LEVEL OF SOCIO-ECONOMIC DEVELOPMENT OF HADOTI REGION

A

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Submitted to the

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Geography

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Faculty of Social Science

Submitted by

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I, **Shivani Meena** hereby certify that the research work presented in my Ph.D. thesis entitled **LEVEL OF SOCIO-ECONOMIC DEVELOPMENT OF HADOTI REGION** which is carried out by me under the supervision of **Dr. H.N. Koli** and submitted in the partial fulfillment of the requirement for the award of the degree of Doctor of Philosophy of the University of Kota, represents my ideas in my own words and where others ideas or words have been included in this thesis, I have adequately cited and referenced the original sources.

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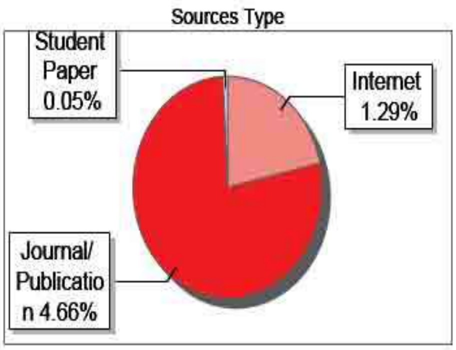

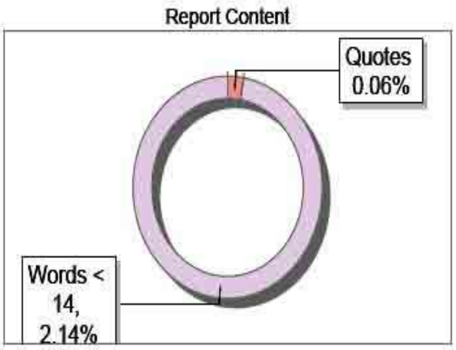

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SHIVANI MEENA

Abstract

Hadoti region geographically, falls in south eastern region of Rajasthan. Hadoti region consists of four (4) districts that are Baran, Bundi, Jhalawar and Kota. All four district comes under Kota division. District collector is head of the district with respect to revenue, law and order matters. District magistrate and district collector is the head of district for administration. For administrative purpose and development district is divided in various subdivisions and tehsils (sub-districts). Baran district has 8 sub-divisions, Bundi district has 5 sub-division Jhalawar district has 7 sub-division and Kota district has 5 sub-division. There is total 25 sub-division in the Hadoti region. This study is conducted on tehsil level 25 tehsils of four districts were selected for the research work. (1) The present study on "Level of Socio – Economic Development of Hadoti Region" is being undertaken with the following objectives that are: (1) To examine the temporal change in the level of development in Hadoti region between 1991 and 2020. (2) To measure the level of social-cultural development at tehsil level. (3) To measure the level of economic development with special reference to agricultural development at tehsil level. (4) To the measure the level of infrastructural development using appropriate indicators at tehsil level. (5) To quantify the level of socio – economic development through composite index of development at the tehsil level. (6) To analyze the existing regional disparities in level of socio – economic development in the Hadoti region. (7) To suggest a suitable strategy for accelerating the overall development of the Hadoti region.

This study has been conducted at the tehsils level. The tehsil level study has been done because of availability of the secondary data. Along with this tehsil can be considered as basic unit of development as it acts as a focal point for a lower level of administrative activities, policy implementation and monitoring in the region. Considering all the facts tehsils level analysis has been done for finding the socio-economic level of development of Hadoti region. For quantifying the level of development at the tehsil level various meaningful indicators has been selected, which are measurable in nature.

In total there are 36 indicators, 16 indicators are related socio-cultural aspects, 11 indicators related to agricultural development and 11 indicators are related to infrastructural development. the study has been done on secondary data and a comparative analysis has been drawn between 1991 and 2020 level of development. So, that both temporal and spatial changes can be observed in depth. Along with this field survey has been done at a village level so, that validity of results from the secondary data can be established, the filed survey was conducted in the year 2023. Primary data was collected from the field through interview schedule, and focused group discussion was done so that more clarity have been established. Primary data was substantiated with the help of self-observation. For the collection of the primary data, stratified random sampling was done.

The level of socio-economic development has been measured with the help of composite index calculated from selected indicators. Coefficient of variance has been calculated of 1991 and 2020 of each indicator so that relative variability can be measured. In order to test the hypothesis T-test has been done. Paired two sample for means has been calculated in order analyse that there is significant difference in level of socio-economic development of 1991 and 2020.

Organization of Study This study has been organised under eight chapters which are summarised below:

Chapter one is introductory chapter which comprises of statement of problem, objective and hypothesis of the study and research methodology.

Chapter two deals in detail about the study area physical settings, administrative setup and land use pattern.

Chapter three is on social-cultural development, which deals with various demographic aspects like growth of population, sex ratio, literacy rate etc. Chapter four is on agricultural development and it is shown with the help of cropping intensity, level of agricultural productivity, existing agricultural inputs and technology, use of HYV seeds etc. Chapter five is on infrastructural development in Hadoti region this chapter consists of Importance of infrastructural development in Hadoti region, existing infrastructural facilities in the region like education, health, water supply, electricity, banking and credit facilities.

Chapter six deals with assessing the socio-economic development through sample survey. In this chapter field survey was conducted and based of field survey results development level was analysed.

Seventh chapter is development correlational matrix which includes composite quotient index and level of socio – economic development of Hadoti region. Based on secondary data of 1991 and 2020, 36 indicators were considered for calculating the development levels. Lastly, correlational matrix has been prepared through which each indicator has been correlated with the composite index value so, that relation of individual variable can be identified and quantified which can help in improving the overall development level of the Hadoti region.

Chapter eight is the last chapter and it is about summary and conclusion which includes major finding of the study and gives the recommendation for the development of the Hadoti region.

Hadoti region of Rajasthan holds very unique position in the state. Considering the study area and its importance in the state, this research work has attempted to quantify the level of socio-economic development of the Hadoti region of the Rajasthan. Through this study the lagging tehsils are identified from the perspective that these lagging tehsils can be pushed forward in development process. The Hadoti region is rich in natural resources and the human capital but both are underutilised. It has been found that development was concentrated round the administrative tehsils and other tehsils of the region were not that developed. Geographical analysis of socio-economic development of a region is very important in reducing region-based disparities within a country and it gives deeper insight in sustainable development of a region. This study will help in regional development in Hadoti region in the coming time followed by polices made by government by keeping the regional perspective in mind while formulation of target specific policy as it well said and interpreted that one size doesn’t fit for the large population which have diversity in terms of social status, religion, economic status of the society. This study gives the explanation and solution to the prevailing problem which has been identified as a research problem. And overall, this will help in making space more balanced with equitable distribution of resource in Hadoti region and at large at country level. Through the approach of regional development, the Hadoti region as well as the country can enter in the age of high mass consumption. It provides the understanding of overall socio-economic development along with its cause and effects in the region. This study will also highlight the indicators which have maximum impact of the development of the region. It will give the insights on the potential underlying the Hadoti region through which development can be speeded up in the state of Rajasthan. This study gives evidence-based results which can be used while formulating policies and strategies in reducing the disparities in the region and development can boosted up along with the inclusive growth and welfare of the individual. The temporal analysis done in study will help in evaluating the trends of development in the region, which in long run act as a benchmark in evaluation of overall progress and effectiveness of the policies implemented for development purpose.

Regional disparities in the level of socio-economic development within the region are very prominent and relatively most developed tehsils are located in the central parts of the region, moderate developed tehsils are found adjacent to the high developed tehsils and low developed tehsils are scattered and majority of them are concentrated in the peripheral part of the region that borders Madhya Pradesh and Tonk district of Rajasthan. All the indicators of socio-economic development are vital in improving the level of development of the Hadoti region. Correlation matrix is very important in understating the relationship between every indicator with composite index of development.

Development is journey towards improving quality of life and increasing standards of living, it can be achieved with blend of modern and traditional knowledge of community. For holistic regional development community participation along with the policy makers is considered very important for the Hadoti region.

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Abbreviation

- % = Percentage
- CT = Census Town
- MM = Millimetre
- SD = Standard Deviation
- CV = Coefficient of Variation
- Sq Km = Square kilometre
- GDP = Gross Domestic Product
- CWPR = Crude Workforce Participation Rate
- HIW = Household Industry Workers
- IMR = Infant Mortality Rate
- GIA = Gross Irrigated Area
- GSA = Gross Sown Area
- HYV = High Yield Varity
- NIA = Net Irrigated Area

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CHAPTER – 1

INTRODUCTION

Studying the variations in the level of development of a specific region is a preliminary approach in the direction of regional development and planning. The current study attempts to show the intra-regional disparities in the level of socio-economic development of the Hadoti region, Rajasthan. Studying physical and culturally homogeneous region will put forward the development prospects ahead for the regional development. In the recent time the concept of balanced regional development has gained popularity in the arena of geography. Level of development is increasing at a very speedy rate in the global sphere. Development is a process along with the journey in achieving wellbeing of the societies, the factors contributing in the development process varies spatially which results is different state and rate of development, this causes regional disparities in the development levels.

Developing countries are currently in a state where level of regional disparities is maximum and this has resulted in global disparities between rich and poor countries. Varying level of regional development can be found in both developed and under-developed counties. Some regions are economically developed whereas some regional are performing well in social indicators, but this creates a divided between social and economic development, this divide can be filled with balanced development in all the contributing factors. Emerging disparities put forward the need to do detailed study of the level of socio-economic development of different regions so that regional imbalance can be removed effectively.

The developed countries have reached to the level where all the inhabitants have been guaranteed with basic level of subsistence, the only challenge which they are facing is that accelerating the level of development of lagging region so that can come in line with the leading regions. Whereas the scenario in the developing countries is very different. Here the challenge is in providing the basic level of subsistence to the inhabitants. This creates a wide gap within the developing counties between developed and under developed regions. Regional disparities result in problems associated with economic and political instability. This makes inescapable for the developing countries to study the socio-economic development.

Hadoti region of Rajasthan holds a very significant position in the state of Rajasthan so, it becomes significant to study the development level of the region. The study has covered in depth all the aspect like physiographic background, demographic profile, socio-cultural development, agricultural development, economic development, infrastructural development. The level of development has been quantified at tehsil level within the region.

1.1. Statement of Problem

India being a developing country we are continuously looking for a suitable model of development for our country which caters all need as per our requirement. India being a vast country with varying diversity each regions development within the country are at different levels. In the recent times, development has become a major concern for policy makers, academicians, bureaucrats etc. Study of development level by different disciple varies greatly. However, the discipline of geography studies regional imbalances with greater depth and it focuses on balanced regional development. The aim of this research work is to analyse the level of development in Hadoti region. Past studies suggests that in early stages of development, imbalanced regional development takes place which exists in advanced stage of development. Due to regional imbalance polarization process takes place, instead of spread effect of development, focal point of growth develops in the region and peripheries shows imbalanced regional growth and in long run this imbalance persists because of circulatory causation process. Development is a process which takes place in stages, change in stages takes place due to structural changes in the society, which shifts the path from low level of development to advanced stages. Development is a process which can not be achieved by all regions at same time because every region in itself is different from other region so, the prerequisite for development of a region will differ from one another. Imbalance regional development is a universal phenomenon. Most advanced and developed countries of world like U.S.A, Japan etc also faces unequal level of regional development. Regional imbalanced growth is a contemporary problem which requires solution-based approach. Similarly, Hadoti region in Rajasthan is such an area which requires attention so that the regional imbalanced growth of a region can be balanced.

The government policies in the past and recent time had tried to solve the problem of regional imbalances, but these policies were partially achieved their target in eliminating disparities. If look entire India big metropolitan cities are so over burden due to which quality of services get deteriorated in these cities, within these cities push factors are so strong, that the place of origin of migration turns into periphery and these region in long run lacks in development. All this cause disparity at the inter-state and intra-district level. Due to lake in decentralised development peripheries always shown imbalanced growth. By keeping all these points in mind Hadoti region is untouched region in Rajasthan which shows variations in different aspect of socio- economic factors of development, which requires priority-based development so that the population of region can develop to their potential and at large region can develop at par with nation.

Due to globalization society has witnessed socio-economic changes and it has resulted in development disparities because diffusion of innovation takes time to spread evenly. Hadoti region is drained majorly with chambal river which forms bad land topography, the region has very unique physiography and the type of problems faced by the people living in this region requires a solution through which proper planning with sustainable development can be undertaken in the region.

1.2. Study Area

V.C. Mishra in 1967 has done geographical regionalisation of Rajasthan based on physiography and relief features. In his book "Geography of Rajasthan". Hadoti region has been categorised by him under the seventh category it was named by him “south-eastern agricultural region”. In 1994, Harimohan Saxena and A.K. Tiwari in their book “Regional Geography of Rajasthan” has given the latest regionalisation of Rajasthan they had divided Rajasthan under four categories that are 1. western sandy plain, 2. Aravalli range and hilly region, 3. Eastern plains, 4. South-eastern Rajasthan plateau (Hadoti region). Hadoti region has been further subdivided into two sub parts that are i. Vindhyan scrapland and ii. Deccan lava plateau. The factors of regionalisation taken by them are physiography, river basin etc and these physiographic division was superimposed on the administrative boundaries to get the regional division of the Rajasthan.

For this particular study the deccan lava plateau has been considered under the Hadoti region which covers four districts that are Baran, Bundi, Kota and Jhalawar. These four districts comprise of 25 tehsils. Along with the physiographic division the administrative division of Rajasthan has been considered. In the administrative division Hadoti region comes under Kota division.

Hadoti region was previously known as the Bundi Kingdom, region got its name from the Hada Rajputs which is clan of Chauhan dynasty. Earlier Meena ruler was ruling over this region afterward the region was conquered by Hada Rajput.

Hadoti region geographically, falls in south eastern region of Rajasthan, which is borderd by Malva plateau on the east, Aravalli range on the west and Marwar region on the south west. The region is drained by Chambal and its tributaries like Kalisindh, Parvati, Chakan. Due to fluvial topography region constitutes alluvial soil. The region is on the windward side of Aravalli rages i.e., on east, it receives good amount of precipitation through south west monsoon.

Region constitutes districts, Bundi, Baran, Kota, Jhalawar and small subdivision of Keshoraipatan situated around twenty – one kilometre from Kota and forty kilometres from Bundi city. On the west of the region, it is surrounded by Mewar region, in northwest of it there is Ajmer district, in the south it is bordered with Malva plateau and on the east Gird region of Madhya Pradesh is bordered. It is Hindi speaking belt within the Rajasthani language with Hadoti dialect, spoken commonly.

The economy of the region is mainly derived out of agriculture, chemical and fertilizer industries in Kota, along with naturally occurring Kota stone. In the recent times Kota has emerged as education hub which is being contribution the region's economy.

Kota district: It is located on the eastern bank of Chambal River. It is third largest city of Rajasthan. Its geographical coordinates are $25^{0}18'$ N $75^{0}83'$ E. It covers 3.63 percentage area of Rajasthan.

Baran district: is located between 24°25' to 25°25' N and 76°12' to 77°26' E. It lies south east of Kota district.

Bundi district: It is situated north east of the region; its geographical coordinates are between latitudes 24°59'11" and 25°53'11" north and longitudes 75°19'30" and 76°19'30" east.

Jhalawar district: It lies on the on edge of Malva plateau, it is the most southernmost district of the Hadoti region. Its geographical coordinated are between 23°45'20" and 24°52'17" north latitudes and 75°27'35" and 76°56'48" east longitudes.

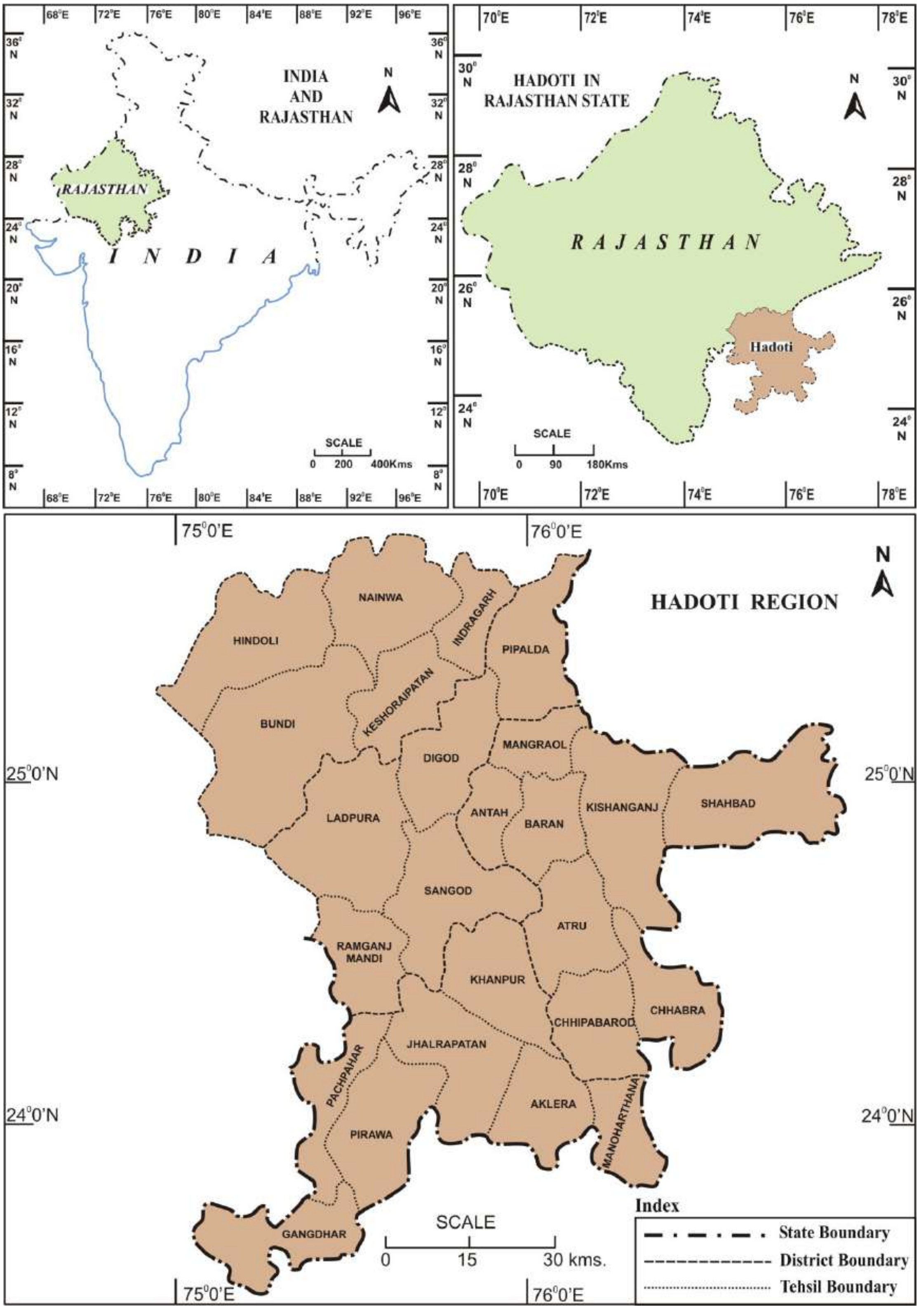
1.3. Literature Review

Level of Socio – Economic Development of Hadoti Region, before proceeding to the further study of on the given title, literature review was done to know how much related work had been done in the given field. Following related literature has been mentioned below:

Regional development and planning, a branch of geography is considered as an important branch which is associated with individual welfare and spatial development by reducing regional inequalities. Different scholars across the world from developed and developing countries have worked on examining and analysing and evaluating the socio-economic dynamics of different regions, they had formulated various techniques, criteria and methods in

MAP-1.1

LOCATION MAP OF HADOTI REGION



order to determine the level of development and disparities. Regional imbalance and inequality have been perceived differently by different schools of thoughts in geography. Neo classical theories on development postulated that inequality and regional imbalance arise due to market imperfection and persistent institutional bottlenecks which causes obstruction in resource mobility. By some scholars it is believed that regional inequality is by product of development. Scholars from developing countries believes that colonial exploitation has shaped the present economy of colonial countries and resulted in regional imbalance on the global scale. Whereas in the recent time geographers focus has been inclined toward to behavioural aspect of the development, this was the outcome of human factor contributing in development apart from economic factors.

Underdevelopment can be understood with the help of two theories that are the modernization theory and the dependency theory. As per modernization theory it is conceptualised that traditional society has undergone changes from backwardness towards development which is reflected in indices such as Gross national product, per capita income, political integration, modern values acceptance by the society. This transformation of the tradition society into modern is the path on which developed countries has moved, and this continuum ends where the ideal situation has been achieved. Fitzerland, F.T. (1981), the notion of modernity has been conceptualised on the basic of capitalist country's social structure. Rostow's schema (1959), he had defined the concept of development as a linear process which individual country goes through. He gave sequential stages to the economic growth. He introduced the idea that poorer countries of the world are poor in some way due to existence of rich countries of the world. He showed that economic changes are associated, sooner or later, with the degree of social changes in the society. Modernization theory has been criticised on the ground that it idealises, development is linear change. However, due to rapid development structural issues arise in the society which hampers the progress of the nation and due to this the growth trajectory of the third world country is different. Another theory is dependency theory, this theory shows the nature of relationship between the third world countries and the industrialised countries. Keith Griffin (1969), third world countries had gone through the negative effects of first world countries. Quijano (1983), the making of third world countries can be understood properly without understanding the imperial dominance as a central theme. This ha created a divide between under developed world and the developed world.

Gunnar Myrdal (1952), introduced the concept of development disparity along with the social welfare in the field of geography. He gave the concept of "circular and cumulative causation". Different scholars gave spatial models which emphasised on the developed and under developed regions, this can be found in the work of A. O. Hirschman, Gunder Frank, J.R. Friedman and F Perroux.

Within India various attempts have been made to quantify the level of development using various indicators, this can be seen in the work of Gupta (1997), Sampath (1977), Sen (1971), Ojha and Bhatt (1964), Lahiri (1969), Mishra (1972), Nair (2004). Sundram (1978-83) has worked on finding the development disparities, by taking fourteen indicators and he used the methods of principal component analysis in finding the level of development. Kundu and Raza (1982), they tried to do in depth analysis of regional dimensions of Indian economy. They analysed regional disparities in terms of agricultural development, industrialization process and space organization. The conclusion derived by them was that regional disparities in agricultural development is witnessed as a consequence of green revolution, public sector's major industrial projects were not successful in stimulating the regional economy; big cities which were considered to give spread effect in their surroundings, were not that successful.

Mitra (1967), he analysed regional disparities in sixties, he showed that disparities in India were not along the ethnic or sub – cultural lines. He also gave example of Europe and America and found that there was nothing like north/south polarization. Dubey (1981), he had studied the process of socio - economic development in Uttar Pradesh, both spatially and sectorally from 1971 – 1981; during this period stance of planning in Uttar Pradesh, as in India, had shifted to regional balance, spatial and distributive justice from macro sectoral approach of economic efficiency. Krishan (1989), he studied about the regional disparities in India. And he found that most of the studies related to regional disparities are done by economists and there are few done by geographers. He showed that prevailing regional disparities in India found its explanation in colonial experience of the country, which caused concentration of development in few favourable pockets resulted in underdevelopment over large neglected areas.Bhalla et al. (2012), they attempt to analyse the factors contributing to regional disparities and growing inter – regional inequalities in India. They concluded that regional disparities and growing regional inequalities has crucial effect on development as well as on democratic and inclusive growth.Sanga et al. (2017), study done regional convergence across 15 major states in India. Showed that high growth rate of the economy as a whole has not led to a similar growth pattern for a region. Concluded that they do not support the neoclassical convergence hypothesis according to which poor region will tend to catch up with the advance regions in future.

Mohanty (2009), research paper shows extensive study on uneven agricultural development in Maharashtra. And showed that rapid agricultural development in western Maharashtra was due to unified political class of peasants whereas in other regions of Maharashtra this social factor was absent resulted in unequal development. Srinivasu et al. (2013), he showed the role of infrastructure on economic growth and development. Infrastructure is prerequisite of development of any economy and to achieve any development targets. According to him infrastructure plays important role in achieving economic growth and thereby contributes to reduction in economic and social inequalities. Cantos et al. (2007), they analysed the role of transport infrastructure of region and sectors and they showed the association of spill over effect of transport infrastructure on economic growth. Aneja et al. (2020), article tried to examine behaviour of various sectors, with emphasis on the role of income inequality in India. Empirical results showed that at the sectoral level disparities decreased in case of primary and tertiary sector whereas it increased in secondary sector. Tertiary and secondary sectors were seen to be more responsible in raising income inequality among the state and primary sector counterbalance this gap. Majumdar (1961), according to him a set of family or common group having common name, and their member occupies the same territory, speaks same language and over serve similar culture, due to which they have developed well assured system of reciprocity and mutuality of obligations.

Dholakia (2003), he tried to examine the trends of regional disparity in India's economic and human development. Also showed the important role of Planning commission and the Finance Commission in economic development. Concluded that economic growth is likely to address the issue of disparities in income and human development rapidly. D. Ray (2010), he suggested that paradigm of economic development rest on the premise of "balanced growth" i.e., all sectors growing over time a country gets richer. He emphasized on macroeconomic models for long term development. Dutta (2013), research article finds out that there is clustering of districts in India in terms of social development outcome. It also showed that spatial autoregressive model indicates the spill over effects on the surrounding areas in terms of social development. And emphasized on the role of policy making to speed up the social development.

Development: Chisholm (1982), has defined development, which is used to signify an evolution of the economic structure accompanying expansion in the total output. He also distinguished between development and modernization; he referred modernization as the social transformation of a nation. Boudeville (1968), he made distinctions on the three concepts i.e., growth, development and progress. He stated that 'Growth' is merely a set of increases in quantities produced, whereas 'Development' is growth along with the favourable change in production techniques and in consumer behaviour, and 'Progress' according to him was defined as a development along with elimination of social tensions between groups within a society. Sen (1999), he defined development's purpose is to enrich human lives, not the richness of the economy which is only one of its parts. He brought human capabilities at the centre and redefined the goal of development from the traditional welfare economics that conflate human welfare. ILO (1957), it has defined development as a process which involves improvement in the quality of life of a weaker sections and greater participation and involvement of the people in decision making in social, economic and cultural aspects of the society. And also emphasized that 'humans' are distinct from material product in process of development. Ghose (2020), he emphasized that development is "growth with employment", and suggested that structural changes in the economy are critically important in the process of development in low – income economies.

Development is perceived differently, economist calls it "development"; Smelser (1966), sociologist terms it "role of differentiation"; David (1965) Political scholars calls it "Modernization"; Epstein (1962) calls it "Cultural Change". Considering social and political change it complicated the economic development process. Escobar (1995) and Ferguson (1990) had emphasised that after 1980s paradigm shift has taken in the way development has been conceptualised. The recent trends in literature have shown that post-modernism idealises development more than the economic growth, whereas earlier it was considered as conventional way of looking development.

Mabogunje (1980), he has pointed out a crucial aspect on his view of development, he found that more recently development has been identified with distributional justice: as a way of reducing poverty level in the region and satisfying the basic needs. The recent dimension added in understanding development is environmental capacity and sustainability, equity, empowerment and sustainable use of resources, knowledge base of human resource, values and governance.

Until 1980s, the literature clearly signifies that "development" was considered linear process which is explained in terms of "capital generation" as per the Neo-Marxist scholars. Behera, D.K. and Pefeer, (1999), Development has also seen as an increased standards of living by fighting poverty and promoting progress in the society. Top-down approach, commonly considered for bridging the gap between have and have not regions. Latter on capitalism was considered as a roadblock to development, it was the major cause of poverty because it only served the interest of capitalist.

Measuring the level of development: Policy formulation for the reduction of regional disparities it becomes very important to have knowledge of existing level of development within the region. The methodology selected for quantifying the development level plays a significant role, which consists of appropriate methods and tools along with the appropriately selected indicators. There is extensive literature available in which various methods used to show development level.

Development has been measured through various methods such as GDP and GNP, these approaches of measuring development particularly focused on monetary indicators which neglects the social indicators of the development. Composite index of development is an approach of measuring development which shows the summary of the social and economic indicators into a single real number. Seers (1969) argued that in early 1970s based on empirical data it was found that outstanding economic growth was noted but there was failure in reduction of poverty. This put forward the need to measure development by taking social indicators into the consideration. Harbison and Myer (1964) proposed composite indicators which were related to human resource development. Later McGranahan et al. (1972) designed an index of socio-economic development which was proposed by United Nations Research Institute for Social Development (UNRISD). Scholars such as Morris (1978), Ram (1982) gave composite index by considering combination of different social and economic indicators. Estes (1984) proposed Index of Social Progress, it was composed of more than forty indicators which were grouped under ten sub-indices that were health, education, women status, demography, economic, environment, cultural diversity, social chaos, defence efforts and welfare efforts. In 1990 with the emergence of Human Development Index, composite indices of development received wider attention and it became more acceptable for calculating the level of development. Anand and Sen (1997) criticised HDI due selective indicators taken for calculating development. It was conceptualised that development is about improving people's lives this put forward way for Millennium Declaration in 2000. It was conceptualized in eight development goals with eighteen targets and quantitative forty-nine indicators.

In India different scholars have studied development by taking various indicators that are economic, social, infrastructural and the physiographic features. They had used varying methods for measuring developmental disparities with the help of principal component analysis, multivariant analysis, ranking and indexing methods. Selection of indicators and methodology has been criticised in different studies. However, in terms of India there are very famous works of different scholars in taking note of regional disparities, it consists of Ashok Mitra(1961), S.K. Rao (1973), Boudhayan Chattopadhyaya and Moonis Raza (1975),A. Kundu (1980), M.N. Pal (1971), B.Das Gupta (1971), N.S. lyenger (1982) and, Hem Lata Rao (1977).

The unit of analysis chosen by the economic is 'state' for finding out the disparities, whereas the geographer's unit of spatial analysis is within the state or sub-regional inequalities for this they do study at 'district' or 'tehsil' or 'block' level. In the present study on the level of socio-economic development tehsil is selected as a spatial unit of analysis.

Based on the existing literature it has been analysed that India has regional imbalance which have been observed based on indicators of development. A. Mathur (1983), the study was on temporal analysis of per capita state domestic product and it was found that there was significant increase in disparities since 1960s. in another study done by V.K.R.V. Rao, it was found that from 1960-61 till 1976-77 gap has widen between highest per capita state domestic product and per capita state domestic product measured at current price. Planning Commission had set up the Task Force on Urban Development and its findings are disparity has increased between 1961 and 1981, the method used for measuring disparity was co-efficient of variation and its vales were 1961 it was 23 percent, 1971 it was 32 percent and in 1981 it was 32 percent. Similarly, inequality index of agricultural productivity (Labour) was 30.59 percent in 1961 and 73 percent in 1981. Many studies have indicated the similar trends of inter-state imbalance which can be looked in the works of R.H. Dholakia (1989) and Mishra and Tiwari (1985). In the work of G.P Mishra and A. Joshi (1985) it was observed that inter-state disparities in terms of socio-economic indicators of development has raised. There is wide literature available which shows inter-state disparities in India has increased over the time.

1.4. Objectives of the Research Work

The present study on "Level of Socio – Economic Development of Hadoti Region" is being undertaken with the following objectives given below:

1. To measure the level of socio-cultural development at tehsil level between 1991 and 2020.
2. To measure the level of economic development with special reference to agricultural development at tehsil level between 1991 and 2020.
3. To the measure the level of infrastructural development using appropriate indicators at tehsil level between 1991 and 2020.
4. To quantify the level of socio – economic development through composite index of development at the tehsil level between 1991 and 2020.

5. To analyze the existing regional disparities in level of socio – economic development in the Hadoti region.
6. To analyse the role of selected indicators in socio-economic development.
7. To suggest a suitable strategy for accelerating the overall development of the Hadoti region.

1.5. Hypotheses

1. Development is a product of improved social, economic and infrastructural facilities in the region.
2. The disparities have been significantly reduced in 2020 with respect to access of various essential services.
3. In 2020 significant improvement was recorded in the underdeveloped tehsils of 1991.
4. The phenomena of distance decay is relevant in considering regional imbalance.

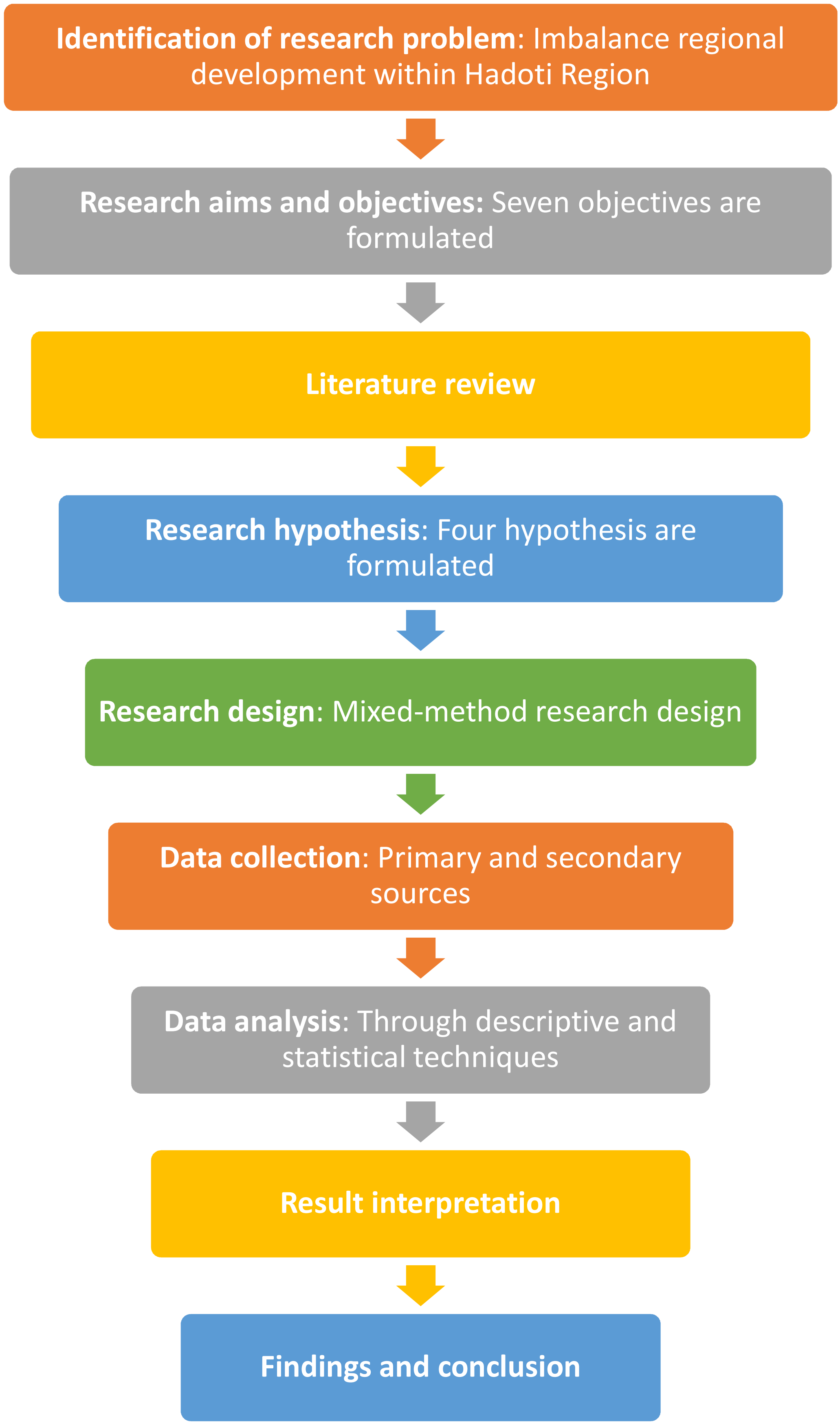
1.6. Research Design and Methodology

The present study has been conducted at the tehsils level. The tehsil level study has been done because of availability of the secondary data. Along with this tehsil can be considered as basic unit of development as it acts as a focal point for a lower level of administrative activities, policy implementation and monitoring in the region. Considering all the facts tehsils level analysis has been done for finding the socio-economic level of development of Hadoti region. In figure 01 the flow of research work undertaken has been shown.

For quantifying the level of development at the tehsil level various meaningful indicators has been selected, which are measurable in nature. In total there are 36 indicators, 16 indicators are related socio-cultural aspects, 11 indicators related to agricultural development and 11 indicators are related to infrastructural development. The list of all the indicators used while calculating the development level has been given in the appendix.

This study has been done on secondary data and a comparative analysis has been drawn between 1991 and 2020 level of development. So, that both temporal and spatial changes can be observed in depth. Along with this field survey has been done at a village level so, that validity of results from the secondary data can be established, the filed survey was conducted in the year 2023.

Figure 01: Flow chart of research design



1.6.1. Data Base:

In this research work both the primary and secondary data are collected. The data used majorly in this study is secondary data from the government sources. The collection of temporal data to analyse the level of development year-wise from 1991 till 2020 was available without any gap year only in Rajasthan: District Outline, so it was kept as main source of data.To substantiate the secondary data, primary survey was conducted so that ground reality can be verified at village level. Following government sources are used while collecting secondary data:

1. State Census Handbooks, 1931-2011
2. District Census Handbook, 1991-2011
3. Statistical abstract of Rajasthan, 1991-2020
4. Directorate of economics and statistics, Rajasthan: District outline, 1991-2022
5. District Brochures, 2019
6. Rajasthan economic review
7. Agricultural statistics at glace
8. Indian Metrological Department
9. Forest Department, Government of Rajasthan
10. Central Ground Water Board, 2022
11. Newspaper 2020 – 2025.

For the geo-spatial representation maps has been used, for this purpose administrative maps of Baran, Bundi, Jhalawar and Kota from Census of India, 2011 was used as a base map. And with the help of the Arc GIS software base maps were geo- referenced and digitized, to get a combined map of Hadoti region.

1.6.2. Sample design

Primary data was collected from the field through interview schedule, and focused group discussion was done so that more clarity have been established. Primary data was substantiated with the help of self-observation. For the collection of the primary data, stratified random sampling was done, whole Hadoti region was divided into strata and these strata were the districts of the region. There are four districts that are: Baran, Bundi, Kota and Jhalawar. These four districts consist of twenty-five tehsils, and from these twenty-five tehsils randomly two villages each were selected. And from each village the households were randomly selected and random sampling was done in the village based on the questionnaire prepared. Size of sample was optimum so, the error during data representation have been minimised.

Table 1.1: Tehsil wise; villages selected for sampling

S.No.	District	Tehsils	Sample Villages	No. of households surveyed
1	Baran	1. Baran	1. Khedli	10
			2. Batwada	10
		2. Kishanganj	1. Rampuriya	10
			2. Hirapur	10
		3. Shahbad	1. Khushiyara	10
			2. Momoni	10
		4. Atru	1. Ummedganj	10
			2. Baldevpura	10
		5. Chhabra	1. Parodiya	10
			2. Godya	10
		6. Chhipabarod	1. Bhagwanpura	10
			2. Kankarda	10
		7. Antah	1. Bamuliya Kala	10
			2. Palaytha	10
		8. Mangrol	1. Mal Bamori	10
			2. Seemlya	10
2	Bundi	1. Hindoli	1. Chatarganj	10
			2. Karkhedi	10
		2. Nainwa	1. Jajawar	10
			2. Diyali	10
		3. Indragarh	1. Makhida	10
			2. Papdi	10
		4. Keshoraipatan	1. Ramganj	10
			2. Deikhera	10
		5. Bundi	1. Ballop Gaon	10
			2. Ramganj Balaji	10

3	Jhalawar	1. Khanpur	1. Chand Kheri	10
			2. Sarola Kalan	10
		2. Jhalrapatan	1. Haripura	10
			2. TeendharRooparel	10
		3. Aklera	1. Ametha	10
			2. Katphala	10
		4. Manoharthana	1. Saredi	10
			2. Udpuriya	10
		5. Panchpahar	1. Mishroli	10
			2. Pagariya	10
		6. Pirawa	1. Hemara	10
			2. Pithakheri	10
		7. Gangdhar	1. Jamuniya	10
			2. Guwalad	10
4	Kota	1.Pipalda	1.Chanda	10
			2. Piplada Khurd	10
		2.Digod	1. Mundla	10
			2. Ummedpura	10
		3. Ladpura	1. Mandana	10
			2. Rasoolpur Kheda	10
		4. Ramganj Mandi	1. Antarliya	10
			2. Julmi	10
		5. Sangod	1. Laxmipura	10
			2. Ghanaheda	10
Total	**4**	**25**	**50**	**500**

1.6.3. Methodology

The methodology taken to conduct this research is based on the theoretical background prepared on the basis of literature review and the available data. Research methodology adopted for this study is a combination of both quantitative and qualitative techniques along with cartographic techniques for geographical analysis.

