
  - ii) Type of Structure _____
  - iii) *Pacca* _____
  - iv) Semi-*Pacca* _____
  - v) *Kacha* _____

- Sources of domestic water supply _____

- Quality of drinking water
  No. of domestic connection of Potable water _____

- Electricity Sources _____

- Sewerage System _____

- Condition of drains in number (percentage) _____

- Market Centres _____

- Commercial/Establishments, Number/Types, etc _____

- Distance of *Mauzas*/human settlement from Main Road, Link Road, Main Road. G.T. Road, Motor Way/N.H.W., Railway Line, Railway Station, People go for employment, Outside the Human Settlement, People go for livestock , outside the Human Settlement, People go for Agri. product of *Mandi*, Number of buses, coaches, motor car, motor cycle and truck etc., (Number of Buses/Vehicle), Major problems of Human Settlement, Problems of the *Mauzas*/human settlement villages *Mauza/Mohallah*, (Revenue State), Water supply, Electricity, Fuel supply, Transport, Market, Education institutions, Health/Housing Sanitation, pollution, Socio-Eco and others.

- Industry, Types/Number of Units, Civic Institutions & Education institutions, University, Degree & Inter College for boys, Degree & Inter College for girls , Higher Secondary School for boys, Higher Secondary School for girls, Middle Secondary School for boys, Middle Secondary School for girls, Primary Secondary School for boys, Primary Secondary School for girls, *Mektab* School for boys & girls, Teacher Training Centre, Commerce College, Post Office/Sub-Post Office, Telephone & Telegraph Office, Police Station/*Check* Post, Hospital, RHU, BHU, Dispensary, Maternity/Child Welfare Centre, Veterinary Hospital, Veterinary Dispensary, Co-operative Banks, Commercial Banks, Agriculture Sub-Office/Field Office, Mining Office, General Services, Any Other

Appendix 4.1 Soan civilisation in the study area

Potohar region Soan civilisation occurrence of upper Soan along the soan river, a few important sites are discussed.

PINDIGHIB

Industry was found beside a small Tank nearly two miles due north of Pindigheb, on the west side of the Track leading to the village Pari, and not far from a small temple marked (25.4 millimeters = 3.2186 Kms). The site lies over 61 metres above the Soan river at Pindigheb and its geological relations are similar to those at Dhok Pathan which industry is typologically the same.

GHILA KALAN

Ghila Kalan lies on the Chauntra-Dulla-Bhagwal road on the left bank of Soan, where it has incised a well-marked meander pattern. The steep banks, cut out the titled Dhok Pathan and early upper siwalie beds of unconsolidated sand and clays are capped by Boulder conglomerate unconsolidated to the earlier deposits. The conglomerate in places nearly 15.2 metres thick has been planed off and forms a resistant ledge from 27 to 36 metres the plantation of the surface to be third glacial age (de-Terra).

BALAWAL

Balawal site lies on the right bank half a mile north of village Bulawal Soan and a small affluent called the *sill*. But the third glacial abrasioual surface is very well marked. The basal gravel of the Potohar loess forms a resistant ledge, owing to its conglomeratic and cemented character. This gravel is a as much as 182.8 centimetres thick in places and rests directly on the title Dhok Pathan. Principally a conglomeratic fancies.

TAXILA

Taxila is one of ancient sites in Potohar region of Punjab/Pakistan, which represent the rich cultural heritage of the region. It lies in the valley of Haro. The city is more than 2,000 years old as it had attracted the attention of the greatest conqueror, Alexander. Late on it saw the rise of Asoka, the famous Buddhist King.

The remains of this historical city are situated about 32 kilometres west of Rawalpindi. This ancient city flourished for more than 1,000 yeas from the sixteenth century B.C. onwards. It had witnessed the rise and fall of at least seven different dynasties.

The most ancient part of these ruins, according to the belief of the people, is the great mound on which stands the small village of Bir, or *Pher*. The mound itself is 1,334.2 metres in length from north to south, and 609.6 metres in breadth, with a circuit of 3,291.8 metres, or rather more than two Kms. On the west side, towards the rock-seated village of Shah-dheri, the Bir mound has an elevation of from 4 to 7 metres above the fields close by , but as the ground continues to slop towards Shah-dheri, the general elevation is not less than from 7 to 10 metres. On the east, towards the Tabra or Tamra nullah, it rises 12 metres above the fields, and 20 metres above the bed of the stream.

The remains of the walls can be traced only in a few places both on the east and west sides; but the whole surface is covered with broken stones and fragments of bricks and pottery. Here the old coins are found in greater numbers than in any other part of the ruins, and here, also, a single man collected for General Cunningham, in about two hours, a double handful of bits of *lapis* ; *lazuli*, which are not to be seen elsewhere. Judging from the size of the place, it is probably the site of the inhabited part of the city in the time of Hwen Thsang.

HITHIAL

Hatial is a strong fortified position on the western end of a spur of the Margala range, and immediately to the north-east of the Bir mound, from which it is separated by the Tabra nullah. About half a mile from Bir the spur is divided into two nearly parallel ridges, about 500 metres apart, which run almost due west to the bank of the Tabra, where they are joined by a high earthen rampart. The clear space thus enclosed is not more 609 metres by 305 metres, but the whole circuit of the defences, along the ridges and the artificial ramparts, is about 2,560 metres, for upwards of 2/3 kilometres. At the east end, the two parallel ridges are joined by a stone wall, 6 metres thick, with square towers at intervals, all of which are still in very good order.

The crest of the south, or main ridges, is 98 metres above the general level of fields, but the north ridge has an elevation of only 34 metres. Between these two there is a small rocky ridge, 69 metres in height, crowned by a large bastion or tower, which the people look upon as a stupas or tipe. There is a similar tower on the crest of the north ridge. The two ridges fall rapidly towards the west for about 366 metres, till they meet the general slope of intervening grounds; and these points are the two gateways of he fort, the one being due north of the other. The north ridge then rises

again, find running to the W.S.W. for 2,000 terminates in a square topped mound, 40 metres high. This part of the ridge is entirely covered with the remains of buildings, and near its east end a villager discovered some copper coins in a ruined type.

SIR-KAP

The fortified city of *Sir-kap* is situated on a large level joined immediately at the north foot of Hathial, of which it really forms a part, as its walls are joined to those of the citadel. It is half a kilometres in length from north to south, with a breadth of 610 metres at the south end, but of only 427 metres at the north end. The walls, which are built entirely of squared stone, are 4.26 metres, 1752.6 millimitres thick, with square towers of 914.4 centimetres face, separated by curtains of 42.67 metres. The east and north wall are straight, but the line of west wall is broken by a deep recess.

There are two large gaps in each of these walls, all of which are said to be the sites of the ancient gates one of these in the north face is undoubted as it lies north of the two gateways of the Hatial citadel, and due south of the three ruined mounds in the Babar-khana. A second in the east face is equally undoubted, as parts of walls of the gateway still remains, with portions of paved roadway leading directly up to it. A third opening in the west face, immediately opposite the last, is almost equally certain as all the old foundations inside the city are carefully laid out at right angles due north and south. The position of *Sir-kap* is naturally very strong, as it is well defended on all sides by the lofty citadel of Hatial on the south, by the Tabra nullah on the west, and by the *Gau* nullah on the east and north sides. The entire circuit of the walls of the two places is 4,328 metres.

KACHA-KOT

Kacha-kot, or the "mud fort", lies to the north of Sir-kap, in a strong isolated position formed by the doubling round of the Tabra nullah below the junction of the *Gau* nullah which together surround the place on all sides except the east. The ramparts of *Kacha-kot*, as the name imports, are formed entirely of earth, and rise to a height of from 9 to 15 metres above the stream. On the east side there are no traces of any defences, and inside there are no traces of any buildings. It is difficult, therefore, to say for what purpose it was intended, but as the *Gau* nullah runs through it, General Cunningham, thinks it elephants and other cattle during a time of siege. It is 6,700 or upwards of 2/6 kilometres in circuit. The people usually called it Kot, and this name is

also applied to *Sir-kap*, between they wish to distinguish it from the letter they called it *Kacha-kot.*

BABAR-KHANA

Babar-khana is the name of the tract of land lying between the *Lundi* nullah on the north, and the Tabra and *Gau* nullah on each side of it to the east and west, embracing the great mound of Serki-pind on the north-west an the Gangu group of and other ruins on the east. In the very middle of this tract, where the *Lundi* Tabra nullah approach one another within 304.80 metres, stands a loft mound 14 metres in height called Jandiala *Pind*, after a small hamlet close by. To the west of *Pind* or mound, there is another mass of ruins of a greater breadth, but only 9 metres in height, which is evidently the remains of a large monastery.

It is remarkable that the road which runs through the two gateways of the Hatial citadel, and through the north gateways of *Sir-kap* passes in a direct line due north between these two mounds until it meets the ruins of a large *stupas* on the bank of the *Lundi* river, 266 metres beyond the Jandiala Pind. This General Cunningham believes to be the famous stupas by Asoka by the third century before Christ to celebrate the gift, already alluded to by Buddha of his head in charity.

SIR-SUKH

This large fortified enclosure called *Sir-sukh* is situated at the north east corner of Babar-khana, beyond the Lundi nullah. In shape it is very nearly square, the north and south side being each 1,371 metres in length, the west side 1,006 metres, and the east side 914 metres. The whole circuit, therefore, is 4,663 metres or nearly 3 miles. The south face which is protected by the Lundi nullah is similar in his construction to the defences of *Sir-kap.* The walls are built of squared stones, smoothed on the outer face only, an are five kilometres, with square towers at intervals of 36 kms.

The towers of this face have been very carefully built with splayed foundations, all the stones being nicely bevelled to form a convex slope. The tower at the south-east corner, which is highest part now standing, is 3 kms. above the interior ground, and 8 metres. Above the low ground on the bank of the stream. Towards the west end, where the stones have been above the interior ground. Of the east and west faces about one half of the walls can still be traced but of the north face there is little

left except some mounds at the two corners. Inside there are three villages named Mirpur, *Thupkia*, and *Pind*, with a large ruined mound called *Pandora*.

At half a kilometre to the west there is an outer line of high earthen mounds running due north and south for upwards of 609 metres, when it bends to the E.N.E. Beyond this the line is only traceable by a broad belt of broken stones, extending for 1,067 metres, when it turns to the south-east for about 365 kms and joins the north face of *Sir-Sukh*. These external lines should appear to be the remains of a large outwork which once rested its north-west angle on the Lundi nullah. The entire circuit of *Sir-Sukh* is 6,187 kms.

CHIR-THUP

The largest stops among the ruins is situated on a high mound to the north of the Tabra nullah, and about half a mile to the east of Shahpur. It is generally known as the "*Chir Thup*", or the "split *tope*" from a broad cut having been made right previous explorer. The cut is 65 metres broad at the west end, and 1,158 metres at the east end, with a depth of 10 metres.

This enormous opening has utterly destroyed the appearance of the monument from the east and west sides. Such are the different parts of this great city, whose ruins, covering an area of eight square kilometres, are more extensive, more interesting, and in much better preservations that those of any other ancient place in the Punjab.

BHALLAR-TOPE

The great *Bhallar-Tope* is visible from this spot about 10 kms north of it. This Tope has been described by General Burnes and noticed by General Court. It stands in a most commanding position on the last spur of the long range of hills which forms the north boundary of the Haro river.

It has at one time been opened by a native chief; probably the Ghakhar chief of Khanpur on the Haro. At present the *Bhallar-Tope* is about 13 metres in height above the rock on which it stands, but as the top of the building is much dilapidated, the original height of the dome must have been considerably more. General Cunningham discovered in the neighbourhood the remains of what believed to be two large religious establishments.

BOATI PIND

On leaving the Nagar fountain, Hwen Thsang proceeded about 8 kms to the south-east, to a gorge between two mountain, where there a *stupa* built by Asoka, about 30 metres in height. This was the place where Sakya Buddha was said to have predicted the period when the future Maitreya Buddha should appear; besides the stupas there was a monastery which had been in ruins for a long time. The distance points to the neighbourhood of *Boati Pind*, where are the ruins of a large town and of several Buddhist monuments. But the bearing is east, which it certainly should be, as a south-east direction would have carried the pilgrim far away from the hills into the open plain about half way to *Kala-ka-Sarai.*

Boati or Boti nullah, and at the west end of a rocky hill which stretches as the Haro river. In the gorge between the *Boati* ridge and the Hassanabdal ridge there is a small hill forming three sides of square which is usually called *Langarkot*, but is also known as *Srikot.*

This was the name of the fort, which was formed by closing the open side of the hill with a strong wall. The north side is about 457 metres in length, and each of the other three sides about 61 metres, which would make the whole circuit of the place just one kilometre and a half.

The remains of numerous building and the tanks are traceable in the lower part of the fort, walls and towers along the crests of the ridge. The hill is everywhere very rocky, but on the north and east sides it is precipitous and inaccessible. The highest point of the ridge is at the north-east angle, which is about 91 metres above the fields. On this point there are the remains of a large stupa, which is visible for many metres all round.

BADARPUR

Badarpur is a smaller hamlet situated to the north-east of Shah-dher, and 5 kilo-metres to the north-east of *Sir-kap*. Its tope is one of the three largest in Punjab, being equalled in size only by the two great *stupas* of Manikiala and Shahpur (at *Shah-dheri*). It is now very much ruined, but it is still 12 metres high with a diameter of 27 metres at 5 metres above the ground. All the cut facing stones are gone, and the building is altogether so much dilapidated that its original diameter must have been upwards of 30 metres.

The people are unanimous in ascribing its opening to *Gen.* Ventura. This *tope* was not opened, as usual, as a shaft sunk from the top or by a gallery driven from the side, but by two deep broad cuts from top to bottom of the building. In the middle of

this excavating, General Ventura is said to have found a complete human skeleton, and a silver sita-rami or coin, with figures upon it. The deposit of the entire body, instead of a few pieces of bone from the burnt ashes, was sometimes practiced by the Buddhists, but the practice was so rare that this Badarpur deposit is the first and only example that has yet been met with amongst the many hundreds of topes than have been explored.

JOALI

The large village of *Jaoli* is situated in a gorge between two hills, about three-quarters of a Km to the south-east of Badarpur, and upwards of 7 kms to the east-north-east of *Shah-dheri*. The ancient remains consist of five ruined topes and two temples, all of which have been examined but without any very valuable results.

KARMAL

There are three neighbouring villages of the name of Karm, which are distinguished from each other as Karmal, Karm Gujar, and Karm Parcha. The first is situated exactly one kilometre to the east south east of the Bir mound. The second is nearly 3 kms to the east of Karmal, on the old road to Rawalpindi by the Shah Allah Ditta Pass, and the last is about one kilometre to the north east of Karm Gujar. Near the first and second besides some natural caves which from the vicinity of four small topes would appear to have been once occupied by Buddhist monks. All the *topes* have been opened by the villagers who profess to have found nothing.

These remains, therefore, posses but little interest in themselves, they are of importance as being probably connected with the history of the great King Asoka. During his stay at Takkasila, Hwen Thsang Kunal, the eldest son of Asoka, had been deprived of his eyes through the false accusation of his step mother. The story is told at some length by Burnouf, from whom we learn how the prince's sight was afterwards restored, and the wicked step mother duly punished. The position of the chief *tope* of Karmal tallies so exactly with the site of Kunala *stupa*, as identity. but with the two villages of Karm Gujar and Karm Parcha so close at hand, it is easy to see how the name of Kunala or a Kunala would be altered to Karmal, to make it assimilate with the other (John Marshall, 1960).

MANIKIALA *STUPA*

About 22 kms south of Rawalpindi and three miles from Rawat lie the ruins of Manikiala. The name is said to have been derived from Raja Man or Manik, who built the great *stupa* to the south of the village. The old town is usually said to have been called Manikpur or Maniknagar or "the city of injustice".

Gen. Cunningham identifies with the Buddhist legend of Sakya's offering of his body to appease the hunger of seven tiger cubs. Here then, we must look for the famous *stupa* of the "body offering" of Buddha, which was one of the four great topes of north-west India. It is probably to be identified in the great tope successfully explore by General Court in 1834. the "*Huta-murta*" or body-offering" is twice mentioned in the inscriptions that were found covering the deposit, and there are other claims of this tope to be identified with the body-offering *stupa* which have been fully discussed and accepted by General Cunningham. The points of resemblance between the two legends are sufficiently striking and obvious.

Accepting this views of the legend as, at least, a very probable one, the present appearance of Manikiala with its numerous ruins of religious edifices, without any traces of either city or fort, may be easily explained by the fact that the great capital of Manikpur was the ideal creation of the fabulist to give reality to the tradition, while the topes and temples were the substantial creations of devout Buddhists.

General Abbott, when he examined the runs around the Mankiala *tope*, could not see any evidence the existence of a city. They are occupied by submerged ruins would not have comprised a very considered bled village, while the comparatively large number of wrought stones denotes some costly structure which might have occupied the entire site.

Raja Man's palace, because pieces of plaster are found there only, and not in other parts of the ruins. Here it is probable that the satraps of Taxila may have taken up their residence when they came to pay their respect to famous shrine of the "body gift" of Buddha. Here, also, there may have been a small town of about 1,500 or 2,000 houses, which extended to the northward and occupied the whole of the rising ground on which the village of Manikiala now stands. The people are fire; and this believer is corroborated by the quantities of charcoal and ashes, which are fond amongst all the ruined buildings. (Gazette Rawalpindi Division, 1894)

SHAH ALL DITTA AND *DHOK GOJRI*

The plains and lower foothills near the western and northern Margalla range have witnessed a very long and rich human settlement and history. This is partially manifest in the magnificent archaeological sites in the Taxila valley Archaeological Protection area, adjacent to the Park's north-western boundary. Here are ruins which extend back in time to the Paleolithic with nearly continuous archaeological documentation from the Neolithic to the fifth century. Paleolithic sites have been found in areas now occupied by Islamabad, Rawalpindi and vicinity including Dhoke Juri Vaves near the southern park boundary west of Shah Allah Ditta. The alternating extensions of cultures and influence from the west and east mimic the overlapping of natural ecosystem, and reflect and unusually diverse cultural heritage.

Although the most significant known sites are not in the park, there are associated sites in the park which are worthy of protection and interpretation. A cobbled path and nearby ancient well on the pass north of Shah Allah Ditta, locally known as *Kukkar Dara Khoh*, is inventoried or described. On he southern slope, below the pass, is *Saddhu Da Bagh* (a spring and former Hindu priest's garden spot) near Shah Allah Village. The caves here date from Medieval age and probably were first developed by Buddhist groups. Hindu images are still faintly visible on some of the walls of these caves. There are locally important religious features, such as the Bouhar (banyan tree) near Faisal Mosque. The shrine of Bari Shah Imam is built on top of Medieval sites, which may be on top of older features. Nurpur and Saidpur villages originated in Medieval age therefore are at least 450 years old. Remnants of Medieval features can still be found in these villages.

Adjacent to the park is an are administered by the Archaeology Department, there are the Khurram Guree spring and excavations nearby, the Faqeer Wali *Bun*(Pond) of Mughal origin, and the Moha Muradoo excavations with an associated cave near the Julian remains. The remnants of a 500 old cobbled highway. District Census Report of Islamabad (1998)

JOGIS TILLA

The monastery of Jogis on the summit of the isolated peak of Tilla, which rises to a height of over 975 metres about 32 kms west of Jhelum, is undoubtedly one of the oldest religious institutions in Northern India it is now know as Tilla Gorakh Nath, or called Tilla Balnath, and the name is still well known the Jogis say that Balnath was prominent disciple of Gorakh Nath, the legendary, founder of the institution.

Alexander in B.C. 326, the royal elephant rushed up a hill sacred to the sun, and in human speech implored him to cease his opposition to the invader; and that the mountain was afterwards called the "Hill of the Elephant:" in this Cunningham finds further proof that Tilla Balnath is referred to and that the monastery was in existence in the time of Alexander, "for the Macedonians, who had just come form Persia, would almost 'Elephant'.

Tilla again is connected by tradition with the name well known in folk-songs of Puran Bhaat, a son of Raja Salwahan of Sialkot, another semi-fabulous king, of whose times there is really no historical information: Puran is said to have joined the Jogi fraternity on being restored to life by their head, and to have subsequently founded a well-known monastery in the Rohtak District.

Balnath of the Jogis is mentioned in the time of Sher Shah Suri, and Abul Fazl in the Ain-i-Akbar, writes of "the temple of Balnath Jog, which is called Tilla Balnath", as being held in veneration by the faqirs of Hindustan.

The old Jagir held by the Jogis of the village of Naugiran is referred to in a sanad of Akbar as an ancient grant: it has recently been restored after over forty years' resumption, due to the misconduct of late *gaddi-nashin*, with whose connivance the murder of a faqir at Tilla, jagir in possession of the Jogis. Tilla is supposed to have been sacked by Ahmad Shah Durrani about the year 1748 A.D.

Appendix-4.2 Hydrology of the project area

The Indus fringes the Potohar on the west and is a very large and powerful stream. It enters the region as a mighty river after having received the Kabul above Attock and Haro 19.3 Km. below. It cuts its way through the plateau and the intervening ranges through a deep narrow canyon, running swiftly with occasional rapids. At Makhad the Soan brings in most of the drainage of the Potohar. It emerges from the gorge near the Salt-built town of Kalabagh and spreads out in an open network of channels over an alluvial fan. Southward it spreads out to a maximum breadth of 20.92 Km. The river is right up to Attock. With a total catchments area of 2,68,831.62 Km. mainly in the Himalayas, the mighty river has a copious flow throughout the year. There is a considerable difference in the summer and winter discharges. In August, it has a maximum discharge of 1,0,00,000 cusecs, the lowest being 9,000 cusecs which is reached late in winter.

As compared to the Indus, the Jhelum is a smaller river, it rises in Kashmir at Verinag and flows for about 402.32 Km. as a racing rapid torrent hemmed in by precipitous rocks and lofty mountains. Thirteen Kilometers above the town of Jhelum from which it takes its name it debauches from the hills and becomes a braided river. Sandy islands called 'bels' stud its wide bed. The *Kahan* joins the river below Sadr Cantonment and the *Bundha* below Darapur bringing the drainage of the eastern part of the Potohar. It then continues a south-westerly course. Its maximum discharge at the peak of the rainy season is 6,00,000 cusecs which dwindles down to a minimum of 4,000 cusecs in winter. The river is subject to occasional destructive floods. It is conveniently up to Jhelum and is used for floating timber in 1820 to 1950 from the forests up in the mountains.

The Soan is also known as Swan or Sohan, the principle local river of the Potohar and rises just below Murree in the village of Musiari. Flowing due south between the Murree and Patriata ridges, it follows a tortuous way through picturesque valleys. It then cuts through the Narar Spur, making a magnificent and rocky gorge one Km. in length, emerging below Pharwala into the plains. Above pharwala it is just a mountain torrent with a narrow boulder strewn bed. Further down it spreads over a wide bed only a small portion of which it fills when not in flood. The stream is everywhere fordable except at times of flood when a complicated network of ravines stretching back for Km. on either side. Its banks are wild and steep flanked by

sandstone cliffs and ridges of pebbles. It is notorious for its treacherous and quicksand throughout its course in the plateaus. In Rawalpindi District the principal tributaries are the Ling river on the east which brings the drainage of the whole mountainous portion of Kahuta, Kotli Sattian and the *Kurang* and the *Lehi* on the west in Islamabad District.

The former collects the drainage of the Murree foot-hills and parts of Margalla range. The *Lehi* rises in the Margalla range from Islamabad District and drains the country lying to the north-west of Rawalpindi. In Jhelum District the Soan flows in a south-westerly direction. The Khunala, the Dhrab, the two Ghabirs, the Draggar, the *Ankar* and the *Leti* are the prominent 'Kases' or torrents of note which all descend from the Salt Range. To their east is a notable series of feeders, the Karachi, the *Bhagneh*, the *Sauj* and a fourth stream all of which join the Soan at *Dulla* which has earned the name of *Panchnad* (five waters). They all have high, steep banks and wilderness of ravines in their sides. Occasionally as in the case of the *Ankar Kas*, the valley widens giving a prosperous well-drained tract.

In Attock District, the Soan follows a westerly course and receives the drainage of all the country south of the Khaire Murat Ridge. Among its tributaries to the north is the Fatehjang as drainage the southern slopes of Khaire Murat as well as the country towards its south. The Wadala is the fourth stream which joins the Soan at Dulla. It is a confusing fretwork of ravines, on its upper reaches in Rawalpindi but broadens out into a wide sandy channel. The Pindi *Gheb Kassi* (no connection at all with the other *Kassi*) is the only tributary of any importance in this District. It originates in western Khaire Murat, receives drainage from a multitude of small streams which cover a very large area Chakwal District. The Talagang Tehsil to the south is drained by numerous kases all flowing north-west. The principal streams are the lower courses of the streams already mentioned in connection with the Jhelum District. They are all fringed by the confused mass of ravines and gullies which characterise the whole region.

The Jhelum drainage system consists mainly of three torrents the *Kanshi, Kahan* and *Bunha*, apart from a multitude of minor *'Kases'*. The *Kanshi* rises in the *Kahru Ilaqa* and flows south, receiving numerous small tributaries on the west. All of them have high banks with sandy or stony beds. The *Kahan* drains the centre and east, Jhelum Tehsil. It starts at Domali from a confluence of numerous branches

flowing down form the Nili Hills. Piercing through the Tilla ranges it enters the Jhelum below Sadar Cantonment. The *Bunha* issues out on the north side of the Salt Range. After receiving the entire drainage of the eastern part of the Chakwal Tehsil, it flows through the *Ghora Gali* Pass across the west of the Khurddar country. It then sweeps through a gap in the Tilla hills and immediately below spreads into a broad, sandy waste which is being extended yearly by its torrential floods. Here its bed is more than two Km. across.

The Reshi is a minor stream draining the Kala-Chitta on the south. The northern slopes of the Kala-Chitta and Margalla ranges drain into the Haro River while the southern slopes of the Salt range discharge their waters principally into the *Nilawan* and the *Kas Kaula.*

The upper courses of all these streams display a typical youthful character, the Indus through its gorge the Jhelum up to its debauchment into the plains, the Soan above Pharwala flow through young valleys where vertical erosion is more prominent. In their lower stages they are mature, meandering streams. With the exception of the Jhelum and of the Soan to a lesser extent, the innumerable streams are hill torrents with swift, rushing courses through narrow, steep-sided valleys. The drainage could in one sense be termed dendritic since far from getting simplified, further desiccation of the soil results in over-elaboration of drainage courses. It is interesting to consider Wynn's belief that the drainage is antecedent in character. "It" (the drainage), he preferring in many cases to interest the hilly or mountainous ranges rather than Soan, the most considerable local stream rises in the hills of Murree not very far from the Jhelum yet wanders sends its affluent to the Jhelum River through the ridges of the Salt Range." He cites some other instances and concludes. "These peculiarities of the drainage indicate that its course was initiated more directly by agencies of elevation than by atmospheric weathering. The directions of the streams were decided by much older contours than those that now exist at the surface."

The Haro

The Haro rising in the Hazara Hills not for most of Murree, flows past Khanpur and cut across a small portion of the Rawalpindi near the village of *Bhallar Top*. Entering Hassanabdal tehsils near the junction of Attock, Rawalpindi and Haripur (Hazara) Districts it flows north-west for about 10 Kms. then turns west and

runs for about 20 Kms below the main wall of the Gandgarh range, passing just north of Hassanabdal. In the broken area east of Lawrencepur it turns south leaves the Kherimar Hill on the left and runs through the west of nala area to the west end of the Kowagar ridge. Then flowing due west it passes south of Attock and after a course of about 15 Kms through the sarwala discharges its water into the Indus near Bagh Nilas 12 Kms below Attock. The Haro is a most capricious stream. In its course through the Attock & Jand tehsils it violates every point of the compass. In no part of its course it flow for any distance in a constant direction., every now and again some little hill starts up to give the stream another kink.

Only in the sarwala is its course uneventful. For much of its course it flows far below the level of the surrounding areas in a channel cut deep into the rock and hard clay of the tract and flanked on either side by high precipitous banks. Add to this the sudden floods to which the river is liable, and it is easy to see what a serious obstacle the Haro presents to District communication.

The bed of the river is generally story and the water clear blues & limpid. Across the Fatehjang Nala the nandna blow north-west in the valley between the Kala Chitta & Kawagar ridges. It joins the Haro near at the bridge which carries the Mari-Attock Railways across the latter river.

The Soan Basin

South of the bordering ranges and ridges towards the north and extending right up to the northern slopes of the Salt Range lies this undulating tract drained principally by the River Soan and its tributaries. Occasionally referred to as Soan Syncline (on account of its synclinal shape) this region is on an average about 304.79 meters higher than the alluvial plains to the south of the Salt Range. It varies in height between 304.8 - 609.6 meters except for a few ridges of bare rock which rise higher. Some of these are often mere vertical walls, rough, jagged and narrow, there is only mural ridge of any considerable size, Khair-Murat (sandal shaped), which runs south-westward from the neighborhood of Rawalpindi. This is about 38.62 Km. long and reaches to a maximum height 457.2 meters above the adjacent country. The general slope of this region is towards the west and the Soan descends from a height of over 540.64 meters where it emerges into the plateau below Pharwala to less than 274.3 Meters. where it discharges its contents into the Indus. The tract is very much

broken up by innumerable deep ramifying ravines called "*Khaderas*" which are a result of destructive erosion of the rain water, giving the area a typical tableland topography. These extend rapidly as is attested by the isolated remnants of the neighbouring level areas included among them.

The descent from the mountainous portion in the north is accomplished through a tract which is hilly and sub-mountain in character. This is not homogeneous in character since only detached parts can be really termed hilly and it is usual to find stretches broken and hilly throughout. In the Rawalpindi District and Islamabad District this transitional region extends in a great house hoe from west to east. An area more jagged and rough than the neighbouring tracts is the Kharora, extending from the western border of the District to the Rawalpindi Cantonment, south of Margalla range Islamabad. The underlying rock is frequently exposed particularly in ravines, and the area has an average height 948.64 meters. A high ridge of rock runs across this circular tract for many Km. in a north-south direction, ending near the Rawalpindi Cantonment. The ridge is a sand-stone rampart tilted vertically on the ground, some 12.19 meters high and only a few feet thick. This is known as a *Chirphar* Ridge or the split hill.

The tract along the Murree foot-hills is termed as *Kaccha* and has a mue sub-mountain character. The Kandhi extends from Islamabad, Rawalpindi, Kahuta and Kotli Sattian.

The general characteristics of this tract is the low hills and outcrop of rocks from the Murree Hills on the north and thus is reflected in the name Kandhi or bank referring to the foot-hills of the Himalayas. Barring a comparatively level plain in the west, sandstone ridges run across the region from the hills of Murree, Kahuta and Kotli Sattian, splitting up the country into valleys and region ravines and gullies scar the country into a desolate waste south of Rawalpindi. Further east lies *Kahruilaqa* named after the inhabiting tribe, hilly in nature and composed of pebble ridge occasionally rising into prominent hills. The hills are low towards the south and consist of sandstone. This *ilaqa* is the most rugged portion of the sub-mountainous tract.

The valley of the Soan in this region deserves separate notice. It is a narrow strip of pebbly alluvial hills. South of the Soan, however, the pebbly ridges are less frequent and the country merges into the main part of the Soan basin.

In the Attock District the sub-mountain region is largely absent for the reason that there are no mountains towards the north. Only minor ranges are seen. The Narrara or Makhad Hills south of the Kala-Chitta Range hardly deserve to be called hills being only an agglomeration of pebble ridges on the bank of the Indus and no-where higher than 555.34 meters. Their general trend is from east to west. This is a very bleak, bare and wild tract.

The Khaire-Murat ridge is the most important of the resistant walls of limestone and sandstone which rise above the Soan Basin. Geographically, it may be said to be a continuation of the *Chir-Phar* Hill in Rawalpindi. Beginning on the border of the Attock District, it rises abruptly from the plain or either side and attains to a height of over 914.4 meters. It runs in a south westerly direction for about 38.62 Km. a steep, dreary, impassable barrier and dies away in a series of small spurs running to the bank of the Soan river. Its starts are vertically, largely contorted due to extreme dislocation.

Southward of this transitional zone lies the vast expanse of the Soan valley, a wilderness of ravines in most parts, cut by torrents and divided into fantastic shapes. This is a plateau by virtue of its height and although there are fertile tracts in between torrents and along the Soan and its main tributaries, a wild fretwork of small ravines and gullies gives the country a very broken and rugged appearance.

The valley of Soan itself consists of a broad and sandy bed flanked by wide stretches of rich alluvial loam with villages clustering closely along the banks. The land on both sides is however scoured by the deep beds of the mountain torrents which descend from the Salt Range or from the northern ridges. Prominent among these are *Sil River, Bhainwalla Kas, Janai Kasand Lei* Nala from the north and *Ankar Kas, Kundwali Kas, Gambhir Kas, Paneand Kas* and *Panehara Kas* from the south. The general aspect of the terrain is bleak, dry and stony. The innumerable ravines that have no order or method, wind and intersect over the region, cutting it up into a network. The ravines are of various sizes and depths. Sometimes they are scoured out of sandstone rock underlying the soil while sometimes they are deep fissures in the

loamy surface Generally, these have no names or the name is different at different places. The larger ravines which receive surface drainage and carry water after rain are knows as *Kas* or *Kassi* according to whether they are large or small. The smaller ravines have no torrent bed and are scoured out by surface drainage alone. These are known as *bhura* or dry ravines.

Each area between two torrents has an arch-like surface, descending steeply towards the channel on either side. Near the large torrents the slopes are abrupt and the surface more rugged and dreary. The underlying rock always crops out at the water-shed which shows that it is not very far from the surface throughout the entire region. Wherever the ground becomes broken up, the overlying soil is almost entirely washed away by rain-water unless specially banked up. This erosive destruction of the soil by rains is the outstanding problem of agriculture. In some instances the lands near the torrents are the best which is the case only when the stream runs in a more open channel. Unfortunately such areas are neither numerous nor extensive.

All the characteristics of aridity and bleakness common to the region culminate in hills near the Indus which extend from the Soan to the *Reshi* in the north and rise to a height of 609.6 meters.

The Soan basin is the most extensive and typical section of Potohar and constitutes the Potohar proper. It has as area of 18,129.3 sq.km.

The Salt Range

The Salt Range forms the southern boundary of the Potohar and is topographically the most interesting section of the whole region. Rising abruptly from the low plains on the south it forms a precipitous escarpment overlooking the *Thal*. It eastern end lies in close proximity to the Jhelum. After running parallel to the course of the river in a south-west direction and at a distance from it now-where greater than 19.31 Km. it takes a sudden turn north-westward opposite the town of Khushab. It now gains in elevation which culminates in the peak of Sakesar (1,521.56 meters). Thence onwards it dwindles specially to a low narrow ridge and turns more towards the north till it crosses the Indus near Kalabagh.

The Range starts in two almost parallel series of hills, the northern one known as Bakrala Ridge and the southern one as Tilla Hills. The latter has a

continuation in hill-locks of Batali Daer, which run right up to the Jhelum. Near the river, they are locally known as the Lehri Hills. They have the characteristic Salt Range aspect of being generally scraped on the southern side and sloping rather gently towards the north. They have, however, undergone slight lateral displacement. The average height of both Bakrala ridge and Tilla Hills is about 762 meters. The highest peak of the former is Sar 923.84 meter and that of the latter Jogi Tilla (975.36 M). Between them they enclose the uplands lying mainly in Jhelum Tehsil which go locally by the name of *Khuddar* or country of ravines "a *name certainly well-deserved the surface of the whole tract being broken and distorted in a way which it is hard to realize without seeing it". Its average height is 365.76 meters. Whatever the superficial differences between this tract and the flanking uplands of the Salt Range, the two areas are nevertheless essentially homologous. Only in *Khuddar*, the peculiar hydrography and lower has resulted in increased and excessive denudation.

The Barkala ridge merges beyond the Ghora Gali Pass into the great mass of Diljabba which rises abruptly out of the plain country of Lundin *Patti*. The Tilla hills terminate sharply on the *Bunha* torrent. They continue beyond in the Wah hills which rise very steeply. They continue southward for some distance but turn abruptly towards the north-west near the town of Jalalpur. They now swing round in a giant sweep to the northward till they reach the village of Phadial. This whole region has obviously been subjected to great upheavals as these abrupt turnings indicate. Further west, the range attains a height of 1,128.06 meters in the peak of *Chel*. The range now proceeds in a west south-west direction.

In tehsil Pind Dadan Khan, the Salt Range again assumes its peculiar aspect running in two parallel lines of hill separated by a distance of 8.05 Km. or more inner distance. Each of these hills consists of a number of parallel ridges which have a tendency for looped formation. At intervals of about 16.09 Km. the two series of hills merge in a knotted mass. They again separate and run parallel. This is observable throughout the range as also on its separate components, though less regularly. The two parallel ranges have a height from 762 to 1,127.76 meters and enclose a number of plateau, fairly level and having an elevation of 609.6 to 914.4 metres. Towards the south the range descends abruptly to the Jhelum valley showing a monotonous series of parched and barren slopes. Northwards it slopes more gradually towards the Soan Basin. The eastern end of the Salt Range has a decidedly subdued

and tame topography but westward, as the Limestone rocks become prominent, the range looks rugged and aggressive with lofty cliffs and deep narrow gorges.

The same general arrangement is traceable westward as the range enters the Khushab District, west of a junction of the two parallel ranges near *Sodhi* they open out considerably and run at a distance of 25.74 Km. across. They again narrow down to meet in the Sakesar hill. The ranges enclose high-lying valleys as usual, the most important of which is that of the *Sun*. This lies immediately to the east of Sakesar, with a length of 23.70 Km. and breadth of 6.4 Km.

West of Sakesar, a remarkable feature is that the direction of the whole range change abruptly from south-west-north east to north-west north. This occurs following a sudden contraction for a distance of 14.5 Km. It now loses greatly in height, the average being only 526.38 meters. The width is about 3.2 Km or less. Beyond the narrow part the range expands into the Tradian Hills reaching to within a few Km. of the Indus and having a maximum width near Swat of 12.87 Km. which diminishes as the Indus is approached. The average height of the Tradian hills is 940.91 meters with the highest point at Tradian 1,059.78 meters. The Punjab Salt Range terminates in a few salt hills of which in *Mari* Hill near Kalabagh is most important.

The series of region enclosed by the parallel ranges from the Jhelum westward up to Sakesar is very no table, these forming the only habitable areas in an otherwise dreary and barren region. These region are, from east to west, the eastern region (*Khuddar* country) Danda region, *Kahun* region Malot Plateau, Narpur Plateau and the *Sun* or Western Plateau.

The range is traversed by three or four principal passes situated near either end. In the extreme east the Bakrala pass in the ridge of the same name carries the National Highway (Grand Trunk Road) and is situated at a height of 426.72 meters. The *Ghora Gali* Pass near Diljabla is a gorge of the Bunha river situated at a height of 398.98 meters. The long pass of Choa Saidan Shah following the deep valley of that name carries an old route from Pind Dadan Khan northwards. The last of these passes is from Namal to Musakhel above the right bank of the impassable Musakhel ravine.