The level of socio-economic development has been measured with the help of composite index calculated from selected indicators. All the selected indicators were transformed to standardized score/Z-Score and summation of all the indicators Z-Score values has been done and the summation value was divided by total number of indicators in order to get tehsil-wise composite score of development.

Firstly, for determining the level of socio-economic development, the given formula has been used:

$$\mathbf{C_s = \frac{\Sigma Zij}{N}}$$

Where,

C_s is composite score

Zij is Z score of an indicator j in the tehsil

N is total number of components (e.g., indicators related to social, economic, agriculture)

Secondly, Coefficient of variance has been calculated of 1991 and 2020 of each indicator so that relative variability can be measured. Coefficient of variation will help in comparing the data set of 1991 and 2020. Coefficient of variation helps in identifying the consistency and stability of the variables. This statistical measure is helpful in decision making and reaching to the statistical inferences.

Coefficient of variance is calculated with the following formula is used:

$$\text{CV} = \left(\frac{\boldsymbol{\sigma}}{\mu}\right) \mathbf{X\ 100}$$

Where,

Σ is Standard deviation

μ is Population mean

Lastly, Matrix of correlation has been prepared to identify the relationship between composite index of development and the individual indicators. It helped in assessing the degree of dependency of variables on each other and studying cause and effect relationship between them. It depicts the relative movement between the two variables, which is linear in nature.

For calculating the coefficient of correlation Karl Pearson formula is used:

$$\mathbf{r = \frac{\sum(X-\bar{X})(Y-\bar{Y})}{\sqrt{\sum(X-\bar{X})^2}\sqrt{\sum(Y-\bar{Y})^2}}}$$

Where,

$\bar{X}$ is mean of variable X

$\bar{Y}$ is mean of variable Y

r is coefficient of correlation

The above-mentioned methods were applied to the secondary data of 1991 and 2020 which was collected from Directorate of Economics and Statistics, Rajasthan and also applied to the primary data collected during field survey done in 2023.

For the analysis of the statistical results cartographic techniques and various methods of data representation has been used like bar graph, line graph and pie chart are used. And in order to test the hypothesis T-test has been done. Paired two sample for means has been calculated in order analyse that there is significant difference in level of socio-economic development of 1991 and 2020.

1.7. Relevance of Present Study

Geographical analysis of socio-economic development of a region is very important in reducing region-based disparities within a country and it gives deeper insight in sustainable development of a region. This study will help in regional development in Hadoti region in the coming time followed by polices made by government by keeping the regional perspective in mind while formulation of target specific policy as it well said and interpreted that one size doesn't fit for the large population which have diversity in terms of social status, religion, economic status of the society. Welfare of the society and harmonized regional development is very important target in economic policy – making, it is very important to realize a balance between political stability and people's participation in the development of any region.

Study will provide the explanation and solution to the prevailing problem which has been identified as a research problem. And overall, this will help in making space more balanced with equitable distribution of resource in Hadoti region and at large at country level. Through the approach of regional development, the Hadoti region as well as the country can enter in the age of high mass consumption. It will provide the understanding of overall socio-economic development along with its cause and effects in the region. This study will also highlight the indicators which have maximum impact of the development of the region. It will give the insights on the potential underlying the Hadoti region through which development can be speeded up in the state of Rajasthan.

The current study will give evidence-based results which can be used while formulating policies and strategies in reducing the disparities in the region and development can boosted up along with the inclusive growth and welfare of the individual. The temporal analysis done in study will help in evaluating the trends of development in the region, which in long run act as a benchmark in evaluation of overall progress and effectiveness of the policies implemented for development purpose. This study will be a contribution to the existing research pool of the previous work done on regional development and particularly going to add new avenues in development of Hadoti region. And it will enhance the existing work by including geographical dimension to the regional problems. Overall, this study will assist in decision making, allocation of resources, and taking target-oriented intervention for development and improvement of standard of living of the people residing in the Hadoti Region.

1.8. Organization of Study

This research work consists of eight chapters. The first chapter is introductory chapter which comprises of statement of problem, objective and hypothesis of the study and research methodology. Second chapter deals in detail about the study area physical settings, administrative setup and land use pattern. Third chapter is on social-cultural development, which deals with various demographic aspects like growth of population, sex ratio, literacy rate etc. Chapter four is on agricultural development and it is shown with the help of cropping intensity, level of agricultural productivity, existing agricultural inputs and technology, use of HYV seeds etc. Chapter five is on infrastructural development in Hadoti region this chapter consists of Importance of infrastructural development in Hadoti region, existing infrastructural facilities in the region like education, health, water supply, electricity, banking and credit facilities. Chapter six deals with assessing the socio-economic development through sample survey. In this chapter field survey was conducted and based of field survey results development level was analysed. Seventh chapter is development correlation matrix which includes composite quotient index and level of socio – economic development of Hadoti region. Based on secondary data of 1991 and 2020, 36 indicators were considered for calculating the development levels. Lastly, correlation matrix has been prepared through which each indicator has been correlated with the composite index value so, that relation of individual variable can be identified and quantified which can help in improving the overall development level of the Hadoti region. Chapter eight is the last chapter and it is about summary and conclusion which includes major finding of the study and gives the recommendation for the development of the Hadoti region.

CHAPTER – 2

INTRODUCTION TO STUDY AREA

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To carry research work investigation in right direction a deep knowledge of study area is required. The study area makes the work specific. Knowing study area facilitates easy understanding of similarities and variations in different components of physical, socio-economic factors of the area, it will provide the background of the region.

Rajasthan is very well known as 'Land of Kings' or 'Land of Kingdom'. It is the largest state of India with total area of 3,42,239 sq. Kms which is about 10.41% area of India. It is located on the north western part of the country. Its geographical coordinates lies between 23°29' to 30°12' North latitude and 69°30' to 78°17' East latitude. It is bordered by domestic boundaries of Punjab in north, Haryana and Delhi in north-east, Gujarat in south, Madhya Pradesh in south-east, Uttar Pradesh in east and international border of Pakistan on the west. Rajasthan is a landlock state, from geographical aspect it is surrounded by plains of river Ganga and Yamuna in the east, Malwa plateau in the south and the plains of Satluj-Vyas River in north and north-east. Rajasthan has four physiographic divisions which are western sandy plain, Aravalli range & hilly region, eastern plain, south eastern plateau. It is drained majorly by Chambal River system, Mahi River system, Luni River system, Sabarmati River system, Banas River system, Yamuna-Ganga River system and some of the inland rivers.

It has extreme climatic conditions ranging from arid to humid type of climate along with variability in rainfall, 50 cm rainfall isohyet runs parallel to Aravalli ranges and it divides Rajasthan two parts that are less than 50cm rainfall in the western Rajasthan and more than 50 cm rainfall in the eastern Rajasthan. Rajasthan soil belongs majorly to five orders that are aridisols, alfisols, entisols, inceptisols and vertisols. Rajasthan is divided into 7 administrative divisions and 33 districts. Jaipur is the capital of Rajasthan. There are 289 sub division, 314 tehsils, 184 municipalities, 295 panchayat samities, 9894 village panchayats.

2.1. Hadoti Region

Hadoti region was previously known as the Bundi kingdom. Hada Rajput, a clan of Chauhan dynasty was dominant in the region because of Hada Rajputs the region got its name as Hadoti region. Hada Rajputs ruled the region/kingdom after conquering Meena ruler of the region. Currently Hadoti region includes 4 districts that are Baran, Bundi, Jhalawar and Kota. Hadoti region geographically, falls in south eastern region of Rajasthan. Its geographical coordinates are between longitude 75°15'00"E to 77°25'35"E and latitude 23°45'20"N to 25°53'00"N. It is bordered by the Malva plateau on the east, Aravalli range on the west and the Marwar region on the south west. The major river in the region is Chambal River and its tributaries like Kali Sindh, Parvati, Chakan and followed by other small tributaries. Region has fluvial topography, and it is dominated by alluvial soil with the mixture of black soil. The region lies on the windward side of the Aravalli rages i.e., on southeast, it receives good amount of precipitation through south west monsoon. On the west, it is surrounded by Mewar region, in northwest of the region there is Ajmer district, in the south it is bordered with Malva plateau and on the east Gird region of Madhya Pradesh is bordered. The region has predominance of Hindi speaking belt, but Rajasthani language with Hadoti dialect is spoken commonly. The economy of the region is mainly dependent on agriculture, chemical and fertilizer industries, along with naturally occurring Kota stone and other minerals. In the recent time Kota city has emerged as educational hub of India for medical and engineering college entrance exam.

2.2. Administrative Setup

Hadoti region consists of four (4) districts that are Baran, Bundi, Jhalawar and Kota. All four district comes under Kota division. District collector is head of the district with respect to revenue, law and order matters. District magistrate and district collector is the head of district for administration. For administrative purpose and development district is divided in various subdivisions and tehsils (sub-districts). Baran district has 8 sub-divisions, Bundi district has 5 sub-division Jhalawar district has 7 sub-division and Kota district has 5 sub-division. There is total 25 sub-division in the Hadoti region. Each subdivision is headed by the Sub-divisional Officer / Magistrate (SDOs/SDM), these officers take care of implementation of law-and-order matters in their sub-division. In the region it has 25 tehsils headquarter. Baran district has 8 tehsil headquarters, Bundi district has 5 tehsils headquarter, Jhalawar has 7 tehsils headquarter and Kota district has 5 tehsils headquarter. Every respective tehsil has Tehsildars an administrative officer they work in accordance with land record system so, that they can serve rural farmers and land holders and they are also responsible for maintain the revenue matters in their respective tehsils. In the Hadoti region there are total 23 Panchayat samiti. Baran district has 7 Panchayat samiti, Bundi district has 5 Panchayat samiti, Jhalawar district has 6 Panchayat samiti and Kota district has 5 Panchayat samiti. These Panchayat samiti are very important for the purpose of implementation of rural development projects/schemes under Panchayati Raj System. For this purpose, district is divided into Blocks and Block development officer or Gram Vikas Adhikari is the controlling officer of each of the Panchayat samiti.

MAP-2.1


75°0'E
76°0'E
ADMINISTRATIVE SETUP
KOTA DIVISION (HADOTI REGION)
N
NAINWA
INDRAGARH
HINDOLI
PIPALDA
KESHORAIPATAN
Bundi
MANGRAOL
DIGOD
LADPURA
Kota
ANTAH
Baran
KISHANGANJ
SHAHBAD
SANGOD
ATRU
RAMGANJ MANDI
KHANPUR
CHHABRA
CHHIPABAROD
Jhalawar
JHALRAPATAN
PACHPAHAR
AKLERA
MANOHARTHANA
PIRAWA
GANGDHAR
25°0'N
24°0'N
Index
State Boundary
District Boundary
Tehsil Boundary
District HQ.
SCALE
0
15
30 kms.

Table 2.1: Administrative setup of Hadoti Region

S. No.	Name of Panchayat samiti	No. of Gram Panchayat	No. of Villages	Tehsil(s) (No. of Villages)	Census Towns
Baran District					
1	Antah	38	161	Mangrol (79), Antah (82)	
2	Baran	25	92	Baran (92)	
3	Atru	36	143	Atru (143)	Kherliganj (CT), Atru (CT), Kawai (CT)
4	Kishanganj	32	213	Kishanganj (213)	
5	Shahbad	27	236	Shahbad (236)	
6	Chhabra	27	194	Chhabra (194)	
7	Chhipabarod	30	182	Chhipabarod (182)	Chhipabarod (CT)
Bundi District					
1	Hindoli	41	184	Hindoli (184)	
2	Nainwa	34	190	Nainwa (190)	
3	Keshoraipatan	46	232	Indragarh (119), Keshoraipatan (113)	Sumerganj Mandi (CT)
4	Bundi	30	163	Bundi (163)	
5	Talera	30	104	Bundi (104)	Talera (CT), Budhpura (CT)

Jhalawar District					
1	Khanpur	36	206	Khanpur (206),	Khanpur (CT)
2	Bakani	42	32	Jhalrapatan (174), Aklera (152)	Bakani (CT)
3	Jhalrapatan	48	317	Jhalrapatan (216), Pachpahar (101)	
4	Manoharthana	42	308	Aklera (115), Manohar Thana (193)	Manoharthana (CT)
5	Dag	40	231	Pachpahar (40), Gangdhar (191)	Kolvi Mandi Rajendrapur (CT)
6	Pirawa	42	218	Pirawa (218)	
Kota District					
1	Itawa	30	174	Pipalda (174)	
2	Sultanpur	30	171	Digod (171)	
3	Ladpura	21	150	Ladpura (150)	
4	Khairabad	35	161	Ramganj Mandi (161)	Chechat (CT), Modak (CT), Khairabad (CT), Satalkheri (CT), Suket (CT), Kumbhkot (CT)
5	Sangod	36	218	Sangod (218)	
Total	**23**	**799**	**4574**	**25**	**18**

Source: Census of India, 2011

2.3. Geographical location

Table 2.2: Geographical coordinate and Area of Hadoti region

Name	Latitude	Longitude	Geographical area (Sq. Km)
Baran	24°25′N to 25°25′N	76°26′E to 77°25′35″E	6994.61
Bundi	24°59′N to 25°53′N	75°15′E to 76°15′E	5819.38
Jhalawar	23°45′20″N to 24°52′17″N	75°27′35″E to 76°56′48″E	6219.00
Kota	23°56′N to 25°51′N	75°37′E to 76°38′E	5217.00
Hadoti Region (Total)	23°45′20′N to 25°53′00″N	75°15′00″E To 77°25′35″E	24249.99

Source: Directorate of Economic and Statistic, Rajasthan, 2020

2.4. Geomorphology

Hadoti region is a distinct geomorphic region of Rajasthan state. Region is surrounded by Vindhyan hill ranges and malva plateau. In Baran district sedimentary rocks belonging to Vindhyan super group occupy north western part and the Baran district is been divided into rocky upland, pedeplains and alluvial plains. Geological formation of Baran district consists of sandstone, limestone and shale of Bhander group of Vindhyan super group, the basement overkain by Deccan trap basal. At some places a thin alluvial cover is also found.

Bundi district has flat to undulating terrain with small isolated mounds. It is divided into two parts by northeast-southwest trending Vindhyan range. District has topographical gradient from southwest to northeast in southern part of the range and the northern part of the ridge the gradient is generally from west to east. Highest elevation in Bundi district is found in the southern part.

The Jhalawar district lies at the edge of Malwa plateau which has an area of low hills and shallow plains. The district can be categorised under 5 physical divisions that are the Mukundara range, the Hills of Dag, the Plateau region with low rounded hills, Central plains of Pachpahar and Jhalarapatan, and the Plain of Khanpur between two arms of Mukundara. The south Jhalawar has characteristic of the Malwa plateau and it has area of rounded bare hills interspersed by plains. The Jhalawar plain is a wide belt which stretches from Bhawanimandi in the west to Asnawar in the east and it is bounded by Mukundara hills in the northern, eastern and southern side.

Physiographically, Kota district has undulating topography with gentle plains, it can be categorized as rugged topography. Slopes from south to north. In the south of the district there is 145 km long Mukundara range of Vindhayn hills. Maximum hill height is in village Borabas in Ladpura block and minimum hill height is found at Khatoli in Itawa block.

Table 2.3: Geomorphologic units, their description and distribution in Hadoti region

Origin	Landform Unit	Description
Denudational	Buried Pediment	Pediment covers essentially with relatively thicker alluvial, colluvial or weathered materials. Pediment
	Pediment	Broad gently sloping rock flooring, erosional surface of low relief between hill and plain, comprised of varied lithology, criss-crossed by fractures and faults.
Fluvial	Alluvial Fan	A fan shaped mass of sediment deposit at a point along a Nallah, river where there is a decrease in gradient. Alluvial Plain
	Alluvial Plain	Mainly undulating landscape formed due to fluvial activity, comprising of gravels, sand, silt and clay. Terrain mainly undulating, produced by extensive deposition of alluvium. Valley Fill
	Valley fill	Formed by fluvial activity, usually at lower topographic locations, comprising of boulders, cobbles, pebbles, gravels, sand, silt and clay. The unit has consolidated sediment deposits. Ravine

	Ravine	Small, narrow, deep, depression, smaller than gorges, larger than gulley, usually carved by running water.
Structural	Plateau	Formed over varying lithology with extensive, flat, landscapes, bordered by escarpment on all sides. Essentially formed horizontally layered rocky marked by extensive flat top and steep slopes. It may be criss crossed by lineament.
	Denudational, Structural Hill, Linear Ridge	Steep sided, relict hills undergone denudation, comprising of varying lithology with joints, fractures and lineaments. Linear to arcuate hills showing definite trend-lines with varying lithology associated with folding, faulting etc. Long narrow low-lying ridge usually barren, having high run off may form over varying lithology with controlled strike.

Source: District Brochures Baran, Bundi, Jhalawar, Kota, 2019

2.5. Geology

Southern part of the Baran district constitutes of basaltic flow and about 16% area of Baran district is covering Chhabra and Chhipabarod blocks. North eastern part of district with Anta, Atru, Baran, Kishanganj and Shahbad block has sandstone, limestone and shale of lower Bhander group with makes 84% of area of the district. The exposed rocks are part of meta-sedimentaries belonging to Vindhyan super group which is overlain by Deccan basal and quaternary alluviam.

Geologically, the rock formation of Bundi district in upper part that is in northeast - southwest belongs to Bhilwara super group and lower part of the district belongs to Vindhyan super group In the Bhilwara Super Group rocks of Hindoli, Mangalwar & Jahajpur Groups are exposed on the surface. Vindhyan sedimentary sequences have occupied north-eastern to southern part of the Bundi district. These are categorized as upper Vindhyan Super Group (100-600 million year) and it is separated from Bhilwara Super Group by a major reverse fault known as Great Boundary Fault. The Groups of Vindhyan Super Group i.e., Kaimur, Rewa & Bhander and their formations are well exposed in the district on the upper surface.

Table 2.4: General stratigraphic succession found in Hadoti region

Era	Group	Sub-group	Lithology
Recent	---	---	Alluvium and soil
Upper Cretaceous to Palaeocene	---	Deccan traps	Basaltic flows with intertrappean be
Upper Vindhyan	Bhander group	Lower Bhander sandstone	Sandstone with shale intercalation
		Bhander limestone	Impure argillaceous stromatolitic limestone
		Ganurgarh shale	Variegated shale
Vindhyan	Upper Bhander	Upper Bhander shale, Balwan Limestone, Maihar Sandstone	
	Lower Bhander	Sirbu shale, Lower Bhander sandstone, Samaria shale, Lower Bhander limestone, Ganugarhshal	
	Rewa	Govindgarh sandstone, Jhiri shale, Indergarh sandstone, Panna shale	
	Kaimur	Kaimur sandstone, Badanpur conglomerate	
	Khorip	Shale	
……….x…………………x…Unconformity…x…………………..x….........			
		Acid & Basic intrusives	
	Jhazpur	Dolomite, ferruginous, chert, carbonaceous, phyllite, ferruginous phyllites with thin band of conglomerate, gritty quartzite & quartzite	
Bhilwara	Hindoli & Mangalwar complex	Shale, phyllite, mica schist, quartzite, dolomites, limestone, amphibolites, calc-silicates & quartzite	

Source: Central Ground Water Board, 2022

Geological Framework of Jhalawar district is underlain by rocks of Vindhyan super group and Deccan traps. Around 60% of the district is covered by Deccan traps. The Vindhyans category comprises of lower and upper Vindhyans which is represented by Jhalrapatan sandstone, Suket shale and limestone, Kaimur sandstone, Rewa shale, sandstone and conglomerate, Ganugarh shales, whereas in lower Bhander sandstone and limestone. The Vindhyan sandstone and shale form linear hills from north west to south east. These hills are exposed around Jhalawar town and to its north east and north west. These rocks in the district are overlain by twelve basaltic flows. Near Dag and Kolvi, the flows have undergone wide spread laterization. Both fossiliferous and non-fossiliferous clay, chert, limestone beds are also present in the area. The entire region of Dag, Pirawa, Manoharthana and parts of Bakani and Jhalrapatan blocks are covered by Deccan traps. The northern part of the Jhalawar district consists of Khanpur block is occupied by sandstone and limestone of lower Bhander group. The hill ranges comprising of shale, sandstone and conglomerates belong to Rewa and Kaimur groups of upper Vindhyan. Semri group belonging to Lower Vindhyan group is exposed in parts of Jhalrapatan block.

Geologically, Kota district consists of Vindhyan super group which forms the part of Great Vindhyan basin. FurtherVindhyan Super Group is divided into Khorip, Kaimur, Rewa and Bhander Groups comprising Sandstones, Shales and Limestone. 70% of the area in the district is of Bhander group. Deccan trap formation is found in the southern part of the district which consists of Khairabad block. Rewa and Kaimur group of rock are found in small patches in Khairabad, Sangod and Ladpura block.

2.6. Physical Setting

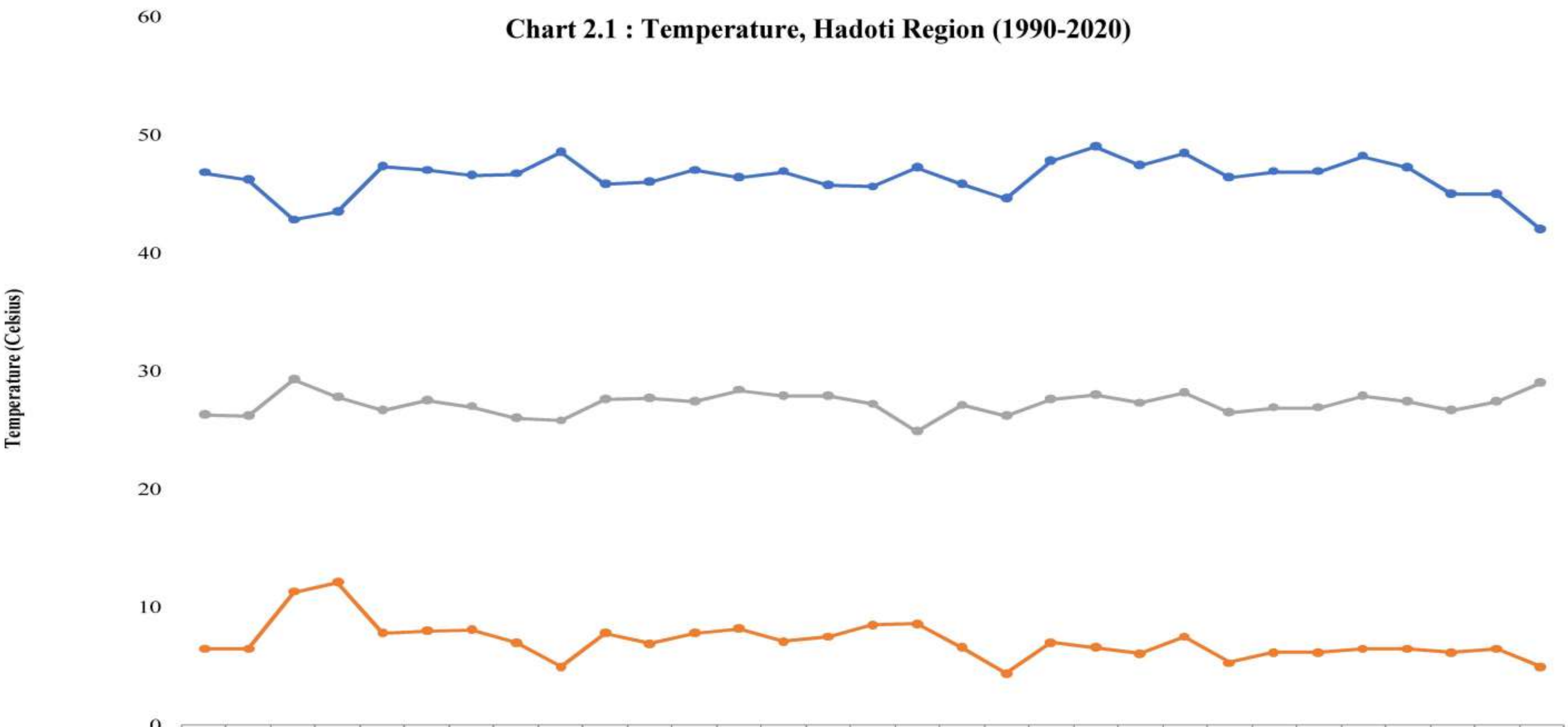
Physical geography of Hadoti region has been discussed under the sub-headings of temperature and humidity, rainfall, drainage, soil type and vegetation.

2.6.1. Temperature and Humidity

The temperature data of Hadoti region has been analysed from 1990-2020, as per the data the average annual temperature was recorded 27.24° Celsius. The period between 2000-2010 it was recorded 27.26° Celsius and between the period of 2010-2020 average temperature was 27.42° Celsius. Which shows that there is slight increase in the average annual temperature. Generally, region has very hot summers dry and winters are very cold.

The average relative humidity between the period of 1990-2020 has been recorded 47.44%.

Chart 2.1 : Temperature, Hadoti Region (1990-2020)

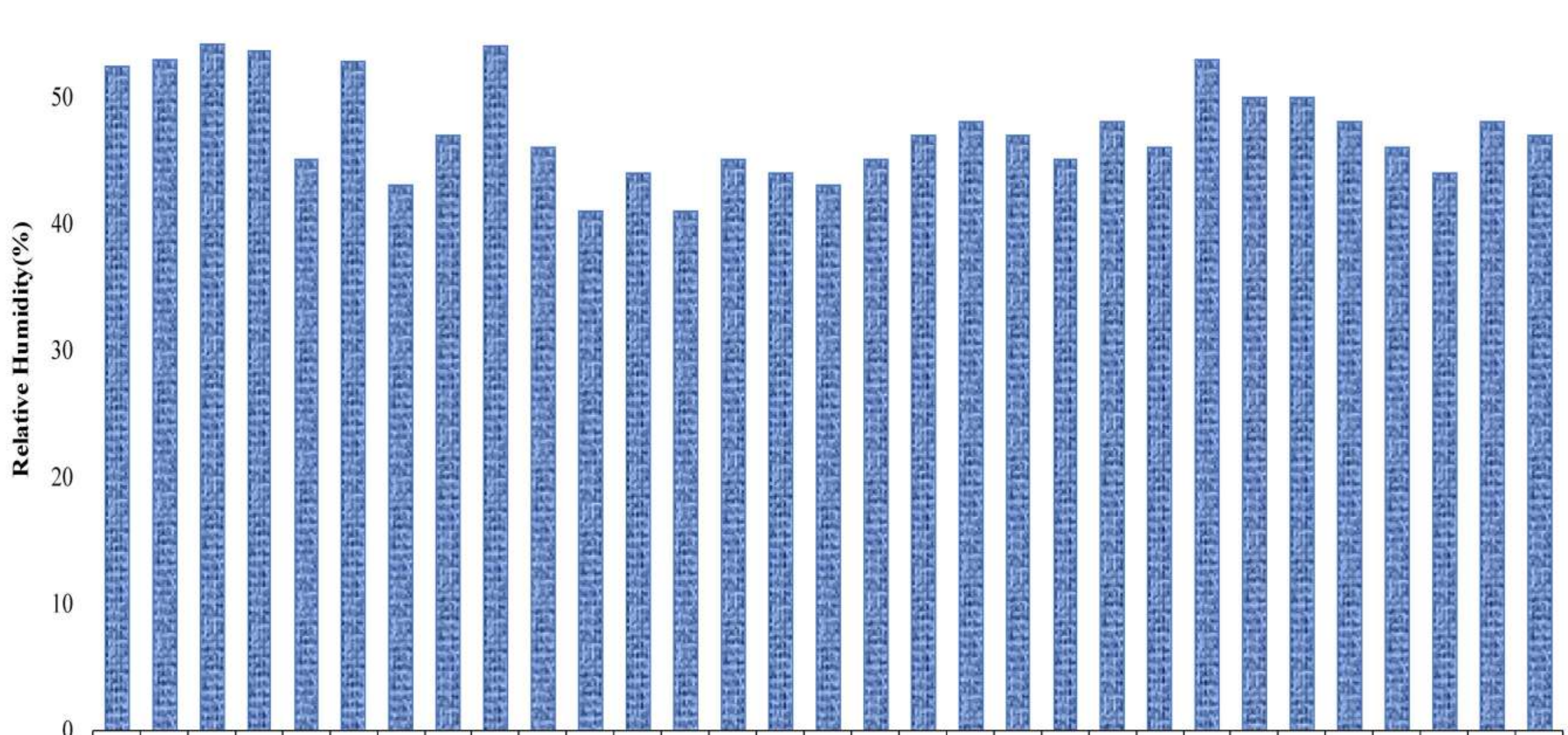


	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Maximum Temprature	46.8	46.2	42.8	43.5	47.3	47	46.6	46.7	48.5	45.8	46	47	46.4	46.9	45.7	45.6
Minimum Temprature	6.5	6.5	11.3	12.1	7.8	8.0	8.1	7.0	5.0	7.8	6.9	7.8	8.2	7.1	7.5	8.5
Average Temprature	26.3	26.2	29.3	27.8	26.7	27.5	27	26	25.8	27.6	27.7	27.4	28.4	27.9	27.9	27.2

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Maximum Temprature	47.2	45.8	44.6	47.8	49	47.4	48.4	46.4	46.9	46.9	48.2	47.2	45	45	42
Minimum Temprature	8.6	6.6	4.4	7.0	6.6	6.1	7.5	5.3	6.2	6.2	6.5	6.5	6.2	6.5	5.0
Average Temprature	24.9	27.1	26.2	27.6	28	27.3	28.2	26.5	26.9	26.9	27.9	27.4	26.7	27.4	29

Source : Indian Metrological Department

Chart 2.2 : Relative Humidity, Hadoti Region (1990-2020)



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Humidity	52.4	52.9	54.1	53.6	45	52.8	43	47	54	46	41	44	41	45	44	43	45	47	48	47	45	48	46	53	50	50	48	46	44	48	47

Years

Source : Indian Metrological Department

2.6.2. Rainfall

Hadoti region falls on south-eastern part of Rajasthan, which is on the windward side of the Aravalli ranges so, it receives fair amount of rainfall. The data of rainfall in Hadoti region has been analysed from 1970 till 2020. From statistical calculation it can be derived that rainfall is not highly inconsistent within the region but district wise it can be observed that rainfall is erratic. The normal annual rainfall in the Hadoti region is being recorded as 821.2 mm. the rainfall in the region starts from July and last till September. In the past ten years i.e., from 2010-2020 the average annual rainfall has increased in the region.

Baran district comes under the arid to semi-arid type of climatic zone according to the meteorological classification given by India Meteorological Department. The normal annual average rainfall for the district between 1970 - 2020 is 894.12 mm. However, the annual average rainfall recorded between the period 2000 – 2011 has been 707 mm and from 2011 to 2020 average annual rainfall was recorded 1083.98 mm.

The normal average annual rainfall in the Bundi district is 681.3mm. Since 1973 till 2020, it was observed that the distribution of rainfall is quite uniform in the district except for Indergarh block where the average annual rainfall of 50 years is higher than other blocks. The amount of rainfall received by the district is fairly good. District average annual rainfall is 681.3mm.

Average annual rainfall between 1970-2020 recorded in the Jhalawar district 934.5mm. The western part of the district has lesser rains than the eastern part of the district. However, the annual average rainfall recorded between the period 2000–2011 has been 792.22 mm and from 2011 to 2020 average annual rainfall was recorded 1104.07 mm.

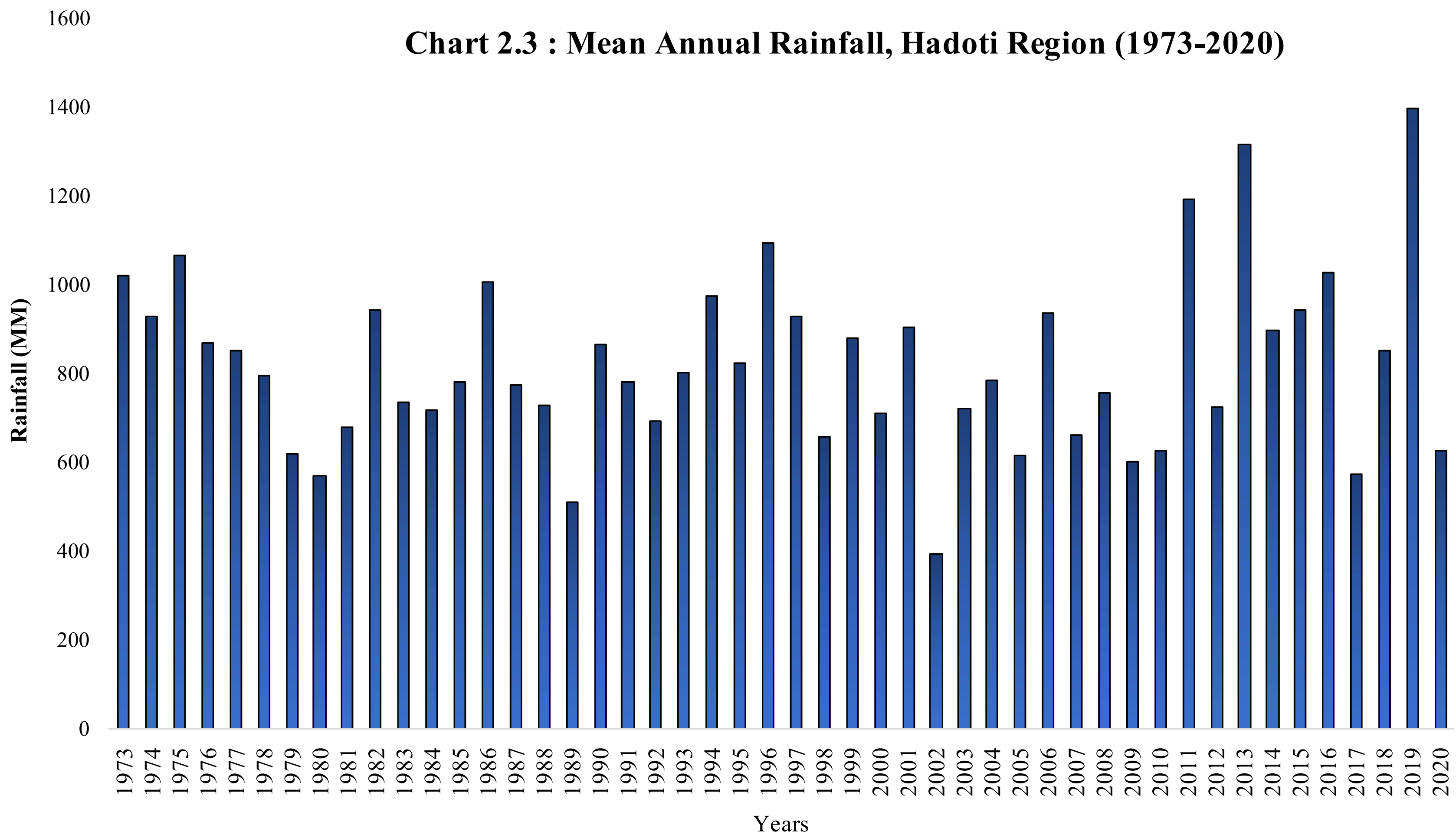
Average annual rainfall in the Kota district for the period 1970-2020 is 777.34 mm. However, average annual rainfall for the period 2001 to 2011 is 746.64 mm and from 2011 to 2020 average annual rainfall was recorded 875.5626 mm.

Table 2.5: Results of statistical analysis of rainfall data for the period (1970-2020)

Parameters	Baran	Bundi	Jhalawar	Kota	Hadoti
Mean Rainfall (mm)	894.13	677.60	935.72	777.35	821.2
Standard Deviation (SD)	243.68	176	253.42	197.09	37.03
Coefficient of Variation (CV%)	27.25	25.97	27.08	25.35	4.51

Source: Indian Metrological Department

Chart 2.3 : Mean Annual Rainfall, Hadoti Region (1973-2020)



Source : Indian Metrological Department

2.6.3. Drainage

The Hadoti region falls in river Chambal basin and the region is being drained by perennial Chambal River along with its tributaries.

The rivers and the streams of the Baran district belong to the Chambal River system. The rivers in the district drain through undulating plain that slopes from southeast to northwest.

In Bundi district Chambal is the most prominent River and there are some important small tributaries like Dungari, Bhimlat, Mej, Bajian, Sugll and Kupalet.

The rivers and streams of the entire Jhalawar district belong to the Chambal system. Except in the Gangdhar tehsil, the general flow of the river is from south to north. The rivers of Jhalawar district can be divided into two groups: the western group and eastern group. The western rivers consist of Ahu, Piplaj, Kyasri, Kantli, Rawa, Kalisindh and Chandrabhaga. The eastern rivers constitute of Parwan, Andheri, Newaj, Ghar and Ujar. Here rivers have deep bed with the result the water level is below that of the surrounding area. Drainage density in most part of the Jhalawar district varies from 0.5 to 0.7 km/km2. Drainage density lie between 0.7 to more than1km/km2 in the south-eastern and south-western parts of the district. In the north central part of the district, drainage density is low and ranges between 0.3 to 0.5 km/km^2.

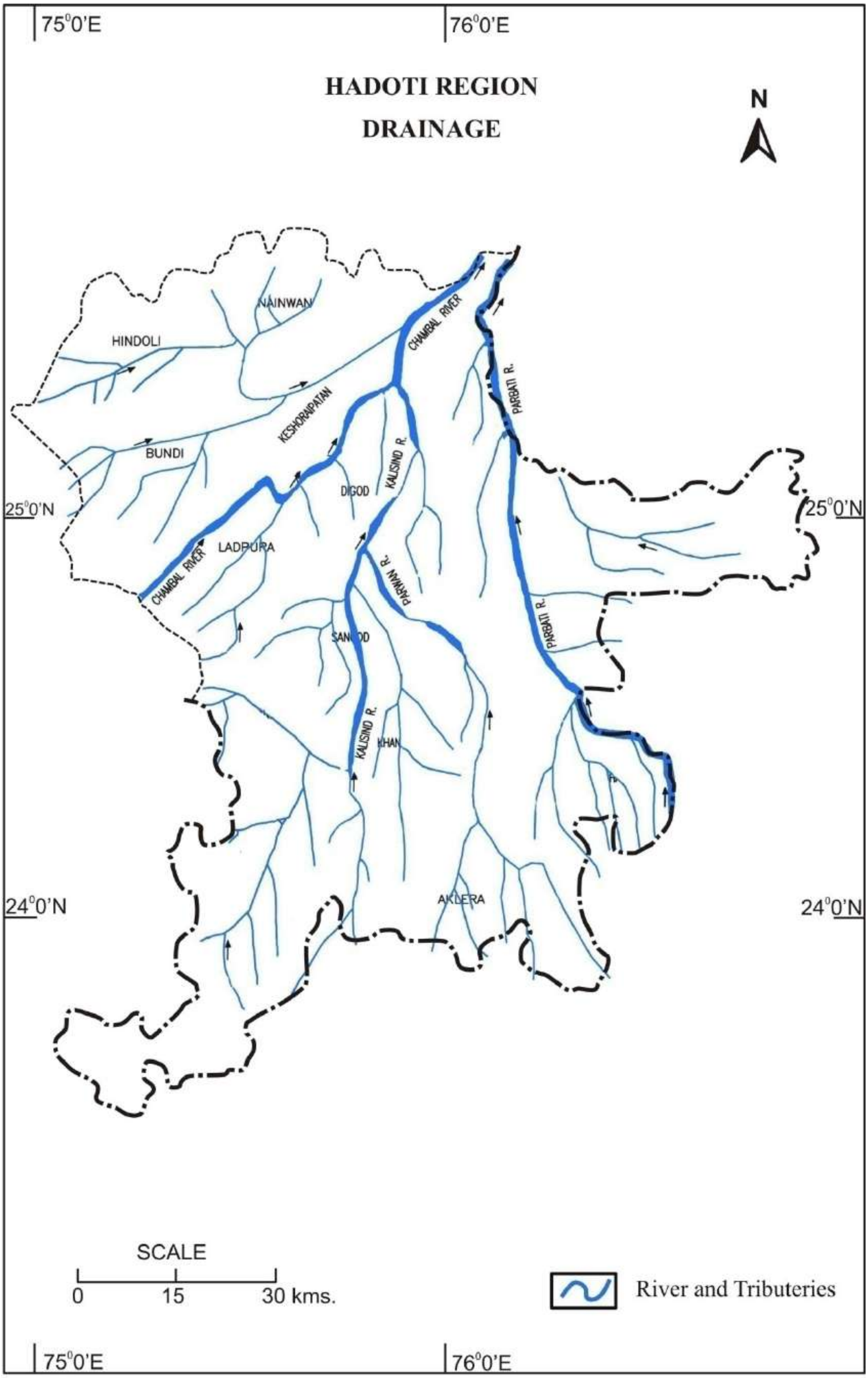
In Kota district also Chambal River is the major river. The land slopes from south to north and it is drained by the river Chambal and its tributaries. The Chambal River runs through rugged topography with undulating plains. Chambal is the major perennial river in the district. Its tributaries are Kalisindh, Parvan and Parvati, which are also perennial in nature.

Table 2.6 : River wise Ravine Area in Hadoti region

S.No.	Name of river	Area in hectare	District covered
1.	Chambal	130000	Kota, Bundi
2.	Kalisindh	40000	Kota
3.	Parvati	40000	Kota
4.	Parwan	20000	Kota
5.	Alnia	5000	Kota
6.	Talera	14000	Bundi
7.	Ghora Pachhar	14000	Bundi
8.	Mangli	20000	Bundi
9.	Moj	30000	Bundi
Total (Hadoti)		**313000**	

Source: Forest Department, Government of Rajasthan

MAP-2.2


75°0'E
76°0'E
HADOTI REGION
DRAINAGE
N
NAINWAN
HINDOLI
CHAMBAL RIVER
KESHORAIPATAN
BUNDI
PARBATI R.
KALISIND R.
DIGOD
25°0'N
LADPURA
CHAMBAL RIVER
PARWAN R.
SANGOD
PARBATI R.
KALISIND R.
KHAN
AKLERA
24°0'N
SCALE
0
15
30 kms.
River and Tributeries
75°0'E
76°0'E

2.6.4. Soil

There are mixed variety of soil category can be found in the Hadoti region. In Baran district majority soil is alluvial in nature which are generally non-calcareous. Soils colour varies from dark brown to black, which is mainly found in plains. Black Kachri soils are found in Baran and Mangrol tehsils which is highly fertile. In the southern and eastern part of the district red gravelly loam hilly soils are found.

In Bundi district five types of soils are found that are lithosol and regosols of hills which covers 21.74% area of the district in parts of Talera, Hindoli and Nainwa. Yellowish – brown soils of foot hills with 16.14% area of the district in parts of Hindoli and Nainwa. Recent alluvium with 33.26% area of district n parts of Talera, and Keshoraipatan. Brown soils-saline phase it covers 13.99% area of the district it is found parts of Hindoli and Nainwa. Lastly Black soils covers 14.87% area of bundi district and it is found in parts of Talera.

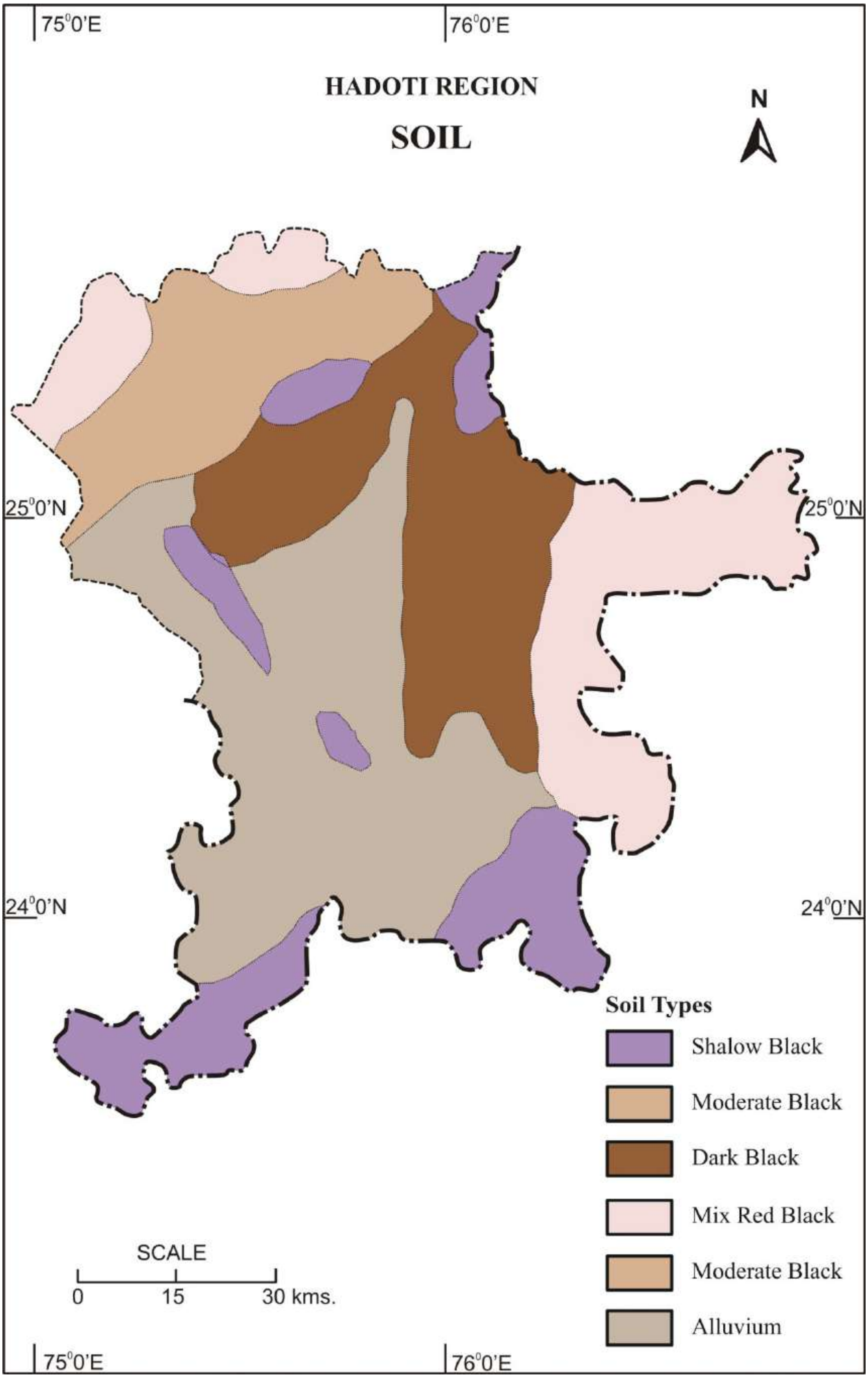
In Jhalawar district major soil category is black cotton soil. Recent alluvium in plain area and regosols are present in few pockets of the district.

In Kota district majority soil is alluvial in nature. Soil colour varies from deep to very deep brown with texture varying from clayey loam to clay and it is generally non-calcareous. This type of soil occurs in plains.

Table 2.7 : Types of soil found in Hadoti region

S.No.	Types of soil
1	Lithosol and regosols of hills
2	Yellowish – brown soil of foot hills
3	Recent alluvium
4	Brown soil-saline phase
5	Black soil
6	Deep black clayey soil
7	Deep brown clayey soil
8	Deep brown loamy soil
9	Red gravelly loam hilly soil

MAP-2.3


75°0'E
76°0'E
HADOTI REGION
SOIL
N
25°0'N
25°0'N
24°0'N
24°0'N
Soil Types
Shalow Black
Moderate Black
Dark Black
Mix Red Black
Moderate Black
Alluvium
SCALE
0
15
30 kms.
75°0'E
76°0'E

2.6.5. Vegetation

The geographic area of the Hadoti region is 24204 Sq.Km and the area under the forest cover is 1335.43 Sq.Km which 25.6% of area. The maximum forest cover is found in Baran district which is around 32.16%. Lowest forest cover is found in Jhalawar District with 20% of area. Bundi district has 27.14%area under forest followed by Kota district which has 25.6% area under forest.

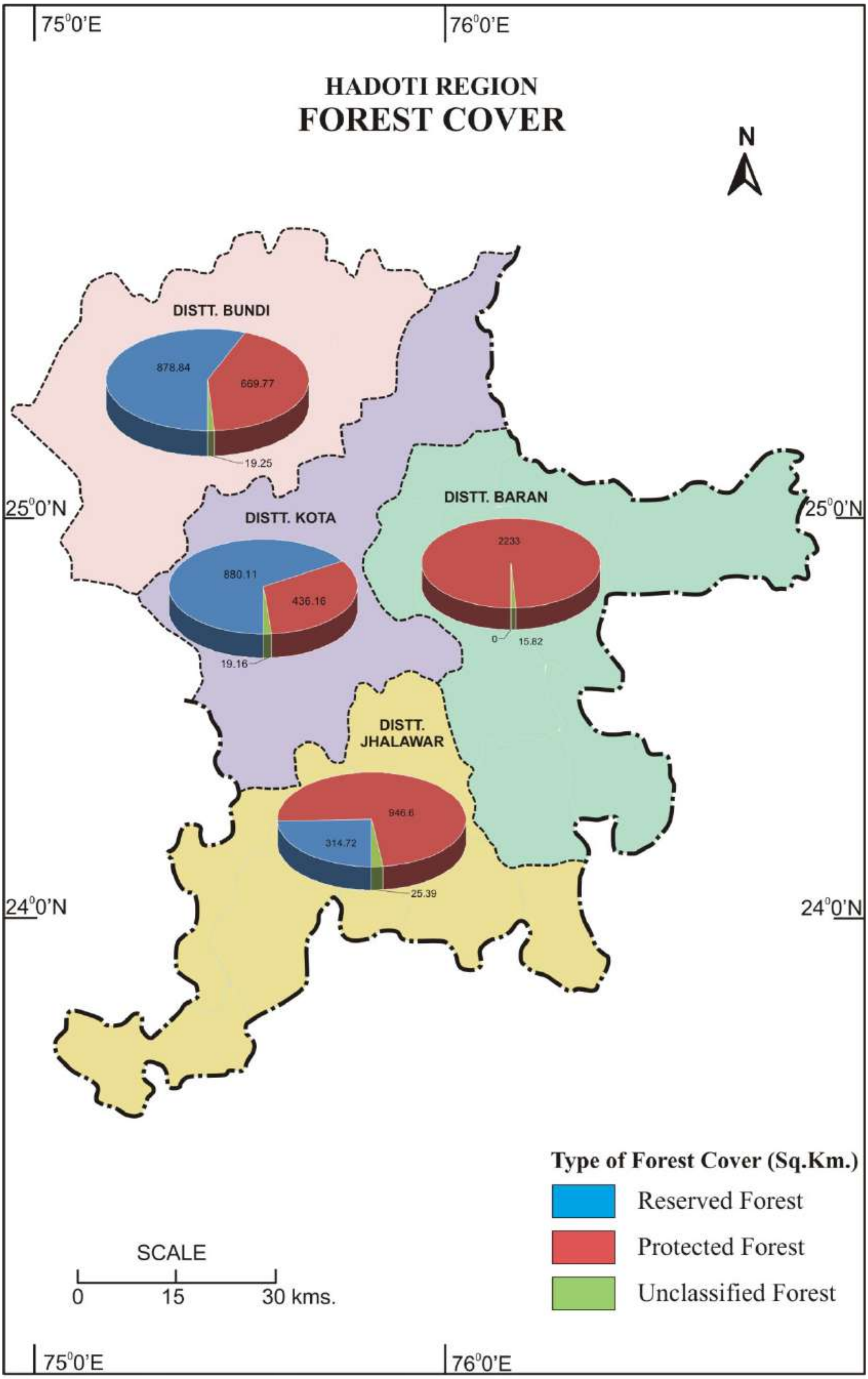
Table 2.8 : Forest Cover in Hadoti Region, 2020

Districts	Geographic area of district in Sq. Km	Geographic area under forest in Sq. Km	% of geographical area under forest	Population	Per capita forest area in Hectare
Baran	6992	2248.84	32.16	1222755	0.18
Bundi	5776	1567.86	27.14	1110906	0.14
Jhalawar	6219	1286.72	20.69	1411129	0.09
Kota	5217	1335.43	25.6	1951014	0.07
Hadoti (Total)	24204	6438.85	26.6	5695804	0.11

Source: Forest Department, Government of Rajasthan

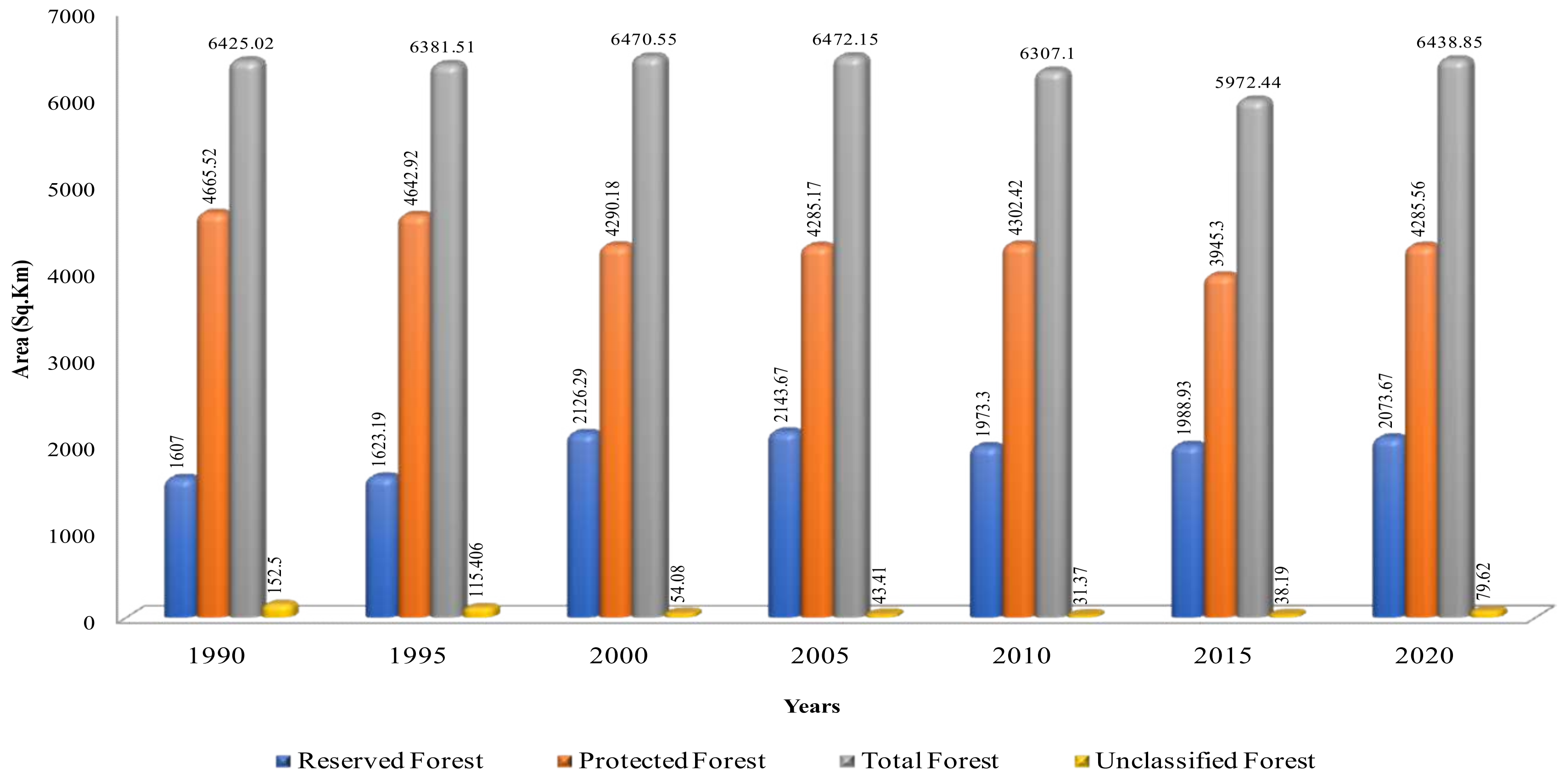
Baran district comes under the central India floristic province and this region in botanical terms supports teak forests. The forest's main composition is Kaldhi (Anogeissus pendula forests), Sagwan (Tectona grandis forests) and grasslands. The Kaldhi forests are gregarious in nature and the common associates of dhonkara, are khair, bor, gurjan, jhinjha, tendu, kakon (Flacourtia indica), chhola and khirani etc. In the upper reaches and plateau region of the district, it has dhav (Anogeissus latifolia), salar, gurjan and kadaya. Kaldhi trees which are generally of 5 m high. These forests are commomly found in Chhabra, Chhipabarod, Shahbad and Shergarh. Chhabra, Kishanganj and Nahargarh ranges have the Sagwan forests. Its growth is superior in Soondas (cut up lands) of river Parvati. Sagwan trees varies in height from 3 to 7 m. It provides timber which is used for furniture. Inferior quality teak is found on the northern most limits in India. It is commonly associated with chhola, khair, kaldhi, salar, tendu, safeddhav, gurjan, kalam and sadadia. The grasslands are also found in the district and the main grasses found here are Aristida, Ergrostis, Chloris, Heteropogon and Thomaeum etc. Important forest products here are Tendu patta and other items are fireweed honey and wax grass etc.

MAP-2.4



Source : Forest Department, Government of Rajasthan

Chart 2.4 : Area Under Forest Cover, Hadoti Region (1990-2020)



Source : Forest Department, Government of Rajasthan

In the Bundi district forest are divided into five ranges that are, Bundi, Nainwa, Hindoli, Baroondhan and Kaprain. The forests in the Bundi district fall under the subsidiary edaphic type of tropical dry deciduous forest as per Champion's classification. The hills in the district are well stocked with forests. Commonly found species are Dhokra (Anogeissus pendula) and Kher (Acacia Catechu). Other tree species are Babul (Acacia Arabica), Beri (Zizyphus Jujuba), Khirni (Wrightia tomentosa), Tendu (Diospyres melanoxylon), Salar (Boswellia serrata), and Khejra (Prosopiesspecigera). The forest products are timber, charcoal, grass, honey and gum. Katha is extracted from the 'Kher' trees and the Khirni wood is extensively used for making wooden toys while tendu leaves are used for making "beedi". The leaves of Dhokra tree are used for tanning leather and its wood provides props, rafters and agricultural implements for local use.

In the Jahlawar district forests are largely of Kaldi (Anogeissus pendula) sub type. Anogeissus pendula generally occupies the lower and gentler slope of hills in the district but also extends to the tops of small hillocks and ridges with the good quality soil. With respect to flora, the district categorized in two main sub-divisions - southern tropical dry deciduous forests and the subsidiary edaphic type of dry tropical forest. The forest, which have scattered of teak (tectoma grandis) are found in the Manoharthana and Aklera forest ranges. The common varity of teak are the Dhokra (Anogeissus Latifolia), Tendu (Diospyros Malanoxylon), Khair (Acacia Catechu), Gurjan (Lannea Caromandelica), Bahera (Terminallabellerica), Salaran (Boswellia Serata), Mohwa (Bassia Latifolia),Beel (Aeglemarmelos), Achar (Buchanania Latifolial), Kulk (Streceulia), Salar (Termnalia Tomntosa), Gatbor (Zizyphus Xylopyra). Major grasses found here in the district are Ratada, Khhas, Posad and Sum.

The Kota district has a rich forest belt. The forests in the district are mainly concentrated in the south-western and central portions on the Mukundara hills. The main sub-types of forests are Anogeissus Pendula Forest, Miscellaneous Forest and Babul (Acacia Arabica Wild) are found in the district. The main variety of flora species found in Anogeissus Pendula forests are Dhokra (Anogeissus latifolia wall) which are mixed with Gurjan (Lanneacoromandelica Houtt Merr), Bel (Aegle marmelos), Tendu (Diosoyros) Tomentosa Roxb) etc. And the miscellaneous forests include Khejra (Acacia leucophlaea Willd), Khair (Accia catechu willd), Bel (Aegle marmelos), Kalam (Kadam) (Staphegyneparvifolia Roxb), Amaltas (Cassia fistula Linn), Bahera (Terminalia belerica Roxb), Gurjan (Lanneacoromandelica), Kohra (Terminalia arjuna), etc. The main variety of flora found in forests of the third sub-type is Babul mixed with Khejra (Acacia leucophloeawilld). Other trees found in the Kota district are namely, Dhau (Anogeissus latifolia wall), Bahera (Terminalia belerica Roxb), Mahuwa

(Madhuca indica Grrel), Karaya or Kara (Sterculiaurens Roxb), Salar (Boswelia Serrata Roxb). Gular (Ficus, glomerata), Jamun (Syzygium Cumini), Neem (Azadirachta indica), Pipal (Ficus religiosa), Aam (Mangifera indica), and Semal (Salmaliamalbarica), Chhola (Dhak) (Butea mono sperma Lomak), Shisham (Dalbergis sissoo Roxb), Sadaria (Terminalia tomentosa). Kanwas and Morak rages have many grass Birs. The common variety of grasses which are found in Darah Valley and some blocks of Ladpura range are Lapla (Aristid depressaretz). Polard (Apludamuticalinn), Karar (Dichanthium, annulatum Fore, Stapl), Bhalki (Chrvsopogan fulvus spreng Dc Chiov) and (Chlonaveriegata), Ratarda (Themedaquadrivulvis Dkata), Surwal (roni) (Heteropogancontortus). The major forest produce are timber, fire wood and charcoal and Minor forest produce includes gum, rasins, tandu leaves, honey etc.

Total forest area by legal status in Hadoti region changes has been observed from 1990 till 2020. The total forest area in the region was more or less consistent since 1990 but decrease has been seen in 2015 after 2015 it again reached to 6438.85 Sq. Km of area under forest. Reserved forest category has also shown mixed trends, maximum area under reserved forest category has been recorded in 2005 with 2143.67 Sq. Km. with respect to protected forest category consistency has been found with slight drop in 2015. Highest variability in forest area under unclassed category has been seen.

2.6. Land - use pattern

Land is the very important resource for agriculture, a primary source of livelihood for majority of Hadoti region, rural population depends upon it. Population pressure of both human and livestock is main deciding factor in allocation of land to different economic and non-economic activities. With changing prospect of demand for food, feed and fibre, technological changes and rate of economic development, requires land for non-agricultural uses and this increases competition for the land resource.

Table 2.9: Land use classification of Hadoti region between 1991 & 2020

S.No.	Land use classification	1991 (Hectares)	1991(%)	2020 (Hectares)	2020(%)
1.	Total geographical area	2434164	100	2431979	100
2.	Forest	581738	23.9	615669	25.32
3.	Land not available for cultivation	117737	4.84	137125	5.64
4.	Non-agricultural uses	173271	7.12	136937	5.63

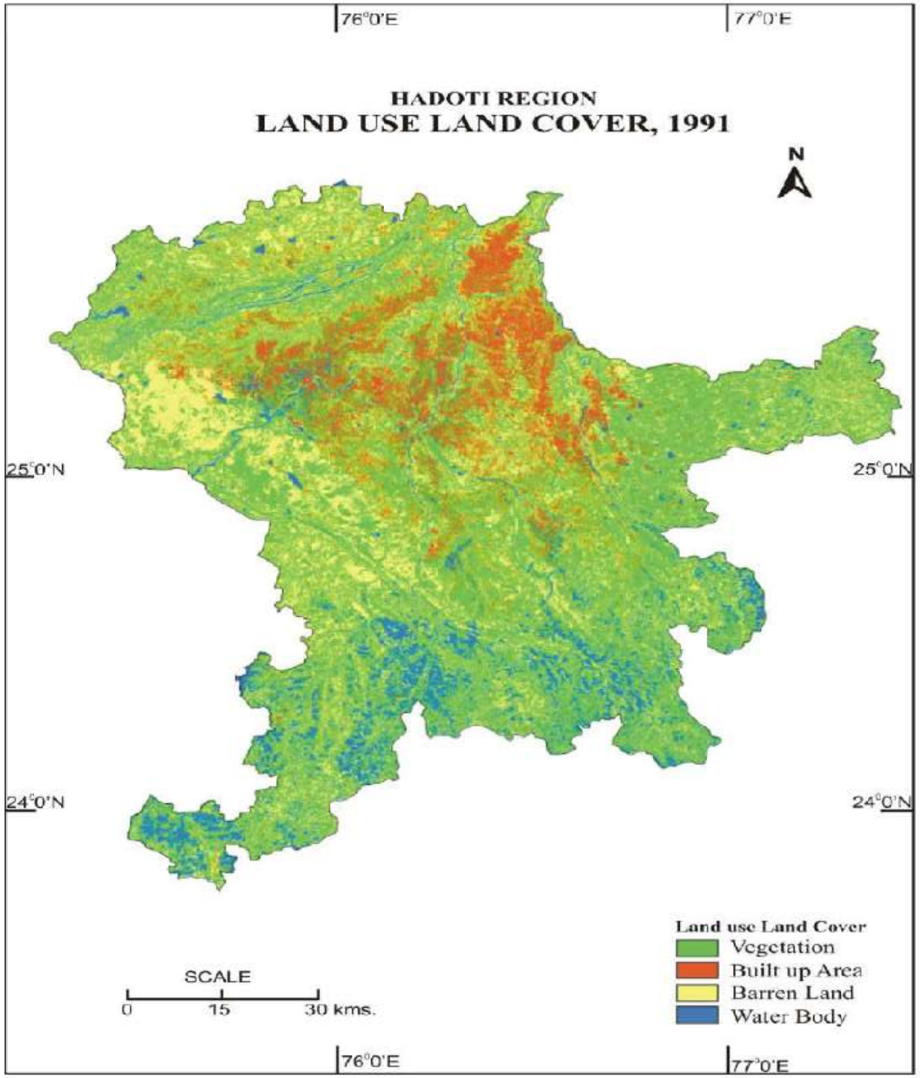
5.	Permanent pasture and other grazing land	126355	5.19	118786	4.88
6.	Land under miscellaneous tree crops and groves	2596	0.11	6892	0.28
7.	Culturable waste land	156681	6.44	91549	3.76
8.	Fallow land other than current fallow	89536	3.68	65494	2.69
9.	Current fallow land	61234	2.52	32025	1.32
10.	Net sown area	1124916	46.21	1223206	50.3
11.	Gross cropped area	1536051	63.1	2294748	94.36
12.	Area sown more than once	411135	16.89	1071542	44.06

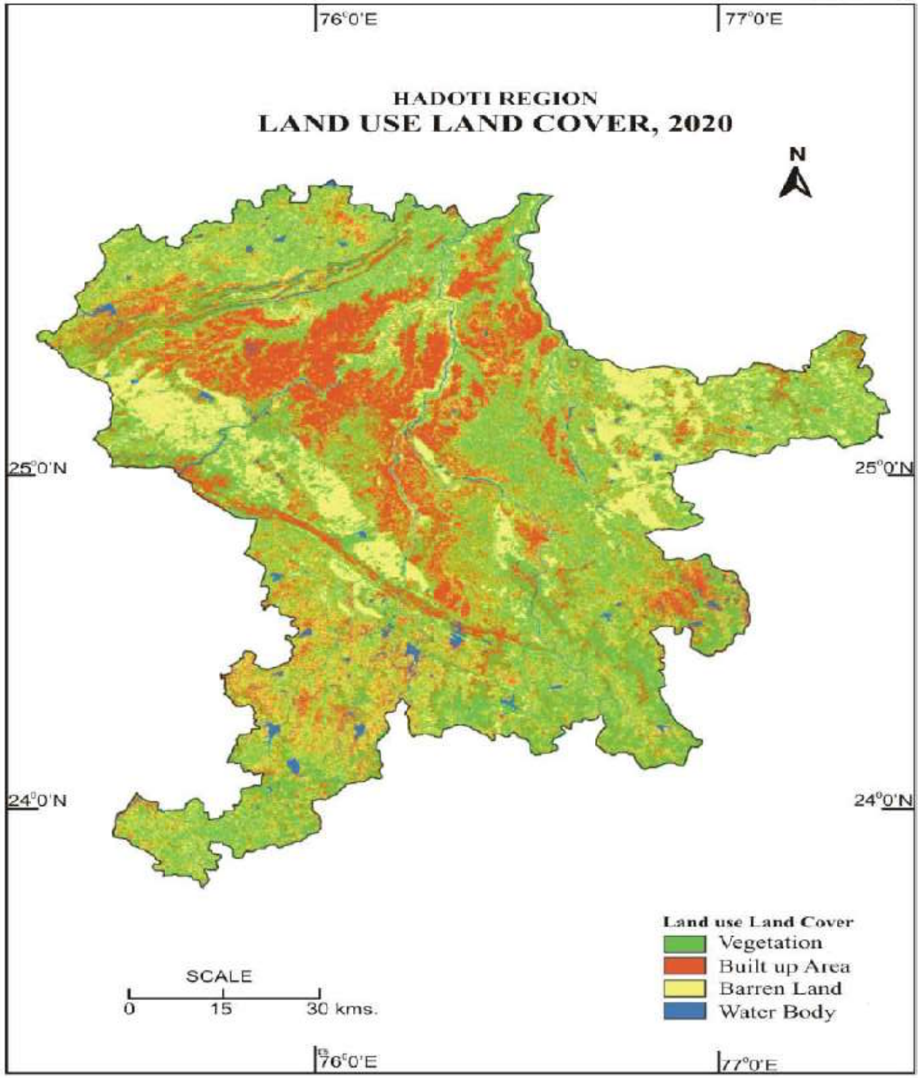
Source: Directorate of Economics and Statistics

There is increasing trends in absolute population growth in the region and expansion of industrial expansion, this has degraded the land resources and has caused depletion and environmental degradation.

Changes in land use of Hadoti region has been compared between 1991 and 2020 land use. Area under forest has shown increase of 1.4% and in 2020 Hadoti region has forest cover of 25.3%. this increase in forest has been recorded because of implementation of afforestation polices of government. Land not available for cultivation has shown increase of 0.8%, this increase is resulted because of construction of houses, roads and railways, factories etc and with increasing population and urbanization land use composition has been changed. Permanent pasture and other grazing land have been declined due to increasing population pressure and there is reduction of common property resources and livestock livelihood has been oriented towards commercial aspect. Land under miscellaneous tree crops and groves has been increased due to afforestation. Culturable waste land has declined by 2.68 % this is because of extension of cultivation to culturable waste land with the help of irrigation facilities and land reclamation and land development measures. Fallow land other than current fallow and Current fallow land has been reduced due to extension of cultivation. Net sown area, Gross cropped area and Area sown more than once has increased drastically this is because of modernization of agricultural practices with the help of irrigation, fertilizers, changing cropping pattern and increasing crop yield rate this has resulted increase of more area under agricultural land in Hadoti region.

MAP-2.5


76°0'E
77°0'E
HADOTI REGION
LAND USE LAND COVER, 1991
N
25°0'N
24°0'N
Land use Land Cover
Vegetation
Built up Area
Barren Land
Water Body
SCALE
0
15
30 kms.


76°0'E
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HADOTI REGION
LAND USE LAND COVER, 2020
N
25°0'N
24°0'N
Land use Land Cover
Vegetation
Built up Area
Barren Land
Water Body
SCALE
0
15
30 kms.

CHAPTER – 3

LEVEL OF SOCIO – CULTURAL DEVELOPMENT

3.1. Demographic Attributes

3.1.1. Population Dynamics of Hadoti Region

3.1.2. Growth of Population

3.2. Density of Population

3.3. Sex Ratio

3.4. Literacy Rate

3.5. Gap in Male-Female Literacy Rate

3.6. Percentage of Urban Population

3.7. Working Population

3.7.1. Percentage of Main Workers

3.7.2. Crude Work Participation Rate

3.7.3. Density of Workers

3.8. Occupation Wise Working Population

3.8.1. Percentage of Agricultural Labourers

3.8.2. Percentage of Cultivators

3.8.3. Percentage of Household Industry Workers

3.8.4. Percentage of Other Workers

3.9. Dependency Ratio

3.10. Infant Mortality Rate

3.11. Level of Socio-Cultural Development

CHAPTER – 3

LEVEL OF SOCIO – CULTURAL DEVELOPMENT

Socio-cultural aspects plays significant role in the human development. It is believed that it is the responsibility of the geographers to analyse the human socio–cultural, factors for understanding disruption of natural equilibria and the subsequent development the space.

Demographic attributes differ from place to place because of change in natural environment and social groups associated with that respective place. These social groups do not use the same array of techniques while exploiting the same environment, and this forms different genres de vie, the concept was put forward by Vidal de la Blache. These genres de vie grew out of the choices made by humans in adapting to specific environment and this notion of complex settings. For understanding the social structure, it is very important to analyse the historical sequence of land occupation. Blache stated that human density differs within the same milieu, here the cultural factors play a key role, the genres de vie are built with both material and social aspects. As per Jean Brunhes the techniques have very important role in structuring the way of life, which imprints cultural marks on the landscape.

Social phenomena are very complex to be interpreted, there are multiple ways for interpreting them but it can be done by keeping the specific context of the social evolution of the society. “Social Phenomena” comprises of the whole framework of human interaction with environment, this led to formation of diverse social space with different human groups. Human activities articulate to different spatial patterns, these patterns acquire their form under the influence of the social structure. The space can be defined on the basis of the social phenomena. Social phenomena shaping the spatial patterns helps in analysing the social problems. Here the idea of social-wellbeing comes into the picture, which can be expressed by different territorial indicators like housing, health and social pathology. Social wellbeing of a region has been persuaded as a top priority where basic human needs of a given population are satisfied.

3.1. Demographic attributes

Studying demographic characteristics of study area are very important in understanding the study area properly, it shows dynamics of species and their interaction with the environment. Demographic data analysis is central in quantifying population – level and processes and their underlying mechanism which has provided critical contribution to the diversity of population of

Hadoti region. Analysing population ecology help to understand the drivers of changes over time and space, especially with demography it is more related with underlying vital rate that are survival, growth, reproduction etc of population structure. Population processes can be termed as "population currency". Demography is very important scaling tool, translating the fates of individuals into population-level outcomes. By widening the scope of population study, it can be treated as demographic metrics as a predictor or response variables that can be linked with other sub disciplines. Population is relatively endogamous and territorial, it is structured along biological dimensions that are age, sex etc and also along with the socio-cultural dimension like social class, ethnicity etc.

The principles of demographic analysis used are:

- **Population Size:** is absolute number of individuals included in an aggregate or a population;
- **Population Structure**: the various ways in which sub categories of population are being considered, and through this subpopulation are formed;
- **Geographic Distribution of population:** this shows how an aggregate or population is dispersed over physical space; and
- **Changes in Size, Structure, and/or Geographic Distribution of population:** temporal changes of the dynamic aspects of these characteristics, as they change with the passage of time.

3.1.1. Population dynamics of Hadoti region

Population size and structure: in Hadoti region highest population is in Kota district with 1951014 of population size along with this it has highest number of both male and female. Followed by Jhalawar district with 1411129 population and Baran district with 1222755 of population. Lowest population is in Bundi district with 1113725 people.

Table 3.1: Population composition in Hadoti region, 2011

S.No.	District	Area (Sq.Km)	Population			Density	Sex Ratio
			Male	Female	Total		
1.	Bundi	5819.38	579385	534340	1113725	193	922
2.	Baran	6994.61	633945	588810	1222755	175	929
3.	Jhalawar	6219	725143	685986	1411129	227	946
4.	Kota	5217	1021161	929853	1951014	374	911
Total (Hadoti)		**24353.34**	**2959634**	**2738989**	**5698623**	**234**	**925**

Source: Census of India, 2011

3.1.2. Growth of population

Analysing the temporal changes of population growth in a region is very important for considering the economic prospects of the Hadoti region. Population projections gives idea of changing needs of people and also shows the deficit and surplus resources within the region, which helps in policy formulation in the coming time. There are three demographic factors which are considered preliminary in analysis the effect of population growth on economic development that are population size, rate of population growth and age- distribution effects. These factors do not behave independently.

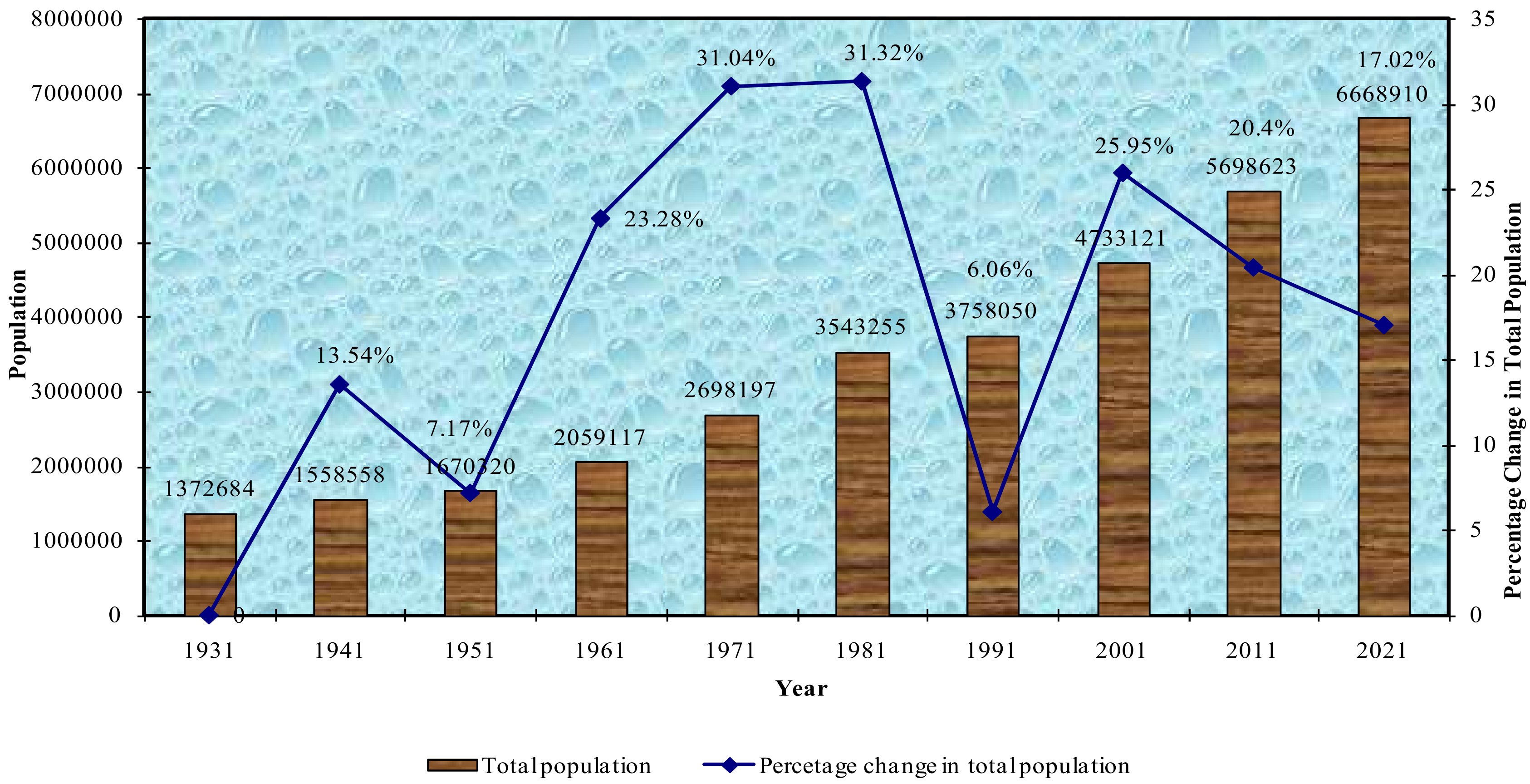
Population growth of Hadoti region has been analysed from 1931 till 2011 census years. Absolute numbers have shown increasing population trends for both male and female population. In Hadoti region there is no fix pattern of decadal change in population growth has been observed rather it is fluctuating in nature. In 1941 there was increase of 13.54% of population, in 1951 the growth population recorded dip in population growth and population increased by 7.17%. From 1951 till 1981 had shown increasing trends of population growth. This shows that between this period health infrastructure was developing due to which death rate was decreased and birth rate was still high. In 1991 there was only 6.06% change in population and recorded negative growth, this was the period where family planning programme was at its peak and its main was to control the increasing population which was recorded between 1961-1981. After relaxing the family planning approaches and betterment of health and other infrastructural facilities again growth of 25.95% was recorded in 2001. In 2011 there was dip in the population growth and registered 20.4% growth of population. This shows the development is inversely proportion with the growth of population.