Throughout its length of 244.61 Km. the Salt Range has been considerably influenced by flexure and fracture, the two prominent results of disturbance. Its aspect is everywhere typical, showing steep declivities and lofty escarpment cliffs towards the vast plains and deserts towards the south but descending by gently undulations towards the region to the north.

Appendix-4.3 Potohar Region: Administrative Units 1998

Sr.No.	Name of		Area (in sq Km)	Number of		
	District	Sub-division/Tehsil		Qanungo Halqa	Patwar Circle	Mauzas
1	Attock		6,857	18	174	446
		Attock	1,350	6	47	124
				Attock I	6	17
				Attock II	6	13
				Burhan	5	15
				Gorgushti	8	17
				Hazro	11	28
				Tajak	11	34
		Fatehjang	1,249	3	35	114
				Bahter	12	36
				Fatehjang	11	30
				Malal	12	48
		Hasanabadal	350	2	17	49
				Burhan	5	12
				Hasanabdal	12	37
		Jand	2,043	3	40	79
				Chab	13	22
				Domel	13	33
				Jand	14	24
		Pindi Ghib	1,865	4	35	80
				Khur	11	21
				Mianwala	7	19
				Pindi Ghib	11	23
				Surag	6	17
2	Chakwal		6,524	19	268	452
		Chakwal	3,120	10	100	307
				Balkassar	16	28
				Bhoochal Kalan	10	37
				Chakwal I	4	13
				Chakwal II	4	10
				Dhudhial	11	28
				Kallar Kahar	12	37
				Karyala	8	25
				Khanpur	17	81
				Mangwal	9	24
				Nial	9	24
		Choa Saidan Shah	472	1	14	50
				Choa Saidan Shah	14	50
		Talagang	2,932	8	154	95
				Jhatla	8	17
				Kot Sarang	8	12
				Lawa	6	10
				Mayal	7	13
				Multan Khurd	7	9
				Talagang Gharbi	5	8
				Talagang Sharqi	5	11
				Tamman	8	15

Contd.

3	Islamabad			2	26	132
		Islamabad	906	2	26	132
				Shiala	13	62
				Tarli Kalan	13	70
4	Jhelum		3,587	13	132	573
		Jhelum	1,062	5	51	285
				Darapur	10	47
				Daniala	10	80
				Dina	11	71
				Jhelum	10	34
				Kalla Gujjran	10	53
		Pind Dadan Khan	1,267	4	41	129
				Haranpur	10	31
				Jalapur Shrif	11	42
				Lilla	11	35
				Pind Dadan Khan	9	21
		Sohawa	1,258	4	40	159
				Bara Gowah	10	34
				Domeli	10	36
				Khurakka	10	43
				Sohawa	10	46
5	Rawalpindi		5,285	26	271	1,164
		Gujar Khan	1,457	8	89	379
				Gujarkhan I	6	37
				Gujarkhan II	6	36
				Jatali	11	41
				Kauntriala	13	42
				Mandara	13	79
				Qazian	15	56
				Sayyad	13	38
				Sukkhu	12	50
		Kahuta	1,096	4	45	261
				Choha Khalsa	11	50
				Kahuta	10	62
				Kallar Sayaddian	12	6
				Nara	12	93
		Kotli Sattian	304	1	13	62
				Kotli Sattian	13	62
		Murree	434	2	18	111
				Charhan	8	48
				More	10	63
		Rawalpindi	1682	9	94	313
				Adhwal	14	33
				Banda	10	45
				Basali	11	52
				Chaklala	8	23
				Chakri	15	33
				Idiala	11	45
				Rawalpindi	4	10
				Sagri	12	53
				Sehal	9	19
		Taxila	312	2	12	38
				Taxila	5	19
				Wah	7	19
Potohar Region			23,160	75	871	2767

Source: GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum & Rawalpindi, Table-39 & 40, Population Census Organisation, Islamabad.

Appendix-4.4 Potohar Region: Population Distribution of Administrative Units by Tehsils/Districts 1951-1998.

Name of Area		1951	1961	1972	1981	1998
POTOHAR REGION	Total	2,276,413	2,653,127	4,016,096	4,773,015	7,464,763
1. ATTOCK DISTRICT	Total	486,043	532,845	748,890	876,667	1,274,935
2.CHAKWAL DISTRICT	Total	454,942	502,004	692,802	775,600	1,083,725
3.ISLAMABAD CAPITAL TERRITORY	Total	95,940	117,669	237,549	340,286	805,235
4.JHELUM DISTRICT	Total	430,194	482,280	686,551	778,778	936,957
5. RAWALPINDI DISTRICT	Total	871,664	1,085,898	1,744,949	2,121,450	3,363,911

Source:- GOP 1951-98, Population of Administrative Units 2002, Table-4, Population Census Organisation, Islamabad.

Appendix-4.5 Social life in the study area

In the study area rural houses are the man product of their physical structure and socio-economic condition out of the total 6,97,419 houses in Research study area 51,745 (7.4 percent) were *Kutcha* Housing structure.

CUSTOMS CONNECTED WITH BIRTH

When a child is born, the *Maulvi* is sent for and calls the *bang* or *azan* in the child's ear.

If the child is a boy six to ten rupees and some cloth is given to the *Maulvi*, and there is much rejoicing. If the child is a girl, some grain only is given. A small portion of *gur* and *ajwain* (Apium-involucrotum) are mixed together, and a few grains are placed in the child's mouth, and this is done daily for three days. On the fourth day the female relatives are all collected, and the child's paternal aunt places by its mother, and a present is then made to the aunt. On the seventh day the *nai* (barber) is sent for and the child's head is shaved, and the *nai* gets a money preset, and a small money present is also made to other *kamins*. On the seventh day the mother and child, and food and sweets are distributed to the relations. This is all done when the child is a boy; when it is a girl much less fuss is made.

The boys are circumcised up to the age of eight years by the *nai*. *Gur* (sugar) and sweets are distributed, and the nai is paid from one rupee to ten for performing the operation.

CUSTOMS CONNCTED WITH MARRIAGES

When the parents of the children arrange a marriage, they appoint a date upon which the boy's father provides some 10 or 12 kg. of gur (sugar), or Rs. 50/- or 100/- in cash, clothes for the girl and jewels according to their station, and a clove; these things are placed on the head of the *nai* or barber, and sent to the girl's house.

The girl's father or guardian takes the *gur*/sugar inside, and the nai takes care of the rest. That night the girl's father gives a feast to the boy's father and others, and next morning the girl's relations assemble and feast the guests, and place the girl; and the other things, the jewels and clothes taken charge of by the nai are placed in a thal or open vessel, and placed before the girl's relatives.

In the Pindigheb tehsils among certain classes from Rs. 60 to Rs. 100 in cash is also placed in the *Thal*. The *Mullan* is present at this time. In accordance with the *Shara* the promise of marriage or *Shara Jawab* is repeated three times by the girl and boy themselves if they are a full age, by their guardians for them if they are not.

In Attock, the custom is somewhat different. The boy's father goes to the girl's village in the afternoon and sits at a *Hujra*, with a musician with him, who however, is kept out of

sight then the girl's father prepares food and feeds the boy's father and those with him: this meal is known as *chore*. After this they sit together on a mat or carpet, a thal before them. The boy's relatives then place jewels and money in this vessel. The nai of the girl's family has been previously instructed as to how much is to be put into the vessel, and until this amount has been put in the *nail* continues to ask for more.

After an interval, the boy's friends proceed to discuss a date for the marriage with the girl's friends, and similar ceremonies and courtesies are gone through again; colored a knot is tied on this threads are also presented; and when the date has been fixed; a knot is tied on this thread for each day remaining, sometimes by the *Mullan*; this is known as *gandh*. Among the Pathans of Pindigheb and Attock, an estimate is made of the cost of the wedding, and this paid by the boy's family to the ghee and goats.

After fixing the date, the parents of both parties dispatch small presents of *gur*/sugar. to their more distant relatives and friends by the hands of the *nai*, who receives small presents of cash, 5 to 50 rupees or of grain. Fifteen days before the wedding, the women of the family come together and sing, which they do nightly thereafter until the wedding, except among the Pathans, *mayan*, a sort of twenty-five of these are placed before the bride, and the rest are kept in reserve. Then the bridegroom comes, two of these are given to each other. At the same time that these cakes are prepared, the *gana* is tied round the bridegroom's right wrist. This is a black string of wool with an iron ring with some reason, tied on to it. This is known a *binda*. The custom of binda follows that of mayan.

After that the friends of both parties assemble in a suitable place, and the marriage contract, or nikah, is performed by the *Mullan*. The girl's friends answer for her, and witnessed by four witnesses and the dower fixed. The *Mullan* gets from fifty rupees to hundred rupees for performing the ceremony. Then the bridegroom is taken into the bride's house, where he seats the bride on a bed, and presents are made to the bridegroom to the *kamins* of he bride's house, and the bride is then placed in a litter and sent off with her husband.

In Chach the expenses of the wedding are all borne by the bridegroom's family, and not by that of the bride.

When the bride reaches her husband's door, the litter is placed on the ground in front of it, and the females or the family abuse her, and the bridegroom's head three times, do; the litter is taken into the house, and the *nai's* wife remains with the girl.

In the morning the *kamars* and *kamins*, who come for the litter; get presents and are dismissed. In the afternoon the threads on the boy's and girl's wrists are removed, each by the other.

CUSTOMS CONNCTED WITH DEATH

When any Muslim dies, his relatives are summoned by the *nai* or other *kamin*, and the female relatives assemble and weep round the body. His male relatives in this District go themselves to dig his grave, and preparations are made for the funeral feasts.

If the deceased is a male, the *Imam* of the *masjid* bathes the body; if a female, the women of the family bathe and lay it out, and the shroud is prepared of white cotton clothes, which consists of a suit fitting to the body, and two long winding sheets.

When the grave is ready, the bed on which the body is lying is lifted by the near relatives and carried to the grave, those accompanying it repeating the *Kalma* as they go, from the graveyard the bed is set down with its head to the north and its feet to the south. The *Mullan* stands on the east side and turns his face towards Mecca, and the by-standers range themselves in three rows behind him. Prayers are then said, and charity is collected from Rs. 3 to Rs. 10 in cash, or grain from 4 to 20 Kg. with copies of the of the Quran. The Quran is first passed round from hand to hand, and then the money, grain and copies of the sacred book are distributed. The charity thus collected is known as the *'askat'*. It is divided into three shares; one share goes to the Imam of the *Masjid* who leads the prayer, one share to the *kamins* or village servants, and one share to the other *Mullans*, *Darweshes* and the poor who may be present.

Then the relatives and others who have come in are fed by the deceased's relatives. After four days charity is again dispensed, and for the next four Thursday the *Mullans* are fed. After forty days charity is dispensed, and thereafter one day in each year is fixed for a commemoration feast, to which the relatives bring contributions with them, and all the brotherhood; the *Mullan* and *imams*, any strangers who may be present, or any mendicants who may ask for it, are fed, and as much as twenty mounds of four and ten feasts and expenses are nearly as great a stain upon the resources of he people as the expenses of their weddings.

Appendix-5.1 Pakistan: Population Distribution of Administrative Units Punjab Province & Potohar Region 1901-1998.

		1901	1911	1921	1931	1941	1951	1961	1972	1981	1998
Pakistan	Total	16,5,76,594	17,7,59,438	31,3,42,919	21,2,82,783	25,9,04,465	33,7,40,167	42,8,80,378	65,3,09,340	84,2,53,644	132,3,52,279
	Urban	1,5,00,973	2,0,11,385	15,7,48,053	4,2,10,997	3,4,07,788	5,9,85,497	9,6,54,572	16,5,93,651	23,8,41,471	43,0,36,404
	Rural	15,0,75,621	15,7,48,053	15,5,94,866	17,0,71,786	22,4,96,677	27,7,54,670	33,2,25,806	48,7,15,689	60,4,12,173	89,3,15,875
Punjab	Total	8,7,89,537	9,4,11,905	10,2,01,629	12,1,15,444	15,0,77,004	18,3,60,289	23,2,28,516	3,3,82,876	42,8,59,712	66,9,61,762
	Urban	7,96,254	7,99,516	8,33,226	1,7,33,226	2,1,06,979	3,1,64,067	4,8,85,570	8,1,20,157	11,6,72,918	20,5,68,638
	Rural	7,9,93,283	8,6,12,389	9,3,28,403	10,3,82,218	12,9,70,025	15,1,96,222	18,0,42,946	25,7,08,719	31,1,86,794	4,63,93,124
Potohar	Total	1,5,24,226	1,5,78,331	1,5,57,646	1,7,58,943	2,0,90,354	2,2,76,413	2,6,53,127	4,0,16,096	4,7,73,015	7,4,64,763
	Urban	1,46,060	1,54,619	1,71,953	2,13,169	3,04,597	4,0,40,09	5,90,352	1,1,39,179	1,5,83,092	2,9,79,567
	Rural	1,3,78,166	1,4,23,712	1,3,85,693	1,5,45,774	1,7,85,757	1,8,72,404	2,0,62,775	2,8,76,917	3,1,89,923	4,4,85,196

Source:-

1. Govt. of India 1941. Census of India Table-1.
2. GOP, Census of Pakistan 1961, Vol. III. Table-4, M/O Home and Kashmir Affairs. Karachi.
3. GOP 1951-98, Population of Administrative Units 2002, Table-1,2,3 & 4. Population Census Organisation, Islamabad.

Appendix-5.2 Potohar Region: Population Distribution by Districts 1951-1998.

Name of Area	Area in Sq.Kms	1951	1961	1972	1981	1998
POTOHAR REGION	23,160	2,2,76,413 100	2,6,53,127 100	4,0,16,096 100	4773015 100	7464763 100
1. ATTOCK DISTRICT	6,857	4,86,043 21.3	5,32,845 20.1	7,48,890 18.6	8,76,667 18.4	1,2,74,935 17.1
2.CHAKWAL DISTRICT	6,524	45,4,942 20.0	5,02,004 19.0	6,92,802 17.2	7,75,600 16.2	1,0,83,725 14.5
3.ISLAMABAD CAPITAL TERRITORY	906	95,940 4.2	1,17,669 4.4	2,37,549 6.0	3,40,286 7.1	8,05,235 10.8
4.JHELUM DISTRICT	3,587	3,67,824 16.1	4,14,711 15.6	5,91,906 14.7	6,59,012 13.8	9,36,957 12.5
5. RAWALPINDI DISTRICT	5,286	8,71,664 38.3	1,0,85,898 40.9	1,7,44,949 43.4	2,1,21,45 44.4	33,6,39,1145.1

Source:-

GOP 1951-98, Population of Administrative Units 2002, Table-4, Population Census Organisation, Islamabad.

Appendix-5.3 Potohar Region: Population Versus Area Distribution of Administrative Units by Tehsils/Districts 1998.

Name of Area	AREA IN SQ. KM.	POPULATION 1998
POTOHAR REGION	23,160	7,4,64,763
1. ATTOCK DISTRICT	6,857	1,2,74,935
i) Attock Tehsil	1,350	5,00,770
ii) Fatch Jang Tehsil	1,249	2,14,256
ii) Hassanabdal Tehsil	350	1,35,856
v) Jand Tehsil	2,043	2,28,349
iv) Pindi Gheb Tehsil	1,865	1,95,704
2.CHAKWAL DISTRICT	6,524	1,0,83,725
i) Chakwal Tehsil	3,120	5,98,048
iii) Choa Saidan Shah Tehsil	472	1,05,256
ii) Talagang Tehsil	2,932	3,80,421
3.ISLAMABAD CAPITAL TERRITORY	906	8,05,235
Islamabad Tehsil	906	8,05,235
4.JHELUM DISTRICT	3,587	9,36,957
i) Jhelum Tehsil	1,062	5,16,942
iii) P.D. Khan Tehsil	1,267	2,63,615
ii) Sohawa Tehsil	1,258	1,56,400
5. RAWALPINDI DISTRICT	5,285	3,3,63,911
vi) Gujar Khan Tehsil	1,457	4,94,010
iii) Kahuta Tehsil	1,096	3,13,200
v) Kotli Sattian Tehsil	304	81,523
iv) Murree Tehsil	434	1,76,426
i) Rawalpindi Tehsil	1,682	1,9,27,612
ii)Taxila Tehsil	312	3,71,140

Source:-

GOP 1951-98, Population of Administrative Units 2002, Table-4, Population Census Organisation, G.O.P. Islamabad.

Appendix-6.1 Potohar Region: Age and Sex Structure by Districts 1998.

Age (in Years)	Attock			Chakwal			Islamabad		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
All Ages	1,2,74,935	6,36,338	6,38,597	1,0,83,725	5,18,249	5,65,476	8,05,235	4,34,239	3,70,9
0-14	5,03,892	2,58,364	2,45,528	4,23,106	2,16,977	2,06,129	3,05,151	1,57,994	1,47,1
15-64	7,14,409	3,49,127	3,65,282	5,96,078	2,68,443	3,27,635	4,78,116	2,64,039	2,14,0
65 +	56,634	28,847	27,787	64,541	32,829	31,712	21,968	12,206	9,7
Age (in Years)	Jhelum			Rawalpindi			Potohar		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
All Ages	9,36,957	4,68,112	4,68,845	3,3,63,911	1,7,22,477	1,6,41,434	7,4,64,763	3,7,79,415	3,6,85,3
0-14	3,71,838	1,91,472	1,80,366	1,2,99,189	6,67,053	6,32,136	2,9,03,176	1,4,91,860	1,4,11,3
15-64	5,19,442	2,52,299	2,67,143	1,9,43,931	9,89,836	9,54,095	4,2,51,976	2,1,23,744	2,1,28,2
65 +	45,677	24,341	21,336	1,20,791	65,588	55,203	3,09,611	1,63,811	1,45,8

Source:-

GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organisation, Islamabad.

Appendix-6.2 Potohar Region: Age and Sex Structure 1998.

Age (in Years)	Potohar		
	Both Sexes	Male	Female
All Ages	7,4,64,763	3,7,79,415	3,6,85,348
0-4	9,27,813	4,74,628	4,53,185
5-9	10,04,283	5,15,878	4,88,405
10-14	9,71,080	5,01,354	4,69,726
15-19	8,22,084	4,20,927	4,01,157
20-24	6,49,631	3,21,723	3,27,908
25-29	5,34,394	2,56,690	2,77,704
30-34	4,81,380	2,31,237	2,50,143
35-39	4,02,501	2,00,761	2,01,740
40-44	3,82,359	1,88,673	1,93,686
45-49	3,22,290	1,62,589	1,59,701
50-54	2,77,270	1,42,171	1,35,099
55-59	2,02,550	1,06,975	95,575
60-64	1,77,517	91,998	85,519
65-69	1,13,330	60,182	53,148
70-74	94,074	49,914	44,160
75 +	1,02,207	53,715	48,492

Source:-

GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organisation, Islamabad.

Appendix-6.3 Potohar Region: Age & Sex Structure 1981.

Age (in Years)	Potohar		
	Both Sexes	Male	Female
All Ages	4,7,73,015	2,4,43,615	2,3,29,400
0-4	6,80,407	3,44,423	3,35,984
5-9	6,78,221	3,49,685	3,28,536
10-14	5,94,957	3,09,770	2,85,187
15-19	4,66,009	2,39,268	2,26,741
20-24	3,65,870	1,83,390	1,82,480
25-29	3,22,764	1,58,923	1,63,841
30-34	2,72,973	1,34,498	1,38,475
35-39	2,67,989	1,27,297	1,40,692
40-44	2,41,265	1,17,030	1,24,235
45-49	2,08,331	1,06,744	1,01,587
50-54	1,84,402	99,664	84,738
55-59	1,15,194	64,558	50,636
60 +	3,74,633	2,08,365	1,66,268

Source:-

GOP 1981, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organisation, Islamabad.

Potohar Region: Age & Sex Structure 1998.

Age (in Years)	Potohar		
	Both Sexes	Male	Female
All Ages	7,4,64,763	3,7,79,415	3,6,85,348
0-4	9,27,813	4,74,628	4,53,185
5-9	1,0,04,283	5,15,878	4,88,405
10-14	9,71,080	5,01,354	4,69,726
15-19	8,22,084	4,20,927	4,01,157
20-24	6,49,631	3,21,723	3,27,908
25-29	5,34,394	2,56,690	2,77,704
30-34	4,81,380	2,31,237	2,50,143
35-39	4,02,501	2,00,761	2,01,740
40-44	3,82,359	1,88,673	1,93,686
45-49	3,22,290	1,62,589	1,59,701
50-54	2,77,270	1,42,171	1,35,099
55-59	2,02,550	1,06,975	95,575
60 +	4,87,128	2,55,809	2,31,319

Source:-

GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organisation, Islamabad.

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Appendix-6.3 Potohar Region: Age & Sex Structure 1961.

Age (in Years)	Potohar		
	Both Sexes	Male	Female
All Ages	2,6,53,127	1,3,60,208	1,2,92,919
0-4	3,99,850	2,02,572	1,97,278
5-9	4,28,832	2,20,680	2,08,152
10-14	2,92,897	1,56,607	1,36,290
15-19	2,31,243	1,18,213	1,13,030
20-24	1,95,899	96,008	99,891
25-29	1,94,661	92,411	1,02,250
30-34	1,63,293	77,921	85,372
35-39	1,50,259	75,943	74,316
40-44	1,24,790	64,757	60,033
45-49	1,10,516	58,579	51,937
50-54	1,02,353	54,597	47,756
55-59	63,981	35,093	28,888
60 +	1,94,553	1,06,827	87,726

Source:-

G.O.P 1961, Census of Pakistan, Vol..III, Table-4, M/O Home and Kashmir Affairs, Karachi..

Potohar Region: Age & Sex Structure 1972.

Age (in Years)	Potohar		
	Both Sexes	Male	Female
All Ages	4,0,16,096	2,1,31,336	1,8,84,760
0-4	5,24,572	2,64,322	2,60,250
5-9	5,76,917	2,98,077	2,78,840
10-14	4,87,814	2,62,345	2,25,469
15-19	3,71,876	1,97,203	1,74,673
20-24	3,25,362	1,69,593	1,55,769
25-29	3,14,902	1,66,612	1,48,290
30-34	2,56,548	1,34,001	1,22,547
35-39	2,36,950	1,27,156	1,09,794
40-44	2,01,611	1,08,546	93,065
45-49	1,75,726	97,788	77,938
50-54	1,56,285	88,507	67,778
55-59	91,984	52,107	39,877
60 +	2,95,549	1,65,079	1,30,470

Source:-

GOP 1972, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organisation, Islamabad.

Appendix-6.4 Potohar Region: Population by Sex 1881-1998.

	1881		1891		1901	
	Male	Female	Male	Female	Male	Female
Attock	2,40,050	2,04,257	2,34,475	2,13,945	2,42,398	2,22,032
Jhelum	2,63,732	2,30,767	2,68,906	2,45,184	2,53,058	2,48,366
Rawalpindi	2,58,953	2,12,126	2,92,657	2,41,083	2,99,893	2,58,806
Potohar	**7,62,735**	**6,47,150**	**7,96,038**	**7,00,212**	**7,95,349**	**7,29,204**
	1911		1921		1931	
	Male	Female	Male	Female	Male	Female
Attock	2,73,037	2,46,236	2,64,919	2,47,330	3,06,949	2,77,011
Jhelum	2,68,621	2,42,954	2,41,386	2,35,682	2,82,714	2,58,362
Rawalpindi	2,96,518	2,51,309	3,11,636	2,57,588	3,42,771	2,91,586
Potohar	**8,38,176**	**7,40,499**	**8,17,941**	**7,40,600**	**9,32,434**	**8,26,959**
	1941		1951		1961	
	Male	Female	Male	Female	Male	Female
Attock	3,56,580	3,19,295	3,58,710	3,31,009	3,89,574	3,77,239
Chakwal	-	-	-	-	-	-
Islamabad	-	-	-	-	-	-
Jhelum	3,24,333	3,05,325	1,38,412	1,27,354	3,79,948	3,69,281
Rawalpindi	4,25,372	3,59,859	4,86,689	4,21,105	5,90,686	5,46,399
Potohar	**1,1,06,285**	**9,84,479**	**9,83,811**	**8,79,468**	**1,3,60,208**	**1,2,92,919**
	1972		1981		1998	
	Male	Female	Male	Female	Male	Female
Attock	5,09,583	4,72,151	5,76,513	5,67,546	6,36,338	6,38,597
Chakwal	-	-	-	-	5,18,249	5,65,476
Islamabad	1,29,812	1,05,001	1,84,804	1,55,482	4,34,239	3,70,996
Jhelum	5,52,919	4,98,945	5,83,194	5,84,026	4,68,112	4,68,845
Rawalpindi	9,39,022	8,08,663	1,0,99,104	1,0,22,346	1,7,22,477	1,6,41,434
Potohar	**2,1,31,336**	**1,8,84,760**	**2,4,43,615**	**2,3,29,400**	**3,7,79,415**	**3,6,85,348**

Source:-

1. Govt. of India, 1911, Census of India, Punjab, Table-11.
2. Govt. of India 1933, Census of India, Punjab Part-II(Table 4) 1933, Civil Military Gazetteer.
3. GOP 1961, Census of Pakistan, Vol. III Table-4, M/O Home and Kashmir affairs, Karachi.
4. GOP 1972-81, District Census Reports Attock, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organisation, Islamabad.
5. GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi Table-4, Population Census Organisation, Islamabad.

Appendix-6.5 Potohar Region: Population by Male/Female Age Groups 1961

Age (in Years)	Potohar	
	Male	Female
All Ages	**1,3,60,208**	**1,2,92,919**
0-4	2,02,572	1,97,278
5-9	2,20,680	2,08,152
10-14	1,56,607	1,36,290
15-19	1,18,213	1,13,030
20-24	96,008	99,891
25-29	92,411	1,02,250
30-34	77,921	85,372
35-39	75,943	74,316
40-44	64,757	60,033
45-49	58,579	51,937
50-54	54,597	47,756
55-59	35,093	28,888
60 & Above	1,06,827	87,726

Source:-

GOP 1961, Census of Pakistan, Vol. III, Table-4, M/O Home and Kashmir Affairs, Karachi.

Potohar Region: Population by Male/Female Age Groups 1972

Age (in Years)	Potohar	
	Male	Female
All Ages	**2,1,31,336**	**1,8,84,760**
0-4	2,64,322	2,60,250
5-9	2,98,077	2,78,840
10-14	2,62,345	2,25,469
15-19	1,97,203	1,74,673
20-24	1,69,593	1,55,769
25-29	1,66,612	1,48,290
30-34	1,34,001	1,22,547
35-39	1,27,156	1,09,794
40-44	1,08,546	93,065
45-49	97,788	77,938
50-54	88,507	67,778
55-59	52,107	39,877
60 +	1,65,079	1,30,470

Source:-

GOP 1972, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organisation, Islamabad.

Appendix-6.5 Potohar Region: Population by Male/Female Age Groups 1981

Age (in Years)	Potohar	
	Male	Female
All Ages	2,4,43,615	2,3,29,400
0-4	3,44,423	3,35,984
5-9	3,49,685	3,28,536
10-14	3,09,770	2,85,187
15-19	2,39,268	2,26,741
20-24	1,83,390	1,82,480
25-29	1,58,923	1,63,841
30-34	1,34,498	1,38,475
35-39	1,27,297	1,40,692
40-44	1,17,030	1,24,235
45-49	1,06,744	1,01,587
50-54	99,664	84,738
55-59	64,558	50,636
60 +	2,08,365	1,66,268

Source:-

GOP 1981, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organisation, Islamabad.

Potohar Region: Population by Male/Female Age Groups 1998.

Age (in Years)	Potohar	
	Male	Female
All Ages	**3,7,79,415**	**3,6,85,348**
0-4	4,74,628	4,53,185
5-9	5,15,878	4,88,405
10-14	5,01,354	4,69,726
15-19	4,20,927	4,01,157
20-24	3,21,723	3,27,908
25-29	2,56,690	2,77,704
30-34	2,31,237	2,50,143
35-39	2,00,761	2,01,740
40-44	1,88,673	1,93,686
45-49	1,62,589	1,59,701
50-54	1,42,171	1,35,099
55-59	1,06,975	95,575
60 +	2,55,809	2,31,319

Source:-

GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-4, Population Census Organisation, Islamabad.

Appendix-6.6 Potohar Population by Male/Female and Urban/Rural, 1901,1951-1998.

	1901				1951				1961			
	Urban		Rural		Urban		Rural		Urban		Rural	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Fem
Attock	13,156	10,953	2,29,242	2,11,079	50,607	39,468	3,26,576	3,06,473	43,157	35,003	3,46,417	3,42
Chakwal	-	-	-	-	-	-	-	-	-	-	-	
Islamabad	-	-	-	-	-	-	-	-	-	-	-	
Jhelum	21,805	16,776	2,78,366	2,75,071	43,837	33,438	3,06,699	2,98,087	59,153	46,416	3,20,795	3,22
Rawalpind	71,979	41,662	4,23,199	3,93,695	1,56,201	98,927	3,12,668	3,07,708	2,30,879	1,75,744	3,59,807	3,70
Potohar	**1,06,940**	**71,391**	**9,30,870**	**8,49,845**	**2,50,645**	**1,71,833**	**9,45,943**	**9,12,268**	**3,33,189**	**2,57,163**	**1,0,27,019**	**1,0,35**

	1972				1981				1998			
	Urban		Rural		Urban		Rural		Urban		Rural	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Fem
Attock	64,612	58,057	4,44,971	4,14,094	82,522	69,704	4,93,931	4,97,842	1,43,506	1,27,586	4,92,832	5,11
Chakwal	-	-	-	-	-	-	-	-	65,770	65,922	4,52,479	4,99
Islamabad	45,806	30,835	84,006	74,166	1,13,341	91,023	71,463	64,459	2,90,717	2,38,463	1,43,522	1,32
Jhelum	90,576	77,681	4,62,343	4,21,254	1,12,861	98,726	4,70,333	4,85,300	1,39,568	1,19,762	3,28,544	3,49
Rawalpind	4,29,461	3,42,141	5,09,561	4,33,522	5,47,317	4,67,538	5,51,787	5,54,808	9,49,456	8,38,817	7,73,021	8,02
Potohar	**6,30,455**	**5,08,724**	**1,5,00,8841**	**1,3,76,036**	**8,56,101**	**7,26,991**	**1,5,87,514**	**1,6,02,409**	**1,5,89,017**	**1,3,90,550**	**2,1,90,398**	**2,2,94**

Source:-

1. Govt. of India, 1901, Census of India, Vol-XVII-A, Table-1, (I-VIII, X-XV & XVIII), Imperial Tables.
2. GOP 1951, Census of Pakistan, Vol-V. Punjab Bahawalpur State Report and Table-1,
3. GOP 1961, Census of Pakistan, Vol-III, Table-4, Kashmir and Home Affairs.
4. GOP 1972, District Census Reports Attock, Islamabad, Jhelum, and Rawalpindi, Table-4,Population Census Organisation, Islamabad.
5. GOP 1981, District Census Reports Attock, Islamabad, Jhelum, and Rawalpindi, Table-4, Population Census Organisation, Islamabad.
6. GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum, and Rawalpindi, Table-4, Population Census Organisation, Islamabad.

Appendix-6.7 Potohar Region: Population by Male/Female Tehsil-wise 1998.

Name of Tehsils/Districts	Male	Female
POTOHAR REGION	3,7,79,415	3,6,85,348
1. ATTOCK DISTRICT	6,36,338	6,38,597
i) Attock Tehsil	2,56,640	2,44,130
ii) Fateh Jang Tehsil	1,07,324	1,06,932
ii) Hassanabdal Tehsil	70,339	65,517
v) Jand Tehsil	1,07,852	1,20,497
iv) Pindi Gheb Tehsil	9,41,83	1,01,521
2.CHAKWAL DISTRICT	5,18,249	565476
i) Chakwal Tehsil	2,86,266	3,11,782
iii) Choa Saidan Shah Tehsil	51,740	53,516
ii) Talagang Tehsil	1,80,243	2,00,178
3.ISLAMABAD CAPITAL TERRITORY	4,34,239	3,70,996
Islamabad Tehsil	4,34,239	3,70,996
4.JHELUM DISTRICT	4,68,112	4,68,845
i) Jhelum Tehsil	2,63,932	2,53,010
iii) P.D. Khan Tehsil	1,30,158	1,33,457
ii) Sohawa Tehsil	74,022	82,378
5. RAWALPINDI DISTRICT	1,7,22,477	1,6,41,434
vi) Gujar Khan Tehsil	2,35,892	2,58,118
iii) Kahuta Tehsil	1,49,082	1,64,118
v) Kotli Sattian Tehsil	39,136	42,387
iv) Murree Tehsil	90,780	85,646
i) Rawalpindi Tehsil	1,0,13,634	9,13,978
ii)Taxila Tehsil	1,93,953	1,77,187

Source:-

GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum And Rawalpindi, Table-4, Population Census Organisation, Islamabad.

Appendix-7.1 The definition of the urban settlement

The official description of the term 'urban settlement' used in 1998 census of population of Pakistan is as follow:

"The term 'urban settlement' will normally include places having a Municipal Corporation, a Municipal Committee, a Cantonment Board or a Town Committee. In general, urban settlement are a concentration of population of at least 5,000 persons in continuous collection of houses where the community sense is well developed and the community maintains public utilities such as roads, street lighting, water supply, sanitary arrangements, etc. These places are generally major centres, sub-centres, of trade and commerce with a population substantially non-agricultural or having non-agricultural labour concentration and a high literacy rate. As a special case a few areas which have urban population characteristics having more than 5,000 population may not be treated as urban area."

This is a combination of administrative, economic and quantitative definition of the urban settlement areas. In addition, it contains elements of subjective decision and personal judgement. Let us critically examine the definition of urban settlement areas adopted for the 1998 Census of Pakistan.

i)	"The term will normally include places having a Municipal Corporation, a Municipal Committee, a Cantonment Boards or a Town committee."	i)	This administrative definition is simple and straightforward in approach. However, there is no need of the qualifier "Normally"
ii)	"In general urban settlement area is a Concentration of population of at least 5,000 persons."	ii)	This definition by size is relatively simple, hence acceptable
iii)	"In continuous collection of Houses".	iii)	This geographic definition implies a density measurement of either population or housing units per unit of land area. This is clear.
iv)	"Where the community is well developed."	iv)	This is subjective approach difficult to decide. In fact there may be rural areas where the community sense is well developed because they strictly

			follow certain decisions and rules of the community.
v)	And the community maintains public utilities such as roads, street lighting, water supply, sanitary arrangements, etc.	v)	This approach is qualitative. However, the community may not necessarily maintain the public utilities. Although it is also not quite clear as to what proportion of the community must be serviced by which facilities; only one facility or all facilities? The proportion of service must be determined.
vi)	These places are generally centres of trade and commerce with a population substantially non-agricultural or having non-agricultural labour concentration and a high literacy rate.	vi)	This is an economic approach. However, unless occupational economic statistics, the decision will be based on subjective judgment. The literacy rate should not be made criteria for the definition of an urban area. There may be rural areas where the literacy rate is higher than in some urban areas.
vii)	As a special case, a few areas, which have urban characteristics but having more than 5,000 population may not be, treated as urban area.	vii)	This appendage is confusing. Areas having urban characteristics may have even as few as 100 persons. Examples may be a telecommunication centre, a small irrigation or electrical establishment of WAPDA. It is, therefore, desirable to establish a precise lower limit of population for each area at a level above 5,000.

In addition to the definitions of urban areas discussed above a subsequent circular was issued before the Census to create urban fringes around major urban centres (larger cities with a population of 1,00,000). While creating such urban fringes an entire village (*mauza* or revenue estate) should be treated as either wholly urban or wholly rural. It was also decided that the newly created fringes and the already existing administrative city should be termed together a metropolitan city.

A new definition and terminology is, however, required for the so-called Metropolitan City. As a matter of fact a broader definition of both should take care of the definition of all urban cum statistical areas.

Appendix-7.2 Pakistan: Population Distribution by Province/Region 1901-1998.

		1901	1911	1921	1931	1941	1951	1961	1972	1981	1998
Pakistan	Total	16,5,76,594	17,7,59,438	31,3,42,919	21,2,82,783	25,9,04,465	33,7,40,167	42,8,80,378	65,3,09,340	84,2,53,644	132,3,52,2
	Urban	1,5,00,973	2,0,11,385	15,7,48,053	4,2,10,997	3,4,07,788	5,9,85,497	9,6,54,572	16,5,93,651	23,8,41,471	43,0,36,4
	Rural	15,0,75,621	15,7,48,053	15,5,94,866	17,0,71,786	22,4,96,677	27,7,54,670	33,2,25,806	48,7,15,689	60412173	8931587
Punjab	Total	8,7,89,537	9,4,11,905	10,2,01,629	12,1,15,444	15,0,77,004	18,3,60,289	23,2,28,516	3,3,82,876	42859712	6696176
	Urban	7,96,254	7,99,516	8,33,226	1,7,33,226	2,1,06,979	3,1,64,067	4,8,85,570	8,1,20,157	11,6,72,918	20,5,68,6
	Rural	79,93,283	8,6,12,389	9,3,28,403	10,3,82,218	12,9,70,025	15,1,96,222	18,0,42,946	25,7,08,719	31,1,86,794	46,3,93,1
Potohar	Total	1,5,24,226	1,5,78,331	1,5,57,646	1,7,58,943	2,0,90,354	2,2,76,413	2,6,53,127	4,0,16,096	4,7,73,015	7,4,64,7
	Urban	1,46,060	1,54,619	1,71,953	2,13,169	3,04,597	4,04,009	5,90,352	1,1,39,179	1,5,83,092	2,9,79,5
	Rural	1,3,78,166	1,4,23,712	1,3,85,693	1,5,45,774	1,7,85,757	1,8,72,404	2,0,62,775	2,8,76,917	3,1,89,923	4,4,85,1
NWFP	Total	2,0,41,535	2,19,6933	2,2,51,340	2,4,25,076	3,0,38,067	4,5,56,545	5,7,30,991	8,3,88,551	11,0,61,328	17,7,43,6
	Urban	2,57,082	2,91,277	3,25,188	3,96,306	5,34,679	5,04,745	7,58,516	1,1,95,655	1,6,65,652	2,9,94,0
	Rural	1,7,84,453	1,9,05,656	1,9,26,152	2,0,28,770	2,5,03,388	4,0,51,800	4,9,72,475	7,1,92,896	9,3,95,675	14,7,49,5
Sindh	Total	3,4,66,332	3,7,98,427	3,5,23,204	4,1,77,261	4,9,09,862	6,0,47,748	8,3,67,065	14,1,55,909	19,0,28,666	30,4,39,8
	Urban	2,75,993	2,96,318	2,99,574	4,12,437	5,47,035	1,7,68,127	3,1,67,018	5,7,25,776	82,4,3,036	14,8,39,8
	Rural	3,1,90,339	3,5,02,109	3,2,23,630	3,7,64,824	4,3,62,827	4,2,79,621	5,2,00,047	8,4,30,133	10,7,85,630	15,6,00,0
alochistan	Total	7,54,637	7,73,498	7,48,929	8,05,609	7,88,768	1,1,67,167	1,3,53,484	2,4,28,678	4,3,32,376	6,5,65,8
	Urban	25,584	33,922	49,001	62,272	64,476	1,44,549	2,28,468	3,99,584	6,76,772	1,5,68,7
	Rural	7,29,053	7,39,576	6,99,928	7,43,337	7,24,292	1,0,22,618	1,1,25,016	2,0,29,094	3,6,55,604	4,9,97,1
FATA	Total	-	-	-	-	-	1,3,32,005	1,8,47,195	2,4,91,230	2,1,98,547	3,1,76,3
	Urban	-	-	-	-	-	-	24,648	13,300	-	85,473
	Rural	-	-	-	-	-	1,33,205	1,8,22,547	2,4,77,930	2,1,98,547	3,0,90,8

Source:-

1. Govt. of India 1941, Census of India, Table-1.
2. GOP 1961, Census of Pakistan, Vol. III, Table-4, M/O Home and Kashmir Affairs, Karachi.
3. GOP 1951-98, Population of Administrative Units 2002, Table-1,2,3 & 4, Population Census Organization, Islamabad,

Appendix-7.3 Potohar Region: Population Distribution by Tehsils/Districts 1951-1998.