Table 3.2: Total population and decadal change in population of Hadoti region, 1931-2011

Years	Male	Female	Total Population	Decadal change in Population (%)
1931	712809	659875	1372684	--
1941	811354	747204	1558558	13.54
1951	863788	806532	1670320	7.17
1961	1079354	979763	2059117	23.28
1971	1423956	1274241	2698197	31.04
1981	1866098	1677157	3543255	31.32
1991	1982944	1775106	3758050	6.06
2001	2479887	2253234	4733121	25.95
2011	2959634	2738989	5698623	20.4
2021*	3444979	3220931	6668910	17.02

Source: Census of India/ (*Projected population)

Chart 3.1 : Decadal Change in Population of Hadoti Region (1941-2011)



3.2. Density of population

Density of population in Hadoti region has been compared between 1991 and 2011 census year to have better understanding of temporal change in the population. The density of population has been categories under 5 categories.

Density of population, 1991

High density of population (Above 257): Ladpura tehsil of Kota district has highest density of population that is 429 persons per square Km. Ladpura tehsil consists of Kota city, which is considered as focal point in the Hadoti region with respect to better infrastructural facilities resulted in high population density.

Moderate high density of population (256-207): This category consists tehsils of Baran district with 221 persons per Sq km and tehsil Ramgaj Mandi of Kota district with 212 persons per Sq km. Here Baran tehsil has district headquarter with maximum facilities in the tehsil of Baran district. And Ramgaj Mandi is located in close proximity to Ladpura tehsil with well-connected transportation network leading to high density of population.

Moderate density of population (206-157): Under this category average population density falls, it consists of three tehsils from Jhalawar district that are Jhalrapatan (183), Panchpahar (172) and Manohar Thana (162) population density of persons per Sq Km respectively. Jhalrapatan tehsil have district headquarter so, it acts as a converging centre within the district. It also consists of Mangrol tehsil of Baran district with 167 persons per Sq Km.

Low density of population (156-107): This category consists of maximum number of tehsils that are Indargarh (156), Antah(151), Pirawa (149), Bundi (145), Piplada (143), Chhipabarod (140), Digod (136), Khanpur (136), Keshoraipatan (135), Snagod (130), Aklera(129), Atru (125), Gangdhar (124), Chhabra (124), Nainwa (115) and Hindoli (113) density of population person per square kilometre.

Very low density of population (Below 106): This category has lowest number of population density and it comprises of only two tehsils both from Baran district that are Kishanganj tehsil and Shahabad tehsil with 76 and 57 person per square kilometre. Baran district borders with Madhya Pradesh it has mainly forested and tribal area which makes fragmented density of population.

Density of population, 2011

High density of population (Above 297): Under this category there are three tehsils that is Ladpura, Ramganj Mandi and Baran with 730,347 and 399 person per square kilometre respectively. The density of population has changed drastically of Ladpura tehsil from 429 to 730 person per square kilometre. Baran and Ramganj mandi has shown increase in density of population.

Moderate high density of population (296-247): It comprises of two tehsils Jhalrapatan and Panchpahar with population density of 278 and 252 respectively. In 1991 both the tehsils were in the moderate density of population category but in 2011 increase in density of population has been registered.

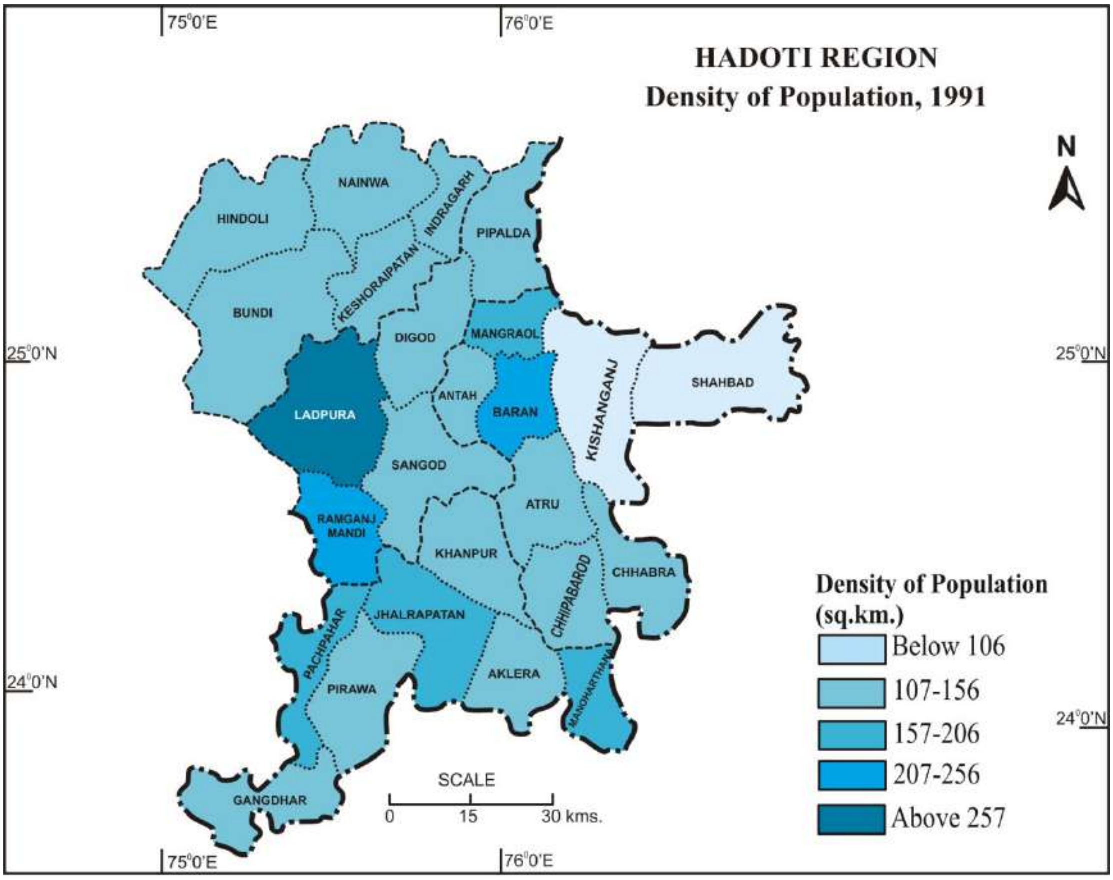
Moderate density of population (246-197): It comprises of nine tehsils whereas in 1991 there were only three tehsils. Mangrol (233), Antah (229), Manohar Thana (226), Aklera (226), Keshoraipatan (218), Bundi (214), Pirawa (205), Chhipabarod (205) and Piplada (200) with density of population person per square kilometre. Earlier average density of population was between 157-206 range but in 2011 has recorded increased density of population.

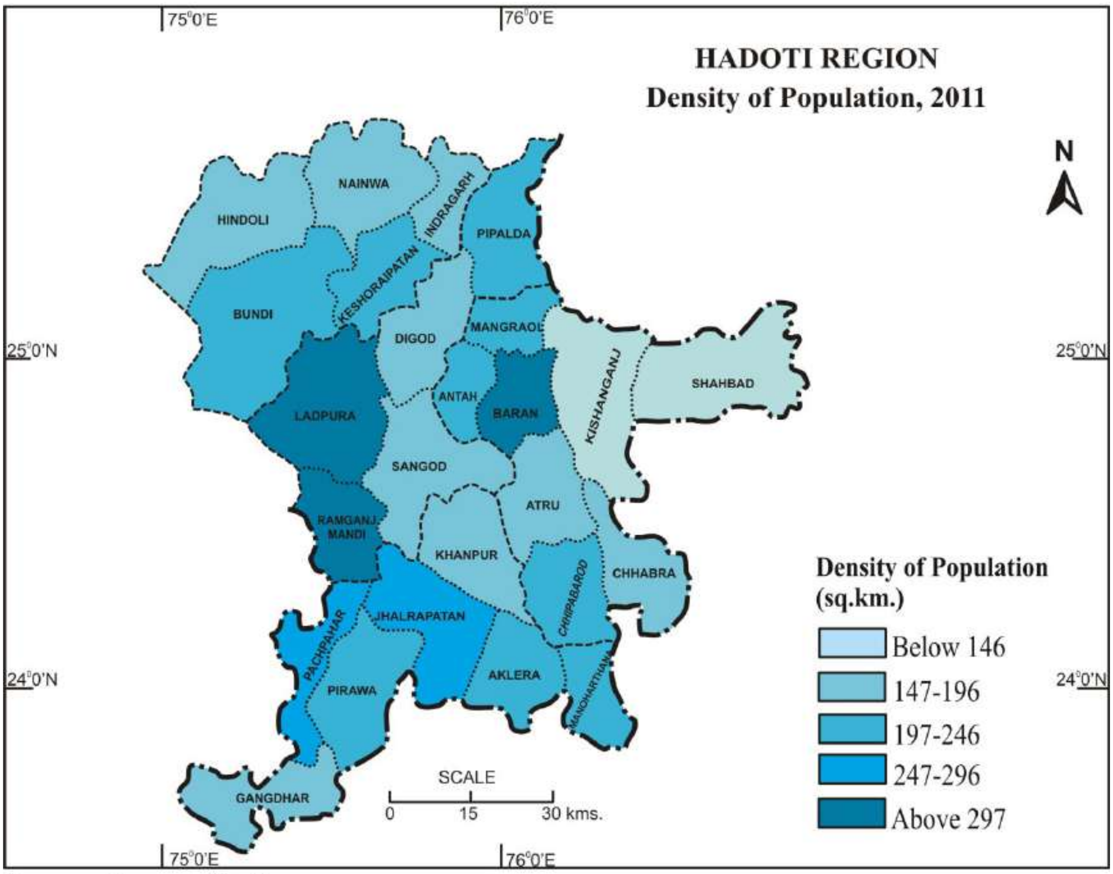
Low density of population (196-147): This category also consists of 9 tehsils in it which are Indargarh (193), Chhabra (190), Digod (185), Gangdhar (183), Khanpur (182), Sangod (177), Atru (177), Nainwa (165) and Hindoli (165) population density per square kilometres.

Very low density of population (Below 146): Under this category Kishanganj and Shahbad tehsil of Baran district with population density of 117 and 97 person per square kilometre. In 1991 same tehsils were under this category however, increase in density of population is seen but still they have lowest density of population in the Hadoti region.

Coefficient of variation for density of population of 1991 is 43.96% and in 2011 it is 51.52% this means that degree of variability of density of population is higher in 2011. Differences in population density became were pronounced over 20 year period from 1991 to 201. Higher value of coefficient of variation greater degree of heterogeneity of unevenness in the distribution of population density. uneven density indicated towards uneven development within the region. Migration patterns has also played significant role in changing density of population.

MAP-3.1





Source : Census of India

3.3. Sex ratio

Sex ratio in Hadoti region has been compared between 1991 and 2011 census year to have better understanding of temporal change in the sex ratio. Overall, sex ratio in the Hadoti region is not favourable this shows the tendency of patriarchal society. The sex ratio has been categories under 5 categories.

Sex ratio, 1991

High sex ratio (Above 911): There are six tehsils in this category and all belongs to Jhalawar district. Highest sex ratio in Hadoti region is found in Gangdhar tehsil with 941 females per thousand males. Followed by Jhalrapatan (913), Manoharthana (913), Aklera (913), Panchpahar (912) females per 1000 males.

Moderate high sex ratio (910-901): Under this category there are six tehsils all belongs to Baran district except Sangod tehsil with sex ratio of 905. Mangrol (904), Antah (904), Kishanganj (902), Baran (902) and Chhipabarod (901) females per 1000 males.

Moderate sex ratio (900-891): This category can be considered as average range of sex ratio found in the Hadoti region. It consists of 6 tehsils which are Khanpur (897), Keshoraipatan (897), Indargarh (897), Atru (893), Digod (892) and Hindoli (891) respectively.

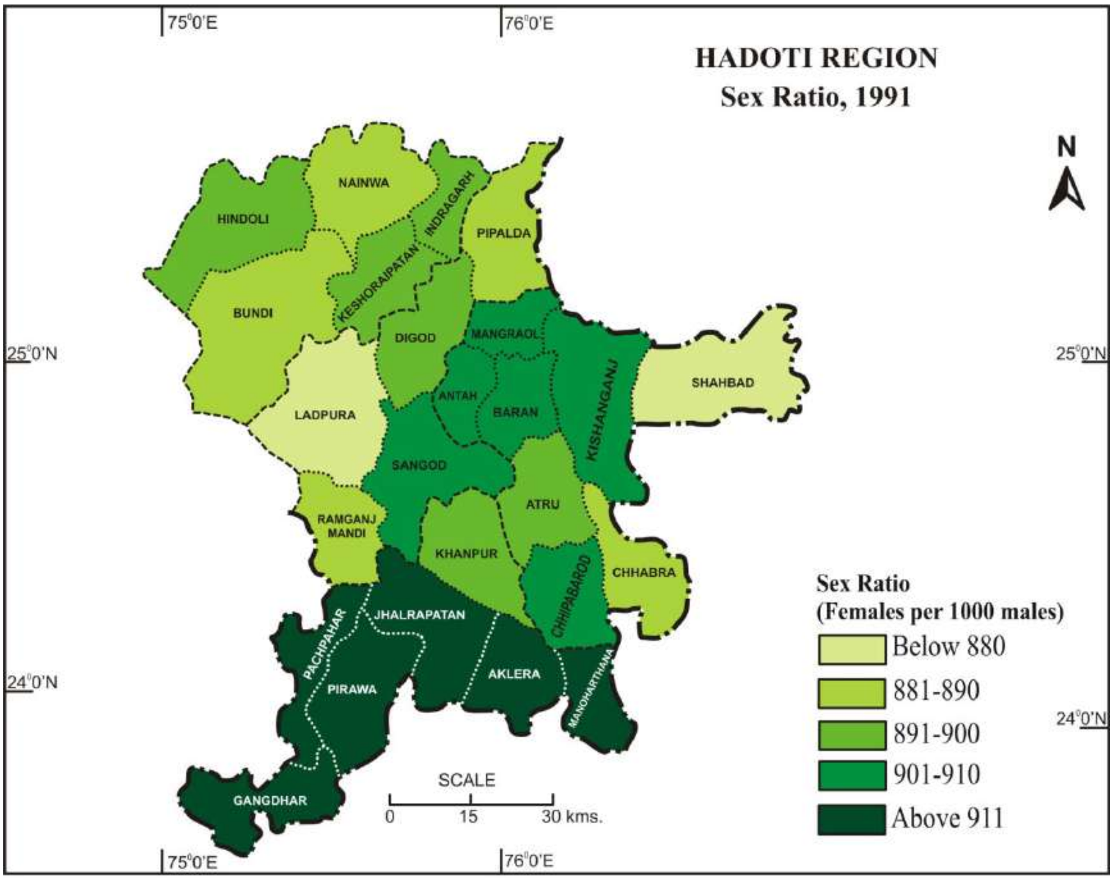
Low sex ratio (890-881): This category comprises of five tehsils that are Piplada (889), Nainwa (886), RamganjMandi (884), Chhabra (884) and Bundi (883) females per 1000 males. These tehsils are mainly from Bundi district.

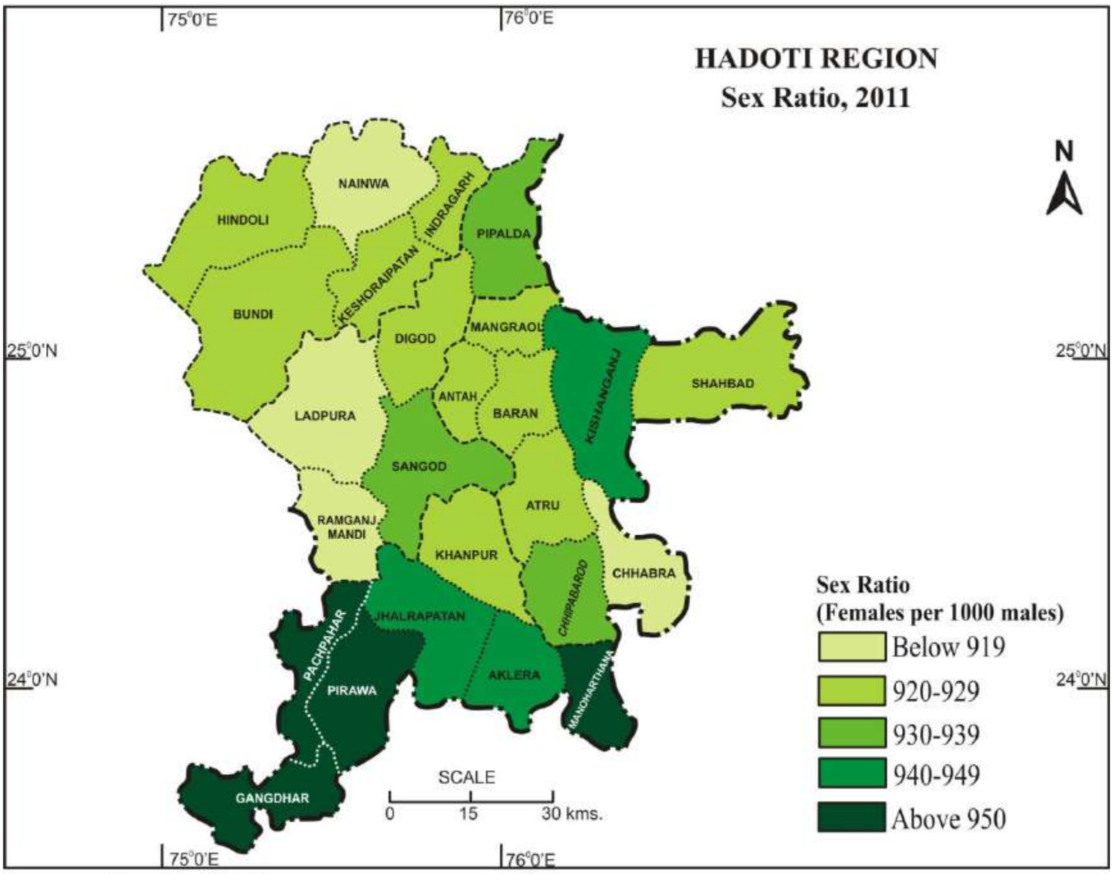
Very low sex ratio (Below 880): Very poorly performing tehsils in Hadoti region with respect to sex ratio are Shahbad tehsil of Baran district with sex ratio of 877 and followed by worst performing tehsil that is Ladpura in Kota district, which ironically the most developed tehsil in terms of the infrastructure.

Sex ratio, 2011

High sex ratio (Above 950): In 2011 also Gangdhar tehsil of Jhalawar district is at the top position in the Hadoti region with 958 females per thousand males. In this category again Jhalawar district is top performing district with tehsils that are Panchpahar (954), Manoharthana (954), Pirawa (953) respectively.

MAP-3.2





Source : Census of India

Moderate high sex ratio (949-940): In this category also number of females have been increased considered to 1991. Jhalrapatan (943), Kishanganj (941) and Aklera(940) females per 1000 males.

Moderate sex ratio (939-930): Under this category average sex ratio of Hadoti falls and it has Chhipabarod (937), Sangod (935) and Piplada (931) females per 1000 males. Earlier Chhipabarod tehsil was in moderate high category but in 2011 it has been recorded under this category.

Low sex ratio (929-920): Majority of the tehsils are under this category which shows that Hadoti region has patriarchal society. Tehsils are Digod (929), Keshoraipatan (929), Mangrol (929), Antah (928), Baran (928), Shahbad (927), Khanpur (925), Bundi (925), Atru (925), Indargarh (920) and Hindoli (920) respectively.

Very low sex ratio (Below 919): In 2011, worst performing tehsil is from Kota district that is Ladpura tehsil. Apart from this it consists of three more tehsils that are Nainwa (915), Ramganjmandi (914) and Chhabra (913) females per 1000 males.

Coefficient of variation for sex ratio of 1991 is 1.79% and in 2011 it is 1.53% this means that degree of variability of sex ratio is higher in 1991. However, in both 1991 and 2011 lower degree of variability in sex ratio is found.

Photoplate-3.1 : Three girls in different age group coming from school

Source: Captured during primary survey, 2023

3.4. Literacy Rate

Literacy rate and development has significant relationship, having literate population is beneficial for both individuals and communities. Literacy is a key for socio-economic development, it transforms people, communities and the social structure. Earlier “literacy” was being defined as ability to read and write. Whereas, the United Nations Educational Scientific and Cultural Organization (UNESCO) has defined literacy as the ability to understand, identify, interpret, create, communicate, compute and can use the written and printed material associated with varying context. Having literate population gives continuum to learning in enabling individuals to achieve their goals to develop knowledge and their potential, and enables individual to participate fully in their community and wider the scope of the society. Literate society positively contributes in the development process. Educational attainment and literacy level are prerequisite indicators of the development in the society. Key variables of development like demographic indicator that are fertility, mortality, rate and migration are being highly affected by literacy rate and educational development. Overall, it improves quality of life which can be seen with respect to life expectancy, infant mortality, nutritional level, learning level etc. Having higher level of literacy rate and educational development results in greater awareness among individuals and helps in acquiring new skills. Hadoti region literacy rate has been compared between 1991 and 2011 and analysed for looking the development level of the region.

Literacy Rate, 1991

High literacy rate (Above 40.8): This category comprises of five tehsils, out of five tehsils two are with district headquarter. These tehsils are Ladpura (54.62) and Baran (50.69) followed by Mangrol (42.57), Antah (42.57), Khanpur (41.17).

Moderate high literacy rate (40.8-35.8): It consists of six tehsils that are Jhalrapatan (40.44), Keshoraipatan (38.76), Indragarh (38.76), Atru (38.37), Panchpahar (38.1) and Bundi (37.01).

Moderate literacy rate (35.8-30.8): In this category various tehsils from Baran, Bundi and Kota district are included, there are five tehsils namely Ramganj Mandi (34.25), Pirawa (34.15), Sangod (34.13), Digod (32.82) and Chhabra (30.81).

Low literacy rate (30.8-25.8): This category consists of four tehsils that are Chhipabarod (30.65), Shahbad (27.84), Pipalda (27.77) and Nainwa (26.62).

Very low literacy rate (Below 25.8): Poorly performing tehsils are Kishanganj (25.63), Gangdhar (23.2), Hindoli (22.16), Manohar thana (20.8) and Aklera (20.8). out of these tehsils three are from Jhalawar district.

Literacy Rate, 2011

High literacy rate (Above 75): Level of literacy has been increased when compared with 1991 data however, in 2011 only two tehsils have recorded literacy rate above 75.5 these tehsils are Ladpura (81.17) and Baran (75.27).

Moderate high literacy rate (75-70): the number of tehsils is constant in this category; it includes six tehsils that are Sangod (73.02), Digod (71.52), Antah (71.17), Mangrol (70.18), Ramganj Mandi (70.08) and Khanpur (70.04). Earlier this category has range between (35.8 - 40.8) but now it has increased to (70 - 75). All these tehsils were earlier in lower range group but now they have upgraded to higher range of literacy level.

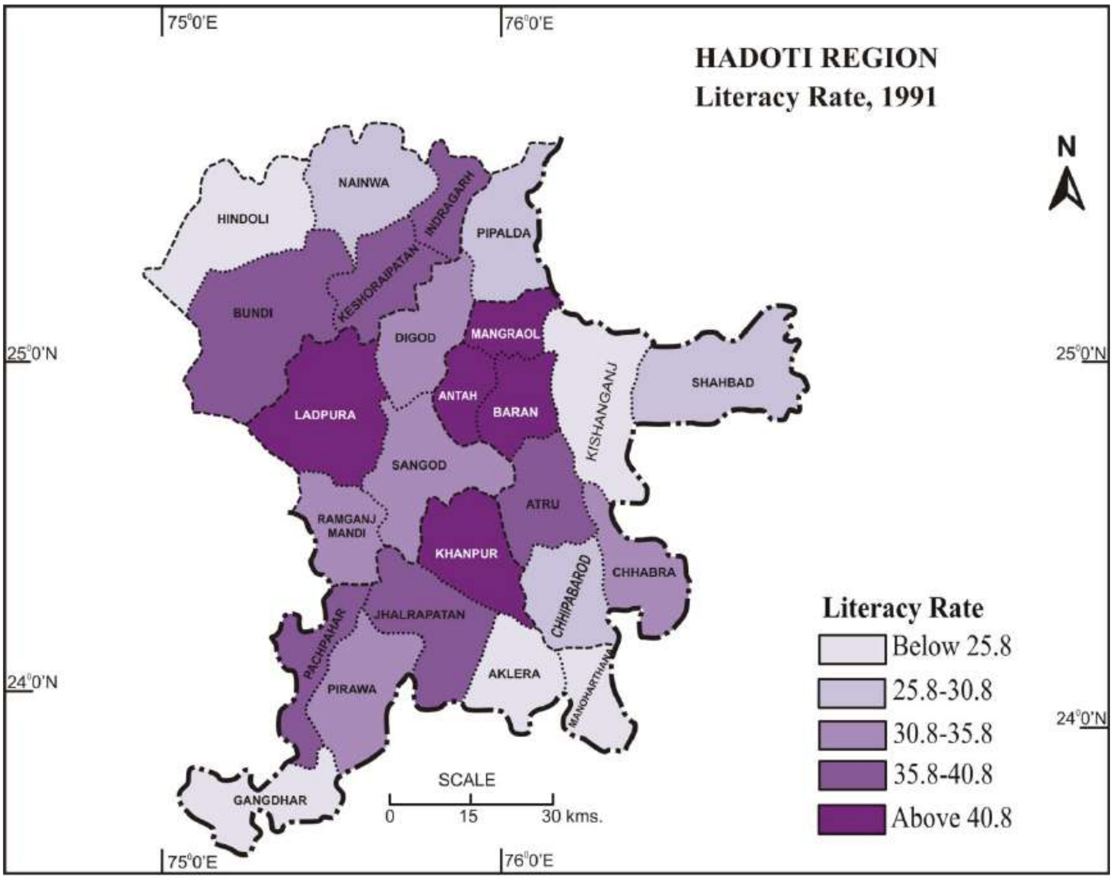
Moderate literacy rate (70-65): This category consists of tehsils from all four district that are Baran, Bundi, Jhalawar and Kota, these tehsils are Atru (69.79), Keshoraipatan (68.82), Pipalda (67.3), Jhalrapatan (66.84) and Indragarh (65.27).

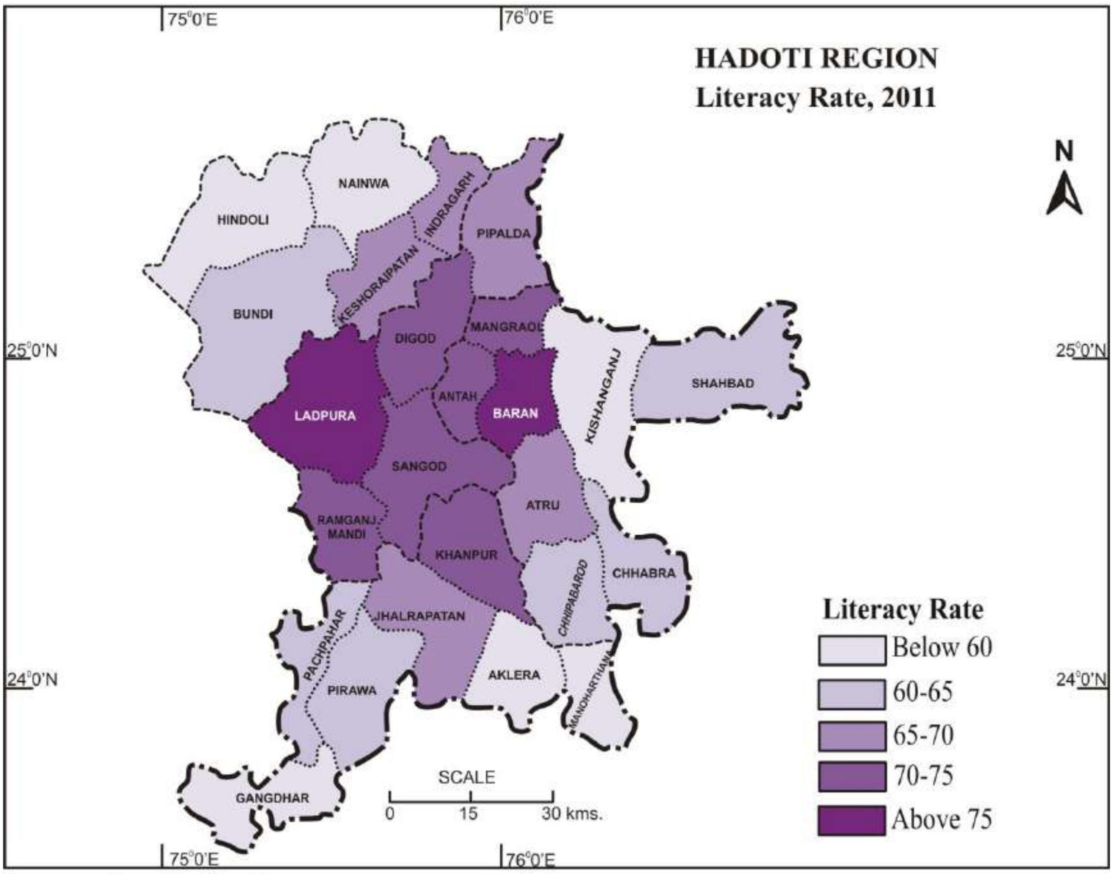
Low literacy rate (65-60): This category consists of six tehsils, earlier in 1991 there were only four tehsils. These tehsils are Panchpahar (64.53), Bundi (64.26), Pirawa (63.65), Chhabra (63.05), Shahbad (62.79) and Chhipabarod (60.67). Bundi and Pirawa tehsils has not shown significant increase.

Very low literacy rate (Below 60): This category has six tehsils and these tehsils are namely Kishanganj (59.42), Nainwa (58.97), Hindoli (55.24), Gangdhar (54.19), Aklera (52.3) and Manohar thana (50). In 2011 these are poorly performing tehsils in context of literacy levels.

Coefficient of variation for literacy rate of 1991 is 25.77% and in 2011 it is 11.43% this means that degree of variability of literacy rate is higher in 1991. Decrease of coefficient of variation from 1991 to 2011 shows that variability and dispersion in the literacy rate has been reduced in the region. Lower value of coefficient of variation suggests evenness and greater degree of homogeneity in literacy rate of the Hadoti region. Reduction in coefficient of variation indicates toward targeted efforts for improving literacy.

MAP-3.3





Source : Census of India

Photoplate-3.2(A) : Literacy improvement programme for adults in RamganjMandi

Source: Captured during primary survey, 2023

(B) : Group of boys doing self-study, Chattarganj, Bundi

Source: Captured during primary survey, 2023

3.5. Gap in Male – Female Literacy Rate

In deep-rooted patriarchal setup girls are less likely to access school and get educated. In India and along with the Hadoti region gender inequality in education is extreme. However, in the recent times importance of education for girls has been put forward and the gender gap in literacy is reducing. Overall growth of any region can not be achieved without considering women education. Increased literacy among women does not only develops half of the human capital but also improves the standard of living. Educated women help in reduction in poverty by supporting their families. Considering the gender gap in literacy rate, it requires more attention on having appropriate measures which can reduce gender gap in literacy, positive measures have been taken by the State which has resulted in reduction of the gap. Having more educated women in society increases the income level, regional disparities in income reduces, shows positive impact on the social behaviour of individual, generated more awareness, increases in productive skills etc. A greater number of educated women act as a force multiplier for the social development of the region. Whereas, illiteracy retards the development at the scale of individual, society, region and the country. Literacy is important factor in reducing gender inequality. Here more gap in gender literacy is considered as a negative indicator of development and it has been compared between 1991 and 2011.

Gap in Male – Female Literacy Rate, 1991

High gap in Male-Female literacy rate (Above 37.82): There are total five tehsils with maximum gap in gender literacy rate, this can be negatively related with the development levels. These tehsils are Khanpur (44.69), Atru (42.55), Mangrol (42.42), Antah (42.42) and Baran (37.98). Except Khanpur all the tehsils are from Baran district.

Moderate high gap in Male-Female literacy rate (37.82-32.82): This category has highest number of tehsils, these tehsils are Keshoraipatan (37.72), Indragarh (37.72), Pirawa (36.2), Chhipabarod (36.09), Sangod (35.16), Digod (35.08), Panchpahar (33.75) and Chhabra (33.31).

Moderate gap in Male-Female literacy rate (32.82-27.82): This category comprises of five tehsils that are Jhalrapatan (32.31), Pipalda (31.77), Shahbad (31.49), Nainwa (30.55) and Bundi (29.21).

Low gap in Male-Female literacy rate (27.82-22.82): This category has been considered, having low gap in gender literacy rate but still the gap is very high. These tehsils are Kishanganj (27.53), Hindoli (26.91), Manohar thana (24.51), Aklera (24.51), Ramganj Mandi (23.83) and Gangdhar (23.56).

Very low gap in Male-Female literacy rate (Below 22.82): Only one tehsil is being recorded in this category that is Ladpura tehsil (7.82) of Kota district. This tehsil has maximum infrastructural facilities with respect to accessibility of education institution and this has positive results in reducing gender gap in literacy.

Gap in Male – Female Literacy Rate, 2011

High gap in Male-Female literacy rate (Above 31.83): In 2011 census year improvement has been seen earlier the maximum gap was 44.69 and it has reduced to 33.99. there are two tehsils only in this category namely, Nainwa (33.99) and Chhipabarod (31.87).

Moderate high gap in Male-Female literacy rate (31.83-29.83): It consists of seven tehsils that are Hindoli (31.75), Pirawa (31.53), Indragarh (31.31), Khanpur (30.54), Panchpahar (30.16), Shahbad (30.16) and Chhabra (30.06). earlier Khnapur tehsil had maximum gap but it had recorded reduction in it.

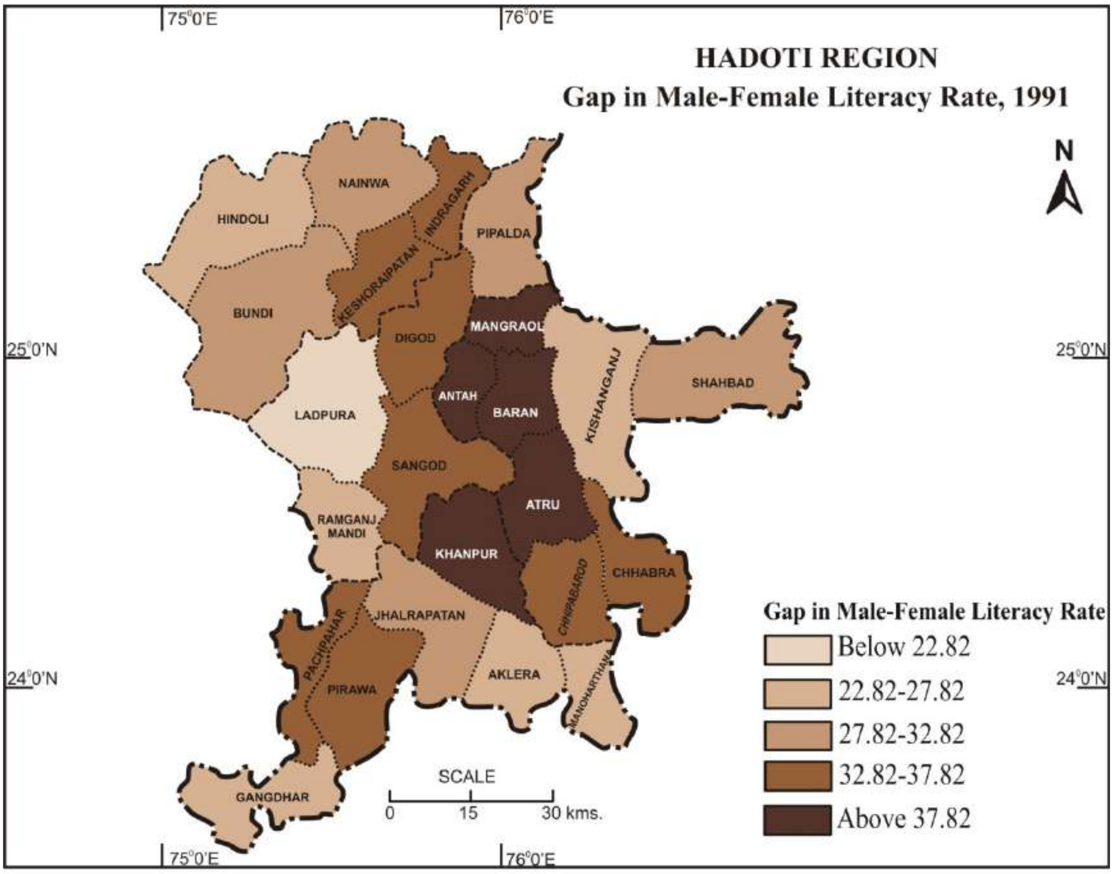
Moderate gap in Male-Female literacy rate (29.83-27.83): This category has maximum number of tehsils and the average gap fall within this range. These tehsils are Manohar thana (29.39), Aklera (29.08), Atru (29.01), Pipalda (28.91), Mangrol (28.87), Gangdhar (28.64), Keshoraipatan (28.61) and Antah (28.04).