Name of Area		1951	1961	1972	1981	1998
POTOHAR REGION	Total	2,2,76,413	2,6,53,127	4,0,16,096	4,7,73,015	7,4,64,763
	Urban	4,04,009	5,90,352	1,1,39,179	1,5,83,092	2,9,79,567
	Rural	1,8,72,404	2,0,62,775	2,8,76,917	3,1,89,923	4,4,85,196
I. ATTOCK DISTRICT	Total	4,86,043	5,32,845	7,48,890	8,76,667	1,2,74,935
	Urban	48,465	67,342	1,05,274	1,31,401	2,71,092
	Rural	4,37,578	4,65,503	6,43,616	7,45,266	1,0,03,843
i) Attock Tehsil	Total	1,91,377	1,95,054	2,74,008	3,22,969	5,00,770
	Urban	25,183	34,868	56,267	66,426	1,59,996
	Rural	1,66,194	1,60,186	2,17,741	2,56,543	3,40,774
Attock M.C.	Urban*	10,119	14,892	21,633	26,233	52,139
Hazro M.C.	Urban	7,512	9,622	12,969	14,307	27,426
Attock Cantt.	Urban	7,552	4,149	7,539	13,753	17,590
Sanjwal Cantt.	Urban	-	-	-	6,275	9,106
Kamra Cantt.	Urban	-	-	-	5,858	39,005
Ghurghusti T.C.[]	Urban	-	-	14,126	-	14,730
Lawrancepur Mills[]	Urban	-	746	-	-	
Mansar Camp[]	Urban	-	5,459	-	-	
ii) Hassanabdal Tehsil	Total	41,896	48,644	71,209	93,119	1,35,856
	Urban	8,006	11,469	16,721	27,132	37,976
	Rural	33,890	37,175	54,488	65,987	97,880
Hassanabdal M.C.	Urban	8,006	11,469	16,721	27,132	37,976
iii) Fateh Jang Tehsil	Total	83,981	93,923	54,488	1,48,616	2,14,256
	Urban	5,126	5,989	10,662	13,505	25,986
	Rural	78,855	87,934	1,18,487	1,35,111	1,88,270
Fateh Jang M.C.	Urban	5,126	5,989	10,662	13,505	25,986
iv) Pindi Gheb Tehsil	Total	77,692	91,477	1,26,974	1,46,633	1,95,704
	Urban	10,150	15,016	21,624	24,338	29,850
	Rural	67,542	76,461	1,05,350	1,22,295	1,65,854
Pindi Gheb M.C.	Urban	10,150	12,416	17,982	20,535	29,850

Cont.

Khaur T.C.	Urban	-	2,600	3,642	3,803	
v) Jand Tehsil	Total	91,097	1,03,747	1,47,550	1,65,330	2,28,349
	Urban	-	-	-	-	17,284
	Rural	91,097	1,03,747	1,47,550	1,65,330	2,11,065
Jand T.C.	Urban	-	-	-	-	17284
2.CHAKWAL DISTRICT	Total	4,54,942	5,02,004	6,92,802	7,75,600	10,83,725
	Urban	22,065	34,128	54,716	64,555	1,31,692
	Rural	4,32,877	4,67,876	6,38,086	7,11,045	9,52,033
i) Chakwal Tehsil	Total	2,62,876	2,83,993	3,87,909	4,28,321	5,98,048
	Urban	13,310	23,310	37,321	43,670	80,508
	Rural	2,49,566	2,60,683	3,50,588	3,84,651	5,17,540
Chakwal M.C.	Urban	13,310	16,843	29,143	43,670	80,508
Bhaun Town	Urban	-	6,467	8,178	-	-
ii) Talagang Tehsil	Total	1,43,866	1,67,486	2,32,844	2,67,392	3,80,421
	Urban	8,755	10,818	17,395	20,885	37,766
	Rural	1,35,111	1,56,668	2,15,449	2,46,507	3,42,655
Talagang M.C.	Urban	8,755	10,818	17,395	20,885	37,766
iii) Choa Saidan Shah Tehsil	Total	48,200	50,525	72,049	79,887	1,05,256
	Urban	-	-	-	-	13,418
	Rural	48,200	50,525	72,049	79,887	91,838
Choa Saidan Shah T.C.	Urban	-	-	-	-	13418
3.ISLAMABAD CAPITAL TERRITORY	Total	95,940	1,17,669	2,37,549	3,40,286	8,05,235
	Urban	-	-	76,641	2,04,364	5,29,180
	Rural	95,940	1,17,669	1,60,908	1,35,922	2,76,055
Islamabad Tehsil	Total	95,940	1,17,669	2,37,549	3,40,286	8,05,235
	Urban	-	-	76,641	2,04,364	5,29,180
	Rural	95,940	1,17,669	1,60,908	1,35,922	2,76,055
Islamabad City	Urban	-	-	76,641	2,04,364	5,29,180
4.JHELUM DISTRICT	Total	4,30,194	4,82,280	6,86,551	7,78,778	9,36,957
	Urban	45,885	82,259	1,33,555	1,91,581	2,59,330
	Rural	3,84,309	4,00,021	5,52,996	5,87,197	6,77,627
i) Jhelum Tehsil	Total	1,91,116	2,10,054	3,10,378	3,52,362	5,16,942
	Urban	38,567	52,585	88,755	1,36,195	2,00,030
	Rural	1,52,549	1,57,469	2,21,623	2,16,167	3,16,912
Jhelum M.C.	Urban	29,360	41,160	63,676	92,646	1,29,442
Dina M.C.	Urban	-	-	-	16,292	23,670

Cont.

Jhelum Cantt	Urban	9,207	11,425	6,481	13,816	17,950
Mangla Cantt.	Urban	-	-	2,306	6,063	13,848
ii) Sohawa Tehsil	Total	74,650	81,139	1,13,292	1,18,326	1,56,400
	Urban	-	-	5,354	-	12,708
	Rural	74,650	81,139			1,43,692
Sohawa T.C.	Urban	-	-	5,354	-	12,708
iii) P.D. Khan Tehsil	Total	1,02,058	1,23,518	1,68,236	1,88,324	2,63,615
	Urban	7,318	29,674	36,837	31,722	46,592
	Rural	94,740	93,844	1,31,399	1,56,602	2,17,023
Pind Dadan Khan T.C.	Urban	7,318	8,328	10,253	12,639	18,766
Khewra T.C.	Urban	-	12,086	15,004	19,083	27,826
Lilla Town	Urban	-	9,260	11,580	-	-
5. RAWALPINDI DISTRICT	Total	8,71,664	10,85,898	17,44,949	21,21,450	33,63,911
	Urban	2,87,594	4,06,623	7,71,602	10,14,855	17,88,273
	Rural	5,84,070	6,79,275	9,73,347	11,06,595	15,75,638
i) Rawalpindi Tehsil	Total	3,81,678	5,21,231	8,51,948	10,65,646	19,27,612
	Urban	2,36,877	3,40,175	6,14,809	7,94,843	14,09,768
	Rural	1,44,801	1,81,056	2,37,139	2,70,803	5,17,844
Rawalpindi M.Corp.	Urban	1,52,893	1,97,370	3,72,919	4,57,091	7,81,927
Rawalpindi Cantt.	Urban	83,984	1,42,805	2,41,890	3,37,752	6,27,841
ii)Taxila Tehsil	Total	57,823	69,512	1,40,142	2,22,840	3,71,140
	Urban	32,823	37,035	1,07,510	1,60,709	2,70,773
	Rural	25,000	32,477	32,632	62,131	1,00,367
Taxila M.C.	Urban	-	-	-	28,780	48,904
Taxila Cantt.	Urban	-	-	-	9,594	22,978
Wah Cantt.	Urban	32,823	37,035	1,07,510	1,22,335	1,98,891
iii) Kahuta Tehsil	Total	1,16,131	1,36,529	2,03,672	2,31,985	3,13,200
	Urban	-	4,398	8,097	9,455	19,207
	Rural	1,16,131	1,32,131	1,95,575	2,22,530	2,93,993
Kahuta T.C.	Urban	-	4,398	8,097	9,455	19,207
iv) Murree Tehsil	Total	72,902	88,646	1,35,618	1,57,136	1,76,426
	Urban	9,398	13,486	17,065	15,928	21,375
	Rural	63,504	75,160	1,18,553	1,41,208	1,55,051
Murree M.C.	Urban	3,700	6,954	12,879	10,744	13,975
Murree Cantt.	Urban	5,698	6,532	4,186	5,184	7,400

CONT.

v) Kotli Sattian Tehsil	Total	33,356	37,843	65,347	83,255	81,523
	Urban	-	-	-	-	-
	Rural	33,356	37,843	65,347	83,255	81,523
vi) Gujar Khan Tehsil	Total	2,09,774	2,32,137	3,48,222	3,60,588	4,94,010
	Urban	8,496	11,529	24,121	33,920	67,150
	Rural	2,01,278	2,20,608	3,24,101	3,26,668	4,26,860
Gujar Khan M.C.	Urban	8,496	11,529	24,121	33,920	57,099
Daultala T.C.	Urban	-	-	-	-	10,051

Source:- GOP 1951-98, Population of Administrative Units, Table-4, Population Census Organisation, Islamabad.

Foot note:-

1 Bhaun Town de-urbanised after 1972 Census.

1 Lilla Town de-urbanised after 1972 Census.

1 Lawrancepur Mills, Mansar Camp de-urbanised after 1981 Census.

1 Khaur T.C. de-urbanised after 1981 Census.

Appendix-7.4 Potohar Region: Urban Population by Size and Class in 1901-1998

Class	Population Size	1901	1911	1921	1931	1941	1951	1961	1972	1981	1998
I	1,00,000 & above	-	-	-	-	1,18,175	1,52,893	3,40,175	7,22,319	1,1,21,542	2,2,67,281
II	50,000-99,999	-	-	55,251	75,767	66,867	83,984	-	1,40,317	92,646	1,89,746
III	20,000-49,999	87,688	86,483	45,891	43,517	26,349	62,183	78,195	74,896	2,24,825	3,36,507
IV	10,000-19,999	25,473	22,888	14,422	27,772	57,612	33,579	1,01,478	1,55,863	97,847	1,69,527
V	5,000-9,999	24,771	39,521	45,790	55,587	29,678	67,670	58,611	33,040	42,429	16,506
VI	Under 5,000	8,128	5,727	10,599	10,526	5,916	3,700	11,893	12,743	3,803	-
Potohar Urban		1,46,060	1,54,619	1,71,953	213169	3,04,597	4,04,009	5,90,352	1,1,39,179	1,5,83,092	2,9,79,567
Potohar Total		**1,5,24,226**	**1,5,78,331**	**1,5,57,646**	**1,7,58,943**	**2,0,90,354**	**2,2,76,413**	**2653127**	**4,0,16,096**	**4,7,73,015**	**7,4,64,763**

Source:-

1. Govt. of India 1941, Census of India, Table-1.
2. GOP 1961, Census of Pakistan, Vol. III, Table-4, M/O Home and Kashmir Affairs, Karachi.
3. GOP 1951-98, Population of Administrative Units, Table-1,2,3 & 4, Population Census Organisation, Islamabad.

$$x = \frac{\left(x-\bar{x}\right)\left(y-\bar{y}\right)}{\sqrt{\left(x-\bar{x}\right)^2\left(y-\bar{y}\right)^2}}$$

$$x = \frac{2979567}{26} \qquad y = \frac{2243.47}{26}$$

$$\bar{x} = 114598.7038 \qquad y = 86.28730769$$

$$= \frac{(2979567-114598.7038)(2243.47-86.28730769)}{\sqrt{(2979567-114598.7038)^2\,(2243.47-86.28730769)^2}}$$

$$= \frac{(2864968.269)(2157.182692)}{\sqrt{(2864968.269)^2\,(2157.182692)^2}}$$

$$= \frac{6180252253}{\sqrt{(8.208043112)(4653425.55)}}$$

$$= \frac{6180259963}{\sqrt{38195612.89}} = \frac{6180259963}{38195517.53}$$

$$r = \frac{6180259963}{6180.259937} = 1000000.004$$

	Punjab	& FATA	Sindh	Balochistan	Reported	Total	AJ & K	Areas	countries	Immigrants Total	Total
Attock	12,878	7,138	941	74	2,205	23,236	992	-	7,016	8,008	31,244
Islamabad	61,983	18,767	3,161	409	18,153	1,02,473	3,783	332	6,556	10,671	1,13,144
Jhelum	30,346	5,424	1,816	498	7,331	45,415	9,258	339	14,930	24,527	69,942
Rawalpindi	1,44,016	61,683	6,321	2,259	32,836	2,47,115	17,004	828	42,954	60,786	3,07,901
Potohar	**2,49,223**	**93,012**	**12,239**	**3,240**	**60,525**	**4,18,239**	**31,037**	**1,499**	**71,456**	**1,03,992**	**5,22,231**
	MALE										
Attock	7,776	3,781	805	47	1,267	13,676	497	-	3,694	4,191	17,867
Islamabad	35,249	11,956	1,721	239	10,500	59,665	2,621	212	3,667	6,500	66,165
Jhelum	15,793	3,641	994	215	4,549	25,192	6,404	215	8292	14911	40,103
Rawalpindi	82,962	35,617	3,460	1,508	18,284	1,41,831	10,746	579	24,155	35,480	1,77,311
Potohar	**1,41,780**	**54,955**	**6,980**	**2,009**	**34,600**	**2,40,324**	**20,268**	**1,006**	**39,808**	**61,082**	**3,01,446**
	FEMALE										
Attock	5,102	3,357	136	27	938	9,560	495	-	3,322	3,817	13,377
Islamabad	26,734	6,811	1,440	170	7,653	42,808	1,162	120	2,889	4,171	46,979
Jhelum	14,553	1,783	822	283	2,782	20,223	2,854	124	6,638	9,616	29,839
Rawalpindi	61,054	26,066	2,861	751	14,552	1,05,284	6,258	249	18,799	25,306	1,30,590
Potohar	**1,07,443**	**38,017**	**5,259**	**1,231**	**25,925**	**1,77,875**	**10,769**	**493**	**31,648**	**42,910**	**2,20,785**

Source:- GOP 1981, Tabulation Plan Computer Tape, Districts Census Reports Attock, Islamabad, Jhelum & Rawalpindi, Table-21, Population Census Organisation, Islamabad.

CONT.

Enumeration	Punjab	N.W.F.P.	Sindh	Balochistan	Not	Internal	AJ & K	Northern	Other	Immigrants	Grand

Enumeration	Birth Place								
	Punjab	NWFP & FATA	Sindh	Balochistan	Not Reported	AJ & K	Northern Areas	Other Countries	Total
Attock	45,953	32,137	3,751	517	200	2,444	109	3,815	88,926
Chakwal	21,109	4,062	1,697	273	821	1,679	75	821	30,537
Islamabad	2,41,977	79,148	26,143	2,969	-	24,438	1,684	21,372	3,97,731
Jhelum	42,689	5,608	2,199	308	6	8,136	162	6,796	65,904
Rawalpindi	3,83,473	1,51,025	35,835	7,549	3,672	84,065	2,419	42,766	7,10,804
Potohar	**7,35,201**	**2,71,980**	**69,625**	**11,616**	**4,699**	**1,20,762**	**4,449**	**75,570**	**1,2,93,902**
	MALE								
Attock	27,638	18,171	1,917	374	79	1,550	69	1,904	51,702
Chakwal	9,019	2,220	610	106	-	1,483	67	441	13,946
Islamabad	1,31,862	49,130	13,913	1,635	-	15,458	1,119	11,234	2,24,351
Jhelum	20,086	3,167	986	144	6	3,495	96	3,568	31,548
Rawalpindi	1,93,555	84,821	21,338	3,156	2,659	52,349	1,093	23,268	3,82,239
Potohar	**3,82,160**	**1,57,509**	**38,764**	**5,415**	**2,744**	**74,335**	**2,444**	**40,415**	**7,03,786**
	FEMALE								
Attock	18,315	13,966	1,834	143	121	894	40	1,911	37,224
Chakwal	12,090	1,842	1,087	167	-	196	8	380	15,770
Islamabad	1,10,115	30,018	12,230	1,334	-	8,980	565	10,138	1,73,380
Jhelum	22,603	2,441	1,213	164	-	4,641	66	3,228	34,356
Rawalpindi	1,89,918	66,204	14,497	4,393	1,013	31,716	1,326	19,498	3,28,565
Potohar	**3,53,041**	**1,14,471**	**30,861**	**6,201**	**1,134**	**46,427**	**2,005**	**35,155**	**5,89,295**

Source:- GOP 1998, Tabulation Plan Computer Tape, Districts Census Reports Attock, Chakwal, Islamabad, Jhelum & Rawalpindi, Table-17, Population Census Organisation, G.O.P. Islamabad.

Appendix-8.2 Potohar Region: In-Migrants in 1998.

Enumeration	Birth Place								
	Punjab	NWFP & FATA	Sindh	Balochistan	Not Reported	AJ & K	Northern Areas	Other Countries	Total

Birth Place	Punjab	NWFP/ FATA	Sindh	Balochistan	Total	Other Countries[2] (Abroad)	Revised Total
Attock	44,285	24,844	44,288	3,221	1,16,638	12,792	1,29,430
Chakwal [1]	-	-	-	-	-	-	-
Islamabad	2,805	1,376	3,632	142	7,955	4,438	12,393
Jhelum [2]	1,08,022	22,235	38,660	7,638	1,76,555	32,103	2,08,658
Rawalpindi	72,615	45,797	47,224	6,099	1,71,735	22,611	1,94,346
Potohar	**2,27,727**	**94,252**	**1,33,804**	**17,100**	**4,72,883**	**71,944**	**5,44,827**

Source:-

1. GOP 1981, Tabulation Plan Computer Tape, Districts Census Reports Attock, Islamabad, Jhelum & Rawalpindi, Table-21, Population Census Organisation, Islamabad.
2. GOP 1981, Tabulation Plan Computer Tape, Provincial Census Reports Punjab, NWFP, Sindh and Balochistan, Table-21, Population Census Organisation, Islamabad.
3. GOP 1981, Tabulation Plan Computer Tape, Districts Census Reports Attock, Islamabad, Jhelum & Rawalpindi, Table- 19, Population Census Organisation, Islamabad.
4. GOP 1981, Tabulation Plan Computer Tape, Provincial Census Reports Punjab, NWFP, Sindh and Balochistan, Table-19, Population Census Organisation, Islamabad.
5. GOP 1981, Tabulation Plan Computer Tape, District Census Reports Attock, Islamabad, Jhelum & Rawalpindi, Table-22, Population Census Organisation, Islamabad.

Foot note -

[1] Chakwal District created after 1981 census.

[2] Includes out-migrants population of (Chakwal district), in Jhelum district in 1981 census.

[3] Out-migrant population data not available in 1981 & 1998 census.

[3] Potohar out-migrants population data other countries not available in 1998 census.

Birth Place	Enumeration						
	Punjab	NWFP/ FATA	Sindh	Balochistan	Total	Other Countries[3] (Abroad)	Revised Total
Attock	19,070	1,451	14,361	1,156	36,038	NA	36,038
Chakwal [1]	29,622	1,226	12,117	975	43,940	NA	43,940
Islamabad	2,824	4,035	3,292	265	10,387	NA	10,387
Jhelum [2]	50,213	1,066	10,546	849	62,674	NA	62,674
Rawalpindi	43,493	3,816	37,771	3,039	88,119	NA	88,119
Potohar	**1,45,222**	**11,594**	**78,087**	**6,284**	**2,41,187**	**NA**	**2,41,187**

Source:-

1. GOP 1998, Tabulation Plan Computer Tape, Districts Census Reports Attock, Islamabad, Jhelum & Rawalpindi, Table-21, Population Census Organisation, Islamabad.
2. GOP 1998, Tabulation Plan Computer Tape, Provincial Census Reports Punjab, NWFP, Sindh and Balochistan, Table-21, Population Census Organisation, Islamabad.
3. GOP 1998, Tabulation Plan Computer Tape, Districts Census Reports Attock, Islamabad, Jhelum & Rawalpindi, Table- 19, Population Census Organisation, Islamabad.
4. GOP 1998, Tabulation Plan Computer Tape, Provincial Census Reports Punjab, NWFP, Sindh and Balochistan, Table-19, Population Census Organisation, Islamabad.

Foot note:-

[1] Chakwal District created after 1981 census.

[2] Includes out-migrants population of (Chakwal district), in Jhelum district in 1981 census.

[3] Out-migrant population data not available in 1981 & 1998 census.

[3] Potohar out-migrants population data other countries not available in 1998 census.

Appendix-8.3 Potohar Region: Out-Migrants [3] Population in 1998.

Appendix-8.4 Potohar: Number of Out-Migrants in Various Districts of Provinces of Pakistan North West Frontier Province

Sr. No.	Name of Adm. District	Out-migrants	
		1981	1998
1.	Chitral	10	10
2.	Upper Dir	-	-
3.	Lower Dir	117	-
4.	Buner	-	-
5.	Swat	918	811
6.	Shangla	-	-
7.	Malakand	60	2
8.	Kohistan	65	22
9.	Batagram	-	108
10.	Mansehra	1,406	33
11.	Abbottabad	34,793	709
12.	Haripur	-	666
13.	Mardan	1,979	65
14.	Swabi	-	3
15.	Charsadda	-	1
16.	Peshawar	29,286	8,390
17.	Nowshera	-	444
18.	Kohat	23,049	192
19.	Hangu	-	4
20.	Karak	-	11
21.	Bannu	1,851	30
22.	Lakki Marwat	-	80
23.	D.I.Khan	718	6
24.	Tank	-	61
	Total:	**94,252**	**11,594**

Source:-

1. GOP 1981, Tabulation Plan Computer Tape, District Census Reports & Provincial Census Reports of NWFP, Table 21, Population Census Organisation, Islamabad.
2. GOP 1981, Provincial Census Reports of NWFP, Table 19, Population Census Organisation, G.O.P., Islamabad, Pakistan.

CONT.

Appendix-8.4 Punjab[4] Province

Sr. No.	Name of Adm. District	Out-migrants	
		1981	1998
25.	Mianwali	6,360	1,476
26.	Sargodha	24,972	14,482
27.	Bhakkar	-	975
28.	Khushab	-	2,269
29.	Faisalabad	16,246	8,722
30.	Jhang	4,074	3,561
31.	T.T. Singh	-	573
32.	Gujranwala	19,081	19,021
33.	Hafizabad	-	714
34.	Gujrat	17,683	12,188
35.	Mandi Bahauddin	-	7,343
36.	Sialkot	21,978	10,318
37.	Narowal	-	797
38.	Lahore	51,712	33,196
39.	Kasur	827	2,056
40.	Okara	-	9,624
41.	Sheikhupura	6,645	3,438
42.	Vehari	4,249	2,343
43.	Sahiwal	7,445	1,215
44.	Pakpattan	-	1,907
45.	Multan	19,163	994
46.	Lodhran	-	286
47.	Khanewal	-	2,479
48.	D.G.Khan	489	368
49.	Rajanpur	-	54
50.	Leiah	-	1,890
51.	Muzaffargarh	14,934	408
52.	Bahawalpur	5,110	710
53.	Bahawalnagar	2,058	371
54.	R.Y.Khan	4,701	1,462
	TOTAL:	2,27,727	1,45,222

Source:-

1. GOP 1981, Tabulation Plan Computer Tape, District Census Reports & Provincial Census Report of Punjab, Table 21, Population Census Organisation, Islamabad.
2. GOP 1998, District Census Reports & Provincial Census Reports of Punjab, Table-19, Population Census Organisation, Islamabad.

Foot note:-

[4]Islamabad District out-migrant population added in districts of Punjab province-1998.

Appendix-8.4 Sind Province

Sr. No	Name of Adm. District	Out-migrants	
		1981	1998
55.	Jacobabad	1,371	537
56.	Sukkur	1,591	2,853
57.	Shikarpur	531	765
58.	Larkana	1,404	2,806
59.	Ghotki	-	188
60.	Khairpur	-	468
61.	Nausharo Feroze	-	111
62.	Nawab Shah	3,276	4,280
63.	Dadu	5,729	4,332
64.	Hyderabad	8,270	10,761
65.	Badin	2,930	3,067
66.	Thatta	1,161	2,134
67.	Sanghar	1,832	2,154
68.	Mirpur Khas	-	24
69.	Umerkot	-	139
70.	Tharparkar	1,150	1,927
71.	Malir	-	9,017
72.	Karachi-E	38,650	4,879
73.	Karachi-W	22,287	1,01,58
74.	Karachi-S	43,622	9,331
75.	Karachi-C	-	8,156
	TOTAL:	1,33,804	78,087

Source:-

1. GOP 1981, Tabulation Plan Computer Tape, District Census Reports & Provincial Census Report of Sindh, Table 21, Population Census Organisation, Islamabad.
2. GOP 1998, Provincial Census Report Sindh, Table 19, Population Census Organisation, Islamabad.

CONT.

Appendix-8.4 Balochistan Province

Sr. No.	Name of Adm. District	Out-migrants	
		1981	1998
76.	Quetta	6,668	1,609
77.	Pishin	652	469
78.	Qilla Abdullah	40	112
79.	Chagai	274	300
80.	Loralai	3,319	607
81.	Musakhel	-	3
82.	Barkhan	50	13
83.	Killa Saifullah	-	-
84.	Zhob	525	472
85.	Ziarat	10	2
86.	Kohlu	1,133	181
87.	Dera Bugti	-	29
88.	Sibi	690	500
89.	Jafarabad	-	7
90.	Nasirabad	267	11
91.	Jhal Magsi	-	-
92.	Bolan	-	29
93.	Kalat	114	210
94.	Mastung	-	14
95.	Khuzdar	2,243	900
96.	Awaran	-	-
97.	Kharan	105	13
98.	Lasbela	779	479
99.	Kech (Turbat)	109	230
100.	Panjgur Kateran	-	4
101.	Gwadar	122	90
	TOTAL:-	17,100	6,284

Source:

1. GOP 1981, Tabulation Plan Computer Tape, District Census Reports & Provincial Census Report of Balochistan, Table 21, Population Census Organisation, Islamabad.
2. GOP 1998, Provincial Census Report of Balochistan, Table-19, Population Census Organisation, Islamabad.

Appendix-8.5 Potohar Region: Duration of Continuous Residence 1998

Duration of Continuous Residence (in year)	Migrants in 1998					
	Attock	Chakwal	Islamabad	Jhelum	Rawalpindi	Potohar Region
Total:-	**88,926**	**29,716**	**3,97,731**	**65,904**	**7,10,804**	**1,2,93,081**
Maximum 1 years	13,843	8,242	46,152	5,692	61,768	1,35,697
Maximum 5 years	37,319	6,166	94,026	14,604	2,07,765	3,59,880
Maximum 10 years	11,513	4,339	68,864	7,495	1,05,009	1,97,220
10 years and above	26,251	10,969	1,88,689	38,113	3,36,262	6,00,284
Rural:-	**30,029**	**21,124**	**85,091**	**18,924**	**75,262**	**2,30,430**
Maximum 1 years	7,074	6,963	12,884	1,936	6,345	35,202
Maximum 5 years	12,002	4,317	21,516	2,931	15,621	56,387
Maximum 10 years	3,089	2,808	18,588	2,266	9,359	36,110
10 years and above	7,864	7,036	32,103	11,791	43,937	1,02,731
Urban:-	**58,897**	**8,592**	**3,12,640**	**46,980**	**6,35,542**	**1,6,62,651**
Maximum 1 years	6,769	1,279	33,268	3,756	55,423	1,00,495
Maximum 5 years	25,317	1,849	72,510	11,673	1,92,144	3,03,493
Maximum 10 years	8,424	1,531	50,276	5,229	95,650	1,61,110
10 years and above	18,387	3,933	1,56,586	26,322	2,92,325	4,97,553

Source:- GOP 1998, District Census Reports Attock, Rawalpindi, Jhelum, Chakwal and Islamabad. 1998, Table 18, Population Census Organisation, Islamabad.

Appendix-9.1 Human Settlement 1998

Sr. No.	Name of Human Settlement	Sr. No.	Name of Human Settlement	Sr. No.	Name of Human Settlement
1	Rawalpindi	59	Dandoot	117	Shakardara
2	Islamabad	60	Wah	118	Kani
3	Wah	61	Tarlai Kalan	119	Akwal
4	Jhelum	62	Thatta	120	Kharpa
5	Chakwal	63	Mathal	121	Waisa
6	Taxila	64	Sanjwal	122	Qazibad
7	Attock	65	Malak Mala	123	Padshahan
8	Gujar Khan	66	Saghar	124	Bahtar
9	Chaklala	67	Phulgran	125	Dahgal
10	Kamra	68	Sarwala	126	Dhara Jawa
11	Dina	69	Mureed	127	Nala Muslim
12	Hasanbdal	70	Hameed	128	Kasran
13	Talagang	71	Dalwal Mai Padshahpur	129	Sehti
14	Shakrial	72	Ikhlas	130	Dewel
15	Pindi Gheb	73	Kandwal	131	Kamalpur Musa
16	Khewra	74	Tarap Shumali	132	Malot Sattian
17	Hazro	75	Malkwal	133	Boota
18	Kot Hathial	76	Odherwal	134	Bahalar Top
19	Fateh Jang	77	Makhad	135	Kot Gula
20	Lawa	78	Numb Ramal	136	Nalhad
21	Khana Dak (R)	79	Lethi	137	Kahuta
22	Chak Jala Din	80	Sihala	138	Kirpa
23	Tha Mahuram Khan	81	Rawat	139	Khurd
24	Murree	82	Burhan	140	Chak Khasa
25	Kota Kalan	83	Tamair	141	Hattar
26	Kahuta	84	Jand	142	Tatral
27	P.D.Khan	85	Hardo Thanda Pani	143	Darot
28	Mirza	86	Shainh Bagh	144	Harcharhar Dhab
29	Jand	87	Basal	145	Ahmadal
30	Hummak	88	Mohra Noor	146	Pind Begwal
31	Morgah	89	Jhatla	147	Jabbi Shah Dilawr
32	Saeelah	90	Bhoochal Kalan	148	Chijjana
33	Gangal (R)	91	Jalapur Sharif	149	Bhakri Kalan
34	Ghurgushti	92	Kot Sarang	150	Choa Khalisa
35	Tamman	93	Tahi	151	Pandoori
36	Bhaun	94	Dher Mund	152	Nara-Tarf-Nara-Dakhneer
37	Usman Khattar	95	Lilla Bhara	153	Mansar
38	Mangala	96	Balkassar	154	Akhori

Cont.

Sr. No.	Name of Human Settlement	Sr. No.	Name of Human Settlement	Sr. No.	Name of Human Settlement
39	Choa Saidan Shah	97	Kauntirala	155	Thoa Khalisa
40	Pinanwal	98	Narali	156	Nambal
41	Sohawa	99	Kot Fateh Khan	157	Dullah
42	Khaur	100	Pind Sultani	158	Mogla
43	Lakhan Dehati	101	Sohan Dehati	159	Manga
44	Darkali Mamori	102	Formali	160	Nawshera
45	Pachnand	103	Khallar Khar	161	Juggian
46	Charhan	104	Haranpur	162	Karsal
47	Khana Dak	105	Aryari	163	Fateh Jang
48	Nara (J)	106	Pindi Saidpur	164	Bhalomar
49	Dhudhial	107	Musa Kadhi	165	Shinka
50	Domeli (S	108	Nara-Tarf-Nara-Chab	166	Jang
51	Narar	109	Malhuwali	167	Dharabi
52	Haji Shah	110	Chingi	168	Nara (K
53	Multan Khurd	111	Lill Bhurwana	169	Bhadian
54	Dhurnal	112	Nara-Tarf-Nara-Lakarma	170	Bannahl
55	Charh	113	Toba	171	Sureg Salar
56	Domel (J)	114	Dhaular	172	Warwal
57	Daultala	115	Khunda	173	Manday
58	Dhaman	116	Parhina Neer		

Source:- GOP 1998, District Census Reports of Attock, Chakwal, Islamabad, Jhelum & Rawalpindi, Table-39 & 40, Population Census Organisation, Islamabad.

Appendix 9.2 Potohar Region: Origin of Human Settlement 1998

Grade/ Class	Sl. No.	Name of Human Settlement	Ancient Period	Buddah Period	Hindu Period	Mughal/ Muslim	British Era	Modern Period	Total
	1	Rawalpindi				M			
	2	Islamabad						MO	
1st						**1**		**1**	**2**
	3	Wah				M			
	4	Jhelum	A						
2nd			**1**			**1**			**2**
	5	Chakwal	A						
	6	Taxila	A	B					
	7	Attock				M			
	8	Gujar Khan				M			
3rd			**2**	**1**		**2**			**5**
	9	Chaklala			H				
	10	Kamra			H				
	11	Dina				M			
	12	Hasanabdal				M			
	13	Talagang			H				
	14	Shakrial			H				
	15	Pindi Gheb			H				
	16	Khewra			H				
	17	Hazro				M			
	18	Kot Hathial			H				
	19	Fateh Jang				M			
4th					**7**	**4**			**11**
	20	Lawa			H				
	21	Khana Dak (R)				M			
	22	Chak Jalal Din				M			
	23	Thua Mahuram Khan				M			
	24	Murree					Br		
	25	Kota Kalan				M			
	26	Kahuta			H				
	27	P.D.Khan				M			
	28	Mirza				M			
	29	Jand				M			
	30	Hummak				M			
	31	Morgah				M			
	32	Saeelah			H				
	33	Gangal (R)			H				
	34	Ghurgushti				M			
	35	Tamman				M			
	36	Bhaun			H				
	37	Usman Khattar				M			
	38	Mangala			H				
	39	Choa Saidan Shah			H				
	40	Pinanwal			H				
	41	Sohawa			H				
	42	Khaur			H				
	43	Lakhan Dehati			H				
	44	Darkali Mamori				M			
	45	Pachnand				M			
	46	Charhan			H				
									Cont.

	47	Khana Dak				M			
	48	Nara (J)				M			
	49	Dhudhial				M			
	50	Domeli (S				M			
	51	Narar				M			
	52	Haji Shah				M			
	53	Multan Khurd				M			
	54	Dhurnal			-	M			
	55	Charh			H				
	56	Domel (J)			H				
	57	Daultala			H				
5th					**15**	**22**	**1**		**38**
	58	Dhaman			H				
	59	Dandoot				M			
	60	Wah				M			
	61	Tarlai Kalan			H				
	62	Thatta	A						
	63	Mathal				M			
	64	Sanjwal			H				
	65	Malak Mala				M			
	66	Saghar			H				
	67	Phulgran			H				
	68	Sarwala				M			
	69	Mureed				M			
	70	Hameed				M			
	71	Dalwal Mai Padshahpur				M			
	72	Ikhlas				M			
	73	Kandwal			H				
	74	Tarap Shumali				M			
	75	Malkwal			H				
	76	Odherwal			H				
	77	Makhad			H				
	78	Numb Ramal			H				
	79	Lethi	A						
	80	Sihala			H				
	81	Rawat				M			
	82	Burhan				M			
	83	Tamair				M			
	84	Jand				M			
	85	Hardo Thanda Pani				M			
	86	Shainh Bagh			H				
	87	Basal				M			
	88	Mohra Noor				M			
	89	Jhatla				M			
	90	Bhoochal Kalan				M			
	91	Jalalpur Sharif				M			
	92	Kot Sarang			H				
	93	Tahi	A						
	94	Dher Mund			H				
	95	Lilla Bhara				M			
	96	Balkassar			H				
	97	Kauntirala			H				
	98	Narali			H				
	99	Kot Fateh Khan				M			**Cont.**

	100	Pind Sultani				M			
	101	Sohan Dehati	A						
	102	Formali			H				
	103	Khallar Khar			H				
	104	Haranpur	A						
	105	Aryari			H				
	106	Pindi Saidpur			H				
	107	Musa Kadhi				M			
	108	Nara-Tarf-Nara-Chab				M			
	109	Malhuwali				M			
	110	Chingi				M			
	111	Lill Bhurwana				M			
	112	Nara-Tarf-Nara-Lakarmar				M			
	113	Toba				M			
	114	Dhaular			H				
	115	Khunda				M			
	116	Parhina Neer			H				
	117	Shakardara				M			
	118	Kani			H				
	119	Akwal			H				
	120	Kharpa			H				
	121	Waisa				M			
	122	Qaziabad				M			
	123	Padshahan				M			
	124	Bahtar				M			
	125	Dahgal					Br		
	126	Dhara Jawa			H				
	127	Nala Muslim				M			
	128	Kasran			H				
	129	Sehti				M			
	130	Dewel			H				
	131	Kamalpur Musa				M			
	132	Malot Sattian				M			
	133	Boota				M			
	134	Bahalar Top	A	13					
	135	Kot Gula			H				
	136	Nalhad			H				
	137	Kahuta			H				
	138	Kirpa			H				
	139	Khurd				M			
	140	Chak Khasa			H				
	141	Hattar				M			
	142	Tatral			H				
	143	Dariot			H				
	144	Harcharhar Dhab			H				
	145	Ahmadal				M			
	146	Pind Begwal			H				
	147	Jabbi Shah Dilawr				M			
	148	Chijjana			H				
	149	Bhakri Kalan				M			
	150	Choa Khalisa				M			
	151	Pandoori			H				
	152	Nara-Tarf-Nara-Dakhneer			H				
	153	Mansar			H				Cont.