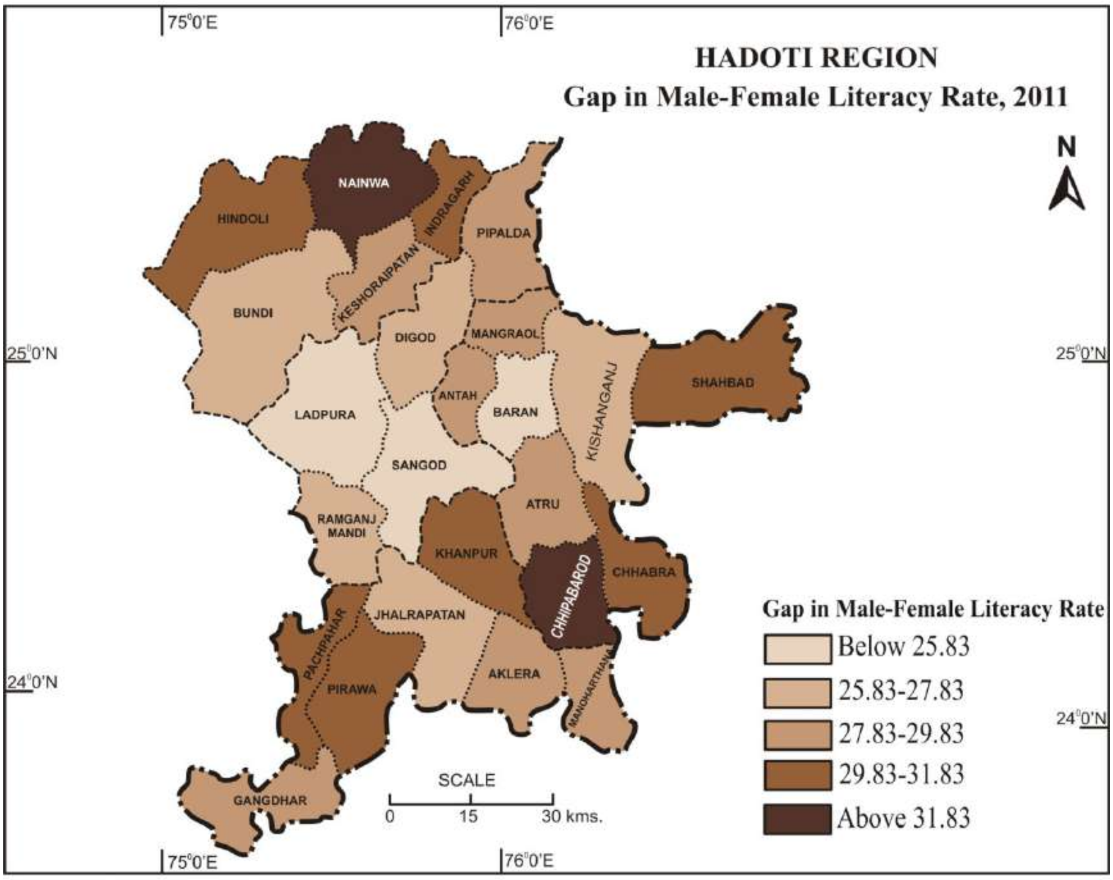
Low gap in Male-Female literacy rate (27.83-25.83): It consists of five tehsils that are Digod (27.07), Kishanganj (27.07), Jhalrapatan (26.85), Ramganj Mandi (26.22) and Bundi (26.02). Digod and Jhalrapatan has significantly reduced gender gap in literacy rate.

Very low gap in Male-Female literacy rate (Below 25.83): This category has three tehsils in it. That are Baran (24.68), Ladpura (15.5) and Sangod (-0.17). Ladpura tehsil has recorded negative change and recorded increased in gender gap in literacy. Whereas Baran and Sangod has reduced there gap significantly.

Coefficient of variation for gap in male-female literacy rate of 1991 is 24.73% and in 2011 it is 24.44% this means that degree of variability of gap in male-female literacy rate is slightly higher in 1991. Coefficient of variation has remain all most similar over 20 year period. It suggests that overall literacy rate may have improved but the gender gap in literacy rate has not seen a positive change. This also shows that step taken to address the gap in male-female literacy rate was not been equally effective in reducing the gender gap in literacy rate. It implies that persistent variability in male-female literacy rate indicates that equitable access to opportunity of education was not same in the region.

MAP-3.4





Source : Census of India

3.6. Percentage of Urban Population

Urbanization is considered an engine of growth and it is being considered as a recent phenomenon, in global statistic of urbanisation, barley 3 percent of population was residing in urban areas in 1800 and by 1900 it increased to 15 percent. Higher income, productivity and growth are associated with urbanization. Urban area has positive agglomeration effects, along with more efficient labour market, lower transaction cost and easier knowledge spill overs and links with global economy. Urbanization is often linked with industrialization and bothy goes hand in hand. Hadoti region's percent of urban population in 1991 and 2011 has been compared.

Percentage of urban population, 1991

High urban population (Above 32): This category comprises of two tehsils of the region that are Ladpura tehsil of Kota district (83.47%) at the top position, followed by Baran tehsil of Baran district (41.65%). These both tehsils have district headquarter along with maximum infrastructural facilities are available here.

Moderate high urban population (32-24): It consists of four tehsils which are Keshoraipatan (27.49%), Indragarh (27.49%), Jhalrapatan (26.67%) and Panchpahar (24.3%). Jhalawar tehsil is also a district headquarter. Apart from this Keshoraipatan and Indargarh tehsils are of Bundi district.

Moderate urban population (24-16): This category comprises of four tehsils which are majorly from Baran district apart from one tehsil that are Bundi (23.31%) followed by Mangrol (22.33%), Antah (22.33%) and Chhabra (16.72%).

Low urban population (16-8): This category comprises of highest number of tehsils which indicates that most of the tehsils in the region has low urbanization. These tehsils are Pirawa (13.89%), Ramganj Mandi (12.4%), Chhipabarod (11.62%), Sangod (11.29%), Manoharthana (10.58%), Aklera (10.58%), Nainwa (9.08%) and Khanpur (8.22%).

Very low urban population (Below 08): This consists of seven tehsils from which only Gangdhar has (5.25%) urban population. Kishanganj, Shahbad, Atru, Hindoli, Pipalda, Digod has no urban population in the tehsils and 100% population is rural.

Percentage of urban population, 2011

High urban population (Above 32): This category consists of four tehsils whereas in 1991 there were only two tehsils. This shows that level of urbanization is increasing in the region. The tehsils are Ladpura (89.7%), Baran (55.25%), Ramganj Mandi (47.28%) and Jhalrapatan (32.03%).

Moderate high urban population (32-24): It consists of four tehsils that are Indragarh (31.79%), Keshoraipatan (29.39%), Bundi (27.94%) and Antah (26.97%). Bundi tehsil has upgraded from moderate urban population to this category and similarly urbanization has been increserd in Antah tehsil, one of the reseaon for the increase is establishment of Antah thermal power plant.

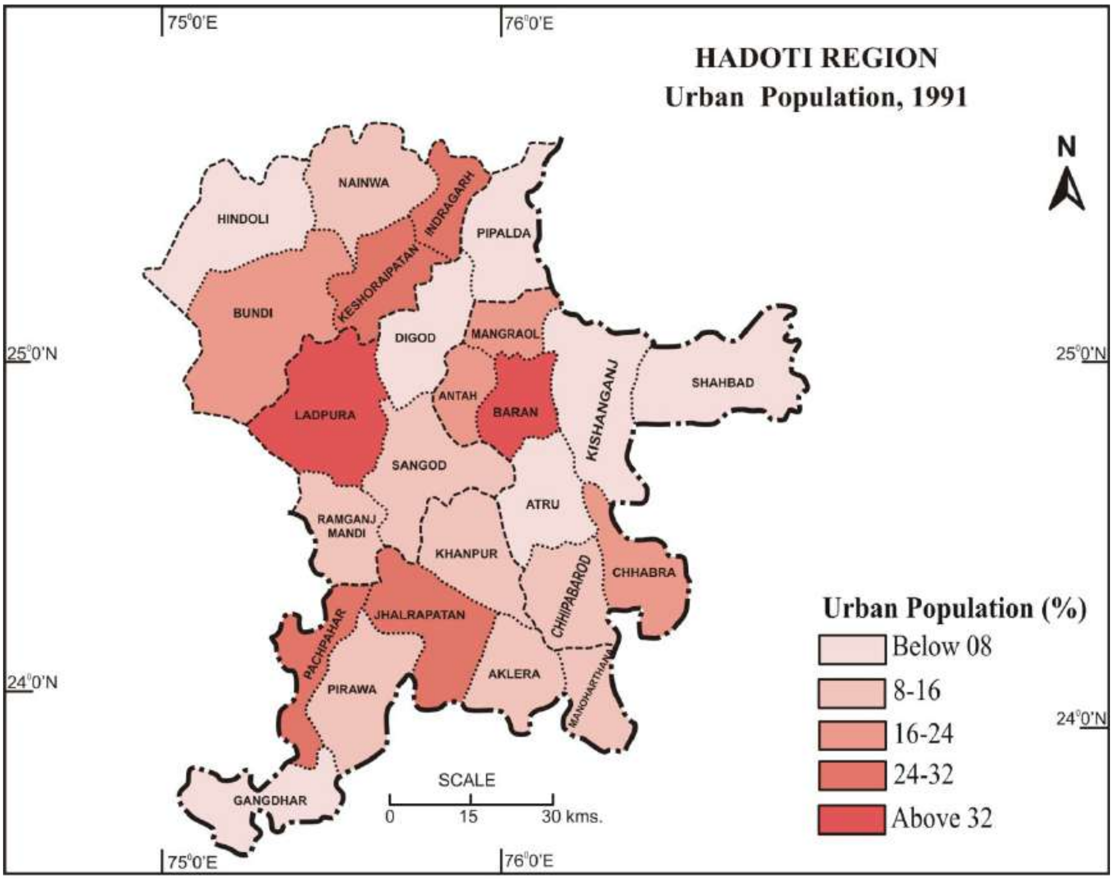
Moderate urban population (24-16): It consists of four tehsils that are Panchpahar (23.57%) of Jhalawar district, which has downgraded from moderate high category. Followed by Mangrol (23.44%), Chhabra (21.18%) and Atru (18.44%), majorly this category is being dominated by Baran district.

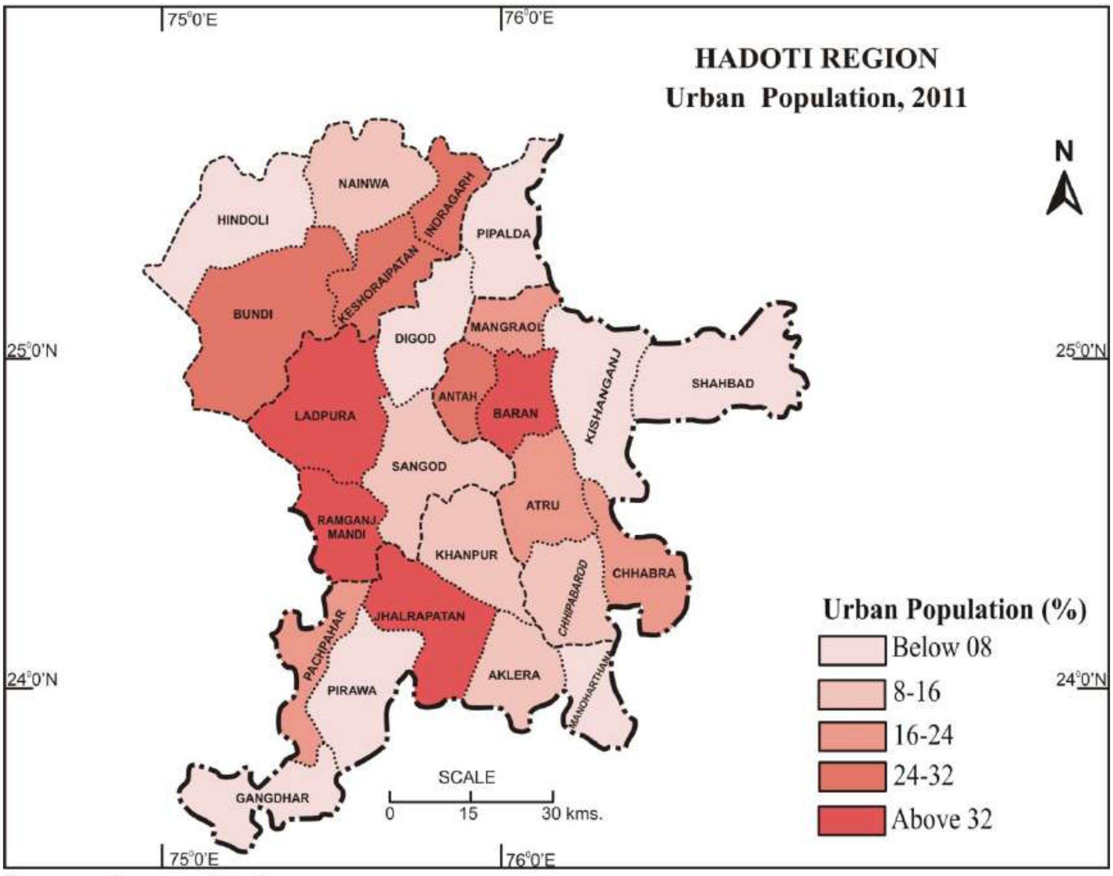
Low urban population (16-8): This category consists of five tehsils, whereas in 1991 it comprises of highest number of tehsils. The tehsils are Aklera (14.69%), Sangod (11.73%), Chhipabarod (11.02%), Nainwa (9.94%) and Khanpur (8%).

Very low urban population (Below 08): This category has eight tehsils and all the tehsils are in the peripheral part of the region, centre being considered as Ladpura tehsil. These tehsils border with Madhya Pradesh. The tehsils are Manohar thana (7.89%), Pirawa (6.02%), Gangdhar (5.13%) and Hindoli (0.74%). Whereas Kishanganj, Shahbad, Pipalda and Digod still have 100% rural population, however improvement has been seen when compared by 1991 data.

Coefficient of variation of percentage of urban population for year 1991 is 109.33% and in 2011 it is 103.26% this means the degree of variability in urban population in 1991 was slightly higher than 2011. However, higher value of CV shows that the urban population has outliners such Ladpura tehsil which has very high percentage of urban population and other tehsils with zero urban population.

MAP-3.5





Source : Census of India

3.7. Working Population

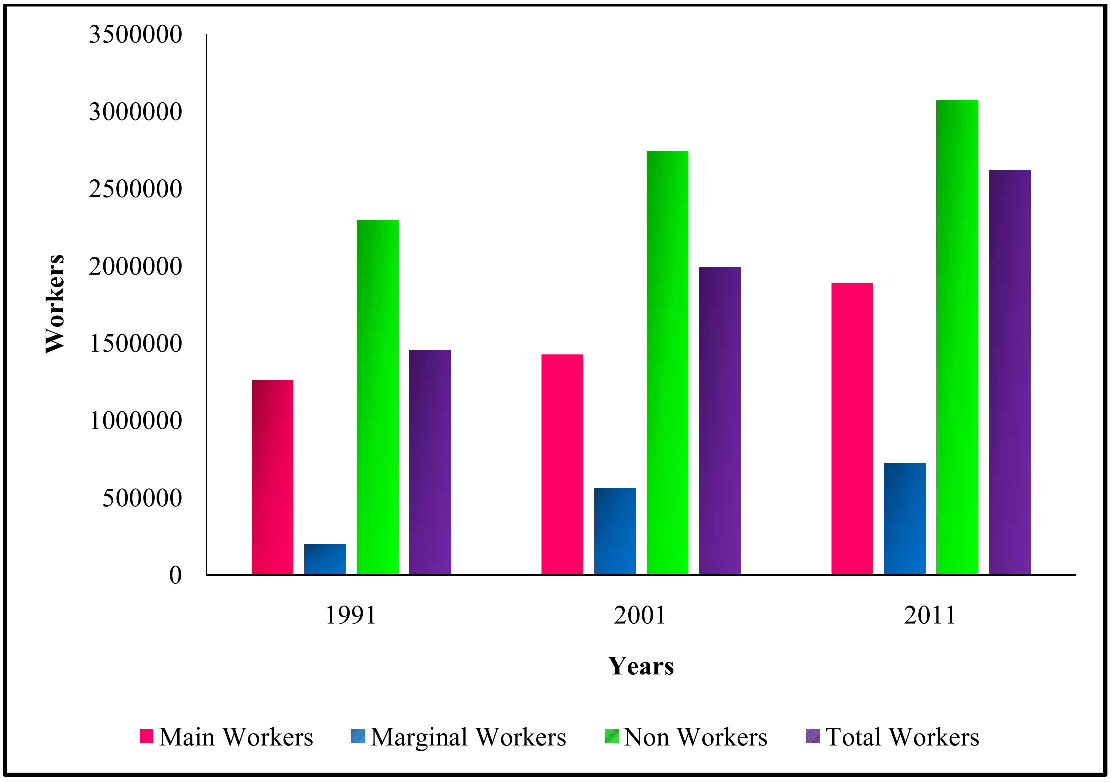
Categorizing economy into various sectors helps in analysing the economic activities within the sectors. The information and the analysis of sectors show that economy is expanding or the areas of the economy is having contraction. In India there are three dominant sectors that are primary sector, secondary sector and tertiary sector. Apart from this economy can be divided into two, one organised sector and unorganised sector. And based on ownership economy is divided into sectors one is private sector and other is public sector. Based on availability of data, working and non-working population has been categorized based on their workforce participation in various sectors of the economy.

Main worker: Are that person who had worked for six months or more during last one year that is preceding the date of enumeration under census, in any activity which is economically productive is termed as main worker.

Marginal worker: These are those persons who had worked for three months or less than three months but not more than six months, during last one year that is preceding the date of enumeration under census.

Non-worker: These are those people who has not worked at all in any economically productive activity, during last one year that is preceding the date of enumeration under census.

Chart 3.2 : Working Population of Hadoti Region, 1991-2011



Source : Census of India

Working population of Hadoti region has been analysed from 1991 till 2011 census year absolute number of people has been increased in all the category that is main worker, marginal worker and total worker along with this non-worker has been increased.

3.7.1. Percentage of Main Workers to Total Workers

Main workers are those people who has worked for six months or more during the last one year from the reference date of enumeration in the census, and contributed to economically productive activity. Main worker percentage has been calculated to the total workers (main + marginal workers) and has been compared between 1991 and 2011 census year to have better understanding of temporal change in the percentage of main worker to total workers. The percentage of main workers to total workers has been categories under 5 categories.

Percentage of Main Workers to Total Workers, 1991

High percentage of main workers (Above 90.59): This category comprises of four tehsils that are Ladpura (95.56), Panchpahar (94.3), Gangdhar (92.76) and Ramganj Mandi (91.39). Ladpura tehsil has highest percentage of main workers.

Moderate high percentage of main workers (90.59-87.59): It comprises of four tehsils that are Bundi (90.23), Jhalrapatan (88.6), Kishanganj (87.91) and Khanpur (87.59).

Moderate percentage of main workers (87.59-84.59): This category comprises of six tehsils that are Pirawa (87.22), Baran (86.15), Digod (85.86), Mangrol (85.33), Antah (85.33) and Shahbad (84.92).

Low percentage of main workers (84.59-81.59): It comprises of four tehsils that are Keshoraipatan (84.04), Indragarh (84.04), Hindoli (83.02) and Chhipabarod (81.83)

Very low percentage of main workers (Below 81.59): This category has maximum number of tehsils, there are total seven tehsils that are Manohar thana (80.99), Aklera (80.99), Atru (80.02), Nainwa (80.01), Chhabra (79.01) and Sangod (75.59). Sangod tehsil of Kota district has the lowest percentage of main workers.

Percentage of Main Workers to Total Workers, 2011

High percentage of main workers (Above75.76): The percentage of main workers to total workers have been reduced in 2011 census year. This category comprises of four tehsils that are Ladpura (88.93), Ramganj mandi (81.4), Bundi (77.81) and Panchpahar (76.57). Still Ladpura tehsils is on top.

Moderate high percentage of main workers (75.76-70.76): This category has six tehsils that are Digod (75.05), Nainwa (74.84), Baran (73.62), Sangod (72.04), Manohar thana (71.12) and Indragarh (70.81).

Moderate percentage of main workers (70.76-65.76): This category has maximum number of tehsils and these tehsils are Chhabra (70.31), Jhalrapatan(69.53), Pipalda (68.66), Chhipabarod (68.21), Khanpur (67.69), Gangdhar (67.65), Aklera (67.36) and Pirawa (67.06).

Low percentage of main workers (65.76-60.76): This category consists of only three tehsils that are Shahbad (63.87), Mangrol (63.04) and Antah (61.16).

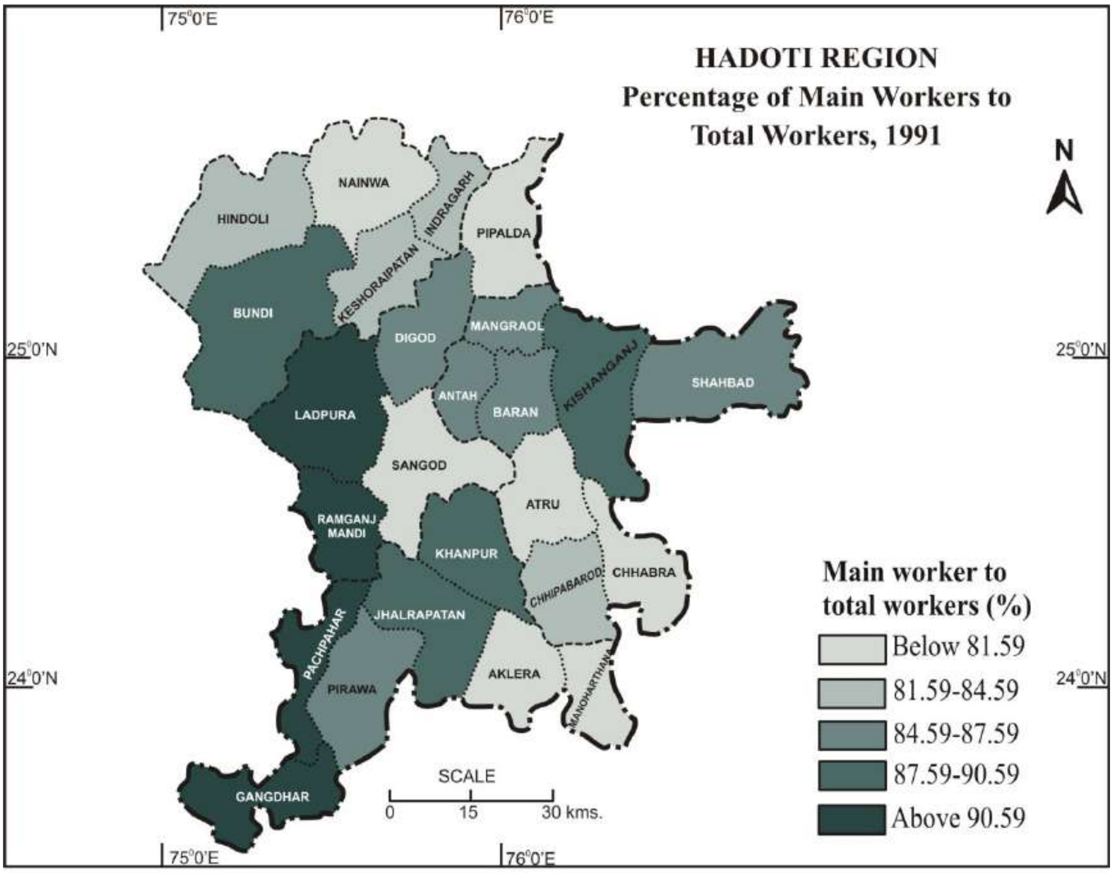
Very low percentage of main workers (Below 60.76): There are only four tehsils in this category that are Atru (60.69), Keshoraipatan (57.36), Kishanganj (56.79) and Hindoli (50.76). this time Hindoli has taken the lowest spot from Sangod.

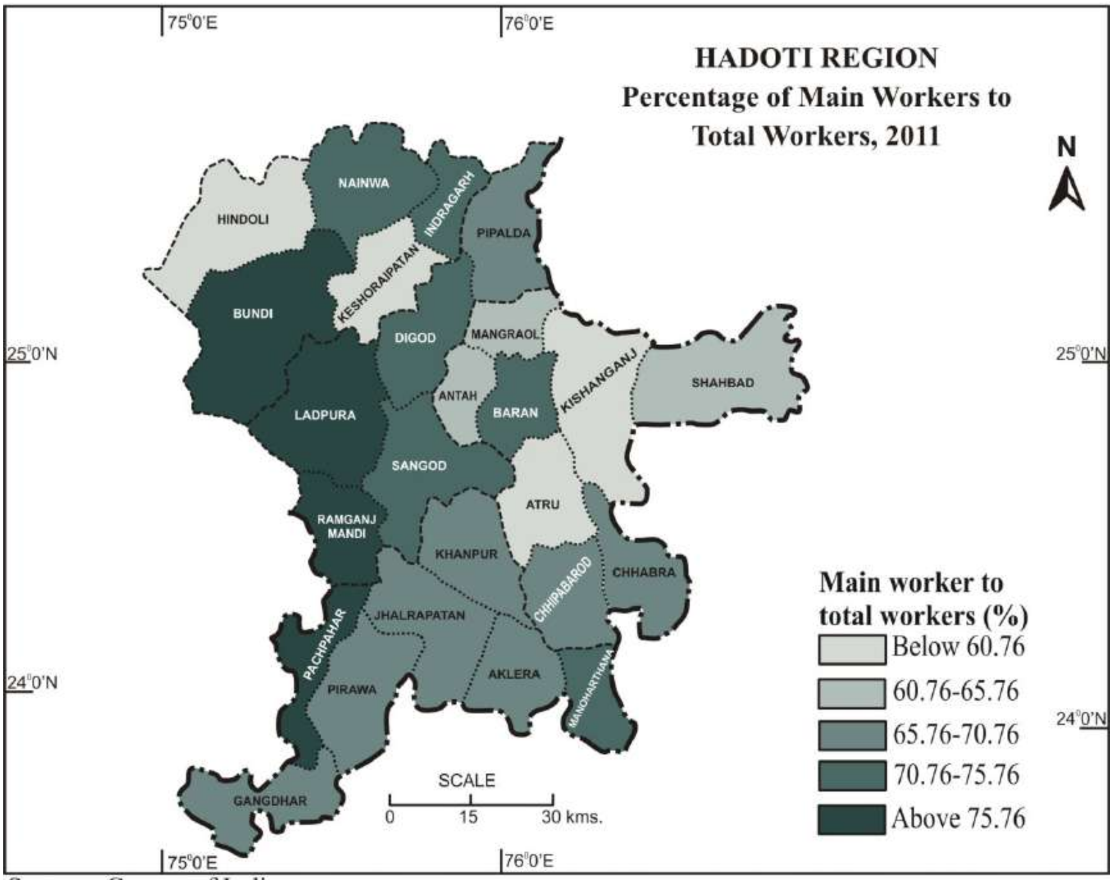
Coefficient of variation for percentage of main worker to total workers of 1991 is 6.05% and in 2011 it is 11.91% this means that degree of variability of percentage of main worker is higher in 2011.

Photoplate-3.3 : Workforce participation, Kota

Source: Captured during primary survey, 2023

MAP-3.6





Source : Census of India

3.7.2. Workforce Participation Rate

Workforce participation rate is very important indicator of social-economic development, having a greater number of workers contributes positively to economic development of the region. It makes the potential output higher, by considering other factors unchanged, it increases the potential GDP. Having higher number jobless population represents waste of economic potential. Other benefits of having higher workforce participation rate also reduces the fiscal pressure which is created due to welfare support and it also serves social inclusion and equity.

Crude work participation rate of Hadoti region has been analysed from 1991-2011 of Baran, Bundi, Jhalawar, Kota and Hadoti total. Baran district has recorded increase in work participation rate, in 2011 it was 45.19%. Bundi district has shown decrease in work participation rate from 47.47% in 2001 to 41.03% in 2011. Jhalawar district has shown increase and it reached to 48.61% in 2011. Kota district has shown highest increase in work participation rate from 34.04% in 1991 to 47.16% in 2011. Overall, Hadoti region has also recorded increase in CWPR.

Table 3.3: Crude work participation rate of Hadoti region, 1991-2011

Years	Crude work participation rate (%) (CWPR)				
	Baran	**Bundi**	**Jhalawar**	**Kota**	**Hadoti (Total)**
1991	38.29	40.17	43.69	34.04	38.67
2001	42.71	47.47	47	34.51	42.03
2011	45.19	41.03	48.61	47.16	45.9

Source: Census of India

Workforce Participation Rate, 1991

High workforce participation rate (Above 45.04): This category comprises of five tehsils that are Pirawa (52.61), Manohar thana (49.1), Aklera (49.1), Chhipabarod (47.36) and Hindoli (45.32). Pirawa tehsil of Jhalawar district has highest number of workers to the total population.

Moderate high workforce participation rate (45.04-42.04): Under this category there are only three tehsils that are Jhalrapatan (44.51), Nainwa (43.71) and Shahbad (42.47).

Moderate workforce participation rate (42.04-39.04): There are five tehsils under this category that are Chhabra (41.99), Kishanganj (40.85), Sangod (40.75), Gangdhar (39.65) and Khanpur (39.29).

Low workforce participation rate (39.04-36.04): This category has maximum number of tehsils that are Ramganj Mandi (39), Atru (38.88), Pipalda (38.83), Bundi (37.86), Panchpahar (37.56), Keshoraipatan (37.22), Indragarh (37.22) and Digod (36.35).

Very low workforce participation rate (Below 36.04): There are four tehsils in this category two tehsil are with district headquarter that are Ladpura and Baran. These tehsils are Baran (34.9), Mangrol (34.33), Antah (34.33) and Ladpura (30.04).

Workforce Participation Rate, 2011

High workforce participation rate (Above 56.71): There are only three tehsils which have highest number of workers to the total population that are Pipalda (67.35), Sangod (64.54) and Digod (59.22) in 2011 top position is taken by Piplada and work participation rate has also been increased.

Moderate high workforce participation rate (56.70-51.71): In this category there are three tehsils that are Manohar thana (53.88), Pirawa (52.78) and Ramganj Mandi (52.1).

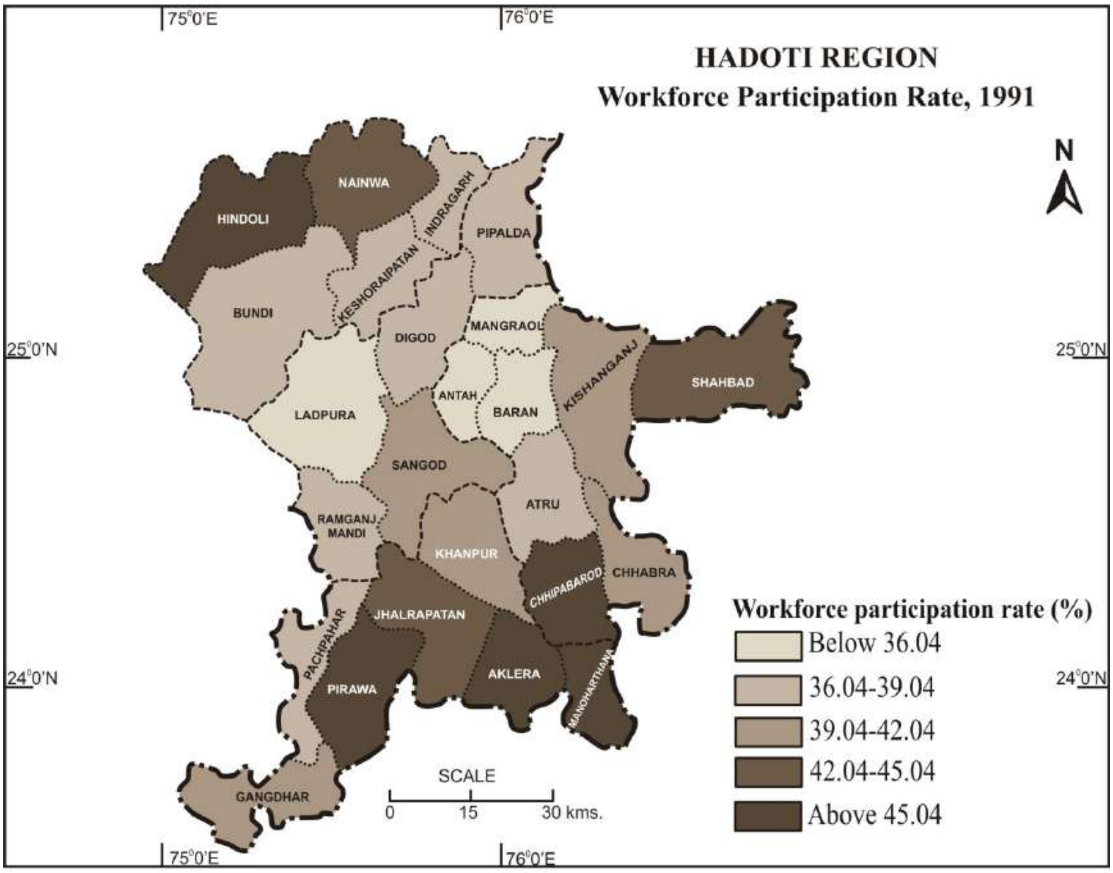
Moderate workforce participation rate (51.71-46.71): There are total seven tehsils under this category that are Hindoli (51.16), Khanpur (51.15), Aklera (49.6), Chhipabarod (49.29), Gangdhar (49.11), Chhabra (47.91) and Atru (46.73).

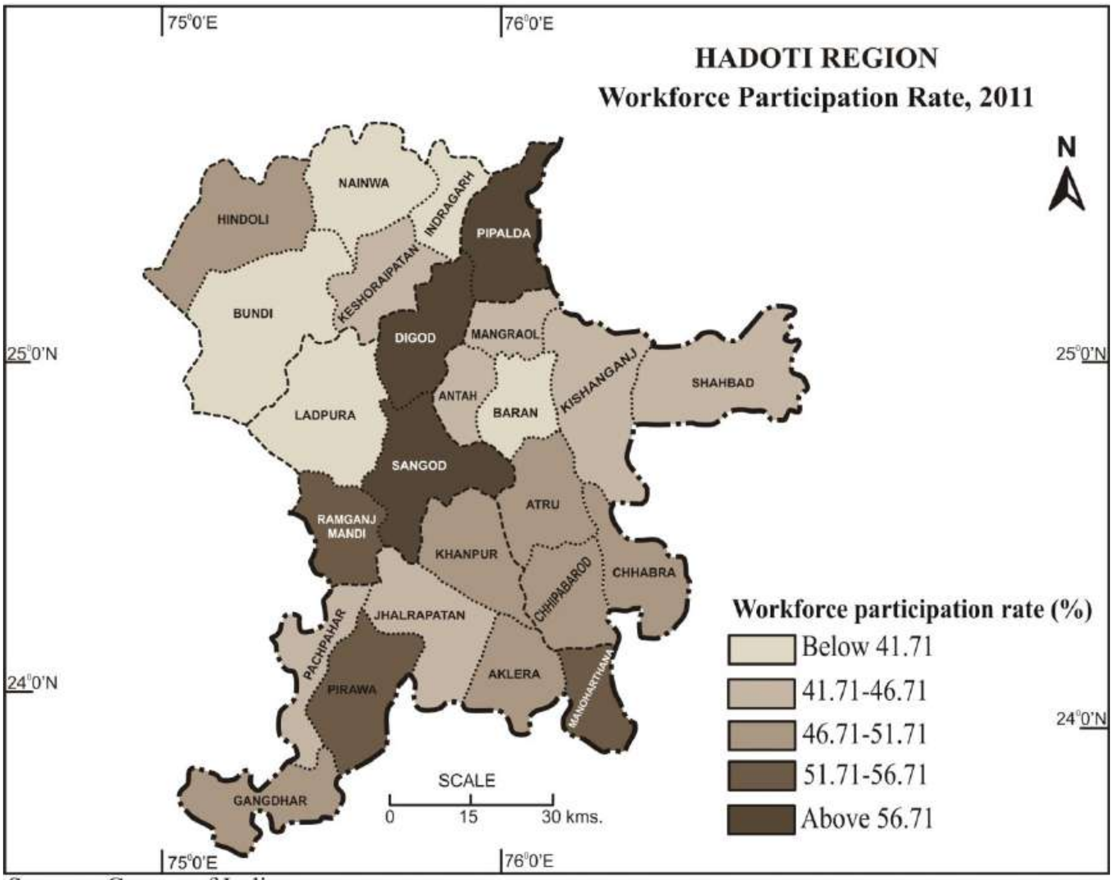
Low workforce participation rate (41.71-46.71): This category also has seven tehsils namely Shahbad (46.7), Kishanganj (46.41), Mangrol (45.48), Jhalrapatan (45.13), Panchpahar (42.48), Antah (42.41) and Keshoraipatan (41.82).

Very low workforce participation rate (Below 41.71): There are five tehsils under this category that are Nainwa (40.87), Baran (38.36), Ladpura (38.2), Indragarh (36.72) and Bundi (36.71). In 2011 three tehsils with district headquarter are under this category that are Ladpura, Baran and Bundi.

Coefficient of variation for workforce participation rate of 1991 is 13.12% and in 2011 it is 16.46% this means that degree of variability of workforce participation rate is higher in 2011.

MAP-3.7





Source : Census of India

3.7.3. Density of Workers

The density of workers has been taken out so that it can be found out that how much workers are there in each tehsil, per square kilometre. Considering this factor becomes important while measuring development because it shows that how many workers are required to serve each tehsil with efficiency and can lead to positive economic output in the region. The density of worker has been compared between 1991 and 2011 to have better understanding of temporal and spatial changes.

Density of Workers, 1991

High density of workers (Above 79): There are total four tehsils that are Ladpura (128.82) on the highest spot followed by Ramganj Mandi (82.58), Jhalrapatan (81.24) and Manohar thana (79.39). Ladpura and Jhlrapatan are tehsils with district headquarter of Kota and Jhalawar district.

Moderate high density of workers (79-68): This category has only two tehsils that are Pirawa (78.6) and Baran (77.24).

Moderate density of workers (68-57): There are five tehsils namely Chhipabarod (66.31), Panchpahar (64.6), Aklera (63.54), Mangrol (59.47) and Indragarh (57.95).

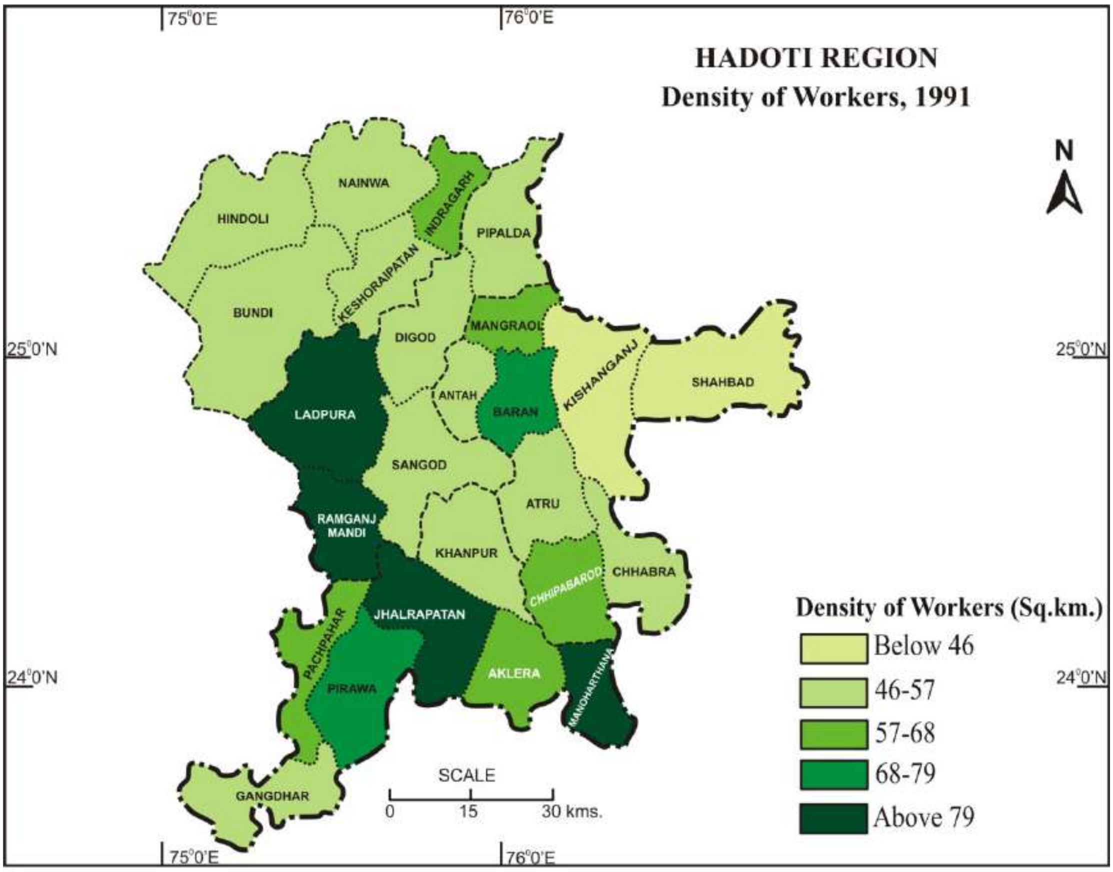
Low density of workers (57-46): This category has highest number of tehsils, namely Pipalda (55.65), Bundi (54.78), Khanpur (53.6), Sangod (53.07), Chhabra (52.02), Antah (51.97), Gangdhar (51.34), Hindoli (51.24), Nainwa (50.49), Keshoraipatan (50.28), Digod (49.36), and Atru (48.55).