	154	Akhori			H				
	155	Thoa Khalisa				M			
	156	Nambal			H				
	157	Dullah				M			
	158	Mogla			H				
	159	Manga				M			
	160	Nawshera				M			
	161	Juggian				M			
	162	Karsal				M			
	163	Fateh Jang				M			
	164	Bhalomar			H				
	165	Shinka				M			
	166	Jang				M			
	167	Dharabi			H				
	168	Nara (K				M			
	169	Bhadian			H				
	170	Bannahl			H				
	171	Sureg Salar			H				
	172	Warwal			H				
	173	Manday					B		
6th			**5**	**1**	**51**	**57**	**2**		**116**
All Grades			**7**	**2**	**73**	**87**	**3**	**1**	**173**

Soruce: - Field Survey-1999-2000

Abbreviation:-

A: Ancient Period
B : Buddhist
H : Hindu Era
M : Mughal Period
Br : British Period
MO: Modern Period

Appendix-9.3 Potohar Region: Name place of human Settlement 1998

Grade/ Class	Sr. No.	Name of Human Settlement	Founder	Tribes	Local	Arabic/ Persian	Holy name/Quranic	Sanskrit language	Un-known	Total
	1	Rawalpindi	-	T	-	-	-	-	-	
	2	Islamabad	-	-	-	AR	-	-	-	
		Total 1st Grade	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**2**
	3	Wah	-	-	L	-	-	-	-	
	4	Jhelum	-	-	L	-	-	-	-	
		Total 2nd Grade	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**2**
	5	Chakwal	-	-	-	-	-	S	-	
	6	Taxila	-	-	-	-	-	S	-	
	7	Attock	-	T	-	-	-	-	-	
	8	Gujar Khan	-	T	-	-	-	-	-	
		Total 3rdGrade	**-**	**2**	**-**	**-**	**-**	**2**	**-**	**4**
	9	Chaklala	-	T	-	-	-	-	-	
	10	Kamra	-	-	-	-	-	S	-	
	11	Dina	-	-	-	AR	-	-	-	
	12	Hasanabdal	F	-	-	-	-	-	-	
	13	Talagang	-	-	-	-	-	S	-	
	14	Shakrial	-	-	-	-	-	-	U	
	15	Pindi Gheb	-	-	-	-	-	S	-	
	16	Khewra	-	-	-	-	-	-	U	
	17	Hazro	F	-	-	-	-	-	-	
	18	Kot Hathial	-	-	-	-	-	-	U	
	19	Fateh Jang	F	-	-	-	-	-	-	
		Total 4th Grade	**3**	**1**	**-**	**1**	**-**	**3**	**3**	**11**
	20	Lawa	-	-	L	-	-	-	-	
	21	Khana Dak (R)	-	-	L	-	-	-	-	
	22	Chak Jalal Din	F	-	-	-	-	-	-	
	23	Thua Mahuram Khan	-	-	-	-	Q	-	-	
	24	Murree	F	-	-	-	-	-	-	
	25	Kota Kalan	-	-	L	-	-	-	-	
	26	Kahuta	-	T	-	-	-	-	-	
	27	P.D.Khan	F	-	-	-	-	-	-	
	28	Mirza	F	-	-	-	-	-	-	
	29	Jand	-	-	L	-	-	-	-	
	30	Hummak	-	-	L	-	-	-	-	
	31	Morgah	-	-	L	-	-	-	-	
	32	Saeelah	-	-	-	-	-	S	-	

Cont.

	33	Gangal (R)	-	T	-	-	-	-	-	
	34	Ghurgushti	F	-	-	-	-	-	-	
	35	Tamman	-	T	-	-	-	-	-	
	36	Bhaun	-	-	-	-	-	S	-	
	37	Usman Khattar	-	-	-	-	Q	-	-	
	38	Mangala	F	-	-	-	-	-	-	
	39	Choa Saidan Shah	F	-	-	-	-	-	-	
	40	Pinanwal	-	-	-	-	-	-	U	
	41	Sohawa	-	T	-	-	-	-	-	
	42	Khaur	-	-	L	-	-	-	-	
	43	Lakhan Dehati	F	-	-	-	-	-	-	
	44	Darkali Mamori	F	-	-	-	-	-	-	
	45	Pachnand	-	-	L	-	-	-	-	
	46	Charhan	-	-	-	-	-	S	-	
	47	Khana Dak	-	-	L	-	-	-	-	
	48	Nara (J)	-	-	-	-	Q	-	-	
	49	Dhudhial	-	T	-	-	-	-	-	
	50	Domeli (S	-	-	L	-	-	-	-	
	51	Narar	-	-	-	-	-	-	U	
	52	Haji Shah	F	-	-	-	-	-	-	
	53	Multan Khurd	-	-	-	-	Q	-	-	
	54	Dhurnal	-	T	-	-	-	-	-	
	55	Charh	-	-	L	-	-	-	-	
	56	Domel (J)	-	-	-	-	-	S	-	
	57	Daultala	F	-	-	-	-	-	-	
		Total 5th Grade	**11**	**6**	**11**	**-**	**4**	**4**	**2**	**38**
	58	Dhaman	F	-	-	-	-	-	-	
	59	Dandoot	-	-	-	AR	-	-	-	
	60	Wah	-	-	L	-	-	-	-	
	61	Tarlai Kalan	F	-	-	-	-	-	-	
	62	Thatta	-	-	-	-	-	S	-	
	63	Mathal	-	T	-	-	-	-	-	
	64	Sanjwal	-	-	-	-	-	-	U	
	65	Malak Mala	-	-	-	-	Q	-	-	
	66	Saghar	-	-	-	-	-	S	-	
	67	Phulgran	-	-	-	-	-	S	-	
	68	Sarwala	-	T	-	-	-	-	-	
	69	Mureed	F	-	-	-	-	-	-	
	70	Hameed	-	-	-	-	Q	-	-	
	71	Dalwal Mai Padshahpur	F	-	-	-	-	-	-	
	72	Ikhlas	-	-	-	-	Q	-	-	
	73	Kandwal	-	T	-	-	-	-	-	

Cont.

	74	Tarap Shumali	-	-	-	-	Q	-	-	
	75	Malkwal	-	-	-	-	-	S	-	
	76	Odherwal	-	-	-	-	-	-	U	
	77	Makhad	-	T	-	-	-	-	-	
	78	Numb Ramal	-	-	-	-	-	S	-	
	79	Lethi	-	-	L	-	-	-	-	
	80	Sihala	-	T	-	-	-	-	-	
	81	Rawat	-	T	-	-	-	-	-	
	82	Burhan	-	-	L	-	-	-	-	
	83	Tamair	-	-	-	-	Q	-	-	
	84	Jand	-	-	L	-	-	-	-	
	85	Hardo Thanda Pani	-	-	L	-	-	-	-	
	86	Shainh Bagh	-	-	-	-	-	S	-	
	87	Basal	-	T	-	-	-	-	-	
	88	Mohra Noor	-	-	-	-	Q	-	-	
	89	Jhatla	-	T	-	-	-	-	-	
	90	Bhoochal Kalan	-	T	-	-	-	-	-	
	91	Jalalpur Sharif	F	-	-	-	-	-	-	
	92	Kot Sarang	F	-	-	-	-	-	-	
	93	Tahi	-	-	-	-	-	S	-	
	94	Dher Mund	-	-	-	-	-	S	-	
	95	Lilla Bhara	F	-	-	-	-	-	-	
	96	Balkassar	-	T	-	-	-	-	-	
	97	Kauntirala	-	-	-	-	-	S	-	
	98	Narali	-	-	L	-	-	-	-	
	99	Kot Fateh Khan	F	-	-	-	-	-	-	
	100	Pind Sultani	-	-	-	-	Q	-	-	
	101	Sohan Dehati	-	-	-	-	-	S	-	
	102	Formali	-	-	-	-	-	-	U	
	103	Khallar Khar	-	-	-	-	-	S	-	
	104	Haranpur	F	-	-	-	-	-	-	
	105	Aryari	-	-	-	-	-	-	U	
	106	Pindi Saidpur	F	-	-	-	-	-	-	
	107	Musa Kadhi	-	-	-	-	Q	-	-	
	108	Nara-Tarf-Nara-Chab	-	T	-	-	-	-	-	
	109	Malhuwali	-	-	-	-	-	-	U	
	110	Chingi	-	-	-	-	-	S	-	
	111	Lill Bhurwana	-	-	-	-	-	-	U	
	112	Nara-Tarf-Nara-Lakarmar	-	-	-	-	Q	-	-	
	113	Toba	-	-	-	-	Q	-	-	

Cont.

	114	Dhaular	-	-	-	-	-	-	U	
	115	Khunda	-	T	-	-	-	-	-	
	116	Parhina Neer	-	-	-	-	-	S	-	
	117	Shakardara	-	-	-	AR	-	-	-	
	118	Kani	-	-	-	-	-	-	U	
	119	Akwal	-	-	-	-	-	-	U	
	120	Kharpa	F	-	-	-	-	-	-	
	121	Waisa	-	-	-	-	Q	-	-	
	122	Qaziabad	F	-	-	-	-	-	-	
	123	Padshahan	F	-	-	-	-	-	-	
	124	Bahtar	-	T	-	-	-	-	-	
	125	Dahgal	F	-	-	-	-	-	-	
	126	Dhara Jawa	-	-	-	-	-	-	U	
	127	Nala Muslim	-	-	L	-	-	-	-	
	128	Kasran	-	-	-	-	-	-	U	
	129	Sehti	F	-	-	-	-	-	-	
	130	Dewel	F	-	-	-	-	-	-	
	131	Kamalpur Musa	-	-	-	-	Q	-	-	
	132	Malot Sattian	-	T	-	-	-	-	-	
	133	Boota	-	-	L	-	-	-	-	
	134	Bahalar Top	-	-	-	-	-	S	-	
	135	Kot Gula	F	-	-	-	-	-	-	
	136	Nalhad	-	-	-	-	-	-	U	
	137	Kahuta	-	T	-	-	-	-	-	
	138	Kirpa	F	-	-	-	-	-	-	
	139	Khurd	F	-	-	-	-	-	-	
	140	Chak Khasa	F	-	-	-	-	-	-	
	141	Hattar	-	-	-	-	-	-	U	
	142	Tatral	-	-	-	-	-	-	U	
	143	Dariot	-	-	-	-	-	-	U	
	144	Harcharhar Dhab	-	-	L	-	-	-	-	
	145	Ahmadal	-	-	-	-	Q	-	-	
	146	Pind Begwal	F	-	-	-	-	-	-	
	147	Jabbi Shah Dilawr	F	-	-	-	-	-	-	
	148	Chijjana	-	-	-	-	-	-	U	
	149	Bhakri Kalan	-	-	L	-	-	-	-	
	150	Choa Khalisa	-	-	-	-	Q	-	-	
	151	Pandoori	-	-	-	-	-	-	U	
	152	Nara-Tarf-Nara-Dakhneer	-	-	-	-	Q	-	-	
	153	Mansar	-	-	-	-	-	S	-	
	154	Akhori	-	T	-	-	-	-	-	
	155	Thoa Khalisa	-	-	-	-	Q	-	-	

Cont.

	156	Nambal	-	-	-	-	-	S	-	
	157	Dullah	-	-	-	-	-	-	U	
	158	Mogla	-	-	-	-	-	-	U	
	159	Manga	F	-	-	-	-	-	-	
	160	Nawshera	F	-	-	-	-	-	-	
	161	Juggian	-	-	L	-	-	-	-	
	162	Karsal	-	-	-	-	-	S	-	
	163	Fateh Jang	F	-	-	-	-	-	-	
	164	Bhalomar	-	-	-	-	-	-	U	
	165	Shinka	-	T	-	-	-	-	-	
	166	Jang	-	T	-	-	-	-	-	
	167	Dharabi	F	-	-	-	-	-	-	
	168	Nara (K	-	-	-	-	Q	-	-	
	169	Bhadian	-	-	-	-	-	-	U	
	170	Bannahl	-	-	-	-	-	-	U	
	171	Sureg Salar	-	-	-	-	-	S	-	
	172	Warwal	F	-	-	-	-	-	-	
	173	Manday	F	-	-	-	-	-	-	
		Total 6th Grade	**28**	**18**	**11**	**2**	**17**	**18**	**22**	**116**
Total All Grades:-			**42**	**28**	**24**	**4**	**21**	**27**	**27**	**173**

Source:-

Field Survey 1999-2000.

Appendix 9.4 Potohar region: Population and area of human Settlement tehsil wise by district 1998

Sl. No.	Name of Human Settlement	Area in Sq. Kms	Population
	ATTOCK District	**6857**	**609747**
	Attock Tehsil	**1350**	**288631**
1	Attock		69729
2	Kamra		39005
3	Hazro		27426
4	Mirza		17854
5	Ghurgushti		14730
6	Haji Shah		11196
7	Sanjwal		9106
8	Malak Mala		9040
9	Sarwala		8851
10	Hameed		8527
11	Shainh Bagh		7797
12	Formali		6877
13	Musa Kadhi		6732
14	Shakardara		6513
15	Waisa		6367
16	Qaziabad		6312
17	Kamalpur Musa		6013
18	Boota		5942
19	Mansar		5290
20	Akhori		5208
21	Shinka		5094
22	Sureg Salar		5022
	Fateh Jang Teshil	**1249**	**55247**
1	Fateh Jang		25986
2	Kot Fateh Khan		7140
3	Bahtar		6302
4	Hattar		5641
5	Fateh Jang		5103
6	Jang		5075
	Hasanabdal Teshil	**350**	**50953**
1	Hasanabdal		37976
2	Burhan		7944
3	Bhadian		5033
	Jand Tehsil	**2043**	**128556**
1	Jand		17284
2	Nara (J)		11480
3	Domel (J)		10561
4	Thatta		9264
5	Mathal		9120
6	Tarap Shumali		8345
7	Makhad		8251
8	Jand		7840
9	Basal		7762
10	Pind Sultani		7050
11	Nara-Tarf-Nara-Chab		6703
12	Nara-Tarf-Nara-Lakarmar		6557
13	Khunda		6537
14	Kani		6508
15	Nara-Tarf-Nara-Dakhneer		5294
	Pindi Gheb Tehsil	**1865**	**86360**
1	Pindi Gheb		29850
2	Khaur		12565
3	Ikhlas		8392
4	Malhuwali		6668
2	Bhaun		13893
3	Dhudhial		11470
4	Mureed		8562
5	Odherwal		8331
6	Bhoochal Kalan		7637
7	Balkassar		7364
8	Kallar Kahar		6859
9	Padshahan		6303
10	Sehti		6068
11	Tatral		5582
12	Harcharhar Dhab		5417
13	Bhakri Kalan		5341
14	Dullah		5201
15	Karsal		5106
16	Dharabi		5050
17	Warwal		5019
18	Manday		5006
	Choa Saidan Shah Tehsi	**472**	**31601**
1	Choa Saidan Shah		13418
2	Dandoot		9727
3	Dalwal Mai Padshahpur		8456
	Talagang Tehsil	**2932**	**232163**
1	Talagang		37766
2	Lawa		22480
3	Thua Mahuram Khan		21447
4	Tamman		14596
5	Pachnand		11769
6	Multan Khurd		11131
7	Dhurnal		10910
8	Saghar		8932
9	Malkwal		8336
10	Lethi		8146
11	Jhatla		7673
12	Kot Sarang		7503
13	Tahi		7493
14	Dher Mund		7385
15	Chingi		6604
16	Dhaular		6540
17	Akwal		6430
18	Kot Gula		5884
19	Darot		5498
20	Jabbi Shah Dilawr		5358
21	Mogla		5181
22	Bhalomar		5101
	ISLAMABAD TEHSIL/DISTRICT	**906**	**670780**
1	Islamabad		529180
2	Koi Hathial		27258
3	Hummak		16309
4	Khana Dak		11500
5	Charh		10586
6	Tarlai Kalan		9412
7	Phulgran		8932
8	Sihala		8057
9	Rawat		7966
10	Tamair		7920

Contd.

Sl. No.	Name of Human Settlement	Area in Sq. Kms	Population
5	Kasran		6100
6	Kharpa		6384
7	Nalhad		5869
8	Ahmadal		5384
9	Nawshera		5148
	CHAKWAL District	**6524**	**462481**
	Chakwal Tehsil	**3120**	**198717**
1	Chakwal		80508
	JHELUM DISTRICT	**3587**	**366237**
	Jhelum Tehsil	**1062**	**232824**
1	Jhelum		147392
2	Dina		38790
3	Saeelah		16093
4	Mangla		13848
5	Khurd		5751
6	Chak Khasa		5648
7	Pandoori		5302
	P. D. Khan Tehsil	**1267**	**109463**
1	Khewra		27826
2	P.D.Khan		18766
3	Pinanwal		12928
4	Kandwal		8362
5	Jalalpur Sharif		7530
6	Lilla Bhara		7379
7	Haranpur		6813
8	Pindi Saidpur		6750
9	Lill Bhurwana		6568
10	Toba		6514
	Sohawa Tehsil	**312**	**23590**
1	Sohawa		12708
2	Domeli		11242
	RAWALPINDI DISTRICRT	**5285**	**2169084**
	Gujarkhan Tehsil	**1457**	**81676**
1	Gujar Khan		57099
2	Daultala		10051
3	Kauntirala		7363
4	Narali		7163
	Kahuta Tehsil	**1096**	**75229**
1	Kahuta		19207
2	Darkali Mamori		12112
3	Narar		11210
4	Nala Muslim		6255
5	Kahuta		5860
6	Choa Khalisa		5313
7	Thoa Khalisa		5207
8	Nara (K		5041
9	Bannahl		5024
	Kotli Sattian Tehsil	**304**	**18116**
1	Aryari		6801
2	Malot Sattian		5962
3	Chijjana		5353

Sl. No.	Name of Human Settlement	Area in Sq. Kms	Population
11	Hardo Thanda Pani		7815
12	Mohra Noor		7718
13	Sohan Dehati		6951
14	Kirpa		5806
15	Pind Begwal		5370
	Murree Tehsil	**434**	**70459**
1	Murree		21375
2	Charhan		11767
3	Numb Ramal		8153
4	Parhina Neer		6514
5	Dhara Jawa		6262
6	Dewel		6034
7	Nambal		5205
8	Manga		5149
	Rawalpindi tehsil	**1682**	**1618343**
1	Rawalpindi		1409768
2	Shakrial		34335
3	Dahgal		6278
4	Dhaman		9941
5	Kota Kalan		21357
6	Chaklala		49937
7	Khana Dak (R)		21768
8	Chak Jalal Din		21652
9	Lakhan Dehati		12199
10	Gangal (R)		14965
11	Morgah		16143
	Taxila Tehsil	**312**	**305261**
1	Bahalar Top		5915
2	Usman Khattar		13859
3	Wah		9600
4	Taxila		71882
5	Wah		198891
6	Juggian		5114
Total 173	**POTOHAR REGION**	**23159**	**4278329**

Source:-

GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table 39 & 40, Population Census Organisation, Islamabad.

Appendix 9.5: Potohar Region: Growth pattern of human settlements 1951-98

Human Settlements	Population				
	1951	1961	1972	1981	1998
1. Rawalpindi	236877	340175	614809	794843	1409768
2. Islamabad	-	-	76641	204364	529180
3. Wah (U)	32823	37035	107510	122335	198891
4. Jhelum	29360	41160	79968	116316	147392
5. Chakwal	13310	23310	37320	43670	-80508
6. Taxila	-	-	-	38374	71882
7. Attock	17671	19041	29172	39986	69729
8. Gujarkhan	8496	11529	24121	33920	57099
9. Chaklala	1550	2157	4839	16169	49937
10. Kamara	570(R)	739(R)	1067	7253	39005
11. Dina	-	-	16292	23670	38790
12. Hasanabdal	8006	11469	16721	27132	37976
13. Talajang	8655	10818	17395	20885	37766
14. Shekrial	480	998	3386	6213	34335
15. Pindi Gheb	10150	12416	17982	20535	29850
16. Khewara	-	12086	15004	19083	27826
17. Hazro	7512	9622	12969	14307	27426
18. Kot Hathial	830	1303	2693	5066	27258
19. Fatehjang	6126	7070	12051	15628	25986
20. Lawa	8570	11043	13201	17645	22480
21. Khana Dak	-	-	-	-	21768
22. Chak Jalaldin	150	293	412	2719	21652
23. Thua Murham Khan	6880	8467	12126	14282	21447
24. Murree	9398	13486	17065	15928	21375
25. Kota Kalan	3445	3187	7021	9381	21357
26. Kahuta	4240	4398	8097	11437	19207
27. P.D.Khan	7318	8328	10253	12639	18766
28. Mirza	6120	6950	11451	9952	17854
29. Jund	4880	6674	10156	13263(R)	17284
30. Hammuk	1690	1919	2972	3745	16309
31. Morgah	1370	5569	6176	8117	16143
32. Saeelha	2600	3279	5560	8116	16093
33. Gengal	1700	2199	3510	4760	14965
34. Ghurgushti	8200	8692	14126	11545	14730
35. Tamman	6000	6841	9330	11025	14596
36. Bhaun	6340	6467	8178	9968	13893
					Cont.

37. Usman Khattar	1160	1564	2774	9995	13859
38. Mangala	-	-	2306	6063	13848
39. Choa Sadian Shah	2210	3255	4932	7402	13418
40. Pinanwal	3450	4692	6834	8228	12928
41. Sohawa	3260	2719	N.R.	64358	12708
42. Khaur	4120	6576	8379	9174	12565
43. Lakhan Dehati	700	824	1171	3284	12199
44. Darkali Mamori	4130	4539	7236	7423	12112
45. Pachnand	4860	5485	7209	7953	11769
46. Charhan	3790	4635	7223	8564	11767
47. Khana Dak (I)	770	1820	3187	5072	11500
48. Nara (J)	3950	4467	6419	7641	11480
49. Dhudhial	3270	4073	5747	7103	11470
50. Domeli (S)	5320	5873	7652	8854	11242
51. Narar	2980	6013	7968	10166	11210
52. Haji Shah	3310	3321	5600	6802	11196
53. Multan Khurd	4190	5358	8209	9324	11131
54. Dhurnal	4070	4919	6379	7490	10910
55. Charah	3620	3984	6440	7995	10586
56. Domiel (J)	4090	4947	6687	7537	10561
57. Daultala	4150	4266	6499	7980	10051
58. Dhaman	340	322	493	1138	9941
59. Dandoot	3680	4209	5300	6541	9727
60. Wah	2263	6512	4473	9478	9600
61. Tarlai Kalan	1880	1994	3218	3368	9412
62. Thatta	4230	4962	6941	6902	9264
63. Mathal	4390	4359	7089	7441	9120
64. Sanjwal	610(r)	536(r)	1185(r)	6379	9106
65. Malak Mala	3550	3829	4750	6173	9040
66. Saghar	3750	4105	5176	5764	8932
67. Phulgran	1510	2009	4187	4426	8932
68. Serwala	2560	2797	4048	5096	8851
69. Mureed	4050	4431	5543	6335	8562
70. Hameed	3420	3902	5167	6363	8527
71. DalwalMai Padshah Pur	4620	5075	7354	6846	8456
72. Ikhlas	3290	3610	5360	5508	8392
73. Kandwal	3040	3919	5441	5792	8362
74. Tarap Shumali	2645	2630	4262	5652	8345
75. Malkwal	2360	2466	3076	3973	8336
76. Odherwal	3180	3408	4122	4792	8331
77. Makhad	4150	4473	4478	6463	8251
78. Numb Ramal	2600	3448	4955	5910	8153
79. Lethi	2530	3404	4105	5487	8146
					Cont.

80. Sihala	1880	2307	4662	4536	8057
81. Rawat(Ibd)	1598	1802	3089	3769	7966
82. Burhan	3510	4304	5272	6235	7944
83. Tamair	2760	3755	4420	5851	7920
84. Jand	4880	6674	10156	13263	7840
85. Hardo Thanda Pani	960	1234	2263	2978	7815
86. Shainh Bagh	1680	1906	2919	4186	7797
87. Basal	3770	4342	6856	7109	7762
88. Mohra Noor	860	1257	2048	2676	7718
89. Jhattla	2610	3062	4670	5074	7673
90. Bhoochal Kalan	4000	4280	5785	5382	7637
91. Jalalpur Sharif	3120	3349	4863	5152	7530
92. Kot Sarang	2900	3182	4257	4823	7503
93. Tahi	2500	2666	4635	5046	7493
94. Dher-Mund	3400	3673	4445	5398	7385
95. Lilla Bhara	2010	NR.	N.R.	5239	7379
96. Balkassar	3040	3231	4208	5089	7364
97. Kauntirala	3000	3515	5349	5632	7363
98. Narali	3490	3840	5423	5187	7163
99. Kot Fateh Khan	3150	3378	3778	5199	7140
100. Pind Sultani	3320	3707	4705	5285	7050
101. Sohan Dehati	1080	2124	1264	1914	6951
102. Formali	3240	3365	3452	4348	6877
103. Khallar Kar	1420	2008	1895	3367	6859
104. Haranpur	2540	3151	4363	5083	6813
105. Aryari	2900	3044	5086	4396	6801
106. Pind Saidpur	2160	2402	3611	3931	6750
107. Musa Kadlathai	2770	2980	4208	4718	6732
108. Nara-Taraf Nara Chab	3244	3979	5672	5329	6703
109. Malhuwali	2480	2901	3861	4579	6668
110. Chingi	2420	2880	4035	4935	6604
111. Lilla Bhurwana	2310	N.R.	N.R.	4901	6568
Lakarmar	3239	3885	5477	5312	6557
113. Toba	2620	2798	4409	4858	6541
114. Dhaular	3330	3582	4276	4890	6540
115. Khunda	3300	3469	5059	5442	6537
116. Parhina Neer	3790	4635	7223	8564	6514
					Cont.

117. Shakar Dara	2160	2551	3109	4194	6513
118. Kani	1710	2193	3373	4380	6508
119. Akwal	2170	2453	3761	3652	6430
120. Kharpa	2110	2460	3741	4724	6384
121. Waisa	2860	2751	4814	4665	6367
122. Qazi Abad	680	1023	3868	4455	6312
123. Padshahan	3750	3912	4966	5174	6303
124. Bahtar	3050	3349	4456	4688	6302
125. Dahgal	410	454	727	876	6278
126. Dhara Jawa	2300	2834	4626	5439	6262
127. Nala Muslim	3120	3527	4956	4829	6255
128. Kasran (PT)	2540	2657	4461	4457	6100
129. Sehti	2610	2876	3773	4213	6068
130. Dewel	2430	2716	4539	5690	6034
131. Kamalpur Musa	2910	2622	3450	3907	6013
132. Malot Sathian	1830	2270	7283	7970	5962
133. Boota	2190	2598	3543	4077	5942
134. Bahalar Top	900	402	2778	3750	5915
135. Kot Gula	2450	2969	3782	4640	5884
136. Nalhad	2710	3018	3893	4727	5869
137. Kahuta	4240	N.R.	N.R.	1982	5860
138. Kirpa	2090	2555	3704	4441	5806
139. Khurd	1950	2376	3778	3885	5751
140. Chak Khasa	1090	1445	2443	2591	5648
141. Hattar	2560	2817	3832	4201	5641
142. Tatral	1790	1957	2612	3412	5582
143. Darot	2260	2207	3885	4078	5498
144. Harcher Dhab	2730	2960	4034	4128	5417
145. Ahmadal	2320	2874	3740	4165	5384
146. Pind Begwal	1170	1516	2755	3489	5370
147. Jabb Shah Dilawar	1880	2508	3376	4416	5358
148. Chijjana	2430	2266	4051	4945	5353
149. Bhakri Kalan	2170	2412	2986	3698	5341
150. Chak Khalisa	2730	3090	4501	4729	5313
151. Pandori	1200	1529	4729	4198	5302
Dakneer	3238	3784	5260	5300	5294
153. Mansar	1720	7341	2967	6654	5290
154. Akhori	2250	2474	3344	3495	5208
155. Thoa Khalisa	2240	2680	4057	4725	5207
156. Nambal	2300	2637	3655	4425	5205
157. Dullah	2710	3050	3981	4088	5201
158. Mogla	2110	2404	2881	3294	5181
159. Manga	1120	1258	2066	3209	5149
160. Nawshera	1810	2022	2355	3655	5148
					Cont.

161. Juggian	60	91	N.R.	151	5114
162. Karsal	2530	2895	3479	3800	5106
163. Fateh Jang	1000	1081	1389	2123	5103
164. Bhalomar	2520	2924	3917	3957	5101
165. Shinka	2040	2619	4039	4008	5094
166. Jang	2270	2452	3240	3538	5075
167. Dharabi	2620	2920	3686	3950	5050
168. Nara (K)	1620	2255	3180	3389	5041
169. Bhadian	1160	1116	1837	3056	5033
170. Bannahl	2380	2680	3723	4310	5024
171. Surg Salar	1670	2034	2433	3162	5022
172. Warwal	2240	2431	2012	3855	5019
173. Manday	2290	2643	4016	4916	5006

Source:-

1. GOP 1951-81, Village Statistics District Census Report Attock, Chakwal, Islamabad, Jhelum and Table 2, Population Census Organisation, Islamabad.
2. GOP 1972-81, Village Statistics District Census Report Islamabad, Table 21 & 25, Population Census Organization, Islamabad.
3. GOP 1972-81, (Village Statistics)- District Census Report, Islamabad, Table 21 & 25, Population Census Organization, Islamabad.

Footnote:-

' These areas are inhabitants.

Appendix-9.6 Potohar Region: Distance of human Settlement from main Road

Sr. No.	Name of Human Settlement	Distance in Km.	Sr. No.	Name of Human Settlement	Distance in Km.
1	Rawalpindi	0	39	Choa Saidan Shah	0
2	Islamabad	0	40	Pinanwal	0
3	Wah	0	41	Sohawa	0
4	Jhelum	0	42	Khaur	1/2
5	Chakwal	0	43	Lakhan Dehati	3
6	Taxila	0	44	Darkali Mamori	5
7	Attock	0	45	Pachnand	6
8	Gujar Khan	0	46	Charhan	0
9	Chaklala	1/2	47	Khana Dak	1/2
10	Kamra	0	48	Nara (J)	0
11	Dina	0	49	Dhudhial	0
12	Hasanabdal	0	50	Domeli (S	0
13	Talagang	0	51	Narar	1
14	Shakrial	1/2	52	Haji Shah	1
15	Pindi Gheb	0	53	Multan Khurd	8
16	Khewra	0	54	Dhurnal	1
17	Hazro	0	55	Charh	2
18	Kot Hathial	4	56	Domel (J)	6
19	Fateh Jang	0	57	Daultala	0
20	Lawa	12	58	Dhaman	3
21	Khana Dak (R)	1/2	59	Dandoot	3
22	Chak Jalal Din	3	60	Wah	1
23	Thua Mahuram Khan	1/2	61	Tarlai Kalan	1
24	Murree	0	62	Thatta	1/2
25	Kota Kalan	0	63	Mathal	0
26	Kahuta	0	64	Sanjwal	0
27	P.D.Khan	0	65	Malak Mala	1
28	Mirza	1/2	66	Saghar	6
29	Jand	1/2	67	Phulgran	2
30	Hummak	0	68	Sarwala	1/2
31	Morgah	1/2	69	Mureed	2
32	Saeelah	0	70	Hameed	2
33	Gangal (R)	1/2	71	Dalwal Mai Padshahpur	7
34	Ghurgushti	2	72	Ikhlas	0
35	Tamman	15	73	Kandwal	0
36	Bhaun	1/2	74	Tarap Shumali	3
37	Usman Khattar	1/2	75	Malkwal	0
38	Mangala	3	76	Odherwal	1

Cont.

77	Makhad	10	122	Qaziabad	0
78	Numb Ramal	2	123	Padshahan	1
79	Lethi	2	124	Bahtar	4
80	Sihala	0	125	Dahgal	0
81	Rawat	0	126	Dhara Jawa	1
82	Burhan	0	127	Nala Muslim	1/2
83	Tamair	0	128	Kasran	4
84	Jand	1	129	Sehti	16
85	Hardo Thanda Pani	0	130	Dewel	1/2
86	Shainh Bagh	1/2	131	Kamalpur Musa	0
87	Basal	2	132	Malot Sattian	1
88	Mohra Noor	0	133	Boota	1
89	Jhatla	0	134	Bahalar Top	2
90	Bhoochal Kalan	0	135	Kot Gula	12
91	Jalalpur Sharif	0	136	Nalhad	6
92	Kot Sarang	3	137	Kahuta	1/2
93	Tahi	1	138	Kirpa	4
94	Dher Mund	8	139	Khurd	0
95	Lilla Bhara	0	140	Chak Khasa	0
96	Balkassar	1/2	141	Hattar	1
97	Kauntirala	3	142	Tatral	1
98	Narali	2	143	Dariot	1
99	Kot Fateh Khan	6	144	Harcharhar Dhab	3
100	Pind Sultani	1/2	145	Ahmadal	0
101	Sohan Dehati	1/2	146	Pind Begwal	3
102	Formali	2	147	Jabbi Shah Dilawr	8
103	Khallar Khar	0	148	Chijjana	8
104	Haranpur	1	149	Bhakri Kalan	1
105	Aryari	3	150	Choa Khalisa	1
106	Pindi Saidpur	1	151	Pandoori	1
107	Musa Kaderhi	3	152	Nara-Tarf-Nara-Dakhneer	4
108	Nara-Tarf-Nara-Chab	4	153	Mansar	1
109	Malhuwali	1/2	154	Akhori	1
110	Chingi	0	155	Thoa Khalisa	1
111	Lill Bhurwana	8	156	Nambal	3
112	Nara-Tarf-Nara-Lakarmar	2	157	Dullah	1
113	Toba	1	158	Mogla	10
114	Dhaular	16	159	Manga	3
115	Khunda	3	160	Nawshera	4
116	Parhina Neer	3	161	Juggian	1/2
117	Shakardara	1/2	162	Karsal	8
118	Kani	13	163	Fateh Jang	4
119	Akwal	0	164	Bhalomar	6
120	Kharpa	0	165	Shinka	0
121	Waisa	0	166	Jang	0

Cont.

167	Dharabi	0	171	Sureg Salar	3
168	Nara (K	0	172	Warwal	10
169	Bhadian	4	173	Manday	1/2
170	Bannahl	10			

Source:-

Field Survey 1999-2000.

Appendix-9.7 Potohar Region: Product moment correlation cofficient by product of two standard deviation

$$= \frac{(a-\bar{a})(b-\bar{b})}{(a-\bar{a})^2 (b-\bar{b})^2}$$

$$= \frac{(17145.5-342.9)(571-114.2)}{(1371.6)^2 (456.8)^2}$$

$$= (1881286)(208666.2)$$

$$a = a$$

$$r = \frac{\frac{1}{n}E(a-a)(b-\bar{b})}{\frac{\sum(x-\bar{x})(y-\bar{y})}{\sum(x-\bar{x})}}$$

(a)	$(a-\bar{a})$	$(a-\bar{a})$
482.5	139.6	19488.16
482.0	−139.1	19348.81
200.5	−142.4	20277.76
433	90.1	8118.01
116.5	−226.4	51256.96
1714.5	−278.2	118489.7

$$5 = \sqrt{\frac{(a - \bar{a})^2}{n}} = 23697.9$$

$$(b - 5) = \frac{118489.7}{5} = 153.9$$

$$S = 153.9$$

(b)	(b - b)	(b - b)
230	115.8	13409.6
35.5	-78.7	6193.69
137	22.8	519.84
128	13.8	190.44
40.5	-73.7	5431.69
571		**25745.26**

$$\bar{b} = 5714/5 = 114.2$$

$$S = \sqrt{\frac{\Sigma (b - 5)^2}{n}} = r =$$

$$= \sqrt{\frac{25745.26}{5}}$$

$$= \sqrt{5149.05}$$

$$= 71.76$$

$a = 1714.5$ $b = 571$

$a = 342.9$ $b = 114.2$

$$r = \frac{1/5\ (342.9)(114.2)}{153.9 \times 71.76}$$

$$= \frac{.7831.84}{.11043.86}$$

$$r = 0.71$$

Appendix 9.8 Potohar: Distribution of human settlement by population size, growth 1998

Grade	Population Size	Nos of Human Settlement		Population			Name of Human Settlement	
		Urban	Rural	Urban	Rural	Total	Urban	Rural
I	5,00,000+	2	-	1,9,38,948	-	1,9,38,948	Rawalpindi & Islamabad	-
II	1,00,000-4,99,999	2	-	3,46,283	-	3,46,283	Wah & Jhelum	-
III	50,000-99,999	4	-	2,79,218	-	2,79,218	Chakwal, Taxila, Attock and Gujarkhan	-
IV	25,000-49,999	8	3	2,64,625	1,11,530	3,76,155	Kamra, Dina, Hasanabdal, Talajang, Pindi Gheb, Khewera, Hazro and Fateh Jang.	Chaklala, Shakrial and Kot Hathial
V	10,000-24,999	9	29	1,41,387	4,17,042	5,58,429	Murree, Kahuta, P.D. Khan, Jand, Ghurgushti Mangala, Choa-S. Shah, Sohawa and Daultala.	Lawa, Khana Dak (R), Chak Jalal Din, Thuha Mahram Khan, Kota Kalan Hummak, Morgah, Saeela, Gangal, Tammon, Bhaun, Usman Khatar, Pinawal Khur, Lakhan, Darkali Mamori, Pachnand, Charhan, Khana Dak, Nara (J), Dhudhial, Domeli (S), Narrar, Haji Shah, Multan Khurd, Dhurnal, Charah and Domel.
VI	5,000-9,999	1	115	9,106	7,70,190	7,79,296	Sanjwal	Dhaman, Dandoat, Wah(R),Tarli Kalan, Thatta, Mathal, Malakmala, Saghar, Phulgran, Sarwala, Mureed, Hameed, Dalwal Maipada Shahpur, Ikhlas, Kandwal, Trap Shumali, Malkwal, Odherwal, Makhad, Namb Ramal, Lethi, Sihala, Rawat, Burhan, Tamair, Jand(R), Hardo Thanda Pani, Shainh Bagh, Basal, Mohra Noor, Jhatla,

								Bhoochal Kalan, Jalapur Sharif, Kot Sarang, Tahi, Dher Mund, Lilla Bhera, Balkassar, Kauntirala, Narali, Kot Fateh Khan, Pind Sultani, Sohan Dhathi, Formali , Kallar Khar, Haranpur, Aryari, Pindi Saidpur, Musa Kadlathi, N.T.N. Chab, Malwali, Chinji, Lilla Bhurwana, N.T.N. Lakarmar, Toba, Dhaular, Khunda, Parhina Neer, ShakarDara , Kani, Akwal, Kharpa Waisa, Qazi Abad, Padshahan, Bahtar, Dahgal, Dhara Jawa, Nala Muslman, Kasran, Sehti, Dewel, Kamal Pur Musa, Malot Sattian, Bahallar, Top, Bhoota, Kot Gula, Nalhad, Kahuta, Kirpa, Khurd, Chak Khasa, Hattar, Titral, Darot, Harchar Dhab, Ahmadal, Pind Begwal, Jabbi-Shah Dilwar, Chijjana, Bhakari Kalan, Choa Khalisa Pindoori, N.TN. Dakhneer, Mansar, Akhori, Thoa Khalisa, Nambal, Dullah, Mogla, Manga, Nowshera, Jaggian, Karsal, Fateh Jang, Bhalomar, Shinka, Jang, Dharabi, Nara(K), Bhadian, Bannhal, Surg Salar, Warwal and Manday.

Source:-

GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Population Census Organisation, Islamabad

Appendix 9.9 Potohar Region: Population Density 1998

Sl. No.	Name of Human Settlement	Population	Total Area in sq.km.	Population Density per sq.km.
1	Rawalpindi	1409768	105.6	
2	Islamabad	529180	220.0	
I	Metropolitan City	1938948	325.6	5955
3	Wah	198891	36.5	
4	Jhelum	147392	21.7	
II	Large Cities	346283	58.2	5950
5	Chakwal	80508	18.0	
6	Taxila	71882	11.6	
7	Attock	69729	45.0	
8	Gujar Khan	57099	11.3	
III	Cities	279218	85.9	3250
9	Chaklala	49937	6.6	
10	Kamra	39005	12.1	
11	Dina	38790	7.1	
12	Hasanabdal	37976	17.5	
13	Talagang	37766	8.0	
14	Shakrial	34335	1.8	
15	Pindi Gheb	29850	56.1	
16	Khewra	27826	55.2	
17	Hazro	27426	25.0	
18	Kot Hathial	27258	7.7	
19	Fatch Jang	25986	6.0	
IV	Large Town	376155	203.1	1852
20	Lawa	22480	340.0	
21	Khana Dak (R)	21768	2.1	
22	Chak Jalal Din	21652	5.0	
23	Thua Mahuram Khan	21447	211.6	
24	Murree	21375	25.9	
25	Kota Kalan	21357	19.1	
26	Kahuta	19207	8.3	
27	P.D.Khan	18766	36.1	
28	Mirza	17854	11.5	
29	Jand	17284	49.4	
30	Hummak	16309	13.9	
31	Morgah	16143	9.0	
32	Saeelah	16093	3.8	
33	Gangal (R)	14965	7.1	
34	Ghurgushti	14730	13.3	
35	Tamman	14596	103.2	
36	Bhaun	13893	69.1	
37	Usman Khattar	13859	5.9	
38	Mangala	13848	11.1	
39	Choa Saidan Shah	13418	13.1	

Cont.

Sl. No.	Name of Human Settlement	Population	Total Area in sq.km.	Population Density per sq.km.
40	Pinanwal	12928	21.0	
41	Sohawa	12708	6.6	
42	Khaur	12565	46.7	
43	Lakhan Dehati	12199	5.1	
44	Darkali Mamori	12112	22.1	
45	Pachnand	11769	55.7	
46	Charhan	11767	4.4	
47	Khana Dak	11500	6.1	
48	Nara (J	11480	87.5	
49	Dhudhial	11470	15.8	
50	Domeli (S	11242	30.9	
51	Narar	11210	35.8	
52	Haji Shah	11196	20.1	
53	Multan Khurd	11131	71.0	
54	Dhurnal	10910	88.6	
55	Charh	10586	30.2	
56	Domel (J	10561	55.8	
57	Daultala	10051	12.1	
V	Intermediate Town	558429	1574.5	355
58	Dhaman	9941	3.9	
59	Dandoot	9727	14.7	
60	Wah	9600	14.6	
61	Tarlai Kalan	9412	5.4	
62	Thatta	9264	73.6	
63	Mathal	9120	59.0	
64	Sanjwal	9106	12.8	
65	Malak Mala	9040	49.4	
66	Saghar	8932	36.8	
67	Phulgran	8932	15.9	
68	Sarwala	8851	5.7	
69	Mureed	8562	5.5	
70	Hameed	8527	3.8	
71	Dalwal Mai Padshahpur	8456	46.3	
72	Ikhlas	8392	23.5	
73	Kandwal	8362	70.3	
74	Tarap Shumali	8345	164.3	
75	Malkwal	8336	19.1	
76	Odherwal	8331	27.0	
77	Makhad	8251	99.0	
78	Numb Ramal	8153	8.9	
79	Lethi	8146	61.0	
80	Sihala	8057	19.7	
81	Rawat	7966	12.3	
82	Burhan	7944	24.4	
83	Tamair	7920	34.4	

Cont.

Sl. No.	Name of Human Settlement	Population	Total Area in sq.km.	Population Density per sq.km.
84	Jand	7840	43.1	
85	Hardo Thanda Pani	7815	9.2	
86	Shainh Bagh	7797	14.3	
87	Basal	7762	59.3	
88	Mohra Noor	7718	10.0	
89	Jhatla	7673	45.8	
90	Bhoochal Kalan	7637	11.4	
91	Jalalpur Sharif	7530	15.1	
92	Kot Sarang	7503	57.9	
93	Tahi	7493	13.9	
94	Dher Mund	7385	22.9	
95	Lilla Bhara	7379	37.0	
96	Balkassar	7364	45.2	
97	Kauntirala	7363	13.5	
98	Narali	7163	19.6	
99	Kot Fatch Khan	7140	40.4	
100	Pind Sultani	7050	43.4	
101	Sohan Dehati	6951	4.6	
102	Formali	6877	5.5	
103	Khallar Khar	6859	31.7	
104	Haranpur	6813	14.7	
105	Aryari	6801	16.2	
106	Pindi Saidpur	6750	8.2	
107	Musa Kaderhi	6732	14.5	
108	Nara-Tarf-Nara-Chab	6703	547.2	
109	Malhuwali	6668	37.2	
110	Chingi	6604	42.9	
111	Lill Bhurwana	6568	30.1	
112	Nara-Tarf-Nara-Lakarmar	6557	386.4	
113	Toba	6541	39.4	
114	Dhaular	6540	91.8	
115	Khunda	6537	45.4	
116	Parhina Neer	6514	14.8	
117	Shakardara	6513	8.6	
118	Kani	6508	52.4	
119	Akwal	6430	13.5	
120	Kharpa	6384	52.5	
121	Waisa	6367	7.2	
122	Qaziabad	6312	11.3	
123	Padshahan	6303	22.0	
124	Bahtar	6302	15.8	
125	Dahgal	6278	64.9	
126	Dhara Jawa	6262	6.9	
127	Nala Muslim	6255	14.6	
128	Kasran	6100	25.0	

Cont.

Sl. No.	Name of Human Settlement	Population	Total Area in sq.km.	Population Density per sq.km.
129	Sehti	6068	30.1	
130	Dewel	6034	6.3	
131	Kamalpur Musa	6013	5.3	
132	Malot Sattian	5962	14.7	
133	Boota	5942	25.6	
134	Bahalar Top	5915	7.4	
135	Kot Gula	5884	58.6	
136	Nalhad	5869	22.5	
137	Kahuta	5860	4.0	
138	Kirpa	5806	14.9	
139	Khurd	5751	17.8	
140	Chak Khasa	5648	2.9	
141	Hattar	5641	35.3	
142	Tatral	5582	5.6	
143	Darot	5498	25.6	
144	Harcharhar Dhab	5417	20.5	
145	Ahmadal	5384	35.7	
146	Pind Begwal	5370	12.1	
147	Jabbi Shah Dilawr	5358	43.7	
148	Chijjana	5353	12.2	
149	Bhakri Kalan	5341	26.3	
150	Choa Khalisa	5313	12.4	
151	Pandoori	5302	13.5	
152	Nara-Tarf-Nara-Dakhneer	5294	81.2	
153	Mansar	5290	4.8	
154	Akhori	5208	25.1	
155	Thoa Khalisa	5207	20.1	
156	Nambal	5205	3.3	
157	Dullah	5201	47.1	
158	Mogla	5181	29.2	
159	Manga	5149	10.4	
160	Nawshera	5148	48.5	
161	Juggian	5114	2.2	
162	Karsal	5106	34.8	
163	Fateh Jang	5103	6.8	
164	Bhalomar	5101	49.4	
165	Shinka	5094	9.2	
166	Jang	5075	19.5	
167	Dharabi	5050	51.1	
168	Nara (K	5041	11.7	
169	Bhadian	5033	10.6	
170	Bannahl	5024	19.5	
171	Sureg Salar	5022	35.6	
172	Warwal	5019	36.5	
173	Manday	5006	31.4	

Cont.

Sl. No.	Name of Human Settlement	Population	Total Area in sq.km.	Population Density per sq.km.
VI	Small Town	779296	4079.6	191
	All Categories Potohar Region:-	**4278329**	**23159**	**185**

Source:- 1. Field Survey 1999-2000

2. GOP 1998, District Census Reports of Attock, Chakwal, Islamabad, Jhelum & Rawalpindi, Table 39 & 40, Population Census Organization, Islamabad.

Appendix-9.10 PotoharRegion: Population density of human settlement 1951–1998 and projected density of 2011 & 2022

	1951			1961			1972			1981			1998		
Class/ Size	Area in Sq. Km.	Population	Density per Sq. Km.	Area in Sq. Km.	Population	Density/ Sq. Km.	Area in Sq. Km.	Population	Density/ Sq. Km.	Area in Sq. Km.	Population	Density/ Sq. Km.	Area in Sq. Km.	Population	Density/ Sq. Km.
I	-	-	-	-	-	-	105.6	614809	5822	105.6	794843	7527	325.6	1938948	5955
II	105.6	236877	2343	105	340175	3240	36.5	107510	2945	278.2	443015	1592	58.2	346283	5950
III	-	-	-	-	-	-	241.7	156609	648	-	-	-	85.9	279218	3250
IV	58.2	62183	1068	58.2	78195	1343	51.6	66492	1289	85.9	15595	1592	203.1	376155	1852
V	63	30981	492	211.1	100669	477	867.7	231069	266	1048.2	279739	276	1574.5	558429	355
VI	965.2	113091	117	1249	154116	123	2377.8	271959	114	2977.5	514685	173	4079.6	779296	191
Potohar region	**1192**	**443132**	**372**	**1623.3**	**673155**	**415**	**3680.9**	**1448448**	**393**	**4495.4**	**2057877**	**458**	**6326.9**	**4272329**	**676**
	Projected Population Density														
	2011			2022											
Class/Size	Area in Sq. Km.	Population	Density per Sq. Km.	Area in Sq. Km.	Population	Density/ Sq. Km.									
I	325.6	3289692	10103	334.9	6340837	19707									
II	145.4	1757695	12089	215.4	4052762	18815									
III	118.7	723562	6096	96.1	619586	6447									
IV	804.9	489636	608	813.2	621209	764									
V	1888.7	800560	424	3380	1188789	352									
VI	2942	586866	199	1338.9	377282	282									
Potohar region	**6225.3**	**7648011**	**1228**	**6179.2**	**13410465**	**2170**									

Source: GOP 1951-1951-98, Population of Mauzas, District Census Reports of Attock, Chakwal, Jhelum, Islmabad & Rawalpindi, Table 1, Population Census Organisation, Islambad.

Appendix-9.11 Potohar Distribution of human Settlement, cultivated area and Population with the Concentric Zones around Rawalpindi City 1998.

Radius in KM (zone)	Name of Human Settlement	Area in Sq.Km.	Cultivated Area in acres	Population 1998
1	Rawalpindi	105.6	5,213	1,4,09,768
9	Chaklala	6.6	326	49,937
11	Shakrial	1.8	213	34,335
21	Khana Dak (R)	2.1	312	21,768
22	Chak Jalal Din	5.0	1,038	21,652
25	Kata Kalan	19.1	898	21,357
31	Morgah	9.0	522	16,143
33	Gangal	7.1	224	14,965
58	Dhaman	3.9	306	9,941
101	Sahan Dehati	4.6	454	6,951
47	Khana Dak (I)	6.1	936	11,500
0-10	11	170.9	10,442	1,6,18,317
2	Islamabad	220.0	-	5,29,180
18	Kot Hathial	7.7	752	27,258
30	Hummak	13.9	1,477	16,309
43	Lakan Dehati	5.1	956	12,199
61	Tarali Kalan	5.4	1,074	9,412
80	Sihala	19.7	2,047	8,057
81	Rawat	12.3	1,758	7,966
125	Dahgal	64.9	7,365	6,278
138	Kirpa	14.9	2,525	5,806
85	Hardo Thanda Pani	9.2	1,383	7,815
88	Mahora Noor	10.0	1,279	7,718
146	Pind Baghwal	12.1	1,783	5,370
10-20	12	395.2	22,399	6,43,368
6	Taxila	11.6	3	71,882
26	Kahuta	8.3	1,229	19,207
55	Charh	30.2	3,489	10,586
67	Phulgran	15.9	1,685	8,932
83	Tamair	34.4	3,358	7,920
137	Kahuta	4.0	324	5,860
161	Juggian	2.2	421	5,114
20-30	7	106.6	10,509	1,29,501
3	Wah	36.5	1,313	1,98,891
19	Fateh Jang	6.0	300	25,986
37	Usman Khattar	5.9	1,618	13,859
44	Darkali Mamori	22.1	3,570	12,112
46	Charhan	4.4	4,404	11,767

60	Wah	14.6	300	9,600
116	Parhina Neer	14.8	1,480	6,514
127	Nala Muslim	14.6	1,585	6,255
134	Bahalar Top	7.4	4,340	5,915
141	Hattar	35.3	7,126	5,641
155	Thoa Khalisa	20.1	1,788	5,207
159	Manga	10.4	613	5,149
166	Jang	19.5	3,894	5,075
105	Aryari	16.2	1,484	6,801
30-40	14	227.8	33,815	3,18,772
8	Gujarkhan	11.3	852	57,099
12	Hasanabdal	17.5	1,665	37,976
24	Murree	25.9	4	21,375
51	Narar	35.8	2,482	11,210
57	Daultala	12.1	2,866	10,051
124	Bahatar	15.8	3,645	6,302
126	Dhara Jawa	6.9	733	6,262
150	Chak Khalisa	12.4	2,291	5,313
156	Nambal	3.3	336	5,205
163	Fateh Jang	6.8	3,820	5,103
168	Nara	11.7	1,439	5,041
169	Bhadian	10.6	2,177	5,033
170	Bannahl	19.5	1,394	5,024
40-50	13	189.6	23,704	1,80,994
34	Ghurshthi	13.3	1,289	14,730
78	Numb Ramal	8.9	1,329	8,153
82	Burhan	24.4	2,985	7,944
97	Kauntriala	13.5	2,079	7,363
98	Narali	19.6	3,957	7,163
130	Dewel	6.3	660	6,034
132	Malot Sattian	14.7	2,212	5,962
148	Chinjjiana	12.2	1,295	5,353
154	Akhori	25.1	2,865	5,208
99	Kot Fateh Khan	40.4	8,658	7,140
50-60	10	178.4	27,329	75,050
7	Attock	45.0	8,893	69,729
10	Kamara	12.1	875	39,005
17	Hazro	25.0	372	27,426
28	Mirza	11.5	1,612	17,854
41	Sohawa	6.6	784	12,708
42	Khaur	46.7	7,550	12,565
49	Dhudhial	15.8	4,855	11,470
65	Malak Mala	49.4	6,866	9,040
64	Sanjwal	12.8	300	9,106
68	Sarwala	5.7	2,552	8,851

70	Hameed	3.8	850	8,527
115	Khunda	45.4	8,645	6,537
107	Musa Kadlathi	14.5	2,668	6,732
122	Qaziabad	11.3	97	6,312
123	Padshahan	22.0	3,917	6,303
128	Kasran	25.0	4,982	6,100
131	Kamalpur Musa	5.3	649	6,013
133	Boota	25.6	3,971	5,942
144	Harchar Dhab	20.5	3,737	5,417
145	Ahmadal	35.7	4,725	5,384
157	Dullah	47.1	5,877	5,201
165	Sinka	9.2	1,770	5,094
60-70	22	496.0	76,547	2,91,316
5	Chakwal	18.0	2,100	80,508
38	Mangala	11.1	855	13,848
50	Domeli (S)	30.9	3,297	11,242
52	Haji Shah	20.1	3,071	11,196
63	Mathal	59.0	8,668	9,120
72	Ikhlas	23.5	2,666	8,392
76	Odherwal	27.0	5,690	8,331
86	Shain Bagh	14.3	2,091	7,797
87	Basal	59.3	11,732	7,762
117	Shakar Dara	8.6	1,772	6,513
121	Waisa	7.2	1,459	6,367
151	Pandoori	13.5	2,424	5,302
153	Manshar	4.8	780	5,290
162	Karsal	34.8	4,045	5,106
171	Sureg Salar	35.6	5,297	5,022
172	Warwal	36.5	4,400	5,019
173	Manday	31.4	2,107	5,006
102	Formali	5.5	955	6,877
70-80	18	441.1	63,409	2,08,698
11	Dina	7.1	1,202	38,790
15	Pndi Ghib	56.1	6,168	29,850
36	Bhaun	69.1	6,534	13,893
56	Domel (J)	55.8	5,568	10,561
62	Jhatla	73.6	6,962	9,264
69	Mureed	5.5	2,712	8,562
75	Malkwal	19.1	3,504	8,336
92	Kot Sarang	57.9	8,455	7,503
96	Balkassar	45.2	4,858	7,364
100	Pind Sultani	43.4	8,645	7,050
120	Kharpa	52.5	7,924	6,384
142	Tatral	5.6	1,141	5,582
167	Dharabi	51.1	5,005	5,050

149	Bhakri Kalan	26.3	3,554	5,341
80-90	14	568.3	72,232	1,63,530
13	Talagang	8.0	500	37,766
4	Jhelum	21.7	1,923	1,47,392
29	Jand	49.4	6,340	17,284
32	Saeelha	3.8	742	16,093
39	Choa Sadian Shah	13.1	849	13,418
48	Nara	87.5	9,500	11,480
84	Jand	43.1	3,700	7,840
93	Tahi	13.9	2,755	7,493
103	Khallar Khar	31.7	2,000	6,859
114	Dhaular	91.8	14,498	6,540
119	Akwal	13.5	3,084	6,430
140	Chak Khasa	2.9	435	5,648
158	Mogla	29.2	6,335	5,181
160	Nawshera	48.5	6,335	5,148
90-100	14	458.1	58,996	2,94,572
16	Khewara	55.2	451	27,826
59	Dandoot	14.7	1,475	9,727
66	Saghar	36.8	6,537	8,932
71	Dalwal-Mai Padshahan	46.3	3,945	8,456
89	Jhatla	45.8	7,805	7,673
109	Malhuwali	37.2	6,129	6,668
136	Nalhad	22.5	7,186	5,869
139	Khurd	17.8	2,808	5,751
100-110	8	276.3	36,336	80,902
27	P.D.Khan	36.1	2,880	18,766
35	Tamman	103.2	13,422	14,596
40	Pinanwal	21.0	4,530	12,928
53	Multan Khurd	71.0	11,207	11,131
90	Bhoochal Kalan	11.4	1,665	7,637
91	Jalalpur Sharif	15.1	1,956	7,530
94	Dharmund	22.9	12,440	7,385
95	Lill Bhera	37.0	4,053	7,379
104	Haranpur	14.7	2,359	6,813
106	Pind Saidpur	8.2	1,889	6,750
108	N.T.N.Chabb	547.2	3,849	6,703
110	Chingi	42.9	7,883	6,604
111	Lilla Bhurwana	30.1	4,896	6,568
112	N.T.N.Lakarmar	386.4	3,850	6,557
113	Toba	39.4	2,560	6,541
129	Sehti	30.1	2,511	6,068
143	Darat	25.6	4,373	5,498
147	Jabi Shah Dalwar	43.7	6,258	5,358

152	N.T.N.Dakhneer	81.2	3,721	5,294
164	Bhalmor	49.4	5,708	5,101
23	Thoa Mahram Khan	211.6	259	21,447
110-120	21	1828.2	1,02,269	1,82,654
45	Pachnand	55.7	11,510	11,769
54	Dhurnal	88.6	1,286	10,910
73	Kandwal	70.3	8,775	8,362
74	Tarap Shumali	164.3	10,525	8,345
79	Lathi	61.0	10,589	8,146
135	Kot Gula	58.6	8,978	5,884
120-130	6	498.5	51,663	53,416
77	Makhad	99.0	5,540	8,251
118	Kani	52.4	5,058	6,508
130-140	2	151.4	10,598	14,759
20	Lawa	340.5	26,590	22,480
140-150	1	340.5	26,590	22,480
Potohar Region	173	6826.9	5,96,838	4,2,78,329

Source:-

GOP 1998, District Census Reports Attock, Chakwal, Islambad, Jhelum and Rawalpindi, Table 39 & 40, Population Census Organization, Islamabad.

Appendix-9.12 Potohar Region: Gradient slope of population density with the regression coefficient by formula.

Concentric Zone around Rawalpindi (in Km)	Area in Km2	Population 1998 (XY)	Population Density	X^2
0 - 10	170.9	1,6,18,000	9467.52	29206.8
10 - 20	395.2	6,43,000	1627.02	156183.0
20 - 30	106.6	1,29,000	1210.13	11363.6
30 - 40	227.8	3,19,000	1400.35	51892.8
40 - 50	189.6	1,81,000	954.64	35948.2
50 - 60	178.4	75,000	420.40	31826.6
60 - 70	496.0	2,91,000	586.69	246016.0
70 - 80	441.1	2,09,000	473.82	194569.2
80 - 90	568.3	1,64,000	288.58	322964.9
90 - 100	458.1	2,95,000	643.96	209855.6
100 - 110	276.3	81,000	293.16	76341.7
110 - 120	1828.2	1,83,000	100.10	3342315.2
120 - 130	498.5	53,000	106.32	248502.3
130 - 140	151.4	15,000	99.08	22922.0
140 - 150	340.5	22,000	64.61	115940.3
All ages	**6326.9**	**4,2,78,000**	**676.16**	**5095848.1**

Source:-

GOP 1998, District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table 39 & 40, Population Census Organization, Islambad.

Appendix-9.13 Potohar Region: Gradient Slope of the Population Density with the regression co-efficient expressed by formula.

$$b = \left[\frac{\sum xy - \frac{\left(\sum x\right)\left(\sum x\right)}{n}}{\sum x^2 - \frac{\left(\sum x^2\right)}{n}} \right]$$

$$b = \left[\frac{4278000 - \frac{(6326.9)(17736.2)}{15}}{5095847.7 - \frac{40029663.6}{15}} \right]$$

$$b = \left[\frac{4278000 - \frac{112215163.8}{15}}{5095847.7 - 2668644.2} \right]$$

$$b = \frac{4278000 - 7481010.9}{2427203.5}$$

$$b = \frac{-3203010.9}{2427203.5}$$

$$b = -1.32$$

$$y = a + bx$$

$$x = a + (-1.32)(x)$$

Appendix-9.14 Potohar: F, Calculated values for corelation between gross human settlement density with proportion of cultivated land ratio

X	Y	X Y	X	Y^2
1.7	0.06	0.102	2.89	0.0036
3.8	0.03	0.114	14.44	0.0009
1.8	0.06	0.108	3.24	0.0036
5.7	0.06	0.342	32.49	0.0036
4.0	0.06	0.240	16.00	0.0036
4.6	0.05	0.230	21.16	0.0025
7.8	0.04	0.312	60.84	0.0016
10.6	0.04	0.424	112.36	0.0016
12.1	0.02	0.242	146.41	0.0004
9.9	0.03	0.297	98.01	0.0009
6.1	0.01	0.061	37.21	0.0001
17.1	0.01	0.171	292.41	0.0001
8.6	0.01	0.086	73.96	0.0001
1.8	0.01	0.018	3.24	0.0001
4.4	0.00	0.000	19.36	0.0000
100.0	0.49	2.747	934.02	0.0227

Source:-

Based on Table 9.14.

$$r = \frac{\sum xy - \left(\sum x\right)\frac{\left(\sum y\right)}{n}}{\sqrt{\left[\sum x^2 - \frac{\left(\sum x\right)^2}{n}\right]\left[\sum y^2 - \frac{\left(\sum y\right)^2}{n}\right]}}$$

$$r = \frac{2.747 - (100)\frac{(0.49)}{15}}{\sqrt{(934.02 - 666.66)(0.0227 - 0.0160)}}$$

$$r = \frac{2.747 - 3.266}{\sqrt{(267.36)(0.0067)}}$$

$$r = \frac{-0.519}{\sqrt{1.791312}}$$

$$r = -0.3870$$

$$r^2 = 0149769$$

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

$$F = \frac{0.149769(15-2)}{1-0.49769}$$

$$F = \frac{0.149769(13)}{0.850231}$$

$$F = \frac{1.946997}{0.850231}$$

Appendix-9.15 Potohar Region: F, calculated values for corelation between gross population density gradient and gross Humnan Settlement density

X	Y	X Y	X^2	Y^2
9467.52	0.06	568.051	89633934.95	0.0036
1627.02	0.03	48.811	2647194.08	0.0009
1210.13	0.06	72.608	1464414.62	0.0036
1400.35	0.06	84.021	1960980.12	0.0036
954.64	0.06	57.278	911337.53	0.0036
420.40	0.05	21.020	176736.16	0.0025
586.69	0.04	23.468	344205.16	0.0016
473.81	0.04	18.952	224495.92	0.0016
288.57	0.02	5.771	83272.64	0.0004
643.15	0.03	19.295	413641.92	0.0009
100.09	0.01	1.001	10018.01	0.0001
106.31	0.01	1.063	11301.82	0.0001
99.07	0.01	0.991	9814.86	0.0001
64.61	0.01	0.646	4174.45	0.0001
676.16	0.00	0.000	457192.35	0.0000
18118.5	0.49	922.976	98352714.59	0.0227

Source:-

Based on Table 9.15.

$$r = \frac{\sum xy - \left(\sum x\right)\frac{\left(\sum y\right)}{n}}{\sqrt{\left[\sum x^2 - \frac{\left(\sum x\right)^2}{n}\right]\left[\sum y^2 - \frac{\left(\sum y\right)^2}{n}\right]}}$$

$$r = \frac{922.9757 - (18118.52)\frac{(0.49)}{15}}{\sqrt{(98352714.59 - 21885384)(0.0227 - 0.0160)}}$$

$$r = \frac{922.9757 - 591.8716}{\sqrt{(76467330.59)(0.0067)}}$$

$$r = \frac{331.1041}{\sqrt{512331.115}}$$

$$r = \frac{331.104}{715.773}$$

$$r = 0.462$$

$$r^2 = 0.213444$$

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

$$F = \frac{0.213444(15-2)}{1-0.213444}$$

$$F = \frac{0.213444(13)}{0.786556}$$

$$F = \frac{2.774772}{0.786556}$$

$$F = 3.52$$

S.No.		Rawal-pindi	Islamabad	Wah	Jhelum	Chakwal	Taxila	Attock	Gujar-Khan	Chaklala	Kamara	Dina	Hasan-Abdal	Talagang	Shakrial	Pindi-Gheb	Khewara	Hazro	Kot Hathial	Fateh Jang	Lawa
1	Rawalpindi	2	12	36	100	77	26	66	47	6	67	82	40	94	5	85	107	62	18	37	145
2	Islamabad	12	6	31	105	82	21	61	52	11	62	87	35	99	9	90	112	58	13	42	150
3	Wah	36	31	2	134	98	11	34	81	45	32	118	4	101	34	77	131	24	48	29	148
4	Jhelum	100	105	134	1	83	125	158	58	82	161	18	138	121	105	142	75	160	108	122	171
5	Chakwal	77	82	98	83	9	91	103	55	83	110	78	99	40	88	55	35	114	102	72	90
6	Taxila	26	21	11	125	91	6	42	72	34	41	107	14	97	32	75	123	34	37	27	143
7	Attock	66	61	34	158	103	42	4	105	77	10	140	32	92	77	58	137	21	84	35	125
8	Gujarkhan	47	52	81	58	55	72	105	8	46	73	36	85	90	50	99	72	105	62	70	143
9	Chaklala	6	11	45	82	83	34	77	46	2	75	81	46	102	5	92	107	71	16	44	153
10	Kamara	67	62	32	161	110	41	10	73	75	3	144	29	102	75	58	142	12	85	40	133
11	Dina	82	87	118	18	70	107	140	36	81	144	4	121	110	85	127	71	141	90	105	162
12	Hasanabdal	40	35	4	138	99	14	32	85	46	29	121	2	102	46	77	138	22	51	26	145
13	Talagang	94	99	101	121	40	97	92	90	102	102	110	102	9	106	38	63	109	120	72	54
14	Shakrial	5	9	34	105	88	32	77	50	5	75	85	46	106	2	94	113	69	11	44	155
15	Pindi Gheb	85	90	77	142	55	75	58	99	92	58	127	77	38	94	5	96	75	105	50	67
16	Khewara	107	112	131	75	35	123	137	72	107	192	71	138	63	113	96	4	147	122	104	102
17	Hazro	62	58	24	160	114	34	21	105	71	12	141	22	109	69	75	147	6	71	40	142
18	Kot Hathial	18	13	48	108	102	37	84	62	16	85	90	51	120	11	105	122	71	5	54	167
19	Fateh Jang	37	42	29	122	72	27	35	70	44	40	105	26	72	44	50	104	40	54	13	116
20	Lawa	145	150	148	171	90	143	125	143	153	183	162	145	54	155	67	102	142	167	116	27
21	Khana Dak	6	11	47	101	86	35	74	48	4	77	84	47	102	3	93	108	70	13	46	155
22	Chak Jalal Din	7	12	48	102	77	32	72	46	5	75	83	45	94	11	86	103	66	21	38	145
23	Thoa Moharram Khan	128	132	131	148	60	128	120	111	126	126	134	127	19	107	55	68	128	140	95	35
24	Murree	45	40	70	113	120	56	97	72	45	90	98	64	140	40	124	144	82	28	78	190
25	Kota Kalan	9	14	50	96	80	37	80	41	4	83	76	51	98	10	10	102	68	20	43	150
26	Kahuta	32	32	66	80	89	56	97	39	27	97	64	68	116	26	112	110	120	25	67	154
27	Pind Dadan Khan	113	118	139	78	42	130	145	78	117	152	72	14	68	120	102	8	126	130	112	110
28	Mirza	64	64	29	163	108	37	9	106	76	11	143	19	95	65	62	140	12	71	29	128
29	Jand	105	105	79	170	97	78	50	123	109	58	156	78	69	108	28	127	70	118	61	81
30	Hummak	18	23	59	88	78	45	87	34	11	88	69	59	100	15	95	98	78	18	46	151
31	Morgah	5	10	46	96	75	33	75	43	3	81	79	47	96	10	88	102	67	18	40	148
32	Saeelah	106	111	145	2	88	134	170	56	99	172	18	145	129	100	150	75	165	103	125	175
33	Ghurgushti	62	57	12	165	125	10	30	82	37	20	146	14	115	62	85	151	11	62	42	152
34	Mangala	75	80	110	25	79	102	134	30	72	137	8	115	112	73	127	76	135	78	99	165
35	Choa Saidan Shah	98	110	122	73	25	115	128	66	100	136	67	125	57	103	90	8	140	115	96	98
36	Sohawa	64	73	102	36	59	90	122	17	64	126	18	105	97	66	112	69	123	70	86	150
37	Daultala	45	55	77	65	19	67	95	18	43	99	47	80	71	48	82	62	96	57	60	125
38	Sanjwal	64	64	30	156	105	35	8	102	71	7	137	25	96	68	63	138	13	72	34	130
	Nth	**2160**	**2249**	**2580**	**3924**	**2968**	**2378**	**3054**	**2521**	**2191**	**3189**	**3406**	**2480**	**3395**	**2240**	**3129**	**3690**	**3053**	**2528**	**2339**	**4980**

Soruce:- Surveyor General 1994, Rawalpindi Divisional Map, Survey of Pakistan, Rawalpindi.

Appendix 9.16 Potohar Region: Human Settlement Population 15,000 & above in 1998 (Distance)

Khana Dak	Chak Jalal Din	Thoa Moharam Khan	Murree	Kota Kalan	Kahuta	Pind Dadan Khan	Mirza	Jand	Hummak	Morgah	Saeelah	Ghurgushti	Mangala	Choa Saidan Shah	Sohawa	Daultala	Sanjwal	mth (Total)
6	7	128	45	9	32	113	64	105	18	5	106	62	75	98	64	45	64	**2160**
11	12	132	40	14	32	118	64	105	23	10	111	57	80	110	73	55	64	**2249**
47	48	131	70	50	66	139	29	79	59	46	145	12	110	122	102	77	30	**2580**
101	102	148	113	96	80	78	163	170	88	96	2	165	25	73	36	65	156	**3924**
86	77	60	120	80	89	42	108	97	78	75	88	125	79	25	59	19	105	**2976**
35	32	128	56	37	56	130	37	78	45	33	134	10	102	115	90	67	35	**2378**
79	72	120	97	80	97	145	9	50	87	75	170	30	134	128	122	95	8	**3059**
48	46	117	72	41	39	78	106	123	34	43	56	82	30	66	17	18	102	**2527**
4	5	126	45	4	27	117	76	109	11	3	99	37	72	100	64	43	71	**2191**
77	75	126	90	83	97	152	11	58	88	81	172	20	137	136	126	99	7	**3089**
84	83	134	98	76	64	72	143	156	69	79	18	146	8	67	18	47	137	**3398**
47	45	127	64	51	68	140	19	78	59	47	145	14	115	125	105	80	25	**2606**
102	94	19	140	98	116	68	95	69	100	96	129	115	112	57	97	71	96	**3395**
3	11	107	40	10	26	120	65	108	15	10	100	62	73	103	66	48	68	**2240**
93	36	55	129	10	112	102	62	28	95	88	150	85	127	90	112	82	63	**3084**
108	103	68	144	102	110	8	140	127	98	102	75	151	76	8	67	62	138	**3738**
70	66	128	82	68	120	126	12	70	78	67	165	11	135	140	123	96	13	**3053**
13	21	140	28	20	25	130	71	118	18	18	103	62	78	115	70	57	72	**2528**
46	38	95	78	43	67	112	29	61	46	40	125	42	99	96	86	60	34	**2339**
155	145	35	190	150	154	100	128	81	151	148	175	152	165	98	150	125	130	**5020**
3	8	125	42	6	26	115	67	108	12	5	95	65	68	99	65	45	68	**2232**
8	2	115	48	6	32	110	60	100	12	4	96	59	68	94	61	40	65	**2148**
125	115	17	168	118	140	72	114	80	120	117	140	135	132	66	117	95	119	**4108**
42	48	168	17	48	35	142	90	138	45	43	110	78	87	135	92	81	90	**3225**
6	6	118	48	2	27	108	68	105	8	5	90	80	65	85	85	35	65	**2128**
26	32	140	35	27	13	116	86	131	26	25	75	85	56	103	51	48	92	**2644**
115	110	72	142	108	116	4	140	120	98	101	72	150	78	15	70	67	150	**3702**
67	60	114	90	68	86	140	2	55	72	58	150	20	130	120	115	85	4	**2867**
108	100	80	138	105	131	120	55	15	105	150	170	70	125	120	135	105	45	**3747**
12	12	120	45	8	26	98	72	105	5	8	108	65	55	82	45	30	70	**2226**
5	4	117	43	5	25	101	58	150	8	2	90	58	65	89	55	37	60	**2134**
95	96	140	116	90	75	72	150	170	108	90	1	150	24	67	32	57	150	**3951**
65	59	135	78	80	85	150	20	70	65	58	150	5	125	128	110	90	18	**2931**
68	68	132	87	65	56	78	130	125	55	65	24	25	4	72	15	47	132	**3080**
99	94	66	135	85	103	15	120	120	82	89	67	128	72	4	60	54	128	**3393**
65	61	117	92	85	51	70	115	135	45	55	32	110	15	60	7	30	120	**2914**
45	40	95	81	35	48	67	85	105	30	37	57	90	47	54	30	9	92	**2358**
68	65	119	90	65	92	150	4	45	70	60	150	18	132	128	120	92	2	**2888**
2237	**2098**	**4114**	**3236**	**2128**	**2644**	**3818**	**2867**	**3747**	**2226**	**2134**	**3945**	**2831**	**3180**	**3393**	**2912**	**2358**	**2888**	**111210**

S.No.	Name of Human Settlement	Rawal-pindi	Islamabad	Wah	Jhelum	Chakwal	Taxila	Attock	Gujar-Khan	Chaklala	Kamara	Dina	Hasan-Abdal	Talagang	Shakrial	Pindi-Gheb	Khewara	Hazro	Kot Hathial
1	Rawalpindi	704884	117481	39160	14098	18309	54222	21360	29995	234962	21041	17192	35244	14997	281954	16585	13175	22738	78320
2	Islamabad	44098	88197	17070	5040	6453	25199	8675	10176	48107	8535	6082	15119	5345	58798	5880	4725	9124	40706
3	Wah	5525	6416	99445	1484	2029	18081	5850	2455	4420	6215	1685	49723	1969	5850	2583	1518	8287	4143
4	Jhelum	1474	1404	1100	147392	1776	1179	933	2541	1797	915	8188	1068	1218	1404	1038	1965	921	1365
5	Chakwal	1045	982	821	970	8945	884	782	1464	970	732	1150	813	2013	915	1464	2300	706	789
6	Taxila	2765	3423	6535	575	790	11980	1711	998	2114	1753	672	5134	741	2246	958	584	2114	1943
7	Attock	1056	1143	2050	441	676	1660	17432	664	905	6973	498	2179	758	905	1202	509	3320	830
8	Gujarkhan	1215	1098	705	984	1038	793	544	7137	1241	782	1586	672	634	1142	577	793	544	921
9	Chaklala	8323	4540	1110	609	602	1469	648	1085	24968	666	616	1085	489	9987	543	467	703	3121
10	Kamara	582	629	1219	242	354	951	3900	534	520	13002	271	1345	382	520	672	275	3250	459
11	Dina	473	446	329	2155	554	362	277	1077	479	269	9697	320	353	456	305	546	275	431
12	Hasanabdal	949	1085	9494	275	383	2712	1186	446	825	1309	314	18988	372	825	493	275	1726	745
13	Talagang	401	381	374	312	944	389	410	420	370	370	343	370	4196	356	994	599	346	315
14	Shakrial	6867	3815	1010	327	390	1073	446	687	6867	458	404	746	324	17167	365	304	498	3121
15	Pindi Gheb	351	332	388	210	543	398	515	301	324	514	235	388	785	317	5970	311	398	284
16	Khewara	260	248	212	371	795	226	203	386	260	145	392	202	442	246	290	6956	189	228
17	Hazro	442	473	1143	171	240	806	1306	261	386	2285	194	1247	252	397	366	186	4571	386
18	Kot Hathial	1514	2097	568	252	267	737	324	440	1704	321	303	534	227	2478	260	223	384	5452
19	Fateh Jang	702	619	896	213	361	962	742	371	590	650	247	999	361	590	520	250	650	481
20	Lawa	155	150	152	131	250	157	180	157	147	169	139	155	416	145	335	220	158	135
21	Khana Dak	3628	1979	463	215	253	622	275	453	5442	282	259	463	213	7256	234	201	311	1674
22	Chak Jalal Din	3093	1804	451	212	281	677	301	471	4330	289	261	481	230	1968	252	210	328	1031
23	Thoa Moharram Khan	167	162	164	145	357	167	179	183	170	170	160	169	1129	200	390	315	167	153
24	Murree	475	534	305	189	178	386	220	297	475	237	218	333	152	534	166	148	261	763
25	Kota Kalan	2373	1525	427	222	267	577	267	521	5339	257	281	419	218	2136	2136	209	314	1068
26	Kahuta	600	600	291	240	216	343	198	492	711	198	300	282	165	739	171	174	160	768
27	Pind Dadan Khan	166	159	135	240	447	144	129	240	160	123	261	134	276	156	184	2346	149	144
28	Mirza	279	279	616	109	165	482	1984	168	235	1623	125	940	188	275	288	127	1488	251
29	Jand	165	165	219	102	178	221	345	140	158	298	111	221	250	160	617	136	247	146
30	Hummak	906	709	276	185	209	362	187	480	1483	185	236	276	163	1087	172	166	209	906
31	Morgah	3229	1614	351	168	215	489	215	375	5381	199	204	343	168	1614	184	158	241	897
32	Saeelah	152	145	111	8046	183	120	95	287	162	93	894	111	125	161	107	214	97	156
33	Ghurshti	237	258	1227	89	118	1473	491	180	398	736	101	1052	128	237	173	97	1339	237
34	Mangala	185	173	126	554	175	136	103	461	192	101	1731	120	124	190	109	182	102	177
35	Choa Saidan Shah	137	122	110	184	537	117	105	203	134	99	200	107	235	130	149	1677	96	117
36	Sohawa	198	174	124	353	215	141	104	747	198	101	706	121	131	192	113	184	103	181
37	Daultala	223	183	130	155	529	150	106	558	234	101	214	126	141	209	122	162	105	176
38	Sanjwal	142	142	303	58	87	260	1138	89	128	1301	66	364	95	134	144	66	700	126
		799436	**245686**	**189610**	**187718**	**50309**	**131107**	**73866**	**67940**	**357286**	**73497**	**56536**	**142393**	**40405**	**404076**	**47111**	**42953**	**67319**	**153146**