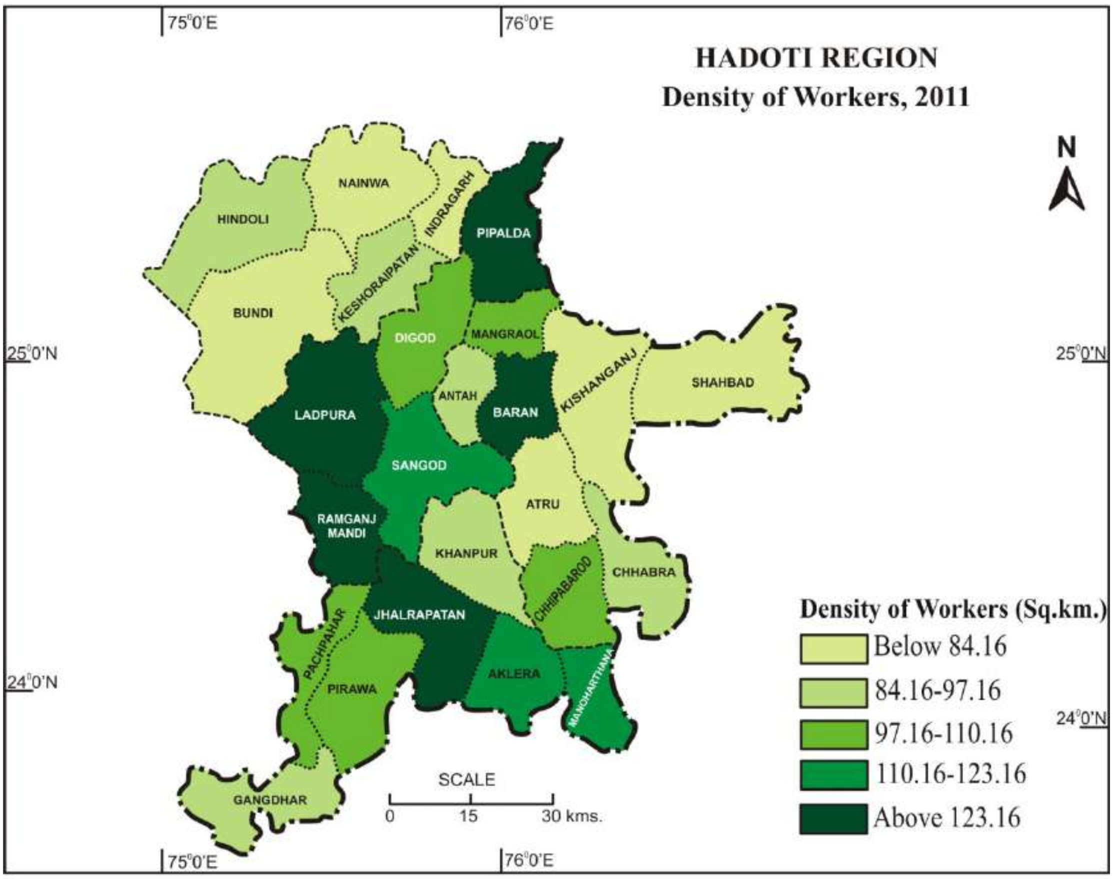
Very low density of workers (Below 46): There only two tehsils that are Kishanganj (30.93) and Shahbad (24). Shahabad tehsil has lowest density of workers, this tehsil is majorly tribal tehsil.

Density of Workers, 2011

High density of workers (Above 123.16): The density of workers has been increased when compared with 1991 density of workers. There are five tehsils in this category that are Ladpura (278.87), Ramganj Mandi (180.8), Pipalda (134.86), Baran (129.99) and Jhalrapatan (125.59). Out of these tehsils three tehsil have district headquarter in it that are Ladpura, Baran and Jhalrapatan district headquarter are Kota, Baran, Jhalawar district respectively. Baran district has shown increase in density of works. This shows that better infrastructure attracts more workers and offers more job opportunities.

MAP-3.8





Source : Census of India

Moderate high density of workers (12.16-110.16): There are only three tehsils under this category that are Manoharthana (121.86), Sangod (113.99), Aklera (112.06). In these tehsils also increase in density of workers has been recorded.

Moderate density of workers (110.16-97.16): There are five tehsils in this category that are Digod (109.47), Pirawa (108.1), Panchpahar (107.03), Mangrol (106.07) and Chhipabarod (101.16). Mngrol and Chhipabarod are consistent in this category with positive increase in worker's density.

Low density of workers (97.16-84.16): This category consists of six tehsils that are Antah (96.98), Khanpur (93), Keshoraipatan (91.44), Chhabra (91.05), Gangdhar (89.93) and Hindoli (84.63).

Very low density of workers (Below 84.16): There are six tehsils namely Atru (82.76), Bundi (78.98), Indragarh (71.07), Nainwa (67.36), Kishanganj (54.14) and Shahbad (45.16). Both in 1991 and 2011 Shahbad tehsil of Bara district has lowest density of workers.

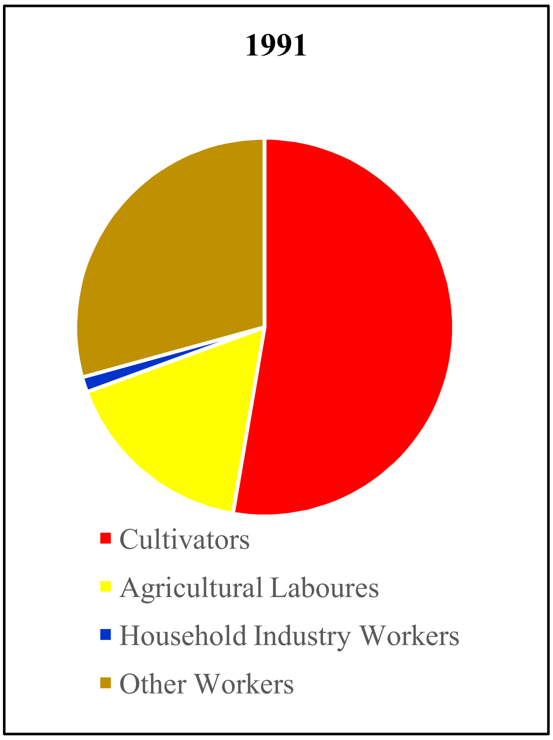
Coefficient of variation for density of workers of 1991 is 33.25% and in 2011 it is 42.38% this means that degree of variability of density of workers is higher in 2011.

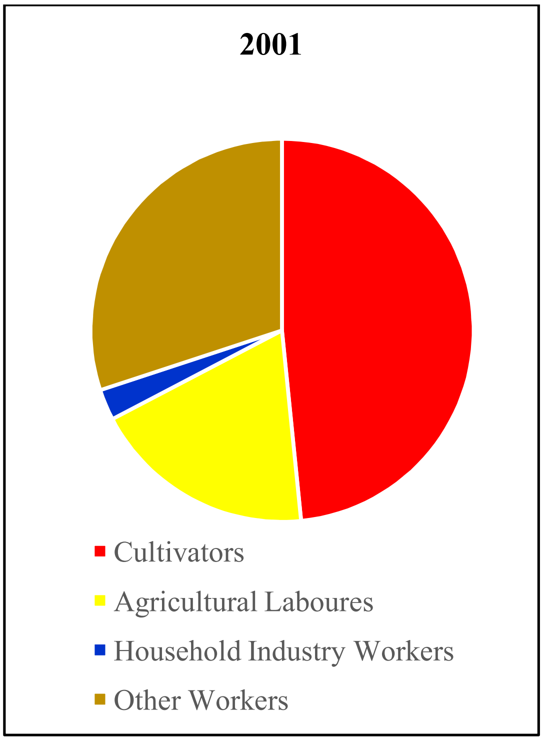
3.8. Occupation-Wise Working Population

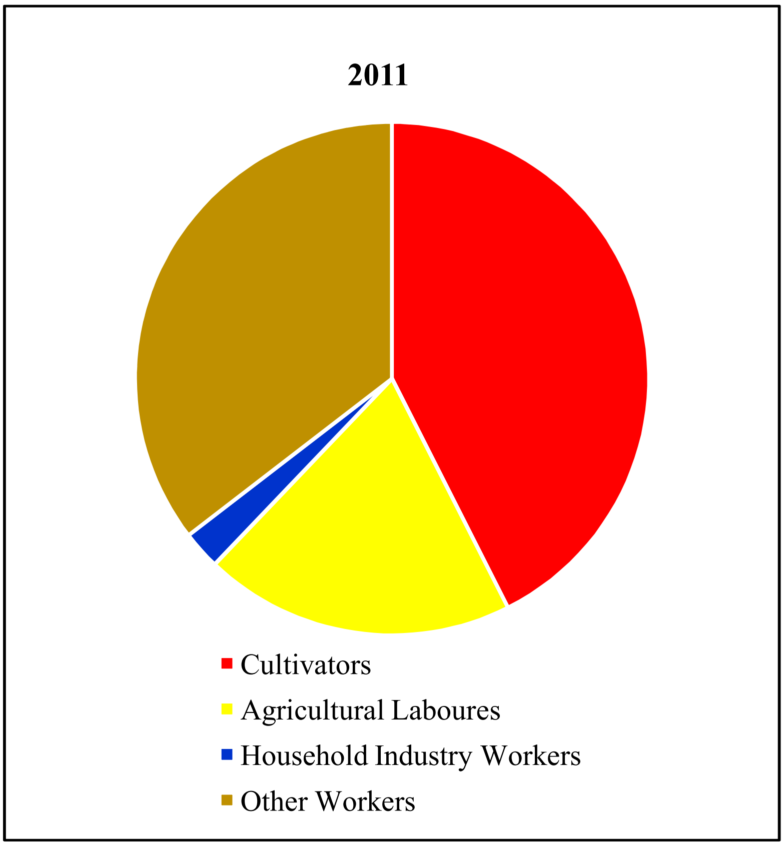
In regional economy, occupation is very important aspect because regional competitiveness is very much dependent upon local knowledge bases and quality of workers. Analysis of occupation cluster is critical for economic development planning and strategy, but this approach is underutilised. It offers insights on regional workforce talent which very important for regional development and it goes beyond relatively simple measure of educational attainment.

Shift of occupational status of people shows in which phase the economy is currently performing. For this purpose, occupation-wise working population in Hadoti Region has been analysed from 1991 till 2011. Since 1991 the biggest share of people has been engaged in agriculture. But in 2011 census people engaged in agriculture has been reduced and people engaged in other sector (mainly constitute service sector occupation). This shows there is shift in occupation from agriculture to service, and this making economy of the Hadoti region expanding.

Chart 3.4 : Occupation-Wise Working Population in Hadoti Region, 1991-2011







Source : Census of India

3.8.1. Percentage of Agricultural Labourers

As per census of India agricultural labourer are defined as a person who works for wages in cash or kind or share and works on another person's land is regarded as agricultural labourer.

These workers do not share risk in the cultivation and they don't have right of lease or contract on land on which they work. Apart from this agricultural labourer are persons who derive their major part of the income as a payment for work done farms of others. Underdevelopment, underemployment and surplus population are parallelly manifested in daily living of these workers. These agricultural labourers are part of rural society and generally considered as the most neglected part of the society. With these workers poverty becomes inevitable due to irregularity in employment. They usually constitute the suppressed class of the society and they belong to the lowest rung of social and economic ladder. Main characteristic features of the agricultural labourers are they are unskilled and lacks formal training, belong to unorganized sector, they have lower social status, there is supply demand mismatch as their population is more, they have less bargaining power and depends on the bidding of the landlord.

Considering the characteristic features of the agricultural labourers, having a greater number of their population is being considered as a negative indicator of the development. 1991 and 2011 percentage of agricultural labourer to total workers has been compared so, that better understanding of temporal change and spatial changes can be recorded. For this purpose, that data has been categorised under five categories.

Percentage of Agricultural Labourers, 1991

High percentage of agricultural labourers (Above 22.02): In this category there are three tehsils that have maximum percentage of agricultural labourers in the region these are Kishanganj (31.12), Digod (25.35) and Khanpur (22.55). Kishanganj tehsil of Baran district has highest percentage of agricultural labourers.

Moderate high percentage of agricultural labourers (22.02-18.02): This category consists of five tehsils that are Gangdhar (21.64), Panchpahar (20.3), Pirawa (19.78), Atru (19.11) and Sangod (18.84).

Moderate percentage of agricultural labourers (18.02-14.02): In this category also, there are five tehsils that are Shahbad (18), Antah (17.99), Mangrol (17.98), Pipalda (15.14) and Baran (14.04).

Low percentage of agricultural labourers (14.02-10.02): This category consists of six tehsils, namely Jhalrapatan (13.92), Keshoraipatan (13.88), Indragarh (13.88), Bundi (12.33), Chhabra (12.11) and Chhipabarod (12.07).

Very low percentage of agricultural labourers (Below 10.02): This category has six tehsils that are Aklera (9.68), Manohar thana (9.67), Ramganj Mandi (9.61), Hindoli (7.47), Nainwa (6.77) and Ladpura (6.02). Ladpura tehsils has lowest percentage of agricultural labourers.

Percentage of Agricultural Labourers, 2011

High percentage of agricultural labourers (Above 30.89): There are three tehsils that are Gangdhar (35.62), Pirawa (34.41) and Khanpur (34.19). All these three tehsils have recorded increase in percentage of agricultural workers in 2011.

Moderate high percentage of agricultural labourers (30.89-23.89): There are four tehsils under this category that are Aklera (29.74), Jhalrapatan (28.77), Panchpahar (28.23) and Keshoraipatan (25.26). All these tehsils have show increase in percentage of agricultural labourers.

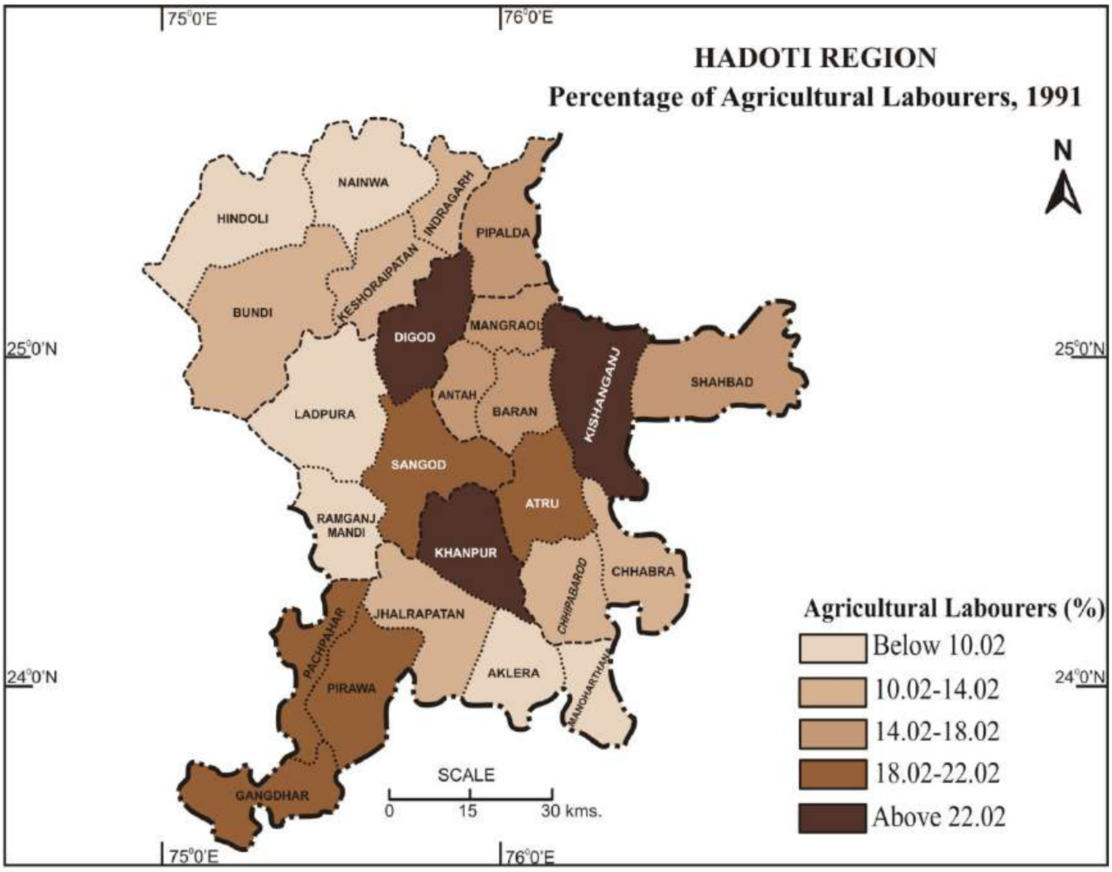
Moderate percentage of agricultural labourers (23.89-16.89): There are four tehsils that are Manoharthana (22.55), Kishanganj (19.99), Digod (17.05) and Shahbad (17.04). Only Manoharthana has recorded increase whereas other three tehsils show decrease in percentage of agricultural labourers.

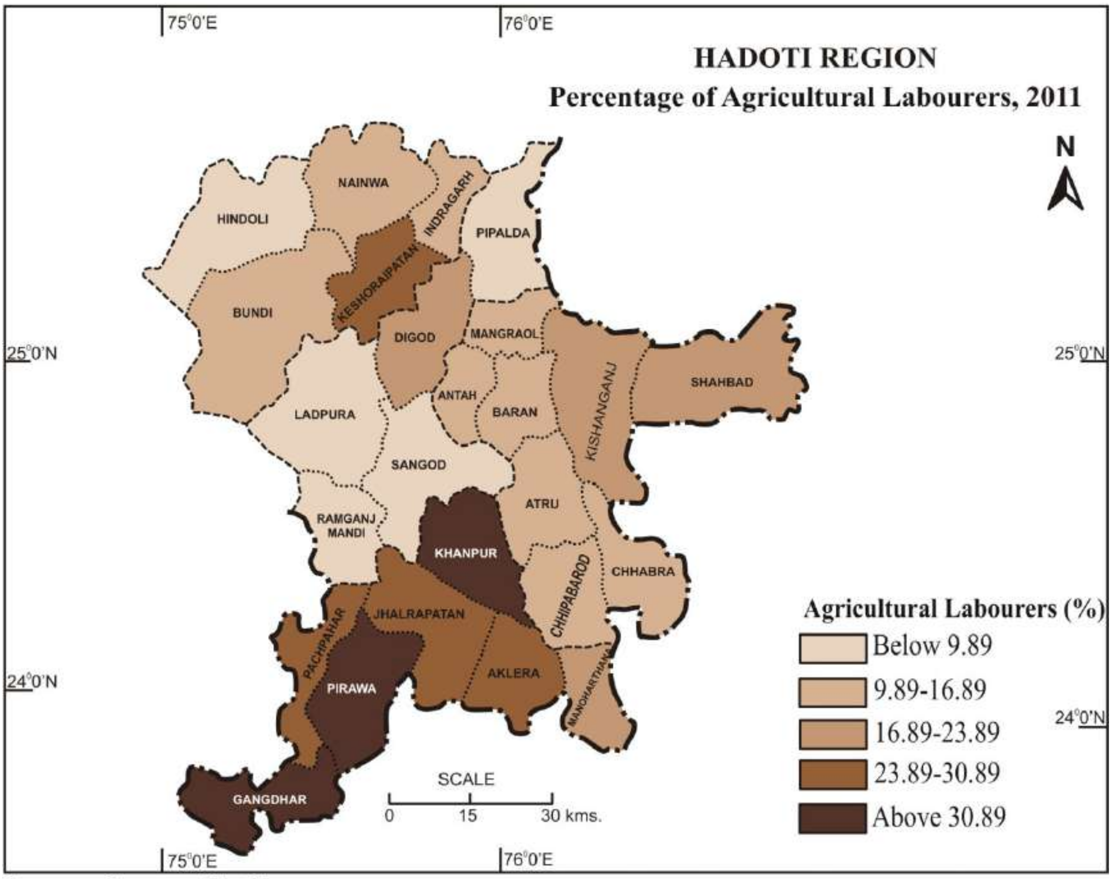
Low percentage of agricultural labourers (16.89-9.89): This category has highest number of tehsils that are Indragarh (14.85), Bundi (14.46), Chhipabarod (13.6), Mangrol (12.32), Antah (12.13), Chhabra (11.7), Atru (11.65), Baran (10.54) and Nainwa (10.51). Indarghar, Bundi, Nainwa and chhipabarod has shown increase whereas other five remaining tehsils of Baran district has recorded decrease in percentage of agricultural labourers.

Very low percentage of agricultural labourers (Below 9.89): This category consists of five tehsils that are Sangod (9.33), Hindoli (8.79), Pipalda (6.98), Ramganj Mandi (6.16) and Ladpura (2.89). Except Hindoli tehsil all four tehsils have recorded decrease in percentage of agricultural labourers.

Coefficient of variation for percentage of agricultural labourers of 1991 is 39.09% and in 2011 it is 54.86% this means that degree of variability of agricultural labourers is higher in 2011.

MAP-3.9





Source : Census of India

3.8.2. Percentage of Cultivators

As per the Census of India, a person is classified as cultivator if he or she is engaged in cultivation of land which may be owned or from government or from private persons or institutions. Effective supervision or direction in cultivation is also included in cultivation. It involves ploughing, sowing, harvesting and production of cereals and millet crops and other crops such as tobacco, ground nuts, sugarcane, cotton etc. medicinal plants, fruits, vegetables, or keeping orchards or groves etc. Workers engaged in plantation crops cultivation like tea, coffee, coconut, rubber and betel nuts, does not come under cultivators, whereas they are recorded under "other workers". Percentage of cultivators to total workers of region have been compared between 1991 and 2011.

Percentage of Cultivators, 1991

High percentage of cultivators (Above 59.73): Under this category there are only three tehsils that are Hindoli (64.01), Manoharthana (63.02) and Aklera (63.02).

Moderate high percentage of cultivators (59.73-49.73): There are total seven tehsils that are Gangdhar (59.48), Chhipabarod (59.02), Shahbad (56.75), Nainwa (54.77), Chhabra (53.39), Khanpur (51.39) and Jhalrapatan (50.82).

Moderate percentage of cultivators (49.73-39.73): There are eleven tehsils under this category and these tehsils are Pipalda (49.09), Panchpahar (48.99), Pirawa (48.39), Kishanganj (47.54), Keshoraipatan (46.84), Indragarh (46.84), Atru (45.78), Mangrol (44.9), Antah (44.9), Digod (44.39) and Bundi (43.78).

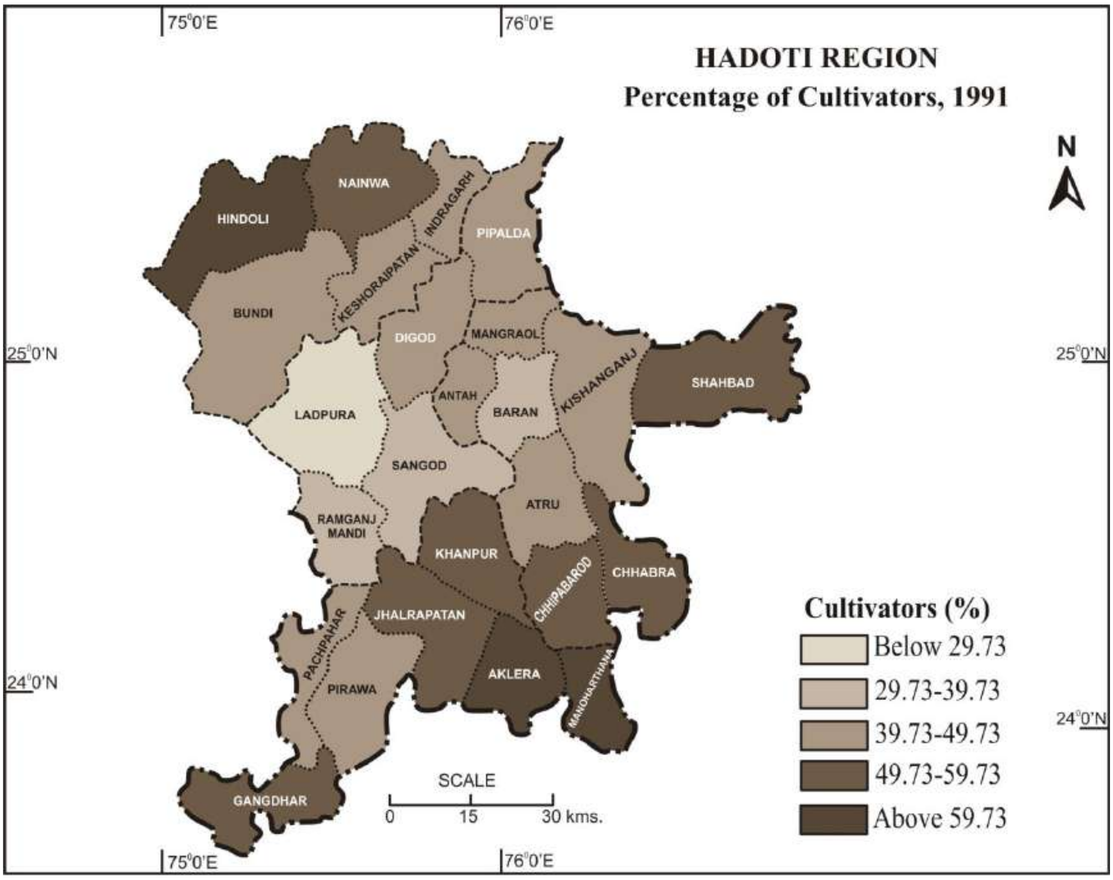
Low percentage of cultivators (39.73-29.73): Under this category there are three tehsils that are Sangod (39.04), Baran (33.14) and Ramganj Mandi (30.06).

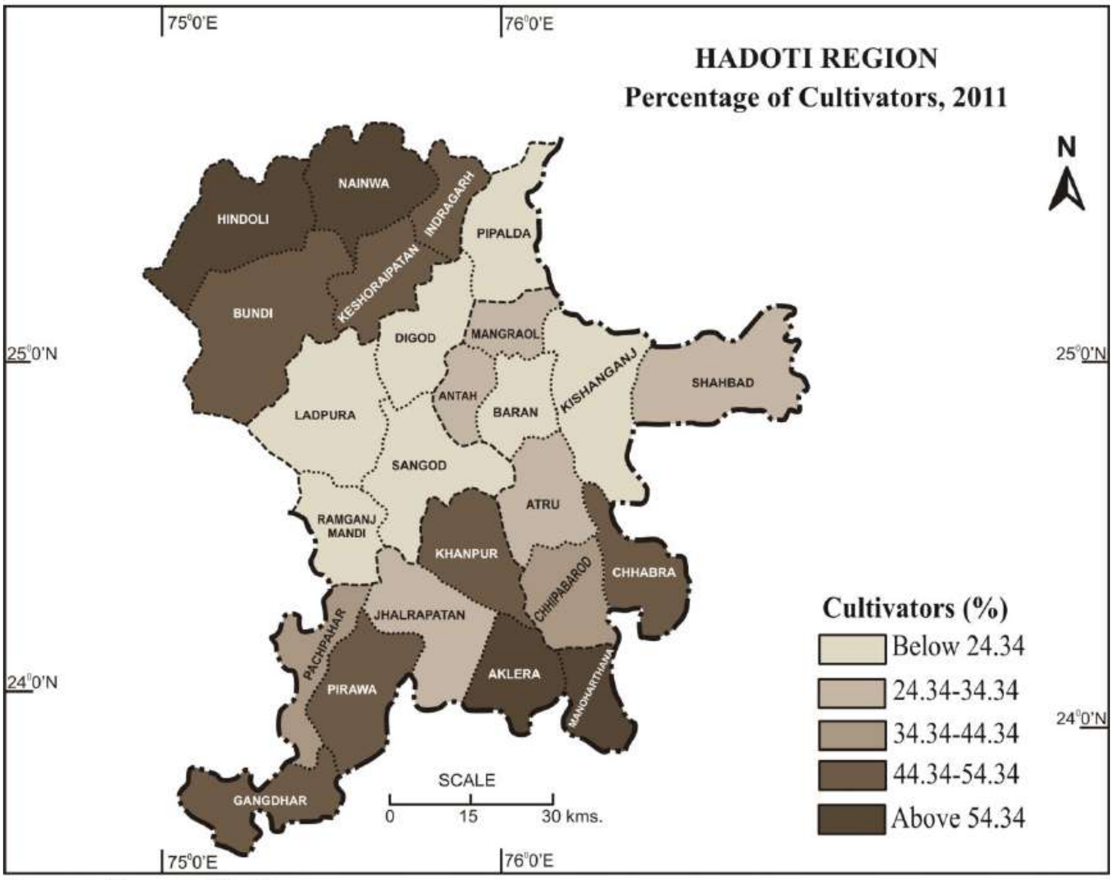
Very low percentage of cultivators (Below 29.73): Under this category there is only one tehsil that is Ladpura (9.73) of Kota district. This shows that where better infrastructure and other facilities are available their engagement of people in agricultural related activities reduces.

Percentage of Cultivators, 2011

High percentage of cultivators (Above 54.34): There are four tehsils in this category that are Hindoli (69.29), Manoharthana (67.46), Nainwa (65.85) and Aklera (56.17). Except Aklera all three tehsils has shown increase in percentage of cultivators.

MAP-3.10





Source : Census of India

Photoplate-3.4 (A) : Women cultivator preparing garlic seeds for sowing

Source: Captured during primary survey, 2023

(B) : Role of woman in agricultural sector

Source: Captured during primary survey, 2023

Moderate high percentage of cultivators (54.34-44.34): Under this category there are seven tehsils that are Keshoraipatan (53.2), Indragarh (51.79), Pirawa (51.72), Bundi (49.64), Khanpur (48.5), Gangdhar (46.59) and Chhabra (44.74). Here except Chhabra, Gangdhar and Khanpur other remaining tehsils has shown increase in cultivators' percentage.

Moderate percentage of cultivators (44.34-34.34): This category consists only two tehsils that are Panchpahar (43.06) and Chhipabarod (42.91). Both tehsils have shown reduction percentage of cultivator.

Low percentage of cultivators (34.34-24.34): It comprises of five tehsils that are Shahbad (34.15), Jhalrapatan (34.05), Atru (32.42), Mangrol (26.91) and Antah (25.35). All these tehsils have shown in decrease percent of cultivators.

Very low percentage of cultivators (Below 24.34): It comprises of seven tehsils that are Kishanganj (23.94), Sangod (22.86), Baran (21.93), Digod (21.34), Pipalda (19.44), Ramganj Mandi (16.2) and Ladpura (4.34). Here also, all these tehsils have shown in decrease percent of cultivators.

Coefficient of variation for percentage of cultivators of 1991 is 24.37% and in 2011 it is 44.51% this means that degree of variability of percentage of cultivators is higher in 2011.

3.8.3. Percentage of Household Industry Workers

As per census of India household industry workers, are industries conducted by one or more members of the household within home or village in rural area or in urban areas. These industries do not come under Indian Factories Act and they do not run on the scale of registered factories, and they should be engaged in manufacturing, processing, servicing and repair of goods including the activities related to production, processing, servicing or making and selling of goods. Professions like doctor, musician, dancer, astrologer, barber etc. or trade or business or services are run at home does not comes under household industry workers. These units are mainly concerned with processing, production, servicing, repairing or making of goods. They have not received any kind of formal training in manufacturing of goods. These units are run by the member of the household. In the Hadoti region, substantial number of household industry workers are employed in informal sector. These workers are socio-economically poorer when compared to informal sector workers. Household industry workers are engaged in bidi making, handicrafts, dying of cloth fabric, textile etc.

Percentage of household industry worker to total workers has been analysed from 1991 to 2011. Five categories have been made which ranges between high to low percentage of household industry workers.

Percentage of Household Industry Workers, 1991

High percentage of HIW (Above 1.39): Under this category there are three tehsils that are Mangrol (2.45), Antah (2.45) and Ladpura (1.46). Top performer is Mangrol and Antah.

Moderate high percentage of HIW (1.39-1.09): This category consists of eight tehsils that are Nainwa (1.36), Manohar thana (1.28), Aklera (1.28), Jhalrapatan (1.27), Atru (1.17), Khanpur (1.16), Pirawa (1.14) and Panchpahar (1.11).

Moderate percentage of HIW (1.09-0.79): This category consists of six tehsils that are Indragarh (1.04), Gangdhar (1.03), Keshoraipatan (1.03), Sangod (0.98), Hindoli (0.83) and Baran (0.83).

Low percentage of HIW (0.79-0.49): Under this category there are six tehsils Digod, Shahbad, Chhabra, Bundi, Ramganj Mandi, Kishanganj, Pipalda.

Very low percentage of HIW (Below 0.49): There is only one tehsil of Baran district that is Chhipabarod (0.19), it has lowest percentage of household industry workers to main workers.

Percentage of Household Industry Workers, 2011

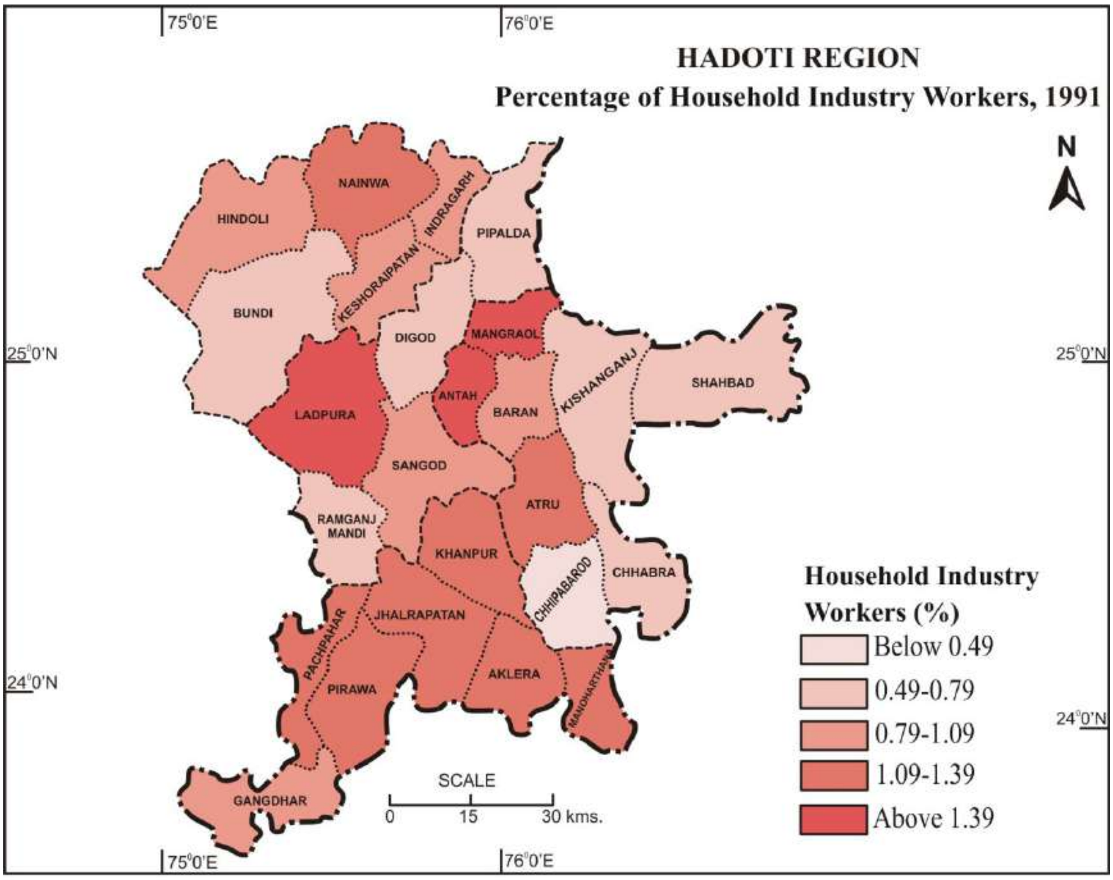
High percentage of HIW (Above 2.62): There are two tehsils of Baran and Kota district that are Mangrol (5.53) and Ladpura (3.46). Both tehsils have recorded increase in percentage of household industry workers.

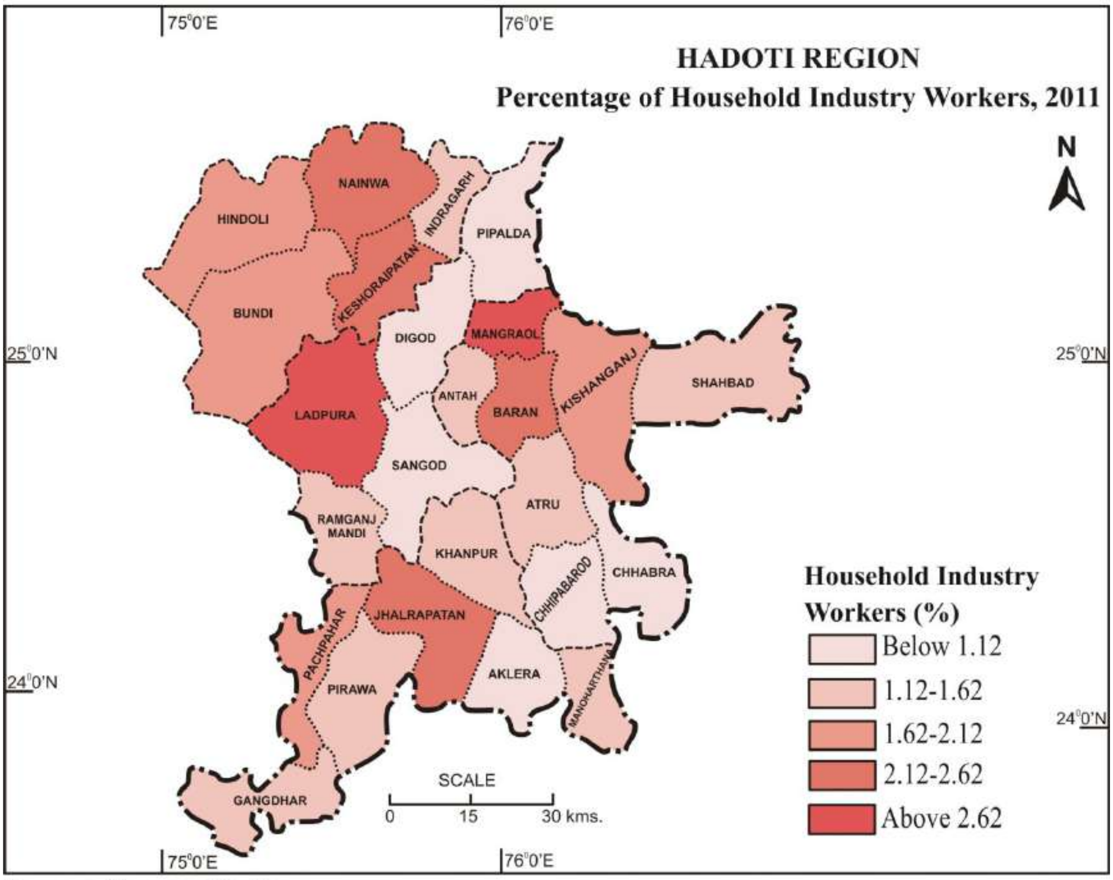
Moderate high percentage of HIW (2.62-2.12): Under this category there are four tehsils that are Nainwa (2.55), Jhalrapatan (2.43), Baran (2.35) and Keshoraipatan (2.18). All the tehsils have recorded increase in percentage of household industry workers.

Moderate percentage of HIW (2.12-1.62): There are four tehsils in this category namely Bundi (2.08), Hindoli (1.79), Panchpahar (1.77) and Kishanganj (1.76). All tehsils have recorded increase in percentage of household industry workers.

Low percentage of HIW (1.62-1.12): This category has maximum number of tehsils in it that are total nine tehsils namely Indragarh (1.6), Gangdhar (1.59), Atru (1.51), Pirawa (1.44), Antah (1.44), Khanpur (1.33), Ramganj Mandi (1.28), Manoharthana (1.28) and Shahbad (1.27). Here Khanpur and Antah has recorded in decrease of percentage of household industry workers.

MAP-3.11





Source : Census of India

Very low percentage of HIW (Below 1.12): Under this category there are six tehsils as compared to 1991. These tehsils are Chhipabarod (1.09), Chhipabarod (1.09), Chhabra (1.07), Aklera (0.94), Sangod (0.87), Digod (0.85) and Pipalda (0.62). All these tehsils have shown increase in the percentage of household industry workers.

Coefficient of variation for percentage of household industry workers of 1991 is 47.19% and in 2011 it is 57.34% this means that degree of variability of percentage of household industry workers is higher in 2011.

3.8.4. Percentage of Other Workers

As per census of India Other worker are workers who has been engaged in some economic activity during last one year from the reference period of the census, is not a cultivator or agricultural labourer or household industry worker are categorised as other workers. This category includes workers such as government servant, municipal employees, teachers, factory workers, plantation workers, workers engaged in trade and commerce, business, transport, banking, mining, construction, entertainment artists, political or social workers, priest etc.

Service sector is very crucial for developed and developing economies. In most of the developing countries service sector accounts for over half of the gross domestic product and act as a single largest contributor in the economy. Primary and secondary sector pick up their momentum in the economy when they get services offered by service sector like banking, insurance, trade and commerce, maintenance of machinery and all other services related to this sector. Service sector accounts for major part in the economy despite this, share of working population in service sector remains very low. This contrast in number of workers engaged in service sector and service sector's contribution in the economy can be attributed to growing globalisation, increase in technology, difference in policy formulation by taking consideration of current needs and institutions in the country. Changes in the structure of production and employment is a process toward modern economic growth. Workers engaged in the service sector plays very important role in the economic and social development, these workers have better living conditions as compared to other sector workers. Percentage of other workers to total workers has been analysed between 1991 and 2011.

Percentage of Other Workers, 1991

High percentage of other workers (Above 23.23): This category consists of four tehsils that are Ladpura (78.37), Ramganj Mandi (51.04), Bundi (33.46) and Panchpahar (23.9). Ladpura has highest percentage of other workers.

Moderate high percentage of other workers (23.23-18.23): There are three tehsils under this category that are Jhalrapatan (22.64), Keshoraipatan (22.28) and Indragarh (22.28).

Moderate percentage of other workers (18.23-13.23): This category also consists of three tehsils that are Nainwa (17.1), Sangod (16.73) and Digod (15.35).

Low percentage of other workers (13.23-8.23): This category has highest number of tehsils that are eight tehsils namely Pipalda (12.69), Khanpur (12.5), Baran (11.55), Hindoli (10.7), Gangdhar (10.61), Mangrol (8.97), Antah (8.97) and Pirawa (8.61).

Very low percentage of other workers (Below 8.23): This category consists of seven tehsils that are Manoharthana (7.51), Aklera (7.51), Chhabra (6.58), Atru (5.38), Shahbad (4.13), Kishanganj (3.41) and Chhipabarod (3.23).

Percentage of Other Workers, 2011

High percentage of other workers (Above 24.72): Under this tehsil there are seven tehsils that are ladpura (67.16), Ramganjmandi (39.16), Baran (38.79), Jhalrapatan (34.75), Bundi (33.82), Indragarh (31.76) and Panchpahar (26.94). Ladpura and Ramganjmandi has shown decline in other worker's percentage.

Moderate high percentage of other workers (24.72-20.72): In this category there are only two tehsils that are Antah (22.24) and Nainwa (21.09).

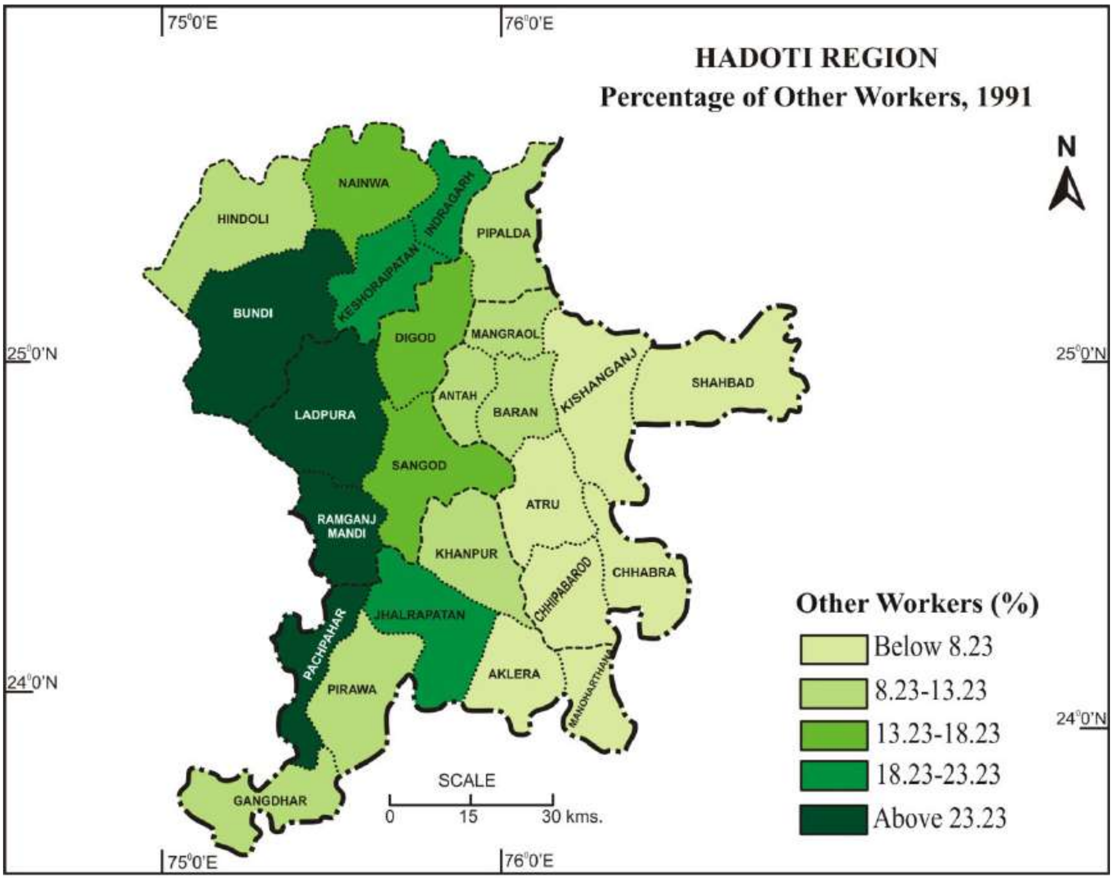
Moderate percentage of other workers (20.72-16.72): This category consists of three tehsils are Hindoli (20.14), Keshoraipatan (19.36) and Mangrol (18.28). Except Keshoraipatan other tehsil has shown increase in percentage of other workers.

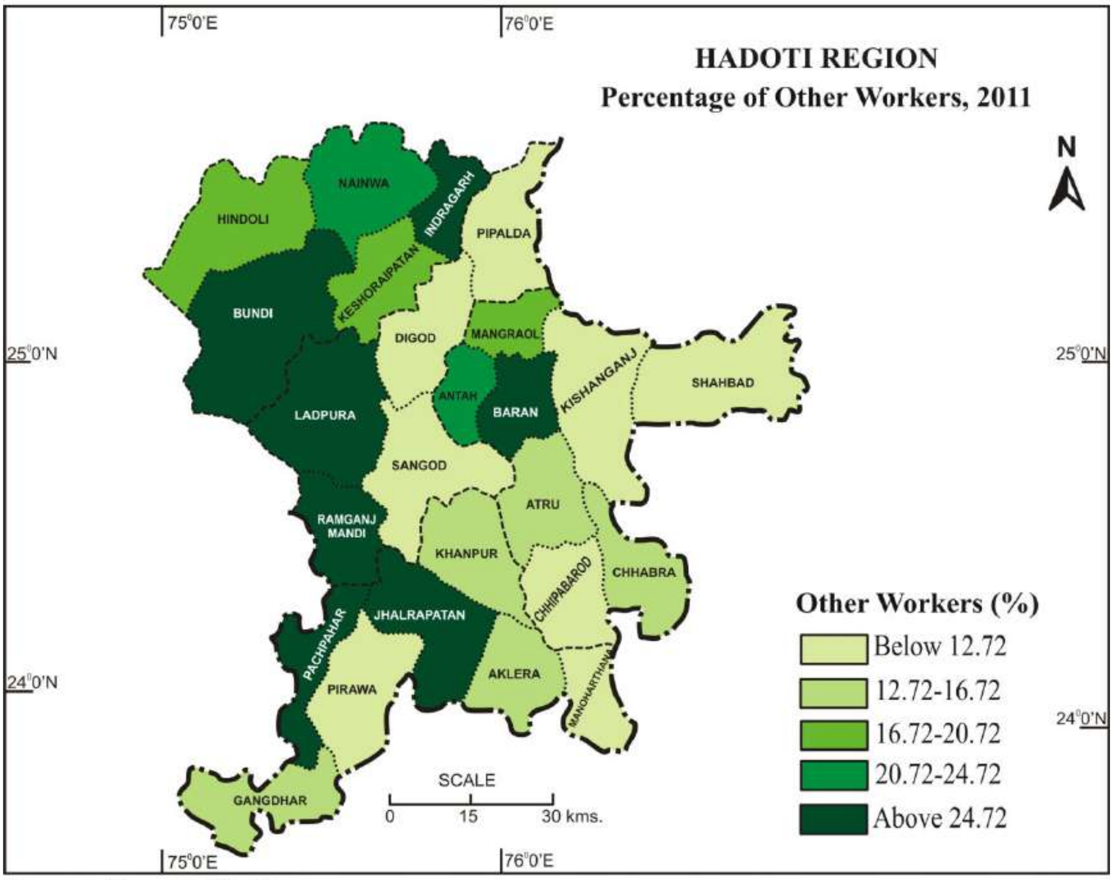
Low percentage of other workers (16.72-12.72): This category consists of five tehsils that are Gangdhar (16.2), Khanpur (15.97), Atru (15.11), Aklera (13.16) and Chhabra (12.8). All tehsil has shown increase in percentage of other workers.

Very low percentage of other workers (Below 12.72): This category consists of eight tehsils that are Pirawa (12.43), Shahbad (11.41), Kishanganj (11.1), Sangod (11.03), Digod (10.85), Chhipabarod (10.6), Pipalda (10.28) and Manoharthana (8.72). All tehsils have shown increase in percent of workers.

Coefficient of variation for percentage of other workers of 1991 is 97.77% and in 2011 it is 63.08% this means that degree of variability of percentage of other workers is higher in 1991.

MAP-3.12





Source : Census of India

3.9. Dependency Ratio

Dependency ratio is a ratio of dependent and working population. Dependent population is between the age group of 0-14 and 65 and above where as working population is between the age group of 15-64. This ratio shows that how much dependency of population is on productive population. Structure of population in region plays significant role in the growth efforts. So, it becomes very important to understand the long-term effects of the changing population structure, when there is more young population dependent on the working population it can be said that it is a developing region and when there is more old age population dependent on working population then the region said to be developed. Change in population structure results in change in composition of labour force and it also have implication on investments, savings and overall economic growth of a region. Low dependency ratio signifies that there is significant working population who can support dependent population, it also means that people have better health care and pension for its citizens. Whereas a higher ratio of dependent population indicates there is more financial stress on working population and have possibility of political instability and it has adverse effect on per capita GDP growth rate. In this condition it is required for the population to have good health, education, pension and social security benefits of the non-working population. With the help of dependency ratio, it can be determined that in which stage the demographic transition model of the region is in. During stage 1 and 2 dependency ratio is higher due to high crude birth rate creating pressure on the smaller working-age population. In stage 3 dependency ratio starts to reduce gradually due to lowering birth and mortality rate, this stage shows that it has greater proportion of young and elderly population. In stage 4 and 5 this ratio starts to increase again due to decrease in fertility and working age population has more pressure of taking care of old age population. For considering development here dependency ratio has been considered as a negative indicator. The average number of economically dependent population per 100 economically productive population, of Hadoti region has been analysed between 1991 and 2011.

Dependency Ratio, 1991

High dependency ratio (Above 168.67): Highest dependency ratio is found in six tehsils that are Ladpura (232.89), Mangrol (191.29), Antah (191.28), Baran (186.53), Digod (175.12) and Keshoraipatan (168.67).

Moderate high dependency ratio (168.67-155.67): Under this category there are six tehsils that are Indragarh (168.66), Panchpahar (166.25), Bundi (164.14), Pipalda (157.53), Atru (157.23) and Ramganj Mandi (156.39).

Moderate dependency ratio (155.67-142.67): This category consists of four tehsils that are Khanpur (154.83), Gangdhar (152.23), Sangod (145.41) and Kishanganj (144.79).

Low dependency ratio (142.67-129.67): Under this category there are only two tehsils that are Chhabra (138.16) and Shahbad (135.45) both are from Baran district.

Very low dependency ratio (Below 129.67): There are seven tehsils in this category that are Nainwa (128.77), Jhalrapatan (124.68), Hindoli (120.67), Chhipabarod (112.12), Pirawa (111.25), Manoharthana (103.67) and Aklera (103.67).

Dependency Ratio, 2011

High dependency ratio (Above 115.66): All the tehsils have shown reduction of dependent population and there are eight tehsils in this category that are Ladpura (172.87), Baran (160.71), Indragarh (137.99), Antah (135.8), Panchpahar (135.4), Bundi (131.96), Jhalrapatan (121.6) and Mangrol (119.85).

Moderate high dependency ratio (115.06-102.66): There are nine tehsils in this category that are Kishanganj (115.46), Shahbad (114.14), Atru (114.01), Nainwa (113.84), Keshoraipatan (113.73), Ramganj Mandi (110.53), Chhabra (108.73), Gangdhar (103.63) and Chhipabarod (102.89). There is decrease in dependency ratio.

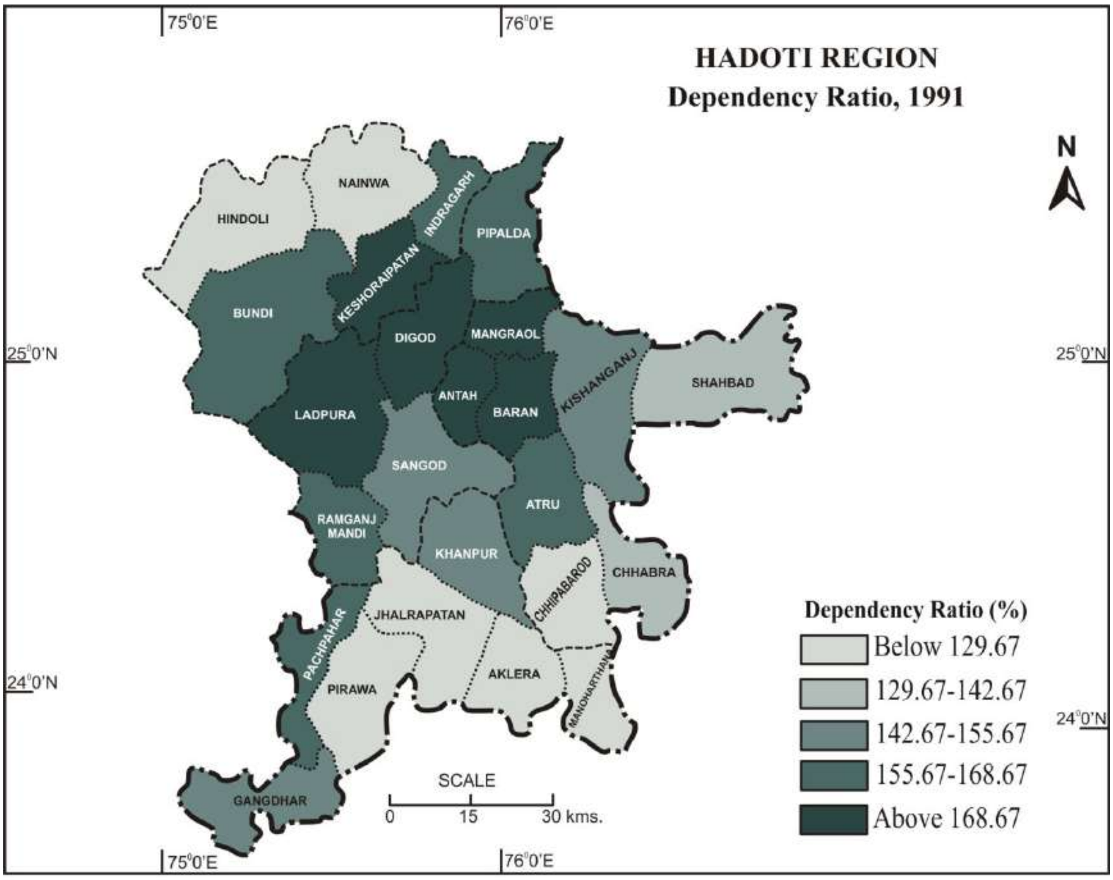
Moderate dependency ratio (102.66-89.66): There are three tehsils in this category that are Aklera (101.61), Khanpur (95.5) and Digod (93.81).

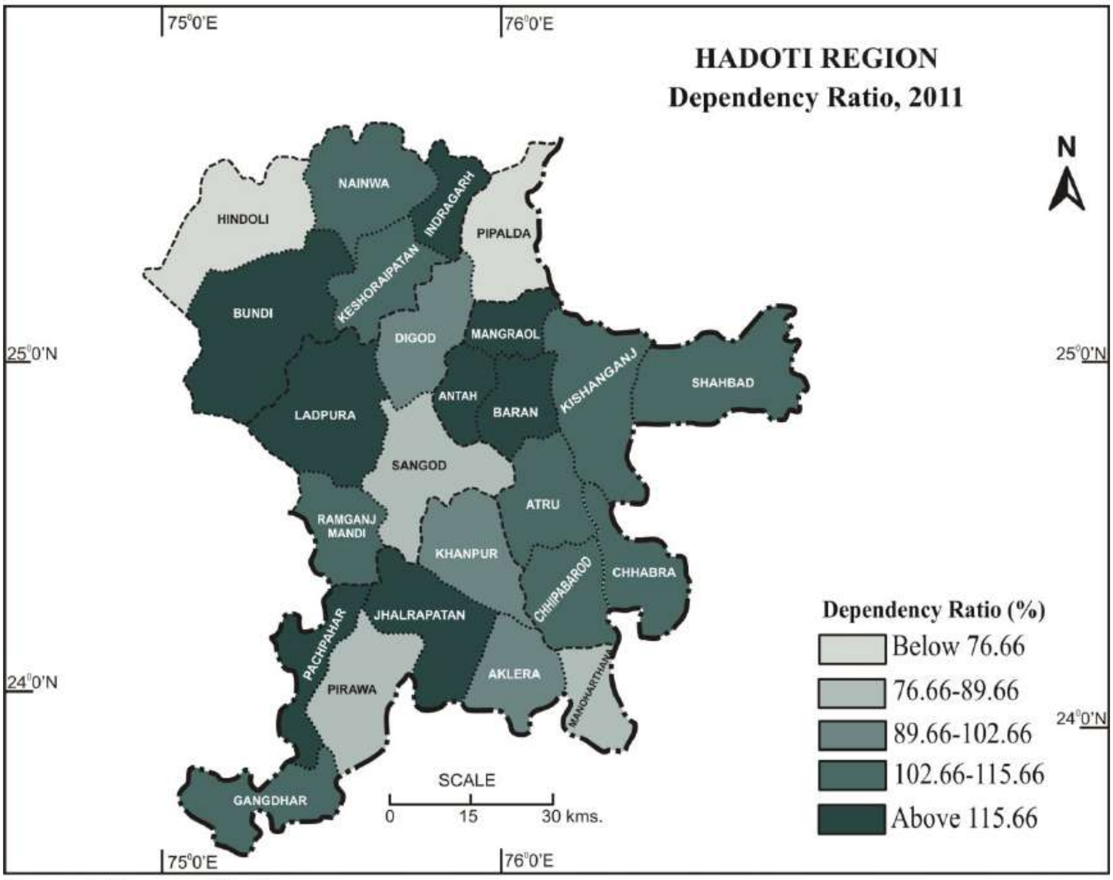
Low dependency ratio (89.66-76.66): This category also has three tehsils that are Pirawa (89.45), Manoharthana (85.6) and Sangod (82.9).

Very low dependency ratio (Below 76.66): Under this category also there are two tehsils Hindoli (66.87) OF Bundi tehsil and Pipalda (50.66) of Kota district.

Coefficient of variation for dependency ratio of 1991 is 20.45% and in 2011 it is 24.05% this means that degree of variability of dependency ratio is higher in 2011.

MAP-3.13





Source : Census of India

3.10. Infant Mortality Rate

IMR is defined as the number of deaths in children under one year of age per 1000 live births in the same year. It is considered as one of the most basic demographic indicators. Infant mortality rate is very sensitive measure which generally considered by the government as it is internationally recognized indicator. Infant mortality is a good measure of socio-economic development and it also gives information that how effectively government provides for social and economic welfare of its citizens. Apart from this infant mortality is strongly associated with income and unemployment rates. In the Hadoti region only institutional delivery was recorded along with the infant deaths, apart from these infant deaths were not got registered by parents that is why some districts show zero infant mortality rate. Despite of imperfection in data, still IMR is very important indicator in measuring level of development.

Infant mortality rate is being considered as a negative marker of development Hadoti region IMR has been analysed between 1991 and 2020 so, that better understanding of temporal and spatial changes can be established. For this purpose, in five categories data has been categorised.

Infant Mortality Rate, 1991

High infant mortality rate (Above 32): Under this category there are three tehsils that are Gangdhar (53), Pipalda (37) and Chhabra (33). Highest infant moratlity is being recorded in Gangdhar.

Moderate high infant mortality rate (31-24): There are only two tehils in this category that are Baran (28) of Baran district and Jhalrapatan (27) of Jhalawar district both the tehsils have district headquarter.

Moderate infant mortality rate (23-16): Under this category there are three tehsils that are Bundi (19), Nainwa (19) and Pirawa (18).

Low infant mortality rate (15-8): There are six tehsils in this category that are Ramganj Mandi (15), Digod (14), Khanpur (14), Hindoli (14) Antah (13).

Very low infant mortality rate (Below 7): This category has maximum number of tehsils in it, but this is also the case of under reporting that’s why very few infant mortalities can be seen in these tehsils. These tehsils are Keshoraipatan (7), Indragarh (5), Ladpura, Kishanganj, Shahbad, Atru, Chhipabarod, Mangrol, Aklera, Manoharthana and Panchpahar.

Infant Mortality Rate, 2020

High infant mortality rate (Above 20): This category has two tehsils that are Mangrol (28) of Baran district and Jhalrapatan (27) of Jhalawar district. Mangrol has the highest infant mortality along with this in 1991 it has zero infant mortality rate and now it has increased to 28.

Moderate high infant mortality rate (19-15): Under this category there are two tehsils that are Gangdhar (19) of Jhalawar district and Baran (16) of Baran district. Both the tehsils have recorded reduction infant mortality rate as compared to 1991.

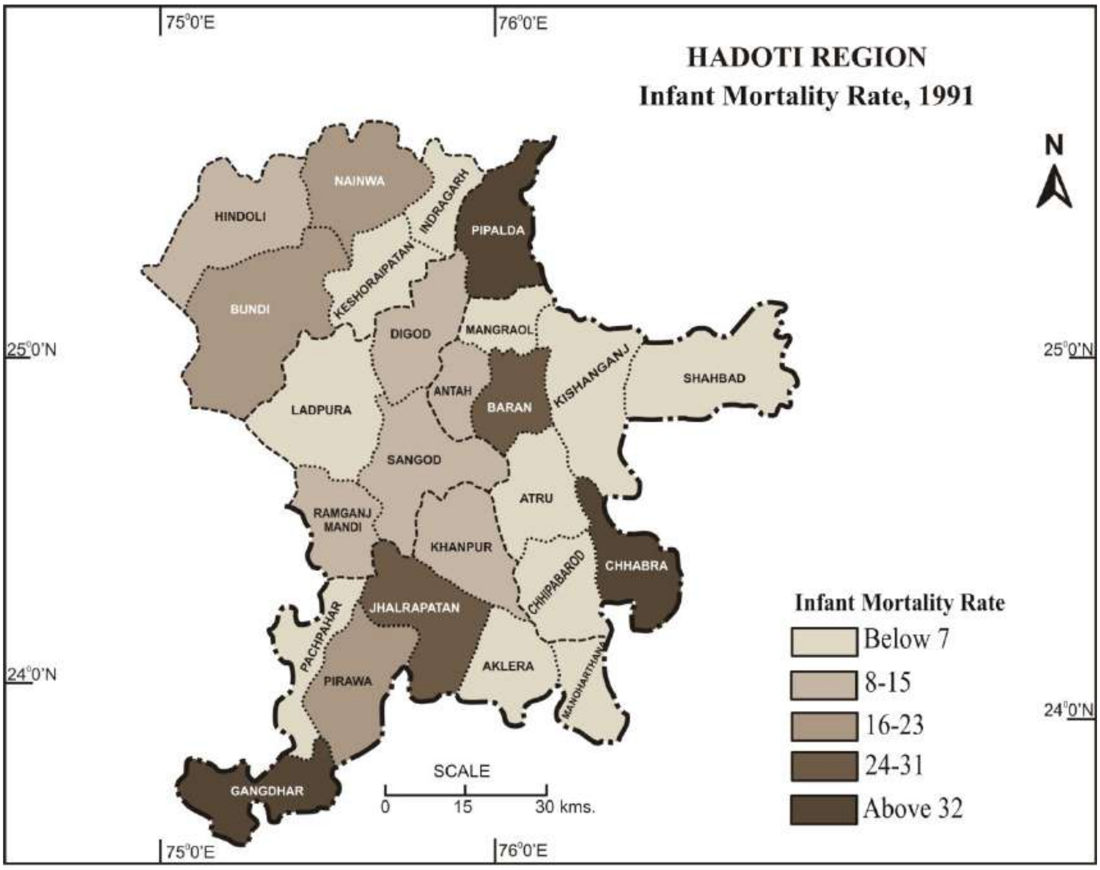
Moderate infant mortality rate (14-10): There are only three tehsils in this category that are Bundi (14), Pirawa (11) and Indragarh (10). Pirawa and Bundi tehsil has show reduction in infant mortality rate whereas Indargarh has shown increase in number of infant mortalities.

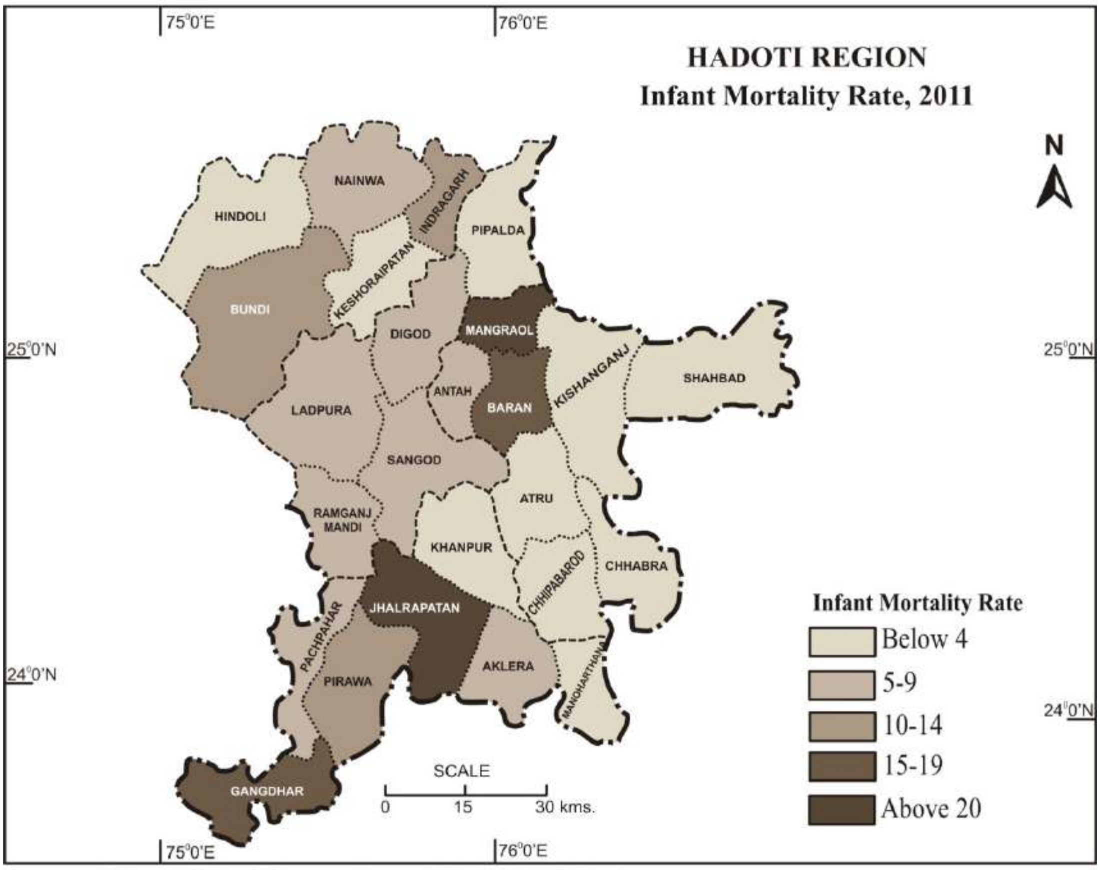
Low infant mortality rate (9-5): There are eight tehsils under this category that are Antah (9), Panchpahar (8), Aklera (8), Digod (7), Ramganj mandi (6), Nainwa (6), Sangod (5) and Ladpura (5). Ladpura, Aklera and Panchpahar has shown slight increase in infant mortality while remaing five tehsils has shown reduction in infant mortality.

Very low infant mortality rate (Below 4): This category consists of maximum number of tehsils that are Pipalda (3), Hindoli (3), Chhabra (2), Khanpur (1), Keshoraipatan (1), Kishanganj (1). Manoharthana, Chhipabarod, Shahbad and Atru has zero infant mortality. Keshoraipatan has shown slight increase in infant moratlity whereas Khanpur, Chhabra, Hindoli, Piplada has shown reduction in IMR. And remaining five tehsils still have zero IMR.

Coefficient of variation for infant mortality rate of 1991 is 105.97% and in 2011 it is 104.3% this means that degree of variability of infant mortality rate is higher in 1991.

There has been slight decrease in coefficient of variation for the infant mortality rate. It indicates that there is high unevenness within the region in terms of infant mortality rate. Higher value of coefficient of variation also implies that there is disparities in access to quality healthcare and nutrition in the region. There is a need to improved healthcare infrastructure along with proper implementation of natural and child heat programs this will reduce the disparities in the region.





Source : Directorate of Economics and Statistics, Rajasthan.

3.11. Level of Socio-Cultural Development

All the fourteen indicators from the social and cultural aspects are used while calculating the Composite Index of Socio-Cultural Development these indicators are Density of Population, Sex Ratio, Literacy Rate, Gap in Male-Female Literacy Rate, Percentage of Urban Population, Percentage of Main Workers, Crude Work Participation Rate, Density of Workers, Percentage of Agricultural Labourers, Percentage of Cultivators, Percentage of Household Industry Workers, Percentage of Other Workers, Dependency Ratio, Infant Mortality Rate. Quantifying the overall social and cultural development signifies the degree of advancement achieved by the society. If a society is socially and culturally development it is reflected in other aspects such as economic growth, infrastructural development, social welfare, governance and such societies are democratic in nature. Social values and norms shape the society and helps in understanding the development from grass-root level. Development is a journey towards achieving maximum level of well-being and this can be achieved only when the society adapt and accept the recent global changes.

Level of socio-cultural development has been calculated for 1991 and 2011. This will allow to have the analysis of both temporal and spatial pattern of development level. Data has been categorised under five categories that are very high, moderate high, moderate, low, very low level of socio-cultural development.

Level of Socio-Cultural Development, 1991

High socio-cultural development (Above 0.49): This category consists of one tehsil that is Ladpura (1.14) of Kota district with highest level of socio-economic development in the region.

Moderate high socio-cultural development (0.49-0.24): This category consists of five tehsils that are Manoharthana (0.46), Jhalrapatan (0.45), Aklera (0.37), Pirawa (0.35) and Panchpahar (0.25).

Moderate socio-cultural development (0.24-(-)0.01): Under this category there are five tehsils that are Ramganj Mandi (0.23), Chhipabarod (0.06), Mangrol (0.04), Hindoli (0.01) and Indragarh (-0.01).

Low socio-cultural development ((-)0.01-(-)0.26): This category comprises of seven tehsils. These tehsils are Bundi (-0.02), Baran (-0.02), Nainwa (-0.03), Keshoraipatan (-0.07), Antah (-0.07), Gangdhar (-0.08) and Khanpur (-0.2).

Very low socio-cultural development (Below (-)0.26) : This category also consists of seven tehsils that are Sangod (-0.3), Chhabra (-0.33), Atru (-0.35), Shahbad (-0.41), Kishanganj (-0.44), Digod (-0.48) and Pipalda (-0.51) of Kota district has lowest score in socio-cultural development. Maximum tehsils are from Baran district.

Level of Socio-Cultural Development, 2011

High socio-cultural development (Above 0.37): This category consists of three tehsils that are Ladpura (1.21), Sangod (0.49) and Ramganj Mandi (0.47). All the tehsils are of Kota district. All the three tehsils have improved their composite score of socio-cultural development when compared with 1991 score.

Moderate socio-cultural development (0.37-0.17): There are only two tehsils in this category that are Pipalda (0.2) of Kota district and Baran (0.2) of Baran district. Both the tehsils have improved their level of socio-cultural development scores.

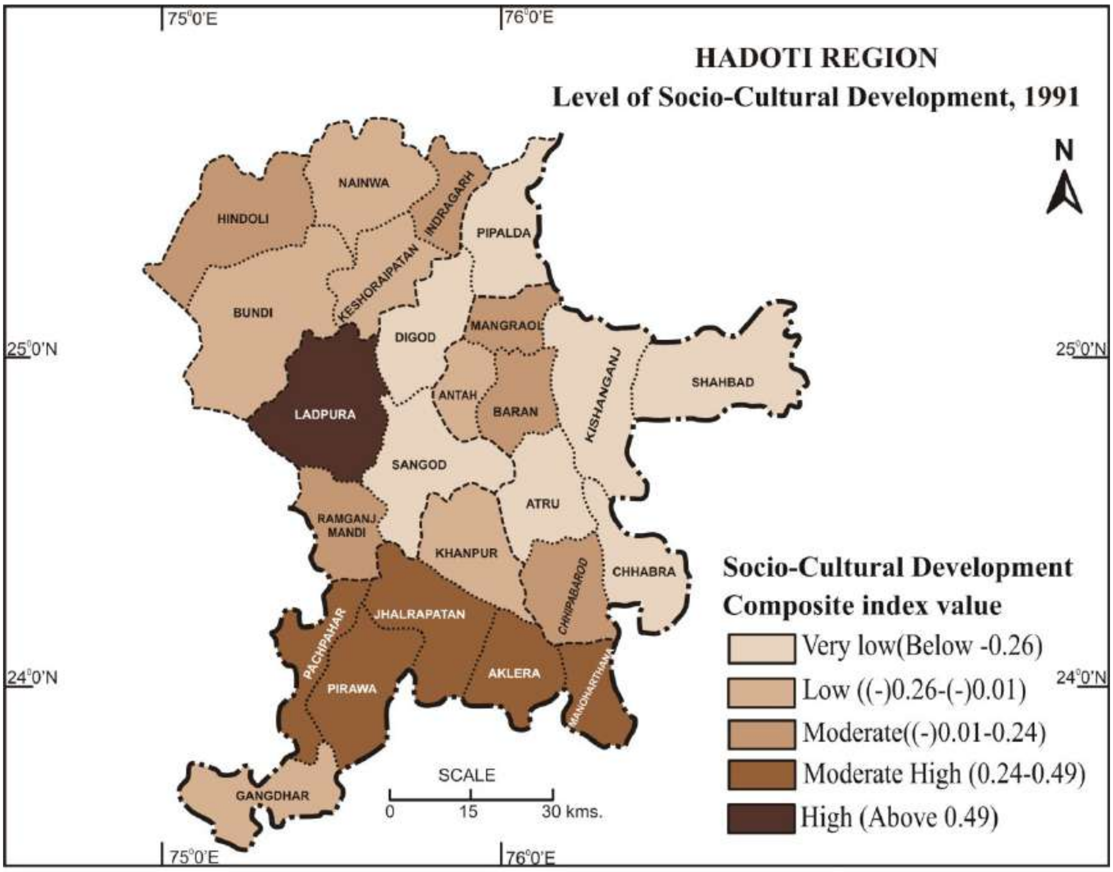
Moderate socio-cultural development (0.17- (-)0.03): This category comprises of six tehsils that are Manoharthana (0.12), Panchpahar (0.02), Mangrol (-0.01), Digod (-0.02), Jhalrapatan (-0.02) and Bundi (-0.03). Only Digod tehsil has improved, remaining five tehsils score has decreased when compared with 1991 in 2011.