Source:- Based on APPENDIX 9.16 & APPENDIX 9.18

Foot note:-

2 Population Potential urban & rural having population 15000 & above in 1998

Appendix 9.17 Potohar Region: Human Settlement Population Potential

Fateh Jang	Lawa	Khana Dak	Chak Jalal Din	Thoa Moharam Khan	Murree	Kota Kalan	Kahuta	Pind Dadan Khan	Mirza	Jand	Hummak	Morgah	Saeelah	Ghurshti	Mangala	Choa Saidan Shah	Sohawa	Daultala	Sanjwal	Total
38102	9722	234961	201395	11014	31328	156641	44055	12476	22028	13426	78320	281954	13300	22738	18797	14385	22028	31328	22028	**3015743**
12599	3528	48107	44098	4009	3221	37798	16537	4484	8268	5040	23008	52918	4767	9284	6615	4811	7249	9621	8268	**721559**
6558	1344	4232	4143	1518	2841	3978	3013	1431	6858	2518	3371	4324	1372	16574	1808	1630	1950	2583	6630	**306354**
1208	862	1459	1445	996	1304	1535	1842	1890	904	867	1674	1535	73696	893	5896	2019	4094	2267	945	**285009**
1118	894	936	1045	1342	671	1006	904	1917	745	830	1032	1073	915	644	1019	3220	1364	4237	767	**53424**
2662	503	2054	2246	561	1284	1943	1284	553	1943	921	1597	2178	536	7188	705	625	799	1073	2054	**79745**
1992	558	883	968	581	719	872	719	481	7748	1394	801	930	410	2324	520	545	571	734	8716	**75667**
816	399	1189	1241	488	793	1393	1464	732	539	464	1679	1328	1020	696	1903	865	3359	3172	560	**46506**
1135	326	12484	9987	396	1110	12484	1849	427	657	458	4540	16646	504	1350	693	499	780	1161	703	**129220**
975	293	506	520	309	433	470	402	257	3546	672	443	481	227	1950	285	287	309	394	5572	**47438**
369	239	462	467	289	396	510	606	539	271	249	562	491	2155	266	4849	579	2155	825	283	**35366**
1461	262	808	844	299	593	745	558	271	1999	487	644	808	262	2712	330	304	362	475	1519	**58145**
524	699	370	402	1988	270	385	325	555	397	547	378	393	293	328	337	662	389	532	393	**22057**
780	221	11445	3121	321	858	3433	1320	286	528	318	2289	3433	343	553	470	333	520	715	505	**76661**
597	445	321	347	543	231	2985	266	293	481	1066	314	339	199	351	235	332	266	364	474	**23013**
267	273	258	270	409	193	273	253	3478	199	219	284	273	371	184	366	3478	415	449	202	**24165**
686	193	392	415	214	334	403	228	218	2285	392	352	409	166	2493	203	196	223	286	2110	**27310**
505	163	2097	1298	195	973	1363	1090	210	384	231	1514	1514	265	440	349	237	389	478	378	**32158**
1999	224	565	684	273	333	604	388	232	896	426	565	650	208	619	262	271	302	433	764	**20902**
193	832	145	155	642	118	150	146	225	176	277	149	151	123	148	136	229	150	180	173	**7849**
473	140	7256	2721	174	518	3628	837	189	325	201	1814	4354	229	335	320	220	335	484	320	**49096**
570	149	2706	10826	188	451	3609	677	197	361	216	1804	5413	225	367	318	230	355	541	333	**46206**
226	613	171	186	1261	128	182	153	298	188	268	179	183	153	159	162	325	183	226	180	**9971**
274	112	509	445	127	1257	445	611	150	237	155	475	497	194	274	246	158	232	264	237	**12770**
497	142	3559	3559	181	445	10678	791	198	314	203	2670	4271	237	267	328	251	251	610	328	**48336**
287	125	738	600	137	549	711	1477	165	223	147	739	768	256	226	342	186	377	400	209	**15310**
168	171	163	171	261	132	174	162	4691	134	156	191	185	261	125	240	1251	268	280	125	**14902**
616	139	266	297	156	198	262	208	127	8927	325	248	308	119	893	137	149	155	210	4463	**27825**
283	213	160	173	216	125	165	132	144	314	1234	165	115	102	247	138	144	128	165	384	**8626**
354	108	1359	1359	136	362	2039	627	166	226	155	3262	2039	151	251	296	199	362	544	233	**22425**
403	109	3229	4035	138	375	3229	646	160	278	108	2018	8071	179	278	248	181	293	436	269	**40728**
129	92	169	168	115	139	179	214	223	107	95	149	179	16093	107	670	240	503	282	107	**31219**
350	97	227	250	109	189	173	98	736	20	210	226	254	98	2946	118	115	134	164	818	**15903**
140	84	203	203	105	159	213	247	177	106	111	252	213	577	554	3462	192	923	295	105	**13262**
140	137	135	143	203	99	158	130	894	112	112	164	150	200	105	186	3354	224	248	105	**11458**
148	85	195	208	109	138	149	249	181	110	94	282	231	397	115	847	211	1815	424	106	**10180**
167	80	223	251	106	124	287	209	150	118	96	335	271	176	112	214	186	335	1117	109	**8290**
268	70	134	140	76	101	140	99	61	2276	202	130	152	61	506	69	71	76	99	4553	**14627**
80039	**24646**	**345076**	**300826**	**30185**	**53492**	**255392**	**84816**	**39862**	**75228**	**34890**	**138619**	**399482**	**120840**	**79602**	**54119**	**43170**	**54623**	**68096**	**76028**	**5489425**

Appendix-9.18 Potohar Region: Human Settlement Population Potential

Settlement	mth	nth	mth + nth
Rawalpindi	3,0,15,743	7,99,436	3,8,15,179
Islamabad	7,21,559	2,45,686	9,67,245
wah	3,06,354	1,89,610	4,95,964
Jhelum	2,85,009	1,87,718	4,72,727
Chakwal	53,424	50,309	1,03,733
Taxila	79,745	1,31,107	2,10,852
Attock	5,667	73,866	79,533
Gujarkhan	46,506	67,940	1,14,446
Chaklala	1,29,220	3,57,286	4,86,506
Kamra	47,438	73,497	1,20,935
Dina	35,366	56,536	91,902
Hassanabdal	58,145	1,42,393	2,00,538
Talagang	22,057	40,405	62,462
Shakrail	76,661	4,04,076	4,80,737
Pindi Gheb	23,013	47,111	70,124
Khewara	24,165	42,953	67,118
Hazro	27,310	67,319	94,629
Kot Hathial	32,158	1,53,146	1,85,304
Fateh Jang	20,902	80,039	1,00,941
Lawa	7,849	24,646	32,495
Khanna Dak	49,096	3,45,076	3,94,172
Chak Jalal Din	46,206	3,00,826	3,47,032
Thoa M. Khan	9,971	30,185	40,156
Murree	12,770	53,492	66,262
LotaKalan	48,336	2,55,392	3,03,728
Kahuta	15,310	84,816	1,00,126
P.D.Khan	14,902	39,862	54,764
Mirza	27,825	75,228	1,03,053
Jand	8,626	34,890	43,516
Hummak	22,425	1,38,619	1,61,044
Morgah	40,728	3,99,482	4,40,210
Saeelah	31,219	1,20,840	1,52,059
Ghurghusti	15,903	79,602	95,505
Mangala	13,262	54,119	67,381
C.S.Shah	11,458	43,170	54,628
Sohawa	10,180	54,623	64,803
Daultala	8,290	68,096	76,386
Sanjwal	14,627	76,028	90,655
TOTAL:	5,4,19,425	5,4,89,425	10,9,08,850

Source:-

Based on APPENDIX 9.16 & APPENDIX 9.17

Appendix 9.19 Potohar region: Human Settlement Growth Pole

Grade/ Class						Market												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Sl. No.	Name of Human Settlement	DIT HQ	Pol Station	Melt	Live stock	GP	Fruit Veg	Railway St	Post Office	Bank	Tele phone	Medical Center	Vet Hos/Dis	Agri Office	Pri	Middle	High
			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
I	1	Rawalpindi	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	Islamabad	1	1	1	-	1	1	-	1	1	1	1	-	1	1	1	1
II	3	Wah	-	1	1	-	1	1	-	1	1	1	1	1	-	1	1	1
	4	Jhelum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
III	5	Chakwal	1	1	1	1	1	1	-	1	1	1	1	1	1	1	1	1
	6	Taxila	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	7	Attock	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	8	Gujar Khan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IV	9	Chaklala	-	-	1	-	-	-	1	1	-	1	-	-	-	1	1	-
	10	Kamra	-	-	1	-	-	-	-	1	1	1	1	-	-	1	-	1
	11	Dina	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	12	Hasanabdal	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	1
	13	Talagang	1	1	1	1	1	1	-	1	1	1	1	1	-	1	1	1
	14	Shakrial	-	-	1	1	-	-	-	1	1	1	-	-	1	1	-	1
	15	Pindi Gheb	1	1	1	1	1	1	-	1	1	1	1	1	1	1	1	1
	16	Khewra	-	1	1	1	-	-	-	1	1	1	1	1	1	1	1	1
	17	Hazro	-	1	1	1	1	1	-	1	1	1	1	1	1	1	1	1
	18	Kot Hathial	-	-	1	-	-	-	-	-	-	1	1	-	-	1	-	1
	19	Fateh Jang	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
V	20	Lawa	-	1	1	1	-	-	-	1	1	1	1	1	1	1	-	1
	21	Khana Dak (R)	-	-	1	1	-	-	-	-	-	1	-	-	-	1	1	-
	22	Chak Jalal Din	-	-	1	-	-	-	-	-	-	1	-	-	-	1	1	-
	23	Thua Mahuram Khan	-	-	1	1	-	-	-	1	1	1	1	1	-	1	-	1
	24	Murree	-	1	1	-	1	1	-	1	1	1	1	1	1	1	1	1
	25	Kota Kalan	1	-	1	-	-	-	-	-	1	1	-	-	-	1	1	-
	26	Kahuta	-	1	1	1	1	1	-	1	1	1	1	1	1	1	1	1
	27	P.D.Khan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	28	Mirza	1	-	1	-	-	-	-	1	1	1	1	-	-	1	-	1
	29	Jand	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	30	Hummak	1	-	1	-	-	-	-	1	1	1	1	-	-	1	-	1
	31	Morgah	-	-	1	-	-	-	-	1	1	1	1	-	-	1	1	1
	32	Saeelah	-	-	1	1	-	-	-	1	-	1	1	1	-	1	1	1
	33	Gangal (R)	-	-	1	1	-	-	-	1	-	1	1	-	-	1	1	1
	34	Ghurgushti	-	1	1	1	1	1	-	1	1	1	1	1	1	1	1	1
	35	Tamman	-	1	1	1	-	-	-	1	1	1	1	1	1	1	-	1
	36	Bhaun	-	-	1	1	-	-	-	1	1	1	1	1	1	-	1	1
	37	Usman Khattar	-	-	1	1	-	-	-	1	-	1	1	-	-	1	-	1
	38	Mangala	-	1	1	-	-	-	-	1	1	1	1	-	1	1	-	1
	39	Choa Saidan Shah	1	1	1	1	1	-	-	1	1	1	1	1	1	1	1	1
	40	Pinanwal	-	-	1	1	-	-	-	1	1	1	1	1	1	1	1	1
	41	Sohawa	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Appendix 9.19 Potohar region: Human Settlement Growth Pole

				Distance in K.M.											Pop Growth (in %age)						Literacy Ratio							
17	18	19	20																									
College	University	Electricity	Water Supply	0	1	2	3	4	6	8	10	12	14	15+	1.0 or less	1.1 - 2.0	2.1 - 3.0	3.1 - 4.0	4.1 - 5.0	5 + above	30 or less	31 - 40	41 - 50	51 - 60	61 - 70	71 - 90	90 +	T.W.I.
10	10	10	10	10	9	8	7	6	5	4	3	2	1	0	1	2	4	6	8	10	1	2	3	4	6	8	10	-
1	1	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	3.46	-	-	-	-	-	-	76.3	-	-	234
1	1	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.76	-	-	-	-	77.2	-	-	218
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.90	-	-	-	-	-	-	-	78.4	-	-	182
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.71	-	-	-	-	-	-	-	-	82.8	-	-	212
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	3.66	-	-	-	-	-	-	71.9	-	-	214
1	1	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.85	-	-	-	-	-	-	-	69.5	-	-	230
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.79	-	-	-	-	-	-	-	-	78.4	-	222
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	3.11	-	-	-	-	-	-	-	72.9	-	224
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.86	-	-	-	-	69.3	-	-	106
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.47	-	-	-	-	-	77.1	-	128
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.95	-	-	-	-	-	-	-	-	73.4	-	212
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.99	-	-	-	-	-	-	-	-	69.3	-	-	208
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	3.54	-	-	-	-	-	-	-	71.2	-	194
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.58	-	-	-	-	-	72.9	-	138
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.22	-	-	-	-	-	-	-	68.7	-	-	210
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.24	-	-	-	-	-	-	-	65.1	-	-	180
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.65	-	-	-	-	-	-	55.8	-	-	-	208
-	-	1	1	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	10.40	-	-	-	-	66.0	-	-	90
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	3.92	-	-	-	-	-	-	66.5	-	-	222
-	-	1	1	-	-	-	-	-	-	-	-	12	-	-	-	1.43	-	-	-	-	-	-	44.8	-	-	-	-	137
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.20	-	-	-	-	-	80.1	-	198
-	-	1	1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	12.98	-	-	-	58.8	-	-	-	81
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.42	-	-	-	30.8	-	-	-	-	-	-	125
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.61	-	-	-	-	-	-	-	-	78.6	-	222
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.96	-	-	-	-	-	-	71.2	-	96
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.26	-	-	-	-	-	-	79.5	-	216
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.35	-	-	-	-	-	-	-	70.8	-	-	220
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	3.49	-	-	-	-	-	-	61.4	-	-	110
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.56	-	-	-	-	-	-	-	-	67.1	-	-	218
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.04	-	-	-	-	-	74.8	-	128
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	4.13	-	-	-	-	-	-	77.2	-	154
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	4.11	-	-	-	-	-	69.3	-	-	132
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19.72	-	-	-	-	-	80.0	-	128
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.44	-	-	-	-	-	-	46.4	-	-	-	-	185
-	-	1	1	-	-	-	-	-	-	-	-	-	-	16	-	1.66	-	-	-	-	-	-	43.9	-	-	-	-	143
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.97	-	-	-	-	-	-	-	-	66.6	-	-	138
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.94	-	-	-	-	-	-	-	-	-	80	-	110
1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.98	-	-	-	-	-	-	-	90.9	145
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	3.56	-	-	-	-	-	-	62.2	-	-	195
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.69	-	-	-	-	-	-	58.6	-	-	-	148
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.08	-	-	-	-	-	-	72.8	-	226

	43	Lakhan Dehati	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-
	44	Darkali Mamori	-	-	1	1	-	-	-	1	-	1	1	1	1	1	-	-
	45	Pachnand	-	-	1	1	-	-	-	1	-	-	1	1	-	1	-	1
	46	Charhan	-	-	1	1	-	-	-	1	-	-	-	1	-	1	-	1
	47	Khana Dak	-	1	1	1	-	-	-	1	-	1	1	-	-	-	1	1
	48	Nara (J)	-	1	1	1	-	-	-	-	1	1	1	1	1	1	1	1
	49	Dhudhial	-	1	1	1	-	1	-	1	1	1	1	1	1	1	1	1
	50	Domeli (S	-	1	1	1	1	-	-	1	1	1	1	1	1	1	1	1
	51	Narar	-	1	1	1	-	-	-	-	1	1	1	-	1	1	1	1
	52	Haji Shah	-	1	1	1	-	-	-	-	-	1	1	1	1	1	-	1
	53	Multan Khurd	-	1	1	1	-	-	-	1	-	1	1	1	1	-	1	1
	54	Dhurnal	-	1	1	1	-	-	-	1	-	1	1	1	1	1	-	1
	55	Charh	-	1	1	1	-	-	-	1	-	1	1	-	1	1	1	1
	56	Domel (J)	-	1	1	1	-	-	-	1	1	1	1	1	1	1	1	1
	57	Daultala	-	1	1	1	1	-	-	1	1	1	1	1	1	1	-	1
VI	58	Dhaman	-	1	1	-	-	-	-	-	-	-	-	-	-	1	-	1
	59	Dandoot	-	1	1	-	-	-	-	1	-	1	1	1	-	-	1	1
	60	Wah	-	1	1	1	-	-	-	1	-	1	1	-	-	1	-	-
	61	Tarlai Kalan	-	1	1	1	-	-	-	1	-	1	1	1	-	1	-	1
	62	Thatta	-	1	1	1	-	-	-	1	1	1	1	1	1	1	-	-
	63	Mathal	-	1	1	1	-	-	-	1	1	1	1	1	1	-	1	-
	64	Sanjwal	-	1	1	-	-	-	-	1	1	1	1	1	1	1	-	1
	65	Malak Mala	-	1	1	1	-	-	-	1	1	1	1	-	1	1	1	1
	66	Saghar	-	1	1	1	-	-	-	1	1	1	1	1	1	1	-	1
	67	Phulgran	-	1	1	1	-	-	-	1	-	-	1	-	-	-	1	1
	68	Sarwala	-	1	1	1	-	-	-	1	1	-	1	1	1	1	-	1
	69	Mureed	-	1	1	1	-	-	-	1	1	1	1	1	1	1	-	1
	70	Hameed	-	1	1	1	-	-	-	1	1	1	1	1	1	1	1	1
	71	Dalwal Mai Padshahpur	-	1	1	1	-	-	-	-	-	-	1	1	1	-	1	1
	72	Ikhlas	-	1	1	1	1	-	-	1	1	1	1	-	-	-	1	1
	73	Kandwal	-	-	1	1	-	-	-	1	1	1	1	1	1	1	1	1
	74	Tarap Shumali	-	-	1	1	-	-	-	1	1	-	1	1	1	1	-	1
	75	Malkwal	-	-	1	1	-	-	-	1	1	1	-	1	1	1	-	1
	76	Odherwal	-	-	1	1	-	-	-	1	-	1	1	1	1	1	1	-
	77	Makhad	-	1	1	1	-	-	-	1	1	1	1	1	1	1	1	-
	78	Numb Ramal	-	-	1	1	-	-	-	-	-	1	11	-	-	1	1	1
	79	Lethi	-	-	1	1	-	-	-	1	1	1	1	1	1	-	1	1
	80	Sihala	-	1	1	1	-	-	1	1	1	1	1	1	1	1	-	1
	81	Rawat	-	1	1	1	-	-	-	1	1	1	1	1	1	1	-	1
	82	Burhan	-	1	1	1	-	-	1	1	1	1	1	1	1	1	1	1
	83	Tamair	-	-	1	1	-	-	-	1	1	1	-	1	1	1	-	1
	84	Jand	-	-	1	1	-	-	-	-	-	1	1	-	-	1	1	-
	85	Hardo Thanda Pani	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	-
	86	Shainh Bagh	-	-	1	1	-	-	-	1	1	1	1	-	-	1	1	1
	87	Basal	-	-	1	1	-	-	1	1	1	1	-	1	1	1	-	1
	88	Mohra Noor	-	-	1	1	-	-	-	1	-	1	1	-	-	1	1	-
	89	Jhatla	-	-	1	1	-	-	-	-	1	1	1	1	1	1	-	1

	42	Khaur	-	-	1	1	-	-	-	1	1	1	1	1	-	1	1	1

-	-	1	1	-	-	-	-	-	6	-	-	-	-	-	-	-	2.92	-	-	-	-	-	-	-	67.8	-	-	115
-	-	1	1	-	-	-	-	-	6	-	-	-	-	-	-	-	2.33	-	-	-	-	-	50.4	-	-	-	-	102
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.88	-	-	-	-	-	-	-	-	-	73.7	-	110
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.80	-	-	-	53.5	-	-	-	124
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.42	-	-	-	-	-	-	51.6	-	-	-	138
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.85	-	-	-	-	-	-	-	69.1	-	-	180
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.41	-	-	-	-	-	-	-	-	67.6	-	-	168
-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	0.58	-	-	-	-	-	-	-	-	-	59.6	-	-	117
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	2.94	-	-	-	-	39.2	-	-	-	-	-	116
-	-	1	1	-	-	-	-	-	-	8	-	-	-	-	-	1.04	-	-	-	-	-	-	-	53.1	-	-	-	120
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	2.23	-	-	-	-	-	43.7	-	-	-	-	126
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	1.66	-	-	-	-	-	-	-	-	63.9	-	-	126
-	-	1	1	-	-	-	-	-	6	-	-	-	-	-	-	2.0	-	-	-	-	-	-	49.3	-	-	-	-	140
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.32	-	-	-	-	-	-	-	69.1	-	-	-	176
-	-	1	1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	13.95	-	-	-	-	-	80.9	-	75
-	-	1	1	-	-	-	3	-	-	-	-	-	-	-	-	-	2.36	-	-	-	-	-	-	56.9	-	-	-	107
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3.85	-	-	-	-	-	-	61.8	-	-	101
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.87	-	-	-	-	64.2	-	-	125
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	1.75	-	-	-	-	-	-	44.9	-	-	-	-	124
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.20	-	-	-	-	-	-	-	52.1	-	-	-	136
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.21	-	-	-	-	-	-	-	-	80.4	-	142
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	2.27	-	-	-	-	36.7	-	-	-	-	-	135
-	-	1	1	-	-	-	-	-	6	-	-	-	-	-	-	-	2.61	-	-	-	-	-	-	58.4	-	-	-	133
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	4.22	-	-	-	-	-	65.2	-	-	102
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3.30	-	-	-	-	43.8	-	-	-	-	128
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	1.78	-	-	-	-	-	-	-	-	63.4	-	-	136
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	1.74	-	-	-	-	-	35.4	-	-	-	-	-	142
-	-	1	1	-	-	-	-	-	-	8	-	-	-	-	-	1.25	-	-	-	-	-	-	-	-	62.7	-	-	102
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.51	-	-	-	-	-	-	59.5	-	-	-	138
-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2.18	-	-	-	-	33.8	-	-	-	-	-	143
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	3.51	-	-	-	-	41.7	-	-	-	-	129
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4.45	-	-	-	-	-	63.2	-	-	133
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3.34	-	-	-	-	-	-	66.6	-	-	131
-	-	1	1	-	-	-	-	-	-	-	10	-	-	-	-	1.63	-	-	-	-	-	-	46.7	-	-	-	-	138
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	1.91	-	-	-	-	-	-	-	-	65.5	-	-	106
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-	2.35	-	-	-	-	38.5	-	-	-	-	-	134
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	3.45	-	-	-	-	-	57.5	-	-	-	160
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.50	-	-	-	-	-	62	-	-	164
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.43	-	-	-	-	-	-	-	56	-	-	-	176
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.79	-	-	-	-	-	-	49.4	-	-	-	-	135
-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	1.56	-	-	-	-	-	-	45.6	-	-	-	-	74
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.84	-	-	-	-	-	77.6	-	88
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	3.73	-	-	-	-	48.9	-	-	-	-	119
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	0.32	-	-	-	-	-	-	-	-	57	-	-	-	143
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.43	-	-	-	60.3	-	-	-	104
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.46	-	-	-	-	-	-	58.8	-	-	-	128

-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.91	-	-	-	-	-	-	-	-	63.5	-	-	138
-	-	1	1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	8.02	-	-	-	-	-	71.8	-	59

	92	Kot Sarang	-	-	1	1	-	-	-	1	-	1	1	-	-	-	1	1
	93	Tahi	-	-	1	1	-	-	-	1	-	-	-	-	-	1	1	1
	94	Dher Mund	-	-	1	1	-	-	-	1	-	1	1	-	-	1	-	-
	95	Lilla Bhara	-	1	1	1	-	-	-	1	1	1	1	1	1	1	-	1
	96	Balkassar	-	1	1	1	-	-	-	1	-	1	1	1	-	1	1	1
	97	Kauntirala	-	-	1	1	-	-	-	1	-	1	1	-	-	1	1	1
	98	Narali	-	-	1	1	-	-	-	1	-	1	1	-	1	1	-	1
	99	Kot Fateh Khan	-	-	1	1	-	-	-	1	1	1	1	1	-	1	-	1
	100	Pind Sultani	-	1	1	1	-	-	1	1	1	1	1	1	1	1	1	1
	101	Sohan Dehati	-	-	1	1	-	-	-	-	-	1	1	-	-	1	-	-
	102	Formali	-	-	1	1	-	-	-	1	1	1	1	-	1	1	1	-
	103	Khallar Khar	-	-	1	1	-	-	-	1	1	1	1	1	1	1	1	1
	104	Haranpur	-	-	1	1	-	-	1	1	1	1	1	1	1	-	1	1
	105	Aryari	-	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-
	106	Pindi Saidpur	-	-	1	1	-	-	-	1	-	1	1	1	-	-	-	1
	107	Musa Kadhi	-	-	1	1	-	-	-	1	-	1	1	-	-	1	1	-
	108	Nara-Tarf-Nara-Chab	-	-	1	1	-	-	1	1	1	1	1	1	1	1	-	1
	109	Malhuwali	-	-	1	1	-	-	-	1	-	1	1	1	-	1	1	-
	110	Chingi	-	-	1	1	-	-	-	1	-	1	1	-	-	1	-	1
	111	Lill Bhurwana	-	-	1	1	-	-	-	-	-	1	1	-	-	1	-	1
	112	Nara-Tarf-Nara-Lakarmar	-	-	1	1	-	-	-	-	-	1	1	1	-	1	-	1
	113	Toba	-	-	1	1	-	-	-	1	-	1	1	-	-	1	1	1
	114	Dhaular	-	-	1	1	-	-	-	1	-	1	1	-	-	1	1	1
	115	Khunda	-	-	1	1	-	-	-	1	-	1	1	-	-	1	-	1
	116	Parhina Neer	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1	-
	117	Shakardara	-	-	1	1	-	-	-	1	-	1	1	-	-	1	1	-
	118	Kani	-	-	1	1	-	-	-	-	-	-	1	-	-	1	-	1
	119	Akwal	-	-	1	1	-	-	-	-	-	1	-	-	-	-	1	1
	120	Kharpa	-	-	1	1	-	-	-	1	-	1	1	-	-	1	-	-
	121	Waisa	-	-	1	1	-	-	-	1	-	1	1	-	-	1	-	1
	122	Qaziabad	-	-	1	1	-	-	-	-	1	1	1	1	1	1	-	-
	123	Padshahan	-	-	1	1	-	-	-	1	1	1	1	1	1	1	-	1
	124	Bahtar	-	1	1	1	-	-	-	1	1	1	1	-	1	1	1	1
	125	Dahgal	-	-	1	1	-	-	-	1	-	1	1	-	-	1	1	-
	126	Dhara Jawa	-	-	1	1	-	-	-	-	-	1	1	-	-	1	-	-
	127	Nala Muslim	-	-	1	1	-	-	-	1	-	1	1	1	-	1	1	1
	128	Kasran	-	-	1	1	-	-	-	1	1	1	1	-	1	1	1	1
	129	Sehti	-	-	1	1	-	-	-	-	1	1	1	1	1	-	1	-
	130	Dewel	-	-	1	1	-	-	-	1	1	1	1	-	1	1	-	-
	131	Kamalpur Musa	-	-	1	1	-	-	-	-	-	1	1	-	-	1	-	1
	132	Malot Sattian	-	-	1	1	-	-	-	1	1	1	1	-	1	1	1	1
	133	Boota	-	-	1	1	-	-	-	1	-	1	1	1	-	1	1	-
	134	Bahalar Top	-	-	1	1	-	-	-	-	-	1	1	-	-	1	1	-
	135	Kot Gula	-	-	1	1	-	-	-	-	-	1	1	1	-	1	1	1
	136	Nalhad	-	-	1	1	-	-	-	1	-	1	1	1	-	1	1	1
	137	Kahuta	-	-	1	1	-	-	-	-	-	1	-	-	-	1	-	-

	90	Bhoochal Kalan	-	1	1	1	-	-	-	1	1	1	1	1	1	1	-	1
	91	Jalalpur Sharif	-	1	1	1	-	-	-	1	1	1	1	1	1	1	-	1

-	-	1	1	-	-	-	3	-	-	-	-	-	-	-	-	-	2.63	-	-	-	-	-	-	58.5	-	-	-	104
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	2.35	-	-	-	-	-	-	56.9	-	-	-	107
-	-	1	1	-	-	-	-	-	-	8	-	-	-	-	-	1.86	-	-	-	-	-	-	35.4	-	-	-	-	79
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.03	-	-	-	-	-	-	42.9	-	-	-	148
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.19	-	-	-	-	-	-	-	65.5	-	-	150
-	-	1	1	-	-	-	3	-	-	-	-	-	-	-	-	1.59	-	-	-	-	-	-	-	-	66.7	-	-	125
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	1.92	-	-	-	-	-	-	-	-	66.9	-	-	106
-	-	1	1	-	-	-	-	-	6	-	-	-	-	-	-	1.88	-	-	-	-	-	-	42.6	-	-	-	-	120
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	1.71	-	-	-	-	-	-	-	55.5	-	-	-	165
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.88	-	-	-	55.9	-	-	-	93
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-	2.73	-	-	-	-	34.9	-	-	-	-	-	124
1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.27	-	-	-	-	-	64	-	-	166
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	1.74	-	-	-	-	-	-	-	-	55.4	-	-	147
-	-	1	1	-	-	-	3	-	-	-	-	-	-	-	-	-	2.61	-	-	-	-	-	-	-	66.7	-	-	57
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3.23	-	-	-	-	-	60.1	-	-	-	109
-	-	1	1	-	-	-	3	-	-	-	-	-	-	-	-	-	2.11	-	-	-	-	-	47.8	-	-	-	-	104
1	-	1	1	-	-	-	-	4	-	-	-	-	-	-	-	-	2.03	-	-	-	-	-	-	56.8	-	-	-	166
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.23	-	-	-	-	-	-	56.8	-	-	-	118
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.72	-	-	-	-	-	-	-	58.8	-	-	-	106
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	1.74	-	-	-	-	-	-	46.1	-	-	-	-	99
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-	2.32	-	-	-	-	-	41.1	-	-	-	-	105
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	1.76	-	-	-	-	-	-	47.8	-	-	-	-	114
-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	1.72	-	-	-	-	-	37.0	-	-	-	-	-	-	84
-	-	1	1	-	-	-	3	-	-	-	-	-	-	-	1.08	-	-	-	-	-	33.7	-	-	-	-	-	-	101
-	-	1	1	-	-	-	3	-	-	-	-	-	-	-1.89	-	-	-	-	-	-	-	-	-	-	73	-	76
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.62	-	-	-	-	-	47.5	-	-	-	-	107
-	-	-	1	-	-	-	-	-	-	-	-	12	-	-	-	-	2.36	-	-	-	-	-	44.0	-	-	-	-	69
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	3.38	-	-	-	-	-	-	63.2	-	-	92
-	-	1	-	0	-	-	-	-	-	-	-	-	-	-	1.79	-	-	-	-	-	-	-	48.6	-	-	-	-	85
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	1.85	-	-	-	-	-	-	-	45.5	-	-	-	-	105
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.07	-	-	-	-	-	58.3	-	-	-	-	117
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	1.16	-	-	-	-	-	-	-	-	60.7	-	-	-	135
-	-	1	1	-	-	-	-	4	-	-	-	-	-	-	1.75	-	-	-	-	-	-	-	-	52.2	-	-	-	142
-	-	1	1	0	-	-	-	-	-	-	-	-	-	0.44	-	-	-	-	-	-	-	-	-	-	63.4	-	-	107
-	-	1	1	-	1	-	-	-	-	-	-	-	-	0.83	-	-	-	-	-	-	-	-	-	57.9	-	-	-	84
-	-	-	1	0	-	-	-	-	-	-	-	-	-	-	1.53	-	-	-	-	-	-	-	-	52.1	-	-	-	116
-	-	1	1	-	-	-	-	4	-	-	-	-	-	-	1.86	-	-	-	-	-	-	-	-	57.1	-	-	-	132
-	-	1	1	-	-	-	-	-	-	-	-	-	-	16	-	-	2.26	-	-	-	-	-	-	55.6	-	-	-	108
-	-	1	1	0	-	-	-	-	-	-	-	-	-	0.34	-	-	-	-	-	-	-	-	-	-	-	74.8	-	119
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.57	-	-	-	-	-	43.1	-	-	-	-	97
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-1.69	-	-	-	-	-	-	-	-	-	-	-	74.2	-	138
-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	2.24	-	-	-	-	-	43.5	-	-	-	-	116
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-	2.76	-	-	-	-	-	-	-	63.6	-	-	98
-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	1.40	-	-	-	-	-	37.3	-	-	-	-	-	86
-	-	1	1	-	-	-	-	-	6	-	-	-	-	-	-	1.28	-	-	-	-	29.0	-	-	-	-	-	-	118
-	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.56	-	-	-	-	67.1	-	-	86

1	-	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	2.07	-	-	-	-	-	-	-	-	71.7	-	102
-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2.26	-	-	-	-	-	-	60.7	-	-	-	138

	140	Chak Khasa	-	-	1	1	-	-	-	-	-	1	-	-	-	-	-	-
	141	Hattar	-	-	1	1	-	-	1	1	-	1	-	1	-	-	-	1
	142	Tatral	-	-	1	1	-	-	-	1	-	1	-	1	-	1	1	1
	143	Dariot	-	-	1	1	-	-	-	-	-	1	-	1	-	1	1	-
	144	Harcharhar Dhab	-	-	1	1	-	-	-	-	-	1	1	1	-	1	1	1
	145	Ahmadal	-	-	1	1	-	-	-	-	1	1	1	-	-	1	-	1
	146	Pind Begwal	-	-	1	1	-	-	-	1	-	1	1	1	-	1	1	1
	147	Jabbi Shah Dilawr	-	-	1	1	-	-	-	1	-	1	-	1	1	1	1	-
	148	Chijjana	-	-	1	1	-	-	-	1	-	1	1	1	1	1	-	1
	149	Bhakri Kalan	-	-	1	1	-	-	-	1	-	1	-	-	-	1	1	-
	150	Choa Khalisa	-	-	1	1	-	-	-	1	1	1	1	1	1	1	1	1
	151	Pandoori	-	-	1	1	-	-	-	-	-	1	-	1	-	1	-	1
	152	Nara-Tarf-Nara-Dakhneer	-	-	1	1	-	-	-	-	-	1	1	1	1	1	-	1
	153	Mansar	-	-	1	1	-	-	-	1	-	1	-	1	1	1	-	-
	154	Akhori	-	-	1	1	-	-	-	1	-	1	1	1	-	1	1	1
	155	Thoa Khalisa	-	-	1	1	-	-	-	1	1	1	1	1	-	-	1	1
	156	Nambal	-	-	1	1	-	-	-	1	-	1	-	-	-	1	-	-
	157	Dullah	-	-	1	1	-	-	-	1	-	-	1	1	-	1	1	1
	158	Mogla	-	-	1	1	-	-	-	1	-	-	1	-	-	1	1	-
	159	Manga	-	-	1	1	-	-	-	1	-	1	1	-	-	1	-	1
	160	Nawshera	-	-	1	1	-	-	-	-	-	1	1	-	-	1	-	-
	161	Juggian	-	-	1	-	-	-	-	1	-	1	-	-	-	1	-	-
	162	Karsal	-	-	1	1	-	-	-	1	-	1	1	1	1	1	-	1
	163	Fateh Jang	-	-	1	1	-	-	-	-	-	1	-	-	-	1	-	1
	164	Bhalomar	-	-	1	1	-	-	-	1	-	1	1	-	-	-	-	1
	165	Shinka	-	1	1	1	-	-	-	1	1	1	1	1	1	1	-	1
	166	Jang	-	-	1	1	-	-	-	1	-	1	1	-	-	1	-	1
	167	Dharabi	-	-	1	1	-	-	-	1	-	1	1	1	1	1	1	1
	168	Nara (K	-	-	1	1	-	-	-	1	1	1	1	1	1	1	-	1
	169	Bhadian	-	-	1	1	-	-	-	-	-	1	1	1	-	1	1	-
	170	Bannahl	-	-	1	1	-	-	-	1	-	-	1	-	-	1	-	1
	171	Sureg Salar	-	-	1	1	-	-	-	1	-	1	1	-	-	1	1	-
	172	Warwal	-	-	1	1	-	-	-	-	-	1	1	-	-	1	1	1
	173	Manday	-	-	1	1	-	-	-	1	-	1	-	-	-	1	1	1

Source:- Field Survey 1999-2000

Abbreviation:

Pol: Police Station

Melt: Mettled Road

GM: Grain Market

Pri: Primary School

TWI: Total Weight Index

	138	Kirpa	-	-	1	1	-	-	-	1	-	1	1	1	-	-	-	1
	139	Khurd	-	-	1	1	-	-	-	1	-	1	1	-	-	1	-	1
	140	Chak Khasa	-	-	1	1	-	-	-	-	-	1	-	-	-	-	-	-

Appendix 9.20 Potohar Region: Allocations of values/scores to various functions in the Human Settlement

Sl. No.	Name of Human Settlement	School						College			Uni	Medical facilities							Services									
		M.	T	Pri	Mid	High	H.S.	Inter.	Deg	P.G.		Hos.	Dis.	R.H.	B.H.	F.P	V.H	V.D	T.O	P.O	P.S.	P.C	Elec	Gas	Wat	A.O.	C.B	A.B.	U.S.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Rawalpindi	-	2.6	3.72	4.61	5.148	6.19	7.2	8.26	9.6	10.3	10.8	5.28	-	-	2.34	4.1	-	6.3	5.67	3.15	2.5	4	3	2	1.1	5.147	6.3	6
2	Islamabad	1.2	2.13	3.68	4.6	5.31	6.6	-	8.28	9.8	10.5	10.8	5.20	-	-	2.19	-	-	6.4	5.53	3.8	2.5	4	3	2	1.1	5.146	6.2	6
3	Wah	-	2.2	3.4	4.3	5.12	6.2	7.1	8.2	-	-	10.2	5.3	-	-	2.3	-	3.1	6.1	5.9	3.1	2.2	4	3	2	-	5.11	-	6
4	Jhelum	1.10	2.9	3.20	4.9	5.13	-	-	8.2	9.1	-	10.3	5.3	-	-	2.3	4.1	-	6.1	5.9	3.2	2.3	4	3	2	1.1	5.39	6.2	6
5	Chakwal	-	2.7	3.14	4.6	5.6	-	-	8.2	-	-	10.1	5.3	-	-	2.2	4.1	-	6.1	5.1	3.2	2.2	4	3	2	1.1	5.13	6.2	6
6	Taxila	-	2.2	3.4	4.2	5.7	-	7.1	8.2	-	10.1	10.3	5.1	-	-	2.3	4.1	-	6.2	5.9	3.3	2.1	4	3	2	1.1	5.10	6.1	6
7	Attock	-	2.5	3.10	4.3	5.8	-	-	8.2	9.1	-	10.1	5.3	-	-	2.3	4.1	-	6.1	5.4	3.2	-	4	3	2	1.1	5.11	6.2	6
8	Gujar Khan	-	2.3	3.8	4.12	5.5	-	-	8.1	-	-	10.1	5.1	-	-	2.6	4.1	-	6.1	5.2	3.1	-	4	3	2	1.1	5.12	6.2	6
9	Chaklala	-	2.1	3.2	4.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
10	Kamra	-	-	3.2	-	5.2	-	-	-	-	-	10.2	-	-	4.1	-	-	-	6.1	5.1	-	-	4	3	2	-	5.3	-	6
11	Dina	-	2.1	3.2	4.2	5.2	6.1	7.1	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.3	3.1	-	4	3	2	1.1	5.19	6.1	6
12	Hasanabdal	-	2.1	3.9	-	5.2	6.1	7.3	-	-	-	10.1	-	-	-	2.1	4.1	-	6.1	5.2	3.2	2.1	4	3	2	1.1	5.7	-	6
13	Talagang	-	2.2	3.19	4.5	5.4	-	-	8.2	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.5	6.1	6
14	Shakrial	-	-	3.2	-	5.2	-	-	-	-	-	-	5.1	-	-	-	-	-	-	5.1	-	-	4	3	2	-	-	-	6
15	Pindi Gheb	1.7	2.4	3.7	4.2	5.3	-	-	8.2	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.7	6.2	6
16	Khewra	1.4	2.1	3.5	4.2	5.1	6.2	-	-	-	-	10.1	-	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	-	2	1.1	5.4	6.1	6
17	Hazro	1.2	2.1	3.2	4.2	5.2	-	-	8.2	-	-	10.1	-	-	-	2.1	-	3.1	6.1	5.1	3.1	-	4	3	2	1.1	5.6	-	6
18	Kot Hathial	1.2	-	3.2	-	5.1	-	-	-	-	-	-	-	-	4.1	2.1	-	-	-	-	-	-	4	-	2	-	-	-	-
19	Fateh Jang	1.3	2.4	3.6	4.1	5.3	-	-	8.2	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.4	6.2	6
20	Lawa	1.5	-	3.25	-	-	6.2	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.1	-	6
21	Khana Dak (R)	-	-	3.2	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	6
22	Chak Jalal Din	-	-	3.2	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
23	T.M. Khan	1.10	-	3.28	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	-	2	-	-	-	-
24	Murree	-	2.2	3.6	4.4	5.4	-	7.3	8.2	-	-	10.2	-	-	-	2.1	4.1	-	6.1	5.1	3.1	2.2	4	-	2	1.1	5.1	6.1	6
25	Kota Kalan	-	-	3.2	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	5.3	-	-
26	Kahuta	-	2.2	3.2	4.1	-	6.2	-	8.2	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.1	6.2	6
27	P.D Khan	1.8	2.1	3.7	4.1	5.2	-	-	8.2	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.4	6.2	6
28	Mirza	1.4	-	3.2	-	5.2	-	-	-	-	-	-	-	-	-	2.1	-	-	-	5.1	-	-	4	3	2	-	5.8	-	-
29	Jand	1.3	2.3	3.5	4.2	5.1	6.1	7.1	-	-	-	10.1	-	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.1	6.1	6
30	Hummak	1.1	-	3.5	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	-	6.1	5.1	-	-	4	3	2	-	5.4	-	6
31	Morgah	-	-	3.1	4.1	5.2	-	-	-	-	-	10.1	-	-	-	2.1	-	-	-	5.1	-	-	4	3	2	-	5.3	-	-
32	Sueelah	-	2.1	3.1	4.1	5.2	-	-	-	-	-	-	-	-	-	2.1	-	3.1	-	5.1	-	-	4	3	2	-	-	-	6
33	Gangal (R)	-	-	3.1	4.2	5.1	-	-	-	-	-	-	-	-	-	2.1	-	-	-	5.1	-	-	4	3	2	-	-	-	6
34	Ghurgushti	1.12	2.2	3.1	4.1	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	3	2	1.1	5.2	-	6
35	Tamman	1.2	-	3.15	-	5.2	6.1	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	3.1	-	4	3	2	1.1	5.1	-	-
36	Bhaun	-	-	-	4.1	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	3	2	1.1	5.1	-	6
37	Usman Khattar	-	-	3.1	-	-	6.1	-	-	-	-	-	-	-	4.1	2.1	-	-	6.1	5.1	-	-	4	3	2	-	-	-	-
38	Mangala	-	-	3.1	-	5.3	-	7.2	-	-	-	10.1	-	-	-	2.1	-	-	6.1	5.1	-	2.1	4	3	2	-	5.7	-	6
39	Choa Saidan Shah	1.1	2.2	3.3	4.1	5.2	6.1	7.1	-	-	-	10.1	-	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.5	6.1	6
40	Pinanwal	1.1	-	3.1	4.2	5.1	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	3	2	1.1	5.2	-	6
41	Sohawa	1.5	2.3	3.6	4.2	5.2	6.1	-	8.1	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.4	6.1	6
42	Khaur	-	-	3.2	4.1	5.2	-	-	-	-	-	10.1	-	-	4.1	2.1	-	3.1	.6	5.1	-	-	4	3	2	1.1	5.1	-	6
43	Lakhan Dehati	-	-	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-

46	Charhan	1.1	-	3.20	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	-	-	-	4	-	2	-	-	-	-
47	Khana Dak	-	-	-	4.1	5.1	-	-	-	-	-	-	-	-	4.1	2.1	-	-	-	5.1	-	2.1	4	3	2	-	-	-	6
48	Nara (J)	1.1	-	3.3	4.1	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.1	-	6
49	Dhudhial	-	-	3.2	4.2	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.4	-	6
50	Domeli (S	1.4	-	3.3	4.1	5.1	6.1	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.2	-	6
51	Narar	1.3	-	3.22	4.3	5.3	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	-	-	-	-	-	2	1.1	5.1	-	-
52	Haji Shah	1.4	-	3.1	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	-	-	-	-	4	-	2	1.1	-	-	-
53	Multan Khurd	1.5	-	-	4.1	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	-	5.1	-	-	4	3	2	1.1	-	-	-
54	Dhurnal	1.4	-	3.14	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	3	2	1.1	-	-	-
55	Charh	-	-	3.1	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	5.1	-	-	4	-	2	1.1	-	-	-
56	Domel (J)	1.2	-	3.7	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.3	-	6
57	Daultala	-	2.2	3.10	-	5.3	-	7.2	-	-	-	-	5.1	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	3	2	1.1	5.3	-	6
58	Dhaman	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
59	Dandoot	1.1	2.2	-	4.1	5.1	-	-	-	-	-	10.1	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	3	2	-	-	-	6
60	Wah	-	-	3.1	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	3	2	-	-	-	-
61	Tarlai Kalan	-	-	3.1	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	-	4	3	2	-	-	-	-
62	Thatta	1.3	-	3.4	-	-	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	3	2	1.1	-	-	-
63	Mathal	1.2	-	-	4.2	-	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
64	Sanjwal	-	-	3.2	-	5.2	-	-	-	-	-	-	5.1	-	-	-	-	-	6.1	5.1	-	-	4	3	2	1.1	-	-	-
65	Malak Mala	-	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
66	Saghar	1.2	-	3.9	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.2	-	6
67	Phulgran	-	-	-	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	-	-	-
68	Sarwala	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	-	5.1	-	-	4	3	2	1.1	-	-	-
69	Mureed	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.2	-	6
70	Hameed	1.2	-	3.1	4.1	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	-	5.1	-	-	4	-	2	1	-	-	-
71	D.M.Padshahpur	-	-	-	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	-	-	-	4	-	2	1	-	-	-
72	Ikhlas	1.1	2.1	-	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	5.1	-	6
73	Kandwal	1.2	-	3.2	4.1	5.2	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
74	Tarap Shumali	1.1	-	3.1	-	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	3	2	1.1	-	-	-
75	Malkwal	-	-	3.1	-	5.1	-	-	-	-	-	-	-	-	-	-	-	3.1	-	5.1	-	-	4	3	2	1.1	-	-	-
76	Odherwal	-	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	-	4	3	2	-	-	-	-
77	Makhad	1.1	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.1	-	6
78	Numb Ramal	-	-	3.2	4.2	5.1	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
79	Lethi	1.11	-	-	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	3	2	1.1	-	-	-
80	Sihala	-	2.2	3.4	-	5.1	6.1	-	-	-	-	10.1	-	-	4.1	2.1	-	3.1	6.1	5.1	3.1	-	4	3	2	1.1	-	-	6
81	Rawat	-	-	3.2	-	-	6.2	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	2.1	4	-	2	1.1	5.3	-	6
82	Burhan	1.1	-	3.4	4.2	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	2.1	4	3	2	1.1	5.1	-	6
83	Tamair	-	-	3.1	-	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	-	4	-	2	1.1	-	-	-
84	Jand	1.3	-	3.2	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2	-	-	-	-
85	H.T. Pani	-	-	-	4.2	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
86	Shainh Bagh	-	-	3.1	4.1	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	-	-	4	3	2	-	5.1	-	6
87	Basal	1.3	-	3.4	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.1	-	-
88	Mohra Noor	-	-	3.1	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
89	Jhatla	1.3	-	3.4	-	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.1	-	6
90	Bhoochal Kalan	-	2.1	3.2	-	5.2	-	7.1	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.2	-	6
91	Jalalpur Sharif	1.1	-	3.2	-	5.1	-	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.1	-	6

44	Darkali Mamori	-	-	3.1	-	-	-	-	-	-	-	-	-	-	4	2.1	-	3.1	6	5.1	-	-	4	-	2	-	-	-	-
45	Pachnand	1.3	-	3.16	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	-	4	-	2	-	-	-	-

95	Lilla Bhara	1.5	-	3.5	-	-	6.2	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	3.1	-	4	-	2	-	-	-	-
96	Balkassar	-	-	3.2	4.1	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	-	2	1.1	5.2	-	6
97	Kauntirala	-	2.1	3.1	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	-	6.1	5.1	-	-	4	3	2	-	-	-	6
98	Narali	-	-	3.1	-	5.1	-	-	-	-	-	-	-	-	4.1	-	-	-	6.1	5.1	-	-	4	-	2	-	-	-	-
99	Kot Fateh Khan	-	-	3.2	-	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
100	Pind Sultani	1.2	-	3.5	4.1	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	-	2	1.1	-	-	-
101	Sohan Dehati	-	-	3.2	-	-	-	-	-	-	-	-	-	-	-	2.1	-	-	-	-	-	-	4	3	2	1.1	-	-	-
102	Formali	-	2.1	3.1	-	-	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	5.1	-	-	4	-	2	1.1	-	-	-
103	Khallar Khar	-	2.2	3.2	4.2	5.2	-	7.1	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.2	-	6
104	Haranpur	1.1	-	-	4.1	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	3	2	1.1	-	-	-
105	Aryari	-	-	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
106	Pindi Saidpur	-	-	-	-	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	-	-	6
107	Musa Kadhi	-	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
108	N-T-N-Chab	1.2	-	3.3	-	5.2	-	7.1	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.1	-	6
109	Malhuwali	-	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	-	-	-	-
110	Chingi	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	-	6.1	5.1	-	-	4	-	2	-	-	-	-
111	Lill Bhurwana	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	-	-	-	-	-	4	-	2	-	-	-	-
112	N-T-N-Lakarmar	-	-	3.2	-	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	5.1	-	-
113	Toba	1.1	-	3.1	4.1	5.2	-	-	-	-	-	-	-	3.1	-	-	-	-	6.1	5.1	-	-	4	-	2	-	5.1	-	6
114	Dhaular	1.3	-	3.5	4.2	5.1	6.1	-	-	-	-	-	-	-	4.1	-	-	-	-	5.1	-	-	-	-	-	-	-	-	-
115	Khunda	1.2	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	-	6.1	5.1	-	-	4	-	2	-	5.1	-	6
116	Parhina Neer	-	-	3.3	4.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
117	Shakardara	-	-	3.4	4.2	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	3	2	-	5.1	-	6
118	Kani	1.1	-	3.4	-	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	-	-	-	-	-	2	-	-	-	-
119	Akwal	-	-	-	4.1	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
120	Kharpa	-	-	3.1	-	-	-	-	-	-	-	-	-	3.1	-	2.1	-	-	6.1	5.1	-	-	4	-	-	-	-	-	-
121	Waisa	1.1	-	3.1	-	5.1	-	-	-	-	-	-	-	-	4.1	-	-	-	6.1	5.1	-	-	4	3	2	-	5.2	-	6
122	Qaziabad	-	-	3.2	-	-	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	-	-	-	4	3	2	1.1	-	-	-
123	Padshahan	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	3	2	1.1	5.1	-	6
124	Bahtar	-	-	3.1	4.1	5.1	-	-	-	-	-	-	-	-	4.1	-	-	3.1	-	5.1	-	-	4	3	2	1.1	5.3	-	6
125	Dahgal	-	-	3.1	4.2	-	-	-	-	-	-	-	-	-	4.1	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
126	Dhara Jawa	1.1	-	3.3	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
127	Nala Muslim	-	-	3.2	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	-	-	-	-	-
128	Kasran	-	-	3.1	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	-	6.1	5.1	-	-	4	-	2	1.1	-	-	-
129	Sehti	-	-	-	4.2	-	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	-	-	-	4	-	2	1.1	-	-	-
130	Dewel	-	-	3.1	-	-	-	-	-	-	-	-	-	-	4.1	-	-	-	6.1	5.1	-	-	4	-	2	1.1	-	-	-
131	Kamalpur Musa	-	-	3.1	-	-	6.2	-	-	-	-	-	-	3.1	-	2.1	-	-	-	-	-	-	4	-	2	-	-	-	-
132	Malot Sattian	-	-	3	4	5	-	-	-	-	-	-	-	-	-	2.1	4.1	-	6.1	5.1	-	-	4	-	2	1.1	5.3	-	6
133	Boota	-	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	-	-	-	-
134	Bahalar Top	-	-	3.1	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
135	Kot Gula	-	-	3.1	4.1	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	-	-	-	-	-	-	-	-	-	-
136	Nalhad	1.1	-	3.1	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	-	-	-	-
137	Kahuta	-	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
138	Kirpa	-	-	-	-	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	-	-	-
139	Khurd	-	-	3.2	-	5.1	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	3	-	-	-	-	-

92	Kot Sarang	-	-	-	4	5	-	-	-	-	-	-	-	-	4.1	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
93	Tahi	1.1	-	3.2	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	5.1	-	-	4	-	2	-	-	-	-
94	Dher Mund	-	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.1	5.1	-	-	4	-	2	-	-	-	-

141	Hattar	-	-	-	-	5.2	-	-	-	-	-	-	-	-	-	-	-	3.1	-	5.1	-	-	4	3	2	-	-	-	-
142	Tatral	1.1	-	3.1	4.2	5.1	-	-	-	-	-	-	-	-	-	-	-	3.1	-	5.1	-	-	4	3	2	-	-	-	-
143	Darot	-	-	3.2	4.1	-	-	-	-	-	-	-	-	-	-	-	-	3.1	6.1	-	-	-	4	-	2	-	-	-	-
144	Harcharhar Dhab	1.1	-	3.5	4.1	5.1	-	-	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	4	-	2	-	-	-	-
145	Ahmadal	-	-	3.1	-	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	-	-	-	4	3	2	-	5.1	-	6
146	Pind Begwal	-	-	3.2	4.1	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	-	4	-	2	-	-	-	-
147	Jabbi Shah Dilawr	-	-	3.1	4.1	-	-	-	-	-	-	-	-	-	-	-	-	3.1	6.1	5.1	-	-	-	-	2	1.1	-	-	-
148	Chijjana	-	-	3.2	-	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
149	Bhakri Kalan	-	-	3.1	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	-	-	4	3	2	-	-	-	-
150	Choa Khalisa	-	-	3.2	4.1	5.1	6.1	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.2	-	6
151	Pandoori	-	-	3.2	-	5.1	-	-	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	4	-	2	-	-	-	-
152	N-T-N-Dakhneer	-	-	3.1	-	5.1	-	-	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	4	-	2	1.1	-	-	-
153	Mansar	1.1	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	3.1	-	5.1	-	-	4	-	2	1.1	-	-	-
154	Akhori	-	-	3.2	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	-	-	-
155	Thoa Khalisa	-	-	-	4.1	5.1	6.1	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	-	5.2	-	6
156	Nambal	1.1	-	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.1	5.1	-	-	4	-	2	-	-	-	-
157	Dullah	-	-	3.1	4.1	5.1	-	-	-	-	-	-	-	3.1	-	-	-	-	6.1	5.1	-	-	-	-	-	-	-	-	-
158	Mogla	1.1	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	-	-	-	-	-
159	Manga	-	-	3.2	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
160	Nawshera	-	-	3.3	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
161	Juggian	1.1	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
162	Karsal	-	-	3.2	-	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
163	Fateh Jang	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
164	Bhalomar	-	-	-	4.1	5.1	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	-	-	-	-	-	-	-
165	Shinka	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	-	2	1.1	5.1	-	6
166	Jang	-	-	3.2	-	5.1	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	3	-	-	-	-	-
167	Dharabi	-	-	3.2	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6	5.1	-	-	4	-	2	1.1	-	-	-
168	Nara (K	-	-	3.2	-	-	6.2	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6	5.1	-	-	4	-	-	1.1	5.1	-	6
169	Bhadian	1.1	-	3.2	4.1	-	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	-	-	-	4	3	2	-	-	-	-
170	Bannahl	-	-	3.2	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	-	3	-	-	-	-	-
171	Sureg Salar	-	-	3.5	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
172	Warwal	-	-	3.2	4.1	5.2	-	-	-	-	-	-	-	3.1	-	-	-	-	-	-	-	-	-	3	2	-	-	-	-
173	Manday	-	-	3.2	4.1	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-

Source:- Field Survey 1999-2000

Footnote:-

.1. mean value of number of institutions/centers

0.2 mean number of institutions/centers

Abbreviation:

M	Maktab	H.S.	Higher Secondary School	R.H.	Rural Health Unit	Hos	Hospital	A.O.	Agriculture Office
T	Technical Professional Center	Deg	Degree	B.H.	Basic Health Unit	P.O.	Post Office	C.B.	Commercial Bank
Pri	Primary School	PG	Post Graduate College	F.P.	Family Planning Markaz.	P.S.	Police Station	A.B.	Agriculture Bank
Mid	Middle School	Uni	University	V.H.	Veterinary Hospital	P.C.	Police Chowki	U.S.	Utility Services
High	Secondary School	Dis	Dispensary	V.D.	Veterinary Dispensary	WS	Water Supply	T.W.I	Total Weightage Index

T.O. Telephone Office

140	Chak Khasa	1.1	-	-	4.1	-	-	-	-	9.1	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-

Appendix 9.21 Potohar Region: Average annual growth rate (in %age) of human settlement 1998

Sl. No.	Name of Human Settlement	Population	Population average annual growth rate 1981-98	Sl. No.	Name of Human Settlement	Population	Population average annual growth rate 1981-98
1	Rawalpindi	1409768	3.46	59	Dandoot	9727	2.36
2	Islamabad	529180	5.76	60	Wah	9600	3.85
3	Wah	198891	2.90	61	Tarlai Kalan	9412	5.87
4	Jhelum	147392	1.71	62	Thatta	9264	1.75
5	Chakwal	80508	3.66	63	Mathal	9120	1.20
6	Taxila	71882	2.85	64	Sanjwal	9106	2.21
7	Attock	69729	2.79	65	Malak Mala	9040	2.27
8	Gujar Khan	57099	3.11	66	Saghar	8932	2.61
9	Chaklala	49937	6.86	67	Phulgran	8932	4.22
10	Kamra	39005	11.47	68	Sarwala	8851	3.30
11	Dina	38790	2.95	69	Mureed	8562	1.78
12	Hasanabdal	37976	1.99	70	Hameed	8527	1.74
13	Talagang	37766	3.54	71	Dalwal Mai Padshahpur	8456	1.25
14	Shakrial	34335	10.58	72	Ikhlas	8392	2.51
15	Pindi Gheb	29850	2.22	73	Kandwal	8362	2.18
16	Khewra	27826	2.24	74	Tarap Shumali	8345	3.51
17	Hazro	27426	2.65	75	Malkwal	8336	4.45
18	Kot Hathial	27258	10.40	76	Odherwal	8331	3.34
19	Fateh Jang	25986	3.92	77	Makhad	8251	1.63
20	Lawa	22480	1.43	78	Numb Ramal	8153	1.91
21	Khana Dak (R)	21768	12.20	79	Lethi	8146	2.35
22	Chak Jalal Din	21652	12.98	80	Sihala	8057	3.45
23	Thua Mahuram Khan	21447	2.42	81	Rawat	7966	4.50
24	Murree	21375	2.61	82	Burhan	7944	1.43
25	Kota Kalan	21357	4.96	83	Tamair	7920	1.79
26	Kahuta	19207	4.26	84	Jand	7840	1.56
27	P.D.Khan	18766	2.35	85	Hardo Thanda Pani	7815	5.84
28	Mirza	17854	3.49	86	Shainh Bagh	7797	3.73
29	Jand	17284	1.56	87	Basal	7762	0.52
30	Hummak	16309	9.04	88	Mohra Noor	7718	6.43
31	Morgah	16143	4.13	89	Jhatla	7673	2.46
32	Saeelah	16093	4.11	90	Bhoochal Kalan	7637	2.07
33	Gangal (R)	14965	19.72	91	Jalalpur Sharif	7530	2.26
34	Ghurgushti	14730	1.44	92	Kot Sarang	7503	2.63
35	Tamman	14596	1.66	93	Tahi	7493	2.35
36	Bhaun	13893	1.97	94	Dher Mund	7385	1.86
37	Usman Khattar	13859	1.94	95	Lilla Bhara	7379	2.03
38	Mangala	13848	4.98	96	Balkassar	7364	2.19
39	Choa Saidan Shah	13418	3.56	97	Kauntirala	7363	1.59
40	Pinanwal	12928	2.69	98	Narali	7163	1.92
41	Sohawa	12708	4.08	99	Kot Fateh Khan	7140	1.88
42	Khaur	12565	1.91	100	Pind Sultani	7050	1.71
43	Lakhan Dehati	12199	8.02	101	Sohan Dehati	6951	7.88
44	Darkali Mamori	12112	2.92	102	Formali	6877	2.73
45	Pachnand	11769	2.33	103	Khallar Khar	6859	4.27
46	Charhan	11767	1.88	104	Haranpur	6813	1.74
47	Khana Dak	11500	10.80	105	Aryari	6801	2.60
48	Nara (J	11480	2.42	106	Pindi Saidpur	6750	3.23
49	Dhudhial	11470	2.85	107	Musa Kaderhi	6732	2.11
50	Domeli (S	11242	1.41	108	Nara-Tarf-Nara-Chab	6703	2.03
51	Narar	11210	0.58	109	Malhuwali	6668	2.23
52	Haji Shah	11196	2.94	110	Chingi	6604	1.72
53	Multan Khurd	11131	1.04	111	Lill Bhurwana	6568	1.74
54	Dhurnal	10910	2.23	112	Nara-Tarf-Nara-Lakarmar	6557	2.32
55	Charh	10586	1.66	113	Toba	6541	1.76
56	Domel (J	10561	2.00	114	Dhaular	6540	1.72
57	Daultala	10051	1.35	115	Khunda	6537	1.08
58	Dhaman	9941	13.59	116	Parhina Neer	6514	-1.59

Contd.

Sl. No.	Name of Human Settlement	Population	Population average annual growth rate 1981-98	Sl. No.	Name of Human Settlement	Population	Population average annual growth rate 1981-98
117	Shakardara	6513	2.62	146	Pind Begwal	5370	2.31
118	Kani	6508	2.36	147	Jabbi Shah Dilawr	5358	1.14
119	Akwal	6430	3.38	148	Chijjana	5353	0.47
120	Kharpa	6384	1.79	149	Bhakri Kalan	5341	2.18
121	Waisa	6367	1.85	150	Choa Khalisa	5313	0.69
122	Qaziabad	6312	2.07	151	Pandoori	5302	1.38
123	Padshahan	6303	1.16	152	Nara-Tarf-Nara-Dakhneer	5294	-1.43
124	Bahtar	6302	1.75	153	Mansar	5290	-1.34
125	Dahgal	6278	0.44	154	Akhori	5208	2.46
126	Dhara Jawa	6262	0.83	155	Thoa Khalisa	5207	0.57
127	Nala Muslim	6255	1.53	156	Nambal	5205	0.96
128	Kasran	6100	1.86	157	Dulliah	5201	1.42
129	Sehti	6068	2.26	158	Mogia	5181	2.69
130	Dewel	6034	0.34	159	Manga	5149	6.36
131	Kamalpur Musa	6013	2.59	160	Nawshera	5148	2.03
132	Malot Sattian	5962	-1.69	161	Juggian	5114	23.02
133	Boota	5942	2.24	162	Karsal	5106	1.75
134	Bahalar Top	5915	2.76	163	Fateh Jang	5103	5.29
135	Kot Gula	5884	1.40	164	Bhalomar	5101	1.50
136	Nalhad	5869	1.28	165	Shinka	5094	1.42
137	Kahuta	5860	6.58	166	Jang	5075	2.09
138	Kirpa	5806	1.59	167	Dharabi	5050	1.45
139	Khurd	5751	2.33	168	Nara (K	5041	2.36
140	Chak Khasa	5648	4.69	169	Bhadian	5033	2.98
141	Hattar	5641	1.74	170	Bannahl	5024	0.25
142	Tatral	5582	2.88	171	Sureg Salar	5022	2.76
143	Darot	5498	1.77	172	Warwal	5019	1.56
144	Harcharhar Dhab	5417	1.61	173	Manday	5006	0.10
145	Ahmadal	5384	1.52				

Source:-

1. GOP 1998. District Census Reports Attock, Chakwal, Islamabad, Jhelum and Rawalpindi, Table-39 & 40, Population Census Organization, Islamabad.

2.Field Survey 1999-2000

Grade	Sl. No.	Name of Human Settlement	School						College				Medical facilities							Services								
			M.	T	Pri	Mid.	High	H.S.	Inter.	Deg.	P.G.	Uni.	Hos.	Dis.	R.H.	B.U.	F.P.	V.H.	V.D.	P.O.	Tel.	P.S.	P.C	A.O.	C.B.	A.B.	U.S.	TWI
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
I	1	Rawalpindi	-	6	72	61	148	19	2	26	6	3	8	28	-	-	34	1	-	67	3	15	5	1	147	3	Y	3186
	2	Islamabad	2	13	68	6	31	6	-	28	8	5	8	20	-	-	19	-	-	53	4	8	5	1	146	2	Y	2162
II	3	Wah	-	2	4	3	12	2	1	2	-	-	2	3	-	-	3	-	1	9	1	1	2	-	11	-	Y	286
	4	Jhelum	10	9	20	9	13	-	-	2	1	-	3	3	-	-	3	1	-	9	1	2	3	1	39	2	Y	522
III	5	Chakwal	-	7	14	6	6	-	-	2	-	-	1	3	-	-	2	1	-	1	1	2	2	1	13	2	Y	353
	6	Taxila	-	2	4	2	7	-	1	2	-	1	3	1	-	-	3	1	-	9	2	3	1	1	10	1	Y	257
	7	Attock	-	5	10	3	8	-	-	1	1	-	1	3	-	-	3	1	-	4	1	2	-	1	11	2	Y	266
	8	Gujar Khan	-	3	8	12	5	-	-	2	-	-	1	1	-	-	6	1	-	2	1	1	-	1	12	2	Y	228
IV	9	Chaklala	-	1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
	10	Kamra	-	-	2	-	2	-	-	-	-	-	2	-	1	1	-	-	-	1	1	-	-	-	3	-	Y	72
	11	Dina	-	1	2	2	2	1	1	-	-	-	-	-	1	1	1	-	1	3	1	1	-	1	19	1	Y	282
	12	Hasanabdal	-	1	9	-	2	1	3	-	-	-	1	-	-	-	1	1	-	2	1	2	1	1	7	-	Y	141
	13	Talagang	-	2	19	5	4	-	-	2	-	-	1	1	-	-	1	1	-	1	1	1	-	1	5	1	Y	160
	14	Shakrial	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	Y	32
	15	Pindi Gheb	7	4	7	2	3	-	-	2	-	-	1	1	-	-	1	1	-	1	1	1	-	1	7	2	Y	273
	16	Khewra	4	1	5	2	1	2	-	-	-	-	1	-	1	-	1	-	1	1	1	-	1	1	4	1	Y	111
	17	Hazro	2	1	2	2	2	-	-	2	-	-	1	-	-	-	-	-	1	1	1	1	-	1	6	-	Y	110
	18	Kot Hathial	2	-	2	-	1	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	22
	19	Fateh Jang	3	4	6	1	3	-	-	2	-	-	1	1	-	-	1	1	-	1	1	1	-	1	4	2	Y	133
V	20	Lawa	5	-	25	-	-	2	-	-	-	-	-	-	1	-	1	-	1	1	1	1	-	1	1	-	Y	136
	21	Khana Dak (R)	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Y	16
	22	Chak Jalal Din	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
	23	T.M. Khan	10	-	28	-	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	-	-	1	-	-	129
	24	Murree	-	2	6	4	4	-	2	2	-	-	2	-	-	-	1	1	-	3	1	1	2	1	3	1	Y	185
	25	Kota Kalan	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	15
	26	Kahuta	-	2	2	1	-	2	-	2	-	-	1	1	-	-	1	1	-	2	1	1	-	1	4	2	Y	121
	27	P.D.Khan	8	1	7	1	2	-	-	2	-	-	1	1	-	-	1	1	-	1	1	1	-	1	8	2	Y	155
	28	Mirza	4	-	2	-	2	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-	32
	29	Jand	3	3	5	2	1	1	1	-	-	-	1	-	-	-	1	1	-	1	1	1	-	1	4	1	Y	110
	30	Hummak	1	-	5	-	2	-	-	-	-	-	-	-	1	1	1	-	-	1	1	-	-	-	3	-	Y	67
	31	Morgah	-	-	1	1	2	-	-	-	-	-	1	-	-	-	1	-	-	1	-	-	-	-	1	-	-	39
	32	Saeelah	-	1	1	1	2	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-	Y	35
	33	Gangal (R)	-	-	1	2	1	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	23
	34	Ghurgushti	12	2	4	1	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	1	1	2	-	Y	81
	35	Tamman	2	-	15	-	2	1	-	-	-	-	-	-	1	1	1	-	1	1	1	1	-	1	1	-	-	82
	36	Bhaun	-	-	-	1	2	-	-	-	-	-	-	-	1	-	-	-	1	1	1	-	-	1	1	-	Y	44
	37	Usman Khattar	-	-	1	-	-	1	-	-	-	-	-	-	-	1	1	-	-	1	1	-	-	-	-	-	-	25
	38	Mangala	-	-	1	-	3	-	2	-	-	-	1	-	-	-	1	-	-	3	1	-	1	-	7	-	Y	108
	39	Choa Saidan Shah	1	2	3	1	2	1	1	-	-	-	1	-	-	-	1	1	-	1	1	1	-	1	5	1	Y	110
	40	Pinanwal	1	-	1	2	1	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	-	1	1	-	Y	50
	41	Sohawa	5	3	6	2	2	1	-	1	-	-	1	-	-	-	1	1	-	1	1	1	-	1	4	1	Y	129
	42	Khaur	-	-	2	1	2	-	-	-	-	-	1	-	1	-	1	-	1	1	1	-	-	1	2	-	Y	57
	43	Lakhan Dehati	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
																												Cont.

Appendix 9.22 Potohar Region: Human Settlement functions and infrastructure

	Sl.	Name of Human	School						College				Medical facilities							Services								
	No.	Settlement	M.	T	Pri	Mid.	High	H.S.	Inter.	Deg.	P.G.	Uni.	Hos.	Dis.	R.H.	B.U.	F.P.	V.H.	V.D.	P.O.	Tel.	P.S.	P.C	A.O.	C.B.	A.B.	U.S.	TWI
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
I	1	Rawalpindi	-	6	72	61	148	19	2	26	6	3	8	28	-	-	34	1	-	67	3	15	5	1	147	3	Y	3186
	2	Islamabad	2	13	68	6	31	6	-	28	8	5	8	20	-	-	19	-	-	53	4	8	5	1	146	2	Y	2162
II	3	Wah	-	2	4	3	12	2	1	2	-	-	2	3	-	-	3	-	1	9	1	1	2	-	11	-	Y	286
	4	Jhelum	10	9	20	9	13	-	-	2	1	-	3	3	-	-	3	1	-	9	1	2	3	1	39	2	Y	522
III	5	Chakwal	-	7	14	6	6	-	-	2	-	-	1	3	-	-	2	1	-	1	1	2	2	1	13	2	Y	353
	6	Taxila	-	2	4	2	7	-	1	2	-	1	3	1	-	-	3	1	-	9	2	3	1	1	10	1	Y	257
	7	Attock	-	5	10	3	8	-	-	1	1	-	1	3	-	-	3	1	-	4	1	2	-	1	11	2	Y	266
	8	Gujar Khan	-	3	8	12	5	-	-	2	-	-	1	1	-	-	6	1	-	2	1	1	-	1	12	2	Y	228
IV	9	Chaklala	-	1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
	10	Kamra	-	-	2	-	2	-	-	-	-	-	2	-	1	1	-	-	-	1	1	-	-	-	3	-	Y	72
	11	Dina	-	1	2	2	2	1	1	-	-	-	-	-	1	1	1	-	1	3	1	1	-	1	19	1	Y	282
	12	Hasanabdal	-	1	9	-	2	1	3	-	-	-	1	-	-	-	1	1	-	2	1	2	1	1	7	-	Y	141
	13	Talagang	-	2	19	5	4	-	-	2	-	-	1	1	-	-	1	1	-	1	1	1	-	1	5	1	Y	160
	14	Shakrial	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	Y	32
	15	Pindi Gheb	7	4	7	2	3	-	-	2	-	-	1	1	-	-	1	1	-	1	1	1	-	1	7	2	Y	273
	16	Khewra	4	1	5	2	1	2	-	-	-	-	1	-	1	-	1	-	1	1	1	-	1	1	4	1	Y	111
	17	Hazro	2	1	2	2	2	-	-	2	-	-	1	-	-	-	-	-	1	1	1	1	-	1	6	-	Y	110
	18	Kot Hathial	2	-	2	-	1	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	22
	19	Fateh Jang	3	4	6	1	3	-	-	2	-	-	1	1	-	-	1	1	-	1	1	1	-	1	4	2	Y	133
V	20	Lawa	5	-	25	-	-	2	-	-	-	-	-	-	1	-	1	-	1	1	1	1	-	1	1	-	Y	136
	21	Khana Dak (R)	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Y	16
	22	Chak Jalal Din	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
	23	T.M. Khan	10	-	28	-	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	-	-	1	-	-	129
	24	Murree	-	2	6	4	4	-	2	2	-	-	2	-	-	-	1	1	-	3	1	1	2	1	3	1	Y	185
	25	Kota Kalan	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	15
	26	Kahuta	-	2	2	1	-	2	-	2	-	-	1	1	-	-	1	1	-	2	1	1	-	1	4	2	Y	121
	27	P.D.Khan	8	1	7	1	2	-	-	2	-	-	1	1	-	-	1	1	-	1	1	1	-	1	8	2	Y	155
	28	Mirza	4	-	2	-	2	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-	32
	29	Jand	3	3	5	2	1	1	1	-	-	-	1	-	-	-	1	1	-	1	1	1	-	1	4	1	Y	110
	30	Hummak	1	-	5	-	2	-	-	-	-	-	-	-	1	1	1	-	-	1	1	-	-	-	3	-	Y	67
	31	Morgah	-	-	1	1	2	-	-	-	-	-	1	-	-	-	1	-	-	1	-	-	-	-	1	-	-	39
	32	Saeelah	-	1	1	1	2	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-	Y	35
	33	Gangal (R)	-	-	1	2	1	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	23
	34	Ghurgushti	12	2	4	1	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	1	1	2	-	Y	81
	35	Tamman	2	-	15	-	2	1	-	-	-	-	-	-	1	1	1	-	1	1	1	1	-	1	1	-	-	82
	36	Bhaun	-	-	-	1	2	-	-	-	-	-	-	-	1	-	-	-	1	1	1	-	-	1	1	-	Y	44
	37	Usman Khattar	-	-	1	-	-	1	-	-	-	-	-	-	-	1	1	-	-	1	1	-	-	-	-	-	-	25
	38	Mangala	-	-	1	-	3	-	2	-	-	-	1	-	-	-	1	-	-	3	1	-	1	-	7	-	Y	108
	39	Choa Saidan Shah	1	2	3	1	2	1	1	-	-	-	1	-	-	-	1	1	-	1	1	1	-	1	5	1	Y	110
	40	Pinanwal	1	-	1	2	1	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	-	1	1	-	Y	50
	41	Sohawa	5	3	6	2	2	1	-	1	-	-	1	-	-	-	1	1	-	1	1	1	-	1	4	1	Y	129
	42	Khaur	-	-	2	1	2	-	-	-	-	-	1	-	1	-	1	-	1	1	1	-	-	1	2	-	Y	57
	43	Lakhan Dehati	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
																												Cont.

	44	Darkali Mamori	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	1	-	-	-	-	-	-	8
	45	Pachnand	3	-	16	-	2	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	-	74
	46	Charhan	1	-	20	-	2	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-	79
	47	Khana Dak	-	-	-	1	1	-	-	-	-	-	-	-	1	-	1	-	-	1	-	-	1	-	-	-	Y	28
	48	Nara (J)	1	-	3	1	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	-	1	1	-	Y	56
	49	Dhudhial	-	-	2	2	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	1	-	1	4	-	Y	74
	50	Domeli (S	4	-	3	1	1	1	-	-	-	-	-	-	1	-	1	-	1	1	1	1	-	1	2	-	Y	71
	51	Narar	3	-	22	3	3	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1	1	-	-	107
	52	Haji Shah	4	-	1	-	2	-	-	-	-	-	-	-	1	-	1	-	1	-	-	-	-	1	-	-	-	27
	53	Multan Khurd	5	-	-	1	2	-	-	-	-	-	-	-	1	-	1	-	1	1	-	-	-	1	-	-	-	34
	54	Dhurnal	4	-	14	-	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	-	1	-	-	-	77
	55	Charh	-	-	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-	1	-	-	-	23
	56	Domel (J)	2	-	7	1	1	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	1	3	-	Y	73
	57	Daultala	-	2	10	-	3	-	2	-	-	-	-	1	1	-	1	1	1	1	1	-	1	1	3	-	Y	112
VI	58	Dhaman	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
	59	Dandoot	1	2	-	1	1	-	-	-	-	-	1	-	1	-	-	-	1	1	1	-	-	-	-	-	Y	48
	60	Wah	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	8
	61	Tarlai Kalan	-	-	3	-	2	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	-	-	-	-	30
	62	Thatta	3	-	4	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	1	-	-	-	35
	63	Mathal	2	-	-	2	-	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	1	-	-	-	30
	64	Sanjwal	-	-	2	-	2	-	-	-	-	-	-	1	-	-	-	-	-	1	1	-	-	1	-	-	-	33
	65	Malak Mala	-	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	1	1	1	-	-	1	-	-	-	25
	66	Saghar	2	-	9	-	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	-	1	2	-	Y	76
	67	Phulgran	-	-	-	1	1	-	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-	-	-	-	-	19
	68	Sarwala	-	-	2	-	2	-	-	-	-	-	-	-	1	-	1	-	1	1	-	-	-	1	-	-	-	31
	69	Mureed	-	-	2	-	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	-	1	2	-	Y	53
	70	Hameed	2	-	1	1	2	-	-	-	-	-	-	-	1	-	1	-	1	1	-	-	-	1	-	-	-	34
	71	D.M.Padshahpur	-	-	-	1	2	-	-	-	-	-	-	-	-	1	2	-	1	-	-	-	-	1	-	-	-	25
	72	Ikhlas	1	1	-	1	2	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	1	-	Y	36
	73	Kandwal	2	-	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1	1	1	-	-	1	-	-	-	44
	74	Tarap Shumali	1	-	1	-	1	-	-	-	-	-	-	-	-	1	-	-	1	1	1	-	-	1	-	-	-	27
	75	Malkwal	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	-	-	17
	76	Odherwal	-	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	-	-	-	-	18
	77	Makhad	1	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	1	1	1	1	-	1	1	-	-	40
	78	Numb Ramal	-	-	2	2	1	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	27
	79	Lethi	11	-	-	1	2	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	1	-	-	-	45
	80	Sihala	-	2	4	-	1	1	-	-	-	-	1	-	1	-	1	-	1	1	1	1	-	1	-	-	Y	67
	81	Rawat	-	-	3	-	-	2	-	-	-	-	-	-	1	-	-	-	1	1	1	-	1	1	3	-	Y	63
	82	Burhan	1	-	4	2	1	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	1	1	1	-	Y	51
	83	Tamair	-	-	1	-	1	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	1	-	-	-	20
	84	Jand	3	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13
	85	H.T. Pani	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	11
	86	Shainh Bagh	-	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	Y	33
	87	Basal	3	-	4	-	2	-	-	-	-	-	-	-	-	1	-	-	1	2	1	-	-	1	-	-	-	53
	88	Mohra Noor	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
	89	Jhatla	3	-	4	-	2	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	1	1	-	Y	56
	90	Bhoochal Kalan	-	1	2	-	2	-	1	-	-	-	-	-	1	-	1	-	1	1	1	2	-	1	2	-	Y	65
	91	Jalalpur Sharif	1	-	2	-	1	-	-	-	-	-	-	-	1	-	1	-	1	1	1	1	-	1	1	-	Y	47
	92	Kot Sarang	-	-	-	2	2	-	-	-	-	-	-	-	1	-	1	-	-	1	-	-	-	-	-	-	-	29

93	Tahi	1	-	2	1	2	-	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-	-	-	-	-	31
94	Dher Mund	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	14
95	Lilla Bhara	5	-	5	-	-	2	-	-	-	-	-	-	-	1	1	-	1	1	1	1	-	1	2	-	Y	71
96	Balkassar	-	-	2	1	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	1	-	-	-	Y	48
97	Kauntirala	-	1	1	1	2	-	-	-	-	-	-	-	-	1	1	-	-	1	1	-	-	-	-	-	Y	41
98	Narali	-	-	1	-	1	-	-	-	-	-	-	-	1	-	1	-	-	1	1	-	-	-	-	-	-	25
99	Kot Fateh Khan	-	-	1	-	1	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	1	-	-	-	27
100	Pind Sultani	2	-	5	1	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	1	1	-	-	-	54
101	Sohan Dehati	-	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	8
102	Formali	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-	1	-	-	-	18
103	Khallar Khar	-	2	2	2	2	-	1	-	-	-	1	-	1	-	1	-	1	1	1	-	-	1	2	-	Y	82
104	Haranpur	1	-	-	1	2	-	-	-	-	-	-	-	1	1	1	-	1	1	1	-	-	1	-	-	Y	45
105	Aryari	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
106	Pindi Saidpur	-	-	-	-	2	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	Y	29
107	Musa Kadlthi	-	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	15
108	N-T-N-Chab	2	-	3	-	2	-	1	-	-	-	-	-	1	-	1	-	1	1	1	-	-	1	1	-	Y	67
109	Malhuwali	-	-	2	1	-	-	-	-	-	-	-	-	-	1	-	-	1	1	1	-	-	-	-	-	-	27
110	Chingi	-	-	2	-	2	-	-	-	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	31
111	Lili Bhurwana	-	-	2	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	20
112	N-T-N-Lakarmar	-	-	2	-	1	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	1	-	-	29
113	Toba	1	-	1	1	2	-	-	-	-	-	-	-	-	1	-	-	-	1	1	-	-	-	1	-	Y	43
114	Dhaular	3	-	5	2	1	1	-	-	-	-	-	-	1	-	1	-	-	1	-	-	-	-	-	-	-	48
115	Khunda	2	-	2	-	2	-	-	-	-	-	-	-	1	-	1	-	-	1	1	-	-	-	1	-	Y	46
116	Parhina Neer	-	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17
117	Shakardara	-	-	4	2	-	-	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-	-	1	-	Y	41
118	Kani	1	-	4	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	23
119	Akwal	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
120	Kharpa	-	-	2	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	1	-	-	-	-	-	-	22
121	Waisa	1	-	1	-	1	-	-	-	-	-	-	-	1	-	1	-	-	1	1	-	-	-	2	-	Y	42
122	Qaziabad	-	-	2	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	-	1	-	-	-	15
123	Padshahan	-	-	2	-	2	-	-	-	-	-	-	-	1	-	-	-	1	1	1	-	-	1	3	-	Y	56
124	Bahtar	-	-	1	1	3	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-	1	1	-	Y	46
125	Dahgal	-	-	1	2	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	20
126	Dhara Jawa	1	-	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	13
127	Nala Muslim	-	-	2	1	2	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	-	33
128	Kasran	-	-	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-	1	1	-	-	1	-	-	-	29
129	Sehti	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-	-	15
130	Dewel	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	1	-	-	1	-	-	-	19
131	Kamalpur Musa	-	-	1	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	18
132	Malot Sattian	-	-	2	2	2	-	-	-	-	-	1	-	-	-	1	1	-	1	1	-	-	1	3	-	Y	47
133	Boota	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	-	-	-	-	26
134	Bahalar Top	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
135	Kot Gula	-	-	1	1	1	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	18
136	Nalhad	1	-	1	1	2	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	-	-	-	-	37
137	Kahuta	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
138	Kirpa	-	-	-	-	2	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	-	23
139	Khurd	-	-	2	-	1	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	19
140	Chak Khasa	1	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
141	Hattar	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	18

146	Pind Begwal	-	-	2	1	1	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	-	-	-	-	26
147	Jabbi Shah Dilawr	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	1	-	-	-	22
148	Chijjana	-	-	2	-	1	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	1	-	-	-	23
149	Bhakri Kalan	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	12
150	Choa Khalisa	-	-	2	1	1	1	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	1	2	-	Y	58
151	Pandoori	-	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	15
152	N-T-N-Dakhneer	-	-	1	-	1	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-	-	15
153	Mansar	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	-	-	13
154	Akhori	-	-	2	1	1	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	-	28
155	Thoa Khalisa	-	-	-	1	1	1	-	-	-	-	-	-	-	1	-	-	1	1	1	-	-	-	2	-	Y	48
156	Nambal	1	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	30
157	Dullah	-	-	1	1	2	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	-	-	-	-	28
158	Mogla	1	-	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	26
159	Manga	-	-	2	-	2	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	24
160	Nawshera	-	-	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	17
161	Juggian	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
162	Karsal	-	-	2	-	1	-	-	-	-	-	-	1	-	1	1	-	1	1	1	-	-	1	-	-	-	30
163	Fateh Jang	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
164	Bhalomar	-	-	-	1	1	-	-	-	-	-	-	1	-	1	-	-	-	1	-	-	-	-	-	-	-	17
165	Shinka	-	-	2	-	2	-	-	-	-	-	-	-	1	-	1	-	1	1	1	-	1	1	1	-	Y	50
166	Jang	-	-	2	-	1	-	-	-	-	-	-	1	-	1	-	-	-	1	-	-	-	-	-	-	-	19
167	Dharabi	-	-	2	1	1	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	1	-	-	-	35
168	Nara (K	-	-	2	-	-	2	-	-	-	-	-	-	-	1	1	-	1	1	1	-	-	1	1	-	Y	49
169	Bhadian	1	-	2	1	-	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-	19
170	Bannahl	-	-	2	-	2	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	19
171	Sureg Salar	-	-	5	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	27
172	Warwal	-	-	2	1	2	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	23
173	Manday	-	-	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	25

Source: Field Survey 1999-2000

Abbreviation:

School/Colleges	
M	Maktab
TTC	Technical Training Centre
Pri	Primary
Mid	Middle
High	Secondary School
H.S.	Higher Secondary School
Inter	Inter College
Degree	Graduate College
P.G.	Post Graduate
Uni	University

Medical	
Hos	Hospital
Dis	Dispansary/Health Centre
R.H.C.	Rural Health Centre
B.H.U.	Basic Health Unit
F.P.	Family Planning Flahi/Centre
V.H.	Vet. Hospital
V.D.	Vet. Dispensary

Services	
P.O.	G.P.O./Post/Sub Post Office
T.O.	Telephone Telegraph Exchange Office
P.S.	Police Station
P.C.	Police Chowki/Post
A.O.	Agri Office/Centre
C.B.	Commercial Bank
A.B.	Agricultural Cooperative Bank
U.S.	Utility Store/Centre

Y	Yes
N	No
N.A.	Not Available
T.W.I.	Total Weight Index

143	Darot	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	19
144	Harcharhar Dhab	1	-	5	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	28
145	Ahmadal	-	-	1	-	2	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	Y	29

Appendix-9.23 Potohar Region: Nearest Neighbour Distance Spacing Amongest Four Grades in human Settlement 1998

$$(A) = \sqrt[8]{207}$$

mean = 25.875

Near neighbour distance

$$(B) = \frac{1}{\sqrt[2]{\frac{8}{23160}}}$$

$$= \frac{1}{\sqrt[2]{0.003454}}$$

$$= \frac{1}{2\times 0.003454}$$

$$= \frac{1}{0.371711}$$

$$= 26.90260$$

$$R = \frac{A}{B} = \frac{25.875}{26.9026}$$

R = 0.961802859 Random

II

4th Grade

$$\sqrt[11]{211}$$

A Mean = 19.1818
near neighbour distance

$$B = \frac{1}{\sqrt[2]{23160}}$$

$$= \frac{1}{\sqrt[2]{0.000474956}}$$

$$= \frac{1}{2 \times 0.021793504}$$

$$R = \frac{A}{B} = \frac{19.1818}{22.9426163}$$

R = 0.836077269 Randóm

III

5th

$$A = \sqrt[2]{426.5}$$

mean

near neighbour distance

$$B = \frac{1}{\sqrt[2]{\frac{38}{23160}}}$$

$$= \frac{1}{\sqrt[2]{0.001640759}}$$

$$= \frac{1}{2 \times 0.040506295}$$

$$= \frac{1}{0.081012589}$$

$$= 12.34376055$$

$$R = \frac{19.1818}{22.9426163}$$

R = 0.909204286 Random

IV

6th Grade

$$A = \sqrt[116]{6200}$$

mean = 5.3448

near neighbour distance

$$B = \frac{1}{\sqrt[2]{\frac{116}{23160}}}$$

$$= \frac{1}{\sqrt[2]{\frac{116}{23160}}}$$

$$= \frac{1}{2 \times 0.070771714}$$

$$= \frac{1}{0.141543429}$$

$$= 7.064969438$$

$$R = \frac{5.3448}{7.064969438}$$

$$R = 0.756521319 \text{ Random}$$

Potohar

All Grade

$$A = \sqrt[173]{1464.5}$$

mean = 8.465317919

near neighbour distance

$$B = \frac{1}{\sqrt[2]{\frac{173}{23160}}}$$

$$= \frac{1}{2 \times 0.007469775}$$

$$= \frac{1}{2 \times 0.086427862}$$

$$= \frac{1}{0.172855725}$$

$$= 5.795178122$$

$$R = \frac{8.465318}{5.795178122}$$

$$R = 1.46075198 \text{ Random}$$

Appendix 10.1 Potohar Region: Number of human Settlement services are not available in 1999-2000

Sl. No.	Name of Human Settlement	School						College			Uni.	Medical facilities							Services									
		M.	T	Pri	Mid.	High	H.S.	Inter.	Deg.	P.G.		Hos.	Dis.	R.H.	B.H.	F.P.	V.H.	V.D.	T.O.	P.O.	P.S.	P.C	Elec.	Gas	Wat.	A.O.	C.B.	A.B.	U.S.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Rawalpindi	-	2.6	3.72	4.61	5.148	6.19	7.2	8.26	9.6	10.3	10.8	5.28	-	-	2.34	4.1	-	6.3	5.67	3.15	2.5	4	3	2	1.1	5.147	6.3	6
2	Islamabad	1.2 *	2.13	3.68	4.6	5.31	6.6	-	8.28	9.8	10.5	10.8	5.20	-	-	2.19	-	-	6.4	5.53	3.8	2.5	4	3	2	1.1	5.146	6.2	6
3	Wah	-	2.2	3.4	4.3	5.12	6.2	7.1	8.[illegible]	-	-	10.2	5.3	-	-	2.3	-	3.1	6.1	5.9	3.1	2.2	4	3	2	-	5.11	-	6
4	Jhelum	1.10	2.9	3.20	4.9	5.13	-	-	8.2	9.1	-	10.3	5.3	-	-	2.3	4.1	-	6.1	5.9	3.2	2.3	4	3	2	1.1	5.39	6.2	6
5	Chakwal	-	2.7	3.14	4.6	5.6	-	-	8.2	-	-	10.1	5.3	-	-	2.2	4.1	-	6.1	5.1	3.2	2.2	4	3	2	1.1	5.13	6.2	6
6	Taxila	-	2.2	3.4	4.2	5.7	-	7.1	8.2	-	10.1	10.3	5.1	-	-	2.3	4.1	-	6.2	5.9	3.3	2.1	4	3	2	1.1	5.10	6.1	6
7	Attock	-	2.5	3.10	4.3	5.8	-	-	8.2	9.1	-	10.1	5.3	-	-	2.3	4.1	-	6.1	5.4	3.2	-	4	3	2	1.1	5.11	6.2	6
8	Gujar Khan	-	2.3	3.8	4.12	5.5	-	-	8.1	-	-	10.1	5.1	-	-	2.6	4.1	-	6.1	5.2	3.1	-	4	3	2	1.1	5.12	6.2	6
9	Chaklala	-	2.1	3.2	4.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
10	Kamra	-	-	3.2	-	5.2	-	-	-	-	-	10.2	-	-	4.1	-	-	-	6.1	5.1	-	-	4	3	2	-	5.3	-	6
11	Dina	-	2.1	3.2	4.2	5.2	6.1	7.1	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.3	3.1	-	4	3	2	1.1	5.19	6.1	6
12	Hasanabdal	-	2.1	3.9	-	5.2	6.1	7.3	-	-	-	10.1	-	-	-	2.1	4.1	-	6.1	5.2	3.2	2.1	4	3	2	1.1	5.7	-	6
13	Talagang	-	2.2	3.19	4.5	5.4	-	-	8.2	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.5	6.1	6
14	Shakrial	-	-	3.2	-	5.2	-	-	-	-	-	-	5.1	-	-	-	-	-	-	5.1	-	-	4	3	2	-	-	-	6
15	Pindi Gheb	1.7	2.4	3.7	4.2	5.3	-	-	8.2	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.7	6.2	6
16	Khewra	1.4	2.1	3.5	4.2	5.1	6.2	-	-	-	-	10.1	-	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	-	2	1.1	5.4	6.1	6
17	Hazro	1.2	2.1	3.2	4.2	5.2	-	-	8.2	-	-	10.1	-	-	-	2.1	-	3.1	6.1	5.1	3.1	-	4	3	2	1.1	5.6	-	6
18	Kot Hathial	1.2	-	3.2	-	5.1	-	-	-	-	-	-	-	-	4.1	2.1	-	-	-	-	-	-	4	-	2	-	-	-	-
19	Fateh Jang	1.3	2.4	3.6	4.1	5.3	-	-	8.2	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.4	6.2	6
20	Lawa	1.5	-	3.25	-	-	6.2	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.1	-	6
21	Khana Dak (R)	-	-	3.2	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	6
22	Chak Jalal Din	-	-	3.2	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
23	T.M. Khan	1.10	-	3.28	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	-	2	-	-	-	-
24	Murree	-	2.2	3.6	4.4	5.4	-	7.3	8.2	-	-	10.2	-	-	-	2.1	4.1	-	6.1	5.1	3.1	2.2	4	-	2	1.1	5.1	6.1	6
25	Kota Kalan	-	-	3.2	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	5.3	-	-
26	Kahuta	-	2.2	3.2	4.1	-	6.2	-	8.2	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.1	6.2	6
27	P.D.Khan	1.8	2.1	3.7	4.1	5.2	-	-	8.2	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.4	6.2	6
28	Mirza	1.4	-	3.2	-	5.2	-	-	-	-	-	-	-	-	-	2.1	-	-	-	5.1	-	-	4	3	2	-	5.8	-	-
29	Jand	1.3	2.3	3.5	4.2	5.1	6.1	7.1	-	-	-	10.1	-	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.1	6.1	6
30	Hummak	1.1	-	3.5	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	-	6.1	5.1	-	-	4	3	2	-	5.4	-	6
31	Morgah	-	-	3.1	4.1	5.2	-	-	-	-	-	10.1	-	-	-	2.1	-	-	-	5.1	-	-	4	3	2	-	5.3	-	-
32	Saeelah	-	2.1	3.1	4.1	5.2	-	-	-	-	-	-	-	-	-	2.1	-	3.1	-	5.1	-	-	4	3	2	-	-	-	6
33	Gangal (R)	-	-	3.1	4.2	5.1	-	-	-	-	-	-	-	-	-	2.1	-	-	-	5.1	-	-	4	3	2	-	-	-	-
34	Ghurgushti	1.12	2.2	3.1	4.1	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	3	2	1.1	5.2	-	6
35	Tamman	1.2	-	3.15	-	5.2	6.1	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	3.1	-	4	3	2	1.1	5.1	-	-
36	Bhaun	-	-	-	4.1	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	3	2	1.1	5.1	-	6
37	Usman Khattar	-	-	3.1	-	-	6.1	-	-	-	-	-	-	-	4.1	2.1	-	-	6.1	5.1	-	-	4	3	2	-	-	-	-
38	Mangala	-	-	3.1	-	5.3	-	7.2	-	-	-	10.1	-	-	-	2.1	-	-	6.1	5.1	-	2.1	4	3	2	-	5.7	-	6
39	Choa Saidan Shah	1.1	2.2	3.3	4.1	5.2	6.1	7.1	-	-	-	10.1	-	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.5	6.1	6
40	Pinanwal	1.1	-	3.1	4.2	5.1	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	3	2	1.1	5.2	-	6
41	Sohawa	1.5	2.3	3.6	4.2	5.2	6.1	-	8.1	-	-	10.1	5.1	-	-	2.1	4.1	-	6.1	5.1	3.1	-	4	3	2	1.1	5.4	6.1	6
42	Khaur	-	-	3.2	4.1	5.2	-	-	-	-	-	10.1	-	-	4.1	2.1	-	3.1	6	5.1	-	-	4	3	2	1.1	5.1	-	6
43	Lakhan Dehati	-	-	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-

44	Darkali Mamori	-	-	3.1	-	-	-	-	-	-	-	-	-	-	4	2.1	-	3.1	6	5.1	-	-	4	-	2	-	-	-	-
45	Pachnand	1.3	-	3.16	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	-	4	-	2	-	-	-	-
46	Charhan	1.1	-	3.20	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	-	-	-	4	-	2	-	-	-	-
47	Khana Dak	-	-	-	4.1	5.1	-	-	-	-	-	-	-	-	4.1	2.1	-	-	-	5.1	-	2.1	4	3	2	-	-	-	6
48	Nara (J)	1.1	-	3.3	4.1	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.1	-	6
49	Dhudhial	-	-	3.2	4.2	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.4	-	6
50	Domeli (S	1.4	-	3.3	4.1	5.1	6.1	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.2	-	6
51	Narar	1.3	-	3.22	4.3	5.3	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	-	-	-	-	-	2	1.1	5.1	-	-
52	Haji Shah	1.4	-	3.1	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	-	-	-	-	4	-	2	1.1	-	-	-
53	Multan Khurd	1.5	-	-	4.1	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	-	5.1	-	-	4	3	2	1.1	-	-	-
54	Dhurnal	1.4	-	3.14	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	3	2	1.1	-	-	-
55	Charh	-	-	3.1	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	5.1	-	-	4	-	2	1.1	-	-	-
56	Domel (J)	1.2	-	3.7	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.3	-	6
57	Daultala	-	2.2	3.10	-	5.3	-	7.2	-	-	-	-	5.1	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	3	2	1.1	5.3	-	6
58	Dhaman	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
59	Dandoot	1.1	2.2	-	4.1	5.1	-	-	-	-	-	10.1	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	3	2	-	-	-	6
60	Wah	-	-	3.1	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	3	2	-	-	-	-
61	Tarlai Kalan	-	-	3.1	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	-	4	3	2	-	-	-	-
62	Thatta	1.3	-	3.4	-	-	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	3	2	1.1	-	-	-
63	Mathal	1.2	-	-	4.2	-	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
64	Sanjwal	-	-	3.2	-	5.2	-	-	-	-	-	-	5.1	-	-	-	-	-	6.1	5.1	-	-	4	3	2	1.1	-	-	-
65	Malak Mala	-	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
66	Saghar	1.2	-	3.9	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.2	-	6
67	Phulgran	-	-	-	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	-	-	-
68	Sarwala	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	-	5.1	-	-	4	3	2	1.1	-	-	-
69	Mureed	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.2	-	6
70	Hameed	1.2	-	3.1	4.1	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	-	5.1	-	-	4	-	2	1	-	-	-
71	D.M.Padshahpur	-	-	-	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	-	-	-	4	-	2	1	-	-	-
72	Ikhlas	1.1	2.1	-	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	5.1	-	6
73	Kandwal	1.2	-	3.2	4.1	5.2	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
74	Tarap Shumali	1.1	-	3.1	-	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	3	2	1.1	-	-	-
75	Malkwal	-	-	3.1	-	5.1	-	-	-	-	-	-	-	-	-	-	-	3.1	-	5.1	-	-	4	3	2	1.1	-	-	-
76	Odherwal	-	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	-	4	3	2	-	-	-	-
77	Makhad	1.1	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.1	-	6
78	Numb Ramal	-	-	3.2	4.2	5.1	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
79	Lethi	1.11	-	-	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	3	2	1.1	-	-	-
80	Sihala	-	2.2	3.4	-	5.1	6.1	-	-	-	-	10.1	-	-	4.1	2.1	-	3.1	6.1	5.1	3.1	-	4	3	2	1.1	-	-	6
81	Rawat	-	-	3.2	-	-	6.2	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	2.1	4	-	2	1.1	5.3	-	6
82	Burhan	1.1	-	3.4	4.2	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	2.1	4	3	2	1.1	5.1	-	6
83	Tamair	-	-	3.1	-	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	-	4	-	2	1.1	-	-	-
84	Jand	1.3	-	3.2	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2	-	-	-	-
85	H.T. Pani	-	-	-	4.2	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
86	Shainh Bagh	-	-	3.1	4.1	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	-	-	4	3	2	-	5.1	-	6
87	Basal	1.3	-	3.4	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.1	-	-
88	Mohra Noor	-	-	3.1	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
89	Jhatla	1.3	-	3.4	-	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.1	-	6
90	Bhoochal Kalan	-	2.1	3.2	-	5.2	-	7.1	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.2	-	6
91	Jalalpur Sharif	1.1	-	3.2	-	5.1	-	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.1	-	6

92	Kot Sarang	-	-	-	4	5	-	-	-	-	-	-	-	-	4.1	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
93	Tahi	1.1	-	3.2	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	5.1	-	-	4	-	2	-	-	-	-
94	Dher Mund	-	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.1	5.1	-	-	4	-	2	-	-	-	-
95	Lilla Bhara	1.5	-	3.5	-	-	6.2	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	3.1	-	4	-	2	1.1	5.2	-	6
96	Balkassar	-	-	3.2	4.1	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	-	2	1.1	-	-	6
97	Kauntirala	-	2.1	3.1	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	-	6.1	5.1	-	-	4	3	2	-	-	-	6
98	Narali	-	-	3.1	-	5.1	-	-	-	-	-	-	-	-	4.1	-	-	-	6.1	5.1	-	-	4	-	2	-	-	-	-
99	Kot Fateh Khan	-	-	3.2	-	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
100	Pind Sultani	1.2	-	3.5	4.1	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	-	2	1.1	-	-	-
101	Sohan Dehati	-	-	3.2	-	-	-	-	-	-	-	-	-	-	-	2.1	-	-	-	-	-	-	4	3	2	1.1	-	-	-
102	Formali	-	2.1	3.1	-	-	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	5.1	-	-	4	-	2	1.1	-	-	-
103	Khallar Khar	-	2.2	3.2	4.2	5.2	-	7.1	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.2	-	6
104	Haranpur	1.1	-	-	4.1	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	-	4	3	2	1.1	-	-	-
105	Aryari	-	-	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
106	Pindi Saidpur	-	-	-	-	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	-	-	6
107	Musa Kadhi	-	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
108	N-T-N-Chab	1.2	-	3.3	-	5.2	-	7.1	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.1	-	6
109	Malhuwali	-	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	-	-	-	-
110	Chingi	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	-	6.1	5.1	-	-	4	-	2	-	-	-	-
111	Lill Bhurwana	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	-	-	-	-	-	4	-	2	-	-	-	-
112	N-T-N-Lakarmar	-	-	3.2	-	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	5.1	-	-
113	Toba	1.1	-	3.1	4.1	5.2	-	-	-	-	-	-	-	3.1	-	-	-	-	6.1	5.1	-	-	4	-	2	-	5.1	-	6
114	Dhaular	1.3	-	3.5	4.2	5.1	6.1	-	-	-	-	-	-	-	4.1	-	-	-	-	5.1	-	-	-	-	-	-	-	-	-
115	Khunda	1.2	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	-	6.1	5.1	-	-	4	-	2	-	5.1	-	6
116	Parhina Neer	-	-	3.3	4.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
117	Shakardara	-	-	3.4	4.2	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	3	2	-	5.1	-	6
118	Kani	1.1	-	3.4	-	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	-	-	-	-	-	2	-	-	-	-
119	Akwal	-	-	-	4.1	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
120	Kharpa	-	-	3.1	-	-	-	-	-	-	-	-	-	3.1	-	2.1	-	-	6.1	5.1	-	-	4	-	-	-	-	-	-
121	Waisa	1.1	-	3.1	-	5.1	-	-	-	-	-	-	-	-	4.1	-	-	-	6.1	5.1	-	-	4	3	2	-	5.2	-	6
122	Qaziabad	-	-	3.2	-	-	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	-	-	-	4	3	2	1.1	-	-	-
123	Padshahan	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	-	-	3.1	6.1	5.1	-	-	4	3	2	1.1	5.1	-	6
124	Bahtar	-	-	3.1	4.1	5.1	-	-	-	-	-	-	-	-	4.1	-	-	3.1	-	5.1	-	-	4	3	2	1.1	5.3	-	6
125	Dahgal	-	-	3.1	4.2	-	-	-	-	-	-	-	-	-	4.1	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
126	Dhara Jawa	1.1	-	3.3	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
127	Nala Muslim	-	-	3.2	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	-	-	-	-	-
128	Kasran	-	-	3.1	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	-	6.1	5.1	-	-	4	-	2	1.1	-	-	-
129	Sehti	-	-	-	4.2	-	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	-	-	-	4	-	2	1.1	-	-	-
130	Dewel	-	-	3.1	-	-	-	-	-	-	-	-	-	-	4.1	-	-	-	6.1	5.1	-	-	4	-	2	1.1	-	-	-
131	Kamalpur Musa	-	-	3.1	-	-	6.2	-	-	-	-	-	-	3.1	-	2.1	-	-	-	-	-	-	4	-	2	-	-	-	-
132	Malot Sattian	-	-	3	4	5	-	-	-	-	-	-	-	-	-	2.1	4.1	-	6.1	5.1	-	-	4	-	2	1.1	5.3	-	6
133	Boota	-	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	-	-	-	-
134	Bahalar Top	-	-	3.1	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
135	Kot Gula	-	-	3.1	4.1	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	-	-	-	-	-	-	-	-	-	-
136	Nalhad	1.1	-	3.1	4.1	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	-	-	-	-
137	Kahuta	-	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
138	Kirpa	-	-	-	-	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	-	-	-
139	Khurd	-	-	3.2	-	5.1	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	3	-	-	-	-	-

140	Chak Khasa	1.1	-	-	4.1	-	-	-	-	9.1	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
141	Hattar	-	-	-	-	5.2	-	-	-	-	-	-	-	-	-	-	-	3.1	-	5.1	-	-	4	3	2	-	-	-	-
142	Tatral	1.1	-	3.1	4.2	5.1	-	-	-	-	-	-	-	-	-	-	-	3.1	-	5.1	-	-	4	3	2	-	-	-	-
143	Darot	-	-	3.2	4.1	-	-	-	-	-	-	-	-	-	-	-	-	3.1	6.1	-	-	-	4	-	2	-	-	-	-
144	Harcharhar Dhab	1.1	-	3.5	4.1	5.1	-	-	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	4	-	2	-	-	-	-
145	Ahmadal	-	-	3.1	-	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	-	-	-	-	-	4	3	2	-	5.1	-	6
146	Pind Begwal	-	-	3.2	4.1	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	-	5.1	-	-	4	-	2	-	-	-	-
147	Jabbi Shah Dilawr	-	-	3.1	4.1	-	-	-	-	-	-	-	-	-	-	-	-	3.1	6.1	5.1	-	-	-	-	2	1.1	-	-	-
148	Chijjana	-	-	3.2	-	5.1	-	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
149	Bhakri Kalan	-	-	3.1	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	-	-	4	3	2	-	-	-	-
150	Choa Khalisa	-	-	3.2	4.1	5.1	6.1	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	5.2	-	6
151	Pandoori	-	-	3.2	-	5.1	-	-	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	4	-	2	-	-	-	-
152	N-T-N-Dakhneer	-	-	3.1	-	5.1	-	-	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	4	-	2	1.1	-	-	-
153	Mansar	1.1	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	3.1	-	5.1	-	-	4	-	2	1.1	-	-	-
154	Akhori	-	-	3.2	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	5.1	-	-	4	-	2	-	-	-	-
155	Thoa Khalisa	-	-	-	4.1	5.1	6.1	-	-	-	-	-	-	3.1	-	-	-	3.1	6.1	5.1	-	-	4	-	2	-	5.2	-	6
156	Nambal	1.1	-	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.1	5.1	-	-	4	-	2	-	-	-	-
157	Dullah	-	-	3.1	4.1	5.1	-	-	-	-	-	-	-	3.1	-	-	-	-	6.1	5.1	-	-	-	-	-	-	-	-	-
158	Mogla	1.1	-	3.1	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	-	-	-	-	-
159	Manga	-	-	3.2	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
160	Nawshera	-	-	3.3	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
161	Juggian	1.1	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-
162	Karsal	-	-	3.2	-	5.2	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6.1	5.1	-	-	4	-	2	1.1	-	-	-
163	Fateh Jang	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	-	-	-	-
164	Bhalomar	-	-	-	4.1	5.1	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	-	-	-	-	-	-	-
165	Shinka	-	-	3.2	-	5.2	-	-	-	-	-	-	-	-	4.1	2.1	-	3.1	6.1	5.1	-	2.1	4	-	2	1.1	5.1	-	6
166	Jang	-	-	3.2	-	5.1	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	3	-	-	-	-	-
167	Dharabi	-	-	3.2	4.1	5.1	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6	5.1	-	-	4	-	2	1.1	-	-	-
168	Nara (K	-	-	3.2	-	-	6.2	-	-	-	-	-	-	3.1	-	2.1	-	3.1	6	5.1	-	-	4	-	-	1.1	5.1	-	6
169	Bhadian	1.1	-	3.2	4.1	-	-	-	-	-	-	-	-	3.1	-	2.1	-	3.1	-	-	-	-	4	3	2	-	-	-	-
170	Bannahl	-	-	3.2	-	5.2	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	-	3	-	-	-	-	-
171	Sureg Salar	-	-	3.5	4.1	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-
172	Warwal	-	-	3.2	4.1	5.2	-	-	-	-	-	-	-	3.1	-	-	-	-	-	-	-	-	-	3	2	-	-	-	-
173	Manday	-	-	3.2	4.1	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	-	-	4	-	2	-	-	-	-

Source:- Field Survey 1999-2000

Abbreviation:

M	Maktab	H.S.	Higher Secondary School	R.H.	Rural Health Unit	Hos	Hospital
T	Technical Professional Center	Deg	Degree	B.H.	Basic Health Unit	P.O.	Post Office
Pri	Primary School	PG	Post Graduate College	F.P.	Family Planning Markaz	P.S.	Police Station
Mid	Middle School	Uni	University	V.H.	Veterinary Hospital	P.C.	Police Chowki
High	Secondary School	Dis	Dispensary	V.D.	Veterinary Dispensary	WS	Water Supply

A.O. Agriculture Office T.O. Telephone Office
C.B. Commercial Bank
A.B. Agriculture Bank
U.S. Utility Services
T.W.I Total Weightage Index

Appendix-10.2 Potohar Region: Distance of human Settlement from main Road

Sr. No.	Name of Human Settlement	Distance in Km.	Sr. No.	Name of Human Settlement	Distance in Km.
1	Rawalpindi	0	39	Choa Saidan Shah	0
2	Islamabad	0	40	Pinanwal	0
3	Wah	0	41	Sohawa	0
4	Jhelum	0	42	Khaur	1/2
5	Chakwal	0	43	Lakhan Dehati	3
6	Taxila	0	44	Darkali Mamori	5
7	Attock	0	45	Pachnand	6
8	Gujar Khan	0	46	Charhan	0
9	Chaklala	1/2	47	Khana Dak	1/2
10	Kamra	0	48	Nara (J)	0
11	Dina	0	49	Dhudhial	0
12	Hasanabdal	0	50	Domeli (S	0
13	Talagang	0	51	Narar	1
14	Shakrial	1/2	52	Haji Shah	1
15	Pindi Gheb	0	53	Multan Khurd	8
16	Khewra	0	54	Dhurnal	1
17	Hazro	0	55	Charh	2
18	Kot Hathial	4	56	Domel (J)	6
19	Fateh Jang	0	57	Daultala	0
20	Lawa	12	58	Dhaman	3
21	Khana Dak (R)	1/2	59	Dandoot	3
22	Chak Jalal Din	3	60	Wah	1
23	Thua Mahuram Khan	1/2	61	Tarlai Kalan	1
24	Murree	0	62	Thatta	1/2
25	Kota Kalan .	0	63	Mathal	0
26	Kahuta	0	64	Sanjwal	0
27	P.D.Khan	0	65	Malak Mala	1
28	Mirza	1/2	66	Saghar	6
29	Jand	1/2	67	Phulgran	2
30	Hummak	0	68	Sarwala	1/2
31	Morgah	1/2	69	Mureed	2
32	Saeelah	0	70	Hameed	2
33	Gangal (R)	1/2	71	Dalwal Mai Padshahpur	7
34	Ghurgushti	2	72	Ikhlas	0
35	Tamman	15	73	Kandwal	0
36	Bhaun	1/2	74	Tarap Shumali	3
37	Usman Khattar	1/2	75	Malkwal	0
38	Mangala	3	76	Odherwal	1

Cont.

77	Makhad	10	122	Qaziabad	0
78	Numb Ramal	2	123	Padshahan	1
79	Lethi	2	124	Bahtar	4
80	Sihala	0	125	Dahgal	0
81	Rawat	0	126	Dhara Jawa	1
82	Burhan	0	127	Nala Muslim	1/2
83	Tamair	0	128	Kasran	4
84	Jand	1	129	Sehti	16
85	Hardo Thanda Pani	0	130	Dewel	1/2
86	Shainh Bagh	1/2	131	Kamalpur Musa	0
87	Basal	2	132	Malot Sattian	1
88	Mohra Noor	0	133	Boota	1
89	Jhatla	0	134	Bahalar Top	2
90	Bhoochal Kalan	0	135	Kot Gula	12
91	Jalalpur Sharif	0	136	Nalhad	6
92	Kot Sarang	3	137	Kahuta	1/2
93	Tahi	1	138	Kirpa	4
94	Dher Mund	8	139	Khurd	0
95	Lilla Bhara	0	140	Chak Khasa	0
96	Balkassar	1/2	141	Hattar	1
97	Kauntirala	3	142	Tatral	1
98	Narali	2	143	Dariot	1
99	Kot Fateh Khan	6	144	Harcharhar Dhab	3
100	Pind Sultani	1/2	145	Ahmadal	0
101	Sohan Dehati	1/2	146	Pind Begwal	3
102	Formali	2	147	Jabbi Shah Dilawr	8
103	Khallar Khar	0	148	Chijjana	8
104	Haranpur	1	149	Bhakri Kalan	1
105	Aryari	3	150	Choa Khalisa	1
106	Pindi Saidpur	1	151	Pandoori	1
107	Musa Kaderhi	3	152	Nara-Tarf-Nara-Dakhneer	4
108	Nara-Tarf-Nara-Chab	4	153	Mansar	1
109	Malhuwali	1/2	154	Akhori	1
110	Chingi	0	155	Thoa Khalisa	1
111	Lill Bhurwana	8	156	Nambal	3
112	Nara-Tarf-Nara-Lakarmar	2	157	Dullah	1
113	Toba	1	158	Mogla	10
114	Dhaular	16	159	Manga	3
115	Khunda	3	160	Nawshera	4
116	Parhina Neer	3	161	Juggian	1/2
117	Shakardara	1/2	162	Karsal	8
118	Kani	13	163	Fateh Jang	4
119	Akwal	0	164	Bhalomar	6
120	Kharpa	0	165	Shinka	0
121	Waisa	0	166	Jang	0

Cont.

167	Dharabi	0	171	Sureg Salar	3
168	Nara (K	0	172	Warwal	10
169	Bhadian	4	173	Manday	1/2
170	Bannahl	10			

Source:-

Field Survey 1999-2000.