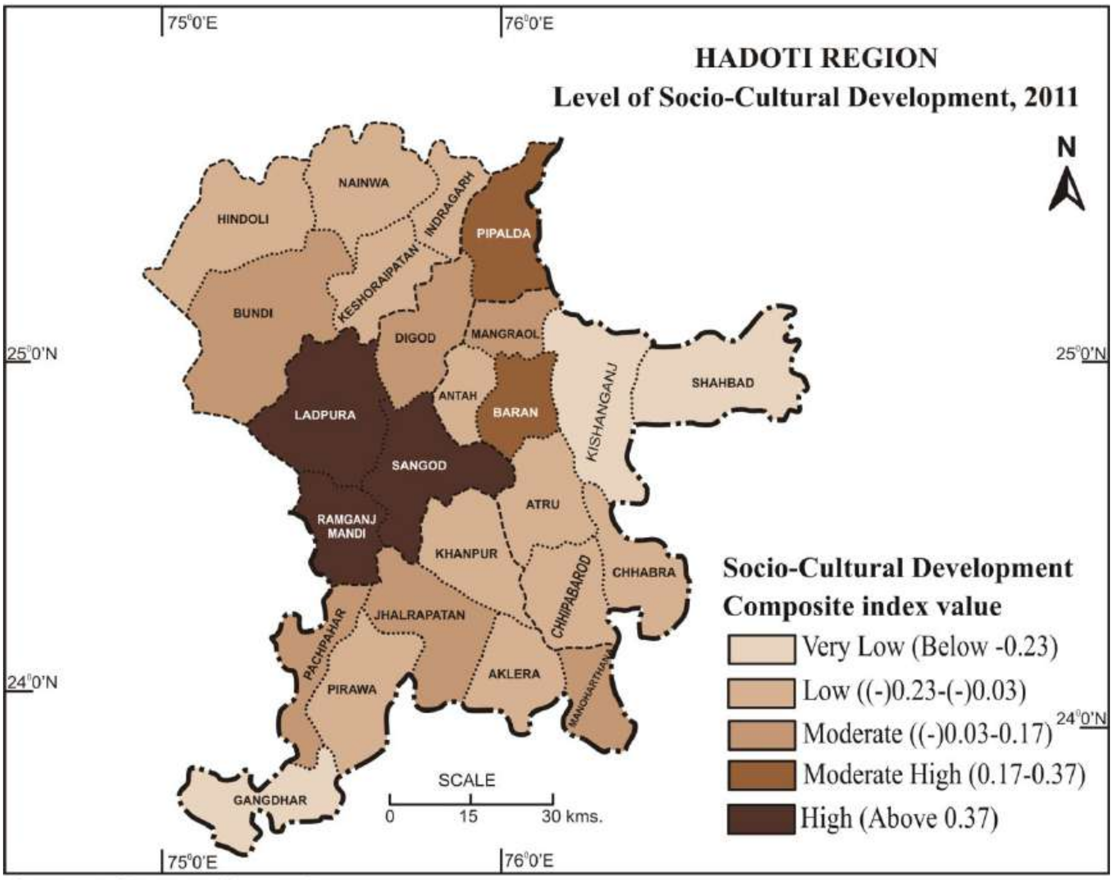
Low socio-cultural development ((-)0.03-(-)0.23): This category has maximum number of tehsils that are eleven tehsils. Keshoraipatan (-0.07), Chhipabarod (-0.08), Pirawa (-0.1), Hindoli (-0.12), Khanpur (-0.13), Nainwa (-0.13), Atru (-0.13), Chhabra (-0.14), Indragarh (-0.19), Antah (-0.19) and Aklera (-0.21). Only three tehsils have improved their score 2011 that are Khanpur, Atru and Chhabra. Score of Keshoraipatan has remained constant in 2011.

Very low socio-cultural development (Below (-)0.23): This category consists of three tehsils that are Gangdhar (-0.31), Shahbad (-0.42) and Kishanganj (-0.43) of Baran tehsil has lowest level of socio-cultural development.

The tehsils with low level of socio-cultural development are those tehsils which are not performing fairly in the indicators such as Sex Ratio is not favourable to women, Literacy Rate is low, Gap in Male-Female Literacy Rate is very high, Percentage of Urban Population is low, Percentage of Main Workers is low, Crude Work Participation Rate is low, Density of Workers is low, Percentage of Cultivators and agricultural labourers is high, Percentage

MAP-3.15





Source : Computed by author

of Other Workers which are in service or tertiary sector is low, Dependency Ratio is high, Infant Mortality Rate is high. Kishanganj and Sahabad tehsil of Baran district are the most backward tehsil and the major reason behind this backwardness is the tribal dominance and poor mainstream connection. The most developed tehsils under this category are from Kota district and these tehsils are Ladpura, Sangod, Ramganj Mandi and Pipalda this shows that nearness to the focal point of the region that is Kota city and maximum diffusion of the innovation has taken place.

CHAPTER – 4

LEVEL OF AGRICULTURAL DEVELOPMENT

4.1. Cropping Intensity

4.2. Per Capita Agricultural Production

4.3. Productivity of Food Grains

4.4. Percentage of Gross Irrigated Area to Gross Area Sown

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4.12. Level of Agricultural Development

CHAPTER – 4

LEVEL OF AGRICULTURAL DEVELOPMENT

Agriculture consists of crop and livestock production, it includes aquaculture, fisheries and forestry for the food and non-food products. Sedentary human civilization developed due agriculture, whereas domestication of selected species in farming created food surplus which fulfilled the food requirements of the people living in cities. Agriculture is major source of livelihood in rural households and the majority income is derived out of agricultural and related activities. Agriculture sector has played significant role in everyday life of individuals, considering agriculture important aspect its importance can’t be minimised. Agriculture sector acts as an engine of growth in developing countries and act as an effective tool in reduction of poverty and creates food security in the country. Recently, due to traditional agricultural practices agriculture is being considered as a least productive sector in the economy. However, linkages between traditional and modern sectors in developing countries agricultural development plays instrumental role in reducing poverty. This happens due to farm employment and profitability, and agricultural output helps in creating jobs in both upstream and downstream non-farm sector. Growth of agricultural sector depends upon various factors such as technological progress, availability of credit etc. Development of agriculture sector gives progressive outlook and becomes motivation for further development of the sector.

For knowing the level of agricultural development in the Hadoti region various parameters have been considered. That are, cropping intensity, per capita agricultural production, crop yield, gross irrigated area to gross area sown, percentage of net area sown under HYV seeds, consumption of chemical fertilizers per thousand of gross sown area, gross area sown per tractor, farm size, density of livestock, percentage of livestock amenities to total livestock.

4.1. Cropping Intensity

Cropping intensity is being defined as growing number of crops in the same field during one agricultural year. Cropping intensity is found out using the formula that is gross cropped area divided by net sown area and it is expressed in percentage. Various type of cropping intensity system includes monocropping, intercropping and relay cropping. In monocropping only one crop is sown on a piece of land in a year. In intercropping two or more crops are sown on a piece of land in a year. Whereas in relay cropping second crop is sown immediately after harvesting the first crop. Cropping intensity plays significant role in nutritional properties and value of crops. For instance, relay cropping reduces the risk of nutrition depletion as soil is covered with crops throughout the year. There are various inputs which are implemented for increasing cropping intensity that are better irrigation, use of HYV seeds, suitable cropping methods like mixed farming, strip cropping etc, mechanisation, chemical fertilizers and pesticides, commercialization of agriculture to have more profits. Having increased cropping intensity in the region would give higher monetary benefits to farmers which will enable in cultivating more.

Cropping intensity of Hadoti region has been compared between 1995 and 2020 to have better understanding of temporal and spatial changes in cropping intensity pattern. For this purpose, five categories have been made as per variability in different tehsils with respect to cropping intensity.

Cropping Intensity, 1991

High cropping intensity (Above 152.8): The highest cropping intensity in 1995 was recorded in two tehsils that are Jhalrapatan (161.05) of Jhalawar district and Bundi (155.03) from Bundi district.

Moderate high cropping intensity (152.8-142.8): This category consists of nine tehsils that are Manoharthana (147.79), Ladpura (145.37), Gangdhar (145.37), Pirawa (145.09), Keshoraipatan (143.03), Indragarh (143.03) and Chhipabarod (142.97).

Moderate cropping intensity (142.8-132.8): Under this category there are five tehsils that are Hindoli (141.37), Khanpur (137.47), Kishanganj (134.8), Digod (133.35) and Chhabra (133.23).

Low cropping intensity (132.8-122.8): This category consists of six tehsils that are Mangrol (129.71), Antah (129.71), Sangod (129.32), Ramganj Mandi (128.35), Shahbad (127.13) and Atru (126.99).

Very low cropping intensity (Below 122.8): There are only three tehsils in this category that are Pipalda (121.54), Baran (115.63) and Nainwa (112.8).

Cropping Intensity, 2020

High cropping intensity (Above 193.19): This category consists of eight tehsils that are Digod (195.88), Atru (194.85), Sangod (194.55), Chhipabarod (194.47), Chhabra (194.05), Mangrol (193.76), Pipalda (193.75) and Antah (193.34). In 2020 overall cropping intensity has been increased and maximum number of tehsils are there in high cropping intensity category.

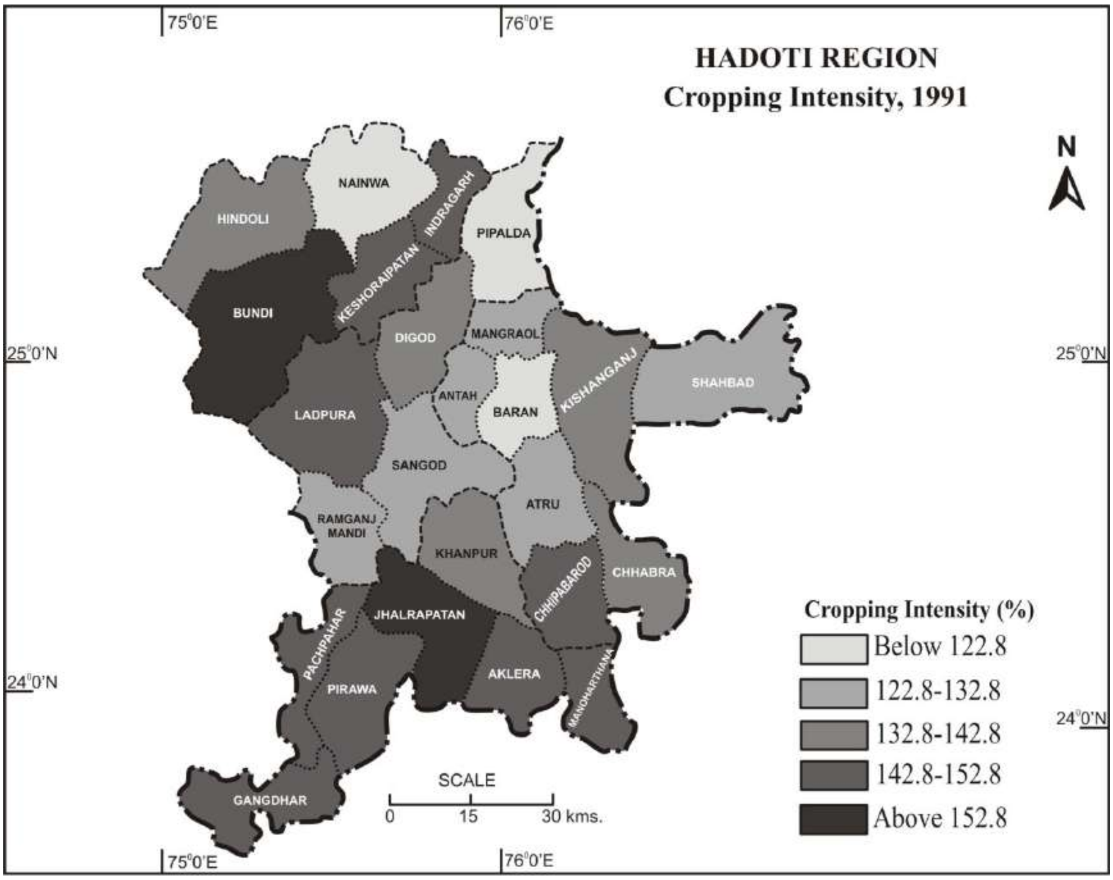
Photoplate 4.1 (A) : Soyabean field

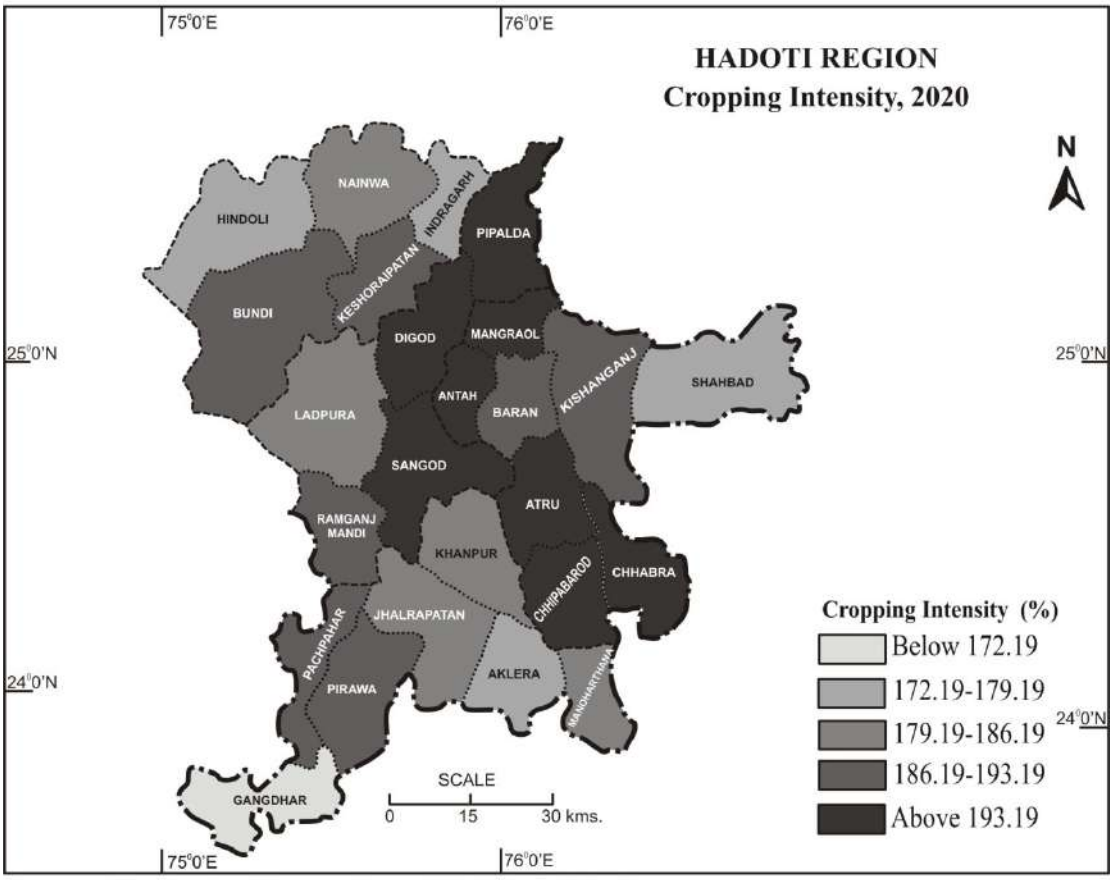
Source: Captured during primary survey, 2023

Photoplate 4.1 (B) : Rice field

Source: Captured during primary survey, 2023

MAP-4.1





Source : Directorate of Economics and Statistics, Rajasthan.

Moderate high cropping intensity (193.19-186.19): This category consists of seven tehsils that are Bundi (192.65), Panchpahar (192.52), Baran (192.52), Pirawa (191.63), Ramganj Mandi (191.46), Keshoraipatan (190.44) and Kishanganj (187.27). Kishanganj, Ramganj Mandi and Baran has shifted to this category from lower cropping intensity category earlier in 1995, however increase in cropping intensity is seen in all the tehsils.

Moderate cropping intensity (186.19-179.19): Under this category there are five tehsils that are Nainwa (183.94), Manoharthana (183.07), Khanpur (182.63), Jhalrapatan (181.43) and Ladpura (180.86).

Low cropping intensity (179.19-172.19): This categegory consists of four tehsils that are Indragarh (178.16), Aklera (177.68), Hindoli (176.63) and Shahbad (176.34).

Very low cropping intensity (Below 172.19): This category has only one tehsil that is Gangdhar (165.19) of Jhalawar district. In 1995 Gnagdhar tehsil was in moderate high category, whereas increase in cropping intensity has been seen in the Gangdhar tehsils.

Coefficient of variation of cropping intensity in 1991 is 8.56% and in 2020 it is 4.3% this means that degree of variability of percentage of cropping intensity is higher in 1991 and more consistent cropping intensity is recorded in 2020 which means more uniform cropping practices has been adopted in all the tehsils of the region.

4.2. Per Capita Agricultural Production

Per capita agricultural production is a measure of average agricultural output per person in the region. The formula used for calculating per capita agricultural production is total agricultural production divided by total population. Per capita food crop production is an important indicator of food availability. In the era of fast pace of globalisation still major part of the people eat locally grown food crops. In developing countries with weak purchasing power makes to import smaller quantity of food crops from the global market. Therefore, local agricultural production is critical for food security and economic development of the region. The determinants for local agricultural production are arable land, amount and quality of agricultural inputs like fertilizer, high yielding variety of seeds, pesticides etc. and farm related technology along with government policies. With increasing price volatility makes local production even more important for food insecure region. Locally grown crops become very important in controlling price volatility in the market and it will eventually help in reducing poverty in the region and secure region from food insecurity. Climate change is very important factor in governing the per capita agricultural production, factors such as land degradation, and soil nutrient depletion are likely to change the productivity. Per capita agricultural production of Hadoti region has been compared between 1995 and 2020 to have better understanding of temporal and spatial changes in cropping intensity pattern.

Per Capita Agricultural Production, 1991

High per capita agricultural production (Above 458.81): This category consists of two tehsils that are Digod (574.51) of Kota district and Bundi (578.47) of Bundi tehsil.

Moderate high per capita agricultural production (458.81-358.81): Under this category there are four tehsils that are Pipalda (372.04), Kishanganj (368.18), Mangrol (366) and Antah (365.98).

Moderate per capita agricultural production (358.81-258.81): This category consists of two tehsils that are Hindoli (312.05) of Bundi district and Atru (270.26) of Baran district.

Low per capita agricultural production (258.81-158.81): This category consists of maximum number of tehsils that are the tehsils namely, Gangdhar (241.56), Keshoraipatan (240.62), Indragarh (240.62), Shahbad (239.51), Sangod (238.73), Nainwa (209.28), Ramganj Mandi (203.77), Chhipabarod (171.47), Panchpahar (170.7) and Chhabra (168.09).

Very low per capita agricultural production (Below 158.81): This category consists of seven tehsils that are Baran (132.07), Pirawa (126.72), Manoharthana (122.07), Aklera (122.07), Ladpura (97.15), Jhalrapatan (68.06) and Khanpur (58.81).

Per Capita Agricultural Production, 2020

High per capita agricultural production (Above 892.8): Per capita agricultural production has increased when compared to 1991. This category consists of seven tehsils that are Keshoraipatan (2169.13), Digod (1402.05), Bundi (1182.67), Mangrol (1069.09), Kishanganj (1001.59), Pipalda (993.14) and Sangod (964.5). Still Digod and Bundi are in the same category as in 1991.

Moderate high per capita agricultural production (892.8-692.8): Under this category there are four tehsils that are Shahbad (846.33), Antah (806.36), Chhabra (793.17) and Hindoli (750.39).

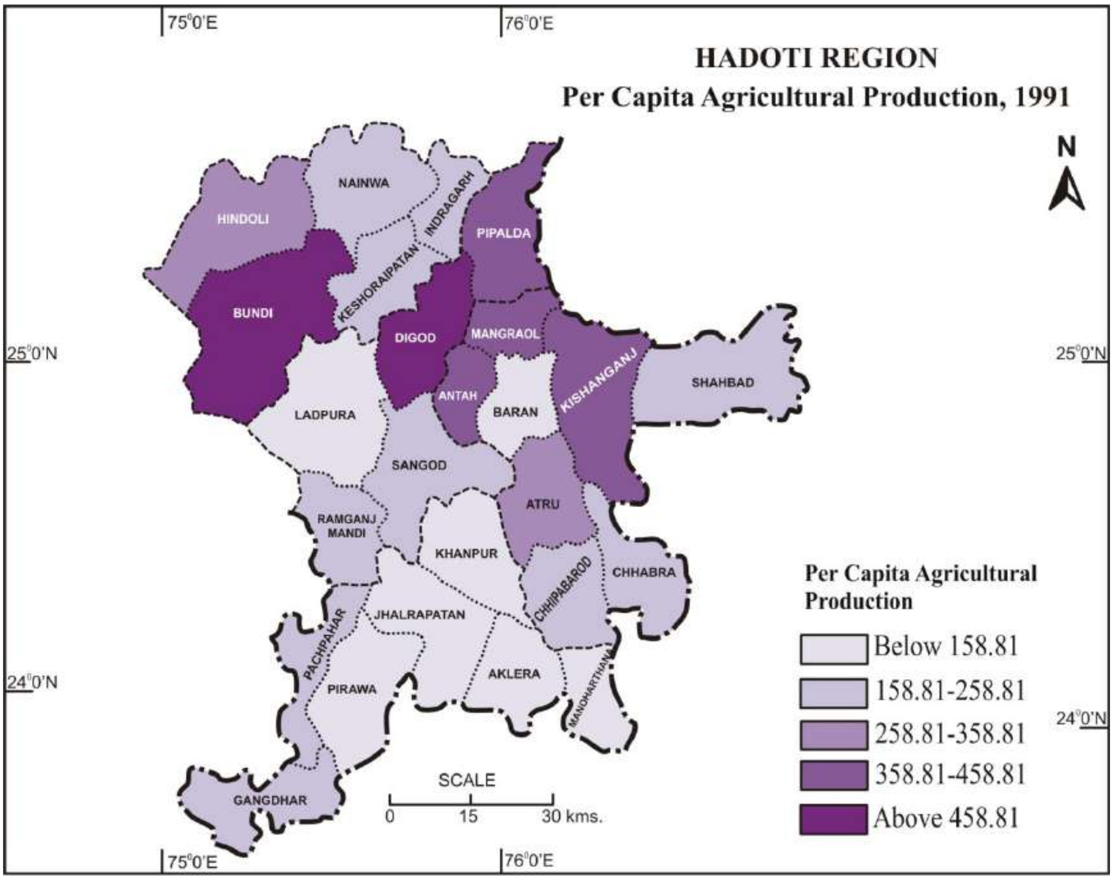
Photoplate 4.2 (A) : Mustard seed harvest

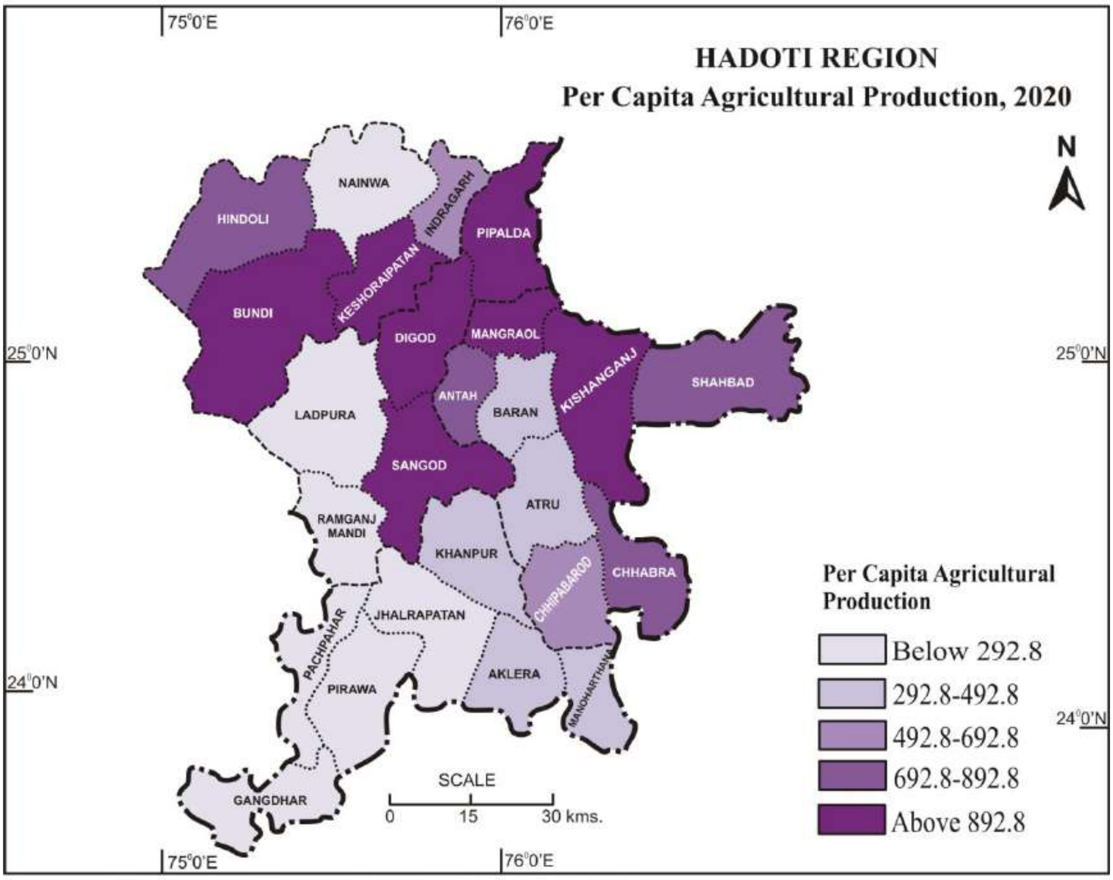
Source: Captured during primary survey, 2023

Photoplate 4.2 (B) : Black gram harvest

Source: Captured during primary survey, 2023

MAP-4.2





Source : Directorate of Economics and Statistics, Rajasthan.

Moderate per capita agricultural production (692.8-492.8): There are only two tehsils in this category that are Chhipabarod (681.54) of Baran tehsil and Indragarh (518.97) of Bundi tehsil.

Low per capita agricultural production (492.8-292.8): This category consists of five tehsils that are Baran (473.39), Atru (437.49), Manoharthana (390.26), Khanpur (358.61) and Aklera (297.2).

Very low per capita agricultural production (Below 292.8): Under this category there are seven tehsils that are Gangdhar (266.28), Panchpahar (194.78), Pirawa (173.4), Jhalrapatan (160.02), Ladpura (155.57), Ramganj Mandi (107.65) and Nainwa (92.8). In 2020 the difference between the range is still very high, highest per capita food production is in Keshoraipatan (2169.13) and lowest is in Nainwa (92.8).

Coefficient of variation of per capita agricultural production of 1991 is 56.5% and in 2020 it is 75.52% this means that degree of variability of per capita agricultural production is higher in 2020.

4.3. Productivity of Foodgrains

Studying productivity of food grain is very crucial in understanding food security. Productivity of foodgrain in Hadoti region has been derived out by dividing total foodgrain production (quintal) by land under foodgrain crops (hectare). Food security has been previously defined by taking various determinants. As per United Nations Food and Agricultural Organisation (FAO) in World Food Conference, 1974 food availability was considered the sole component of food security. Fluctuations in agricultural productivity impact food security, agricultural production is governed by environmental factors such as temperature, rainfall etc sometimes these factors affect crop productivity positively and negatively. Agriculture sector is very important sector in reducing poverty in several ways like increase in crop productivity directly impacts level of food security and increases employment. Whereas adverse scenario can be seen where there is insufficient availability of food this leads to incidence of poverty and hunger. Insufficient food could lead to vicious cycle of poverty; food security has both cause and effect on poverty. Food security and poverty both are correlated and impact each other.

Productivity of Foodgrains, 1991

High productivity of foodgrains (Above 17.89): This category has maximum number of tehsils that are ten tehsils namely, Digod (29.46) of Kota tehsil has highest productivity of foodgrains, followed by Ladpura (28.2), Mangrol (27.74), Antah (27.74), Pipalda (27.52), Atru (27.05), Sangod (26.26), Baran (25.12), Bundi (24.91) and Kishanganj (23.6).

Moderate High productivity of foodgrains (17.89-14.89): Under this category there are only two tehsils that are Ramganj Mandi (15.74) of Jhalawar district and Shahbad (15.01) of Baran district.

Moderate productivity of foodgrains (14.89-11.89): This category consists of two tehsils that are Gangdhar (14) of Jhalawar district and Hindoli (13.92) of Bundi district.

Low productivity of foodgrains (11.89-8.89): This category consists of six tehsils that are Nainwa (11.56), Panchpahar (10.81), Keshoraipatan (10.66), Indragarh (10.66), Chhipabarod (10.53) and Pirawa (8.99).

Very low productivity of foodgrains (Below 8.89): This category comprises of five tehsils that are Chhabra (8.88), Manoharthana (7), Aklera (7), Jhalrapatan (6.92) and Khanpur (5.89). Lowest productivity has been recorded in Khanpur tehsils of Jhalawar district.

Productivity of Foodgrains, 2020

High productivity of foodgrains (Above 49.6): Productivity of foodgrains in 2020 has been increased when compared to 1991. Highest productivity of foodgrain is recorded in Keshoraipatan (67.69) of Bundi district followed by Mangrol (49.94) of Baran district. In 1991 Mangrol was in same category.

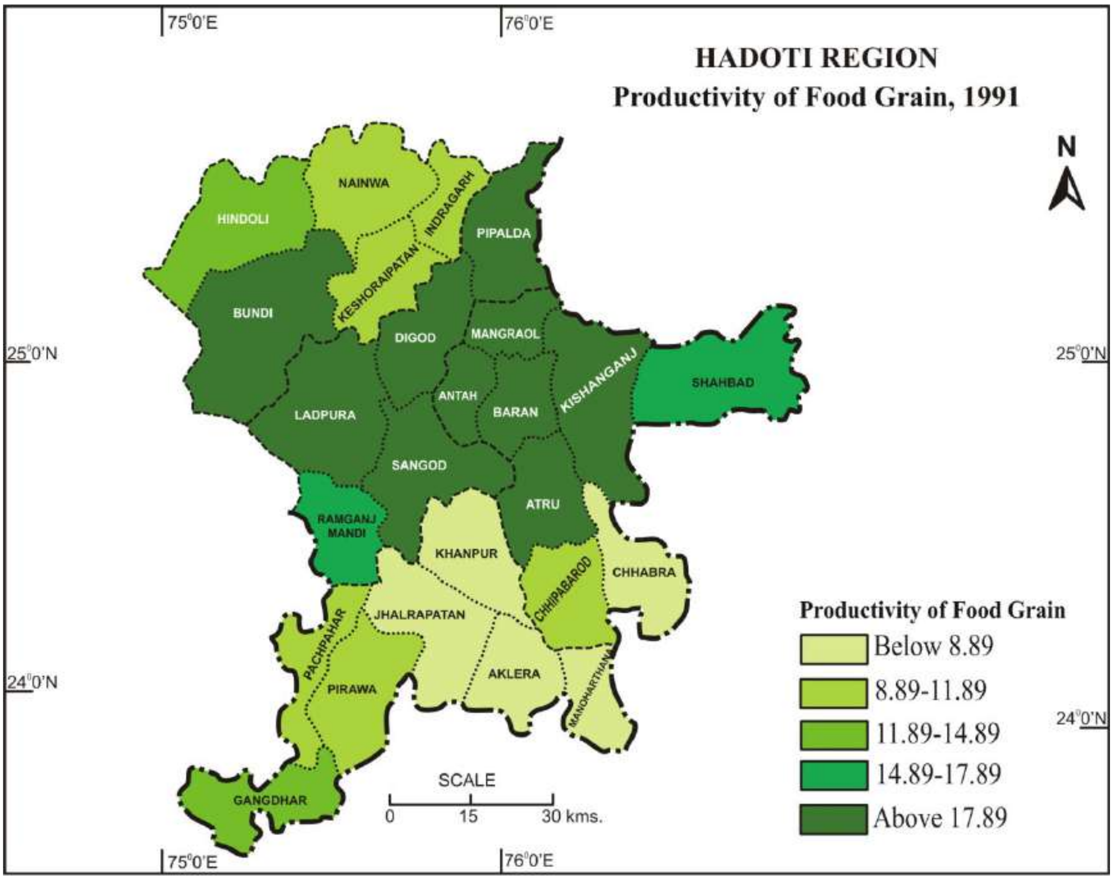
Moderate High productivity of foodgrains (49.6-45.6): This category consists of seven tehsils that are Kishanganj (49.15), Baran (48.2), Pipalda (47.85), Digod (47.74), Sangod (47.1), Ladpura (45.98) and Bundi (45.82). Earlier these tehsils were in high productivity of foodgrain category and now shifted to moderate high productivity of foodgrains.

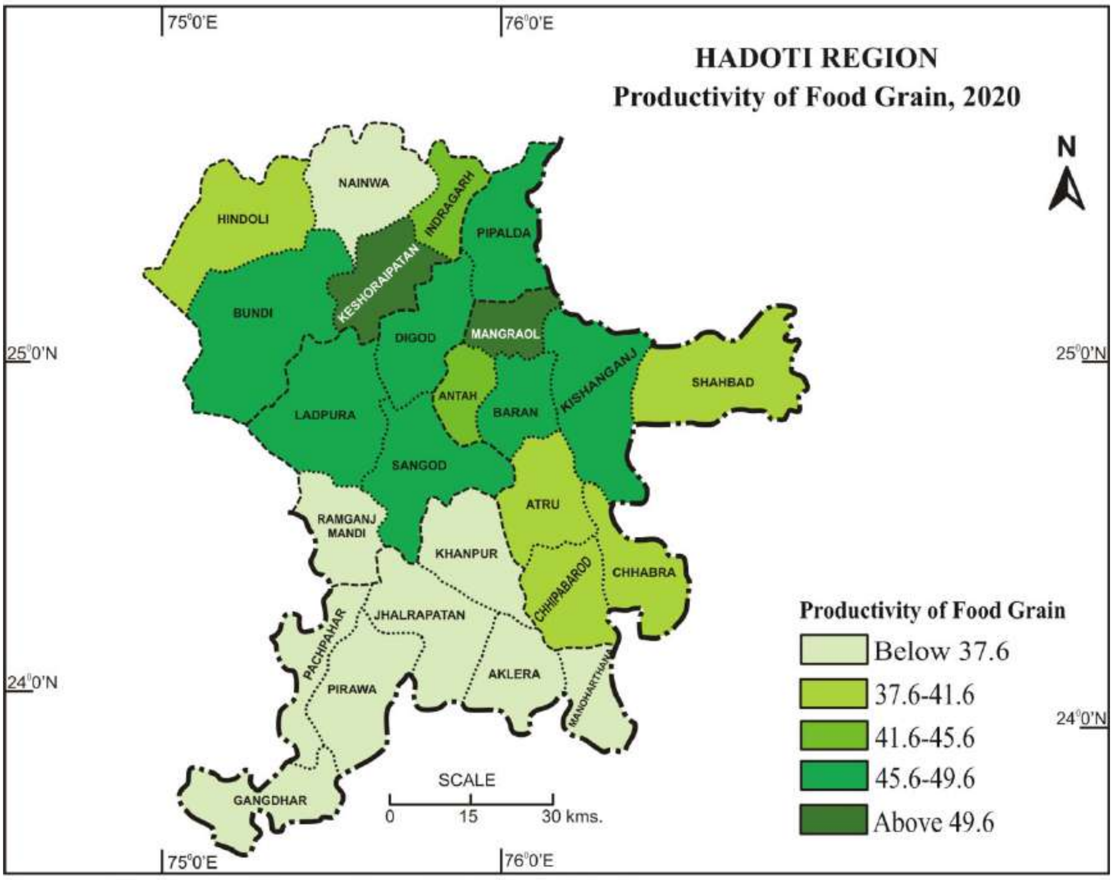
Moderate productivity of foodgrains (45.6-41.6): Under this category there are two tehsils that are Antah (45.32) of Baran district and Indragarh (44.47) of Bundi tehsil. Both the tehsils have recorded increase in productivity of foodgrains quintal per hectare.

Low productivity of foodgrains (41.6-37.6): This category comprises of five tehsils that are Shahbad (40.06), Chhipabarod (39.97), Hindoli (38.82), Atru (38.62) and Chhabra (37.81). Atru, Hindoli and Shahbad were in categories with higher productivity of foodgrains. Whereas Chhabra has improved its range from being in very low category to this category.

Very low productivity of foodgrains (Below 37.6): This category consists of maximum number of tehsils that are nine tehsils namely, Ramganj Mandi (33.69), Khanpur (25.17), Panchpahar (23.23), Pirawa (23.2), Gangdhar (23.03), Jhalrapatan (22.69), Aklera (20.78), Manoharthana (19.63) and Nainwa (17.6).

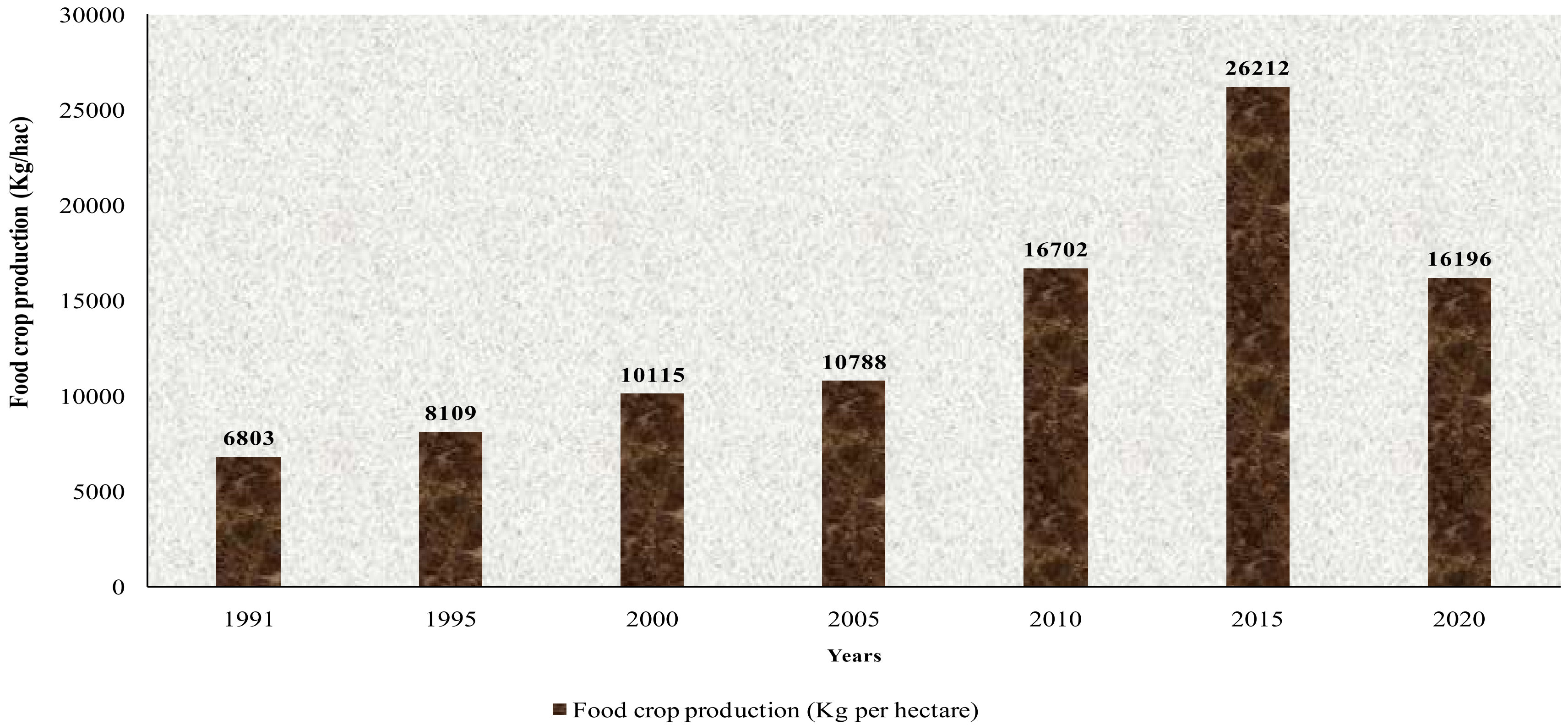
MAP-4.3





Source : Directorate of Economics and Statistics, Rajasthan.

Chart 4.1 : Total Food Crop Production (Kg per hectare) of Hadoti Region, 1991-2020



Source : Directorate of Economics and Statistics, Rajasthan.

Coefficient of variation of productivity of food grains quintal/hectare of 1991 is 50.21% and in 2020 it is 33.71% this means that degree of variability in productivity of food grains quintal/hectare is higher in 1991. Whereas in 2020 has lower coefficient of variation which means more consistent productivity of food grains was found in the Hadoti region.

Total food crop production (Kilogram per hectare) in the Hadoti region has been analysed from 1991 till 2020 from the chart 4.1, it can be clearly seen that the food production has been increased, it was 6803 kg/hectare in 1991 and it reached to 16196 kg/hectare in 2020. Since 1991 till 2015 there was constant increase in food crop production but in 2020 there was decrease recorded and food crop production was 16196 kg/hectare, whereas in 2015 it was 26212 kg/hectare.

4.4. Percentage of Gross Irrigated Area to Gross Sown Area

The percentage of gross irrigated area to gross sown area is measure of proportion of total area which is sown is irrigated. It has been calculated by dividing the gross area irrigated by gross sown area and then multiplied by 100 so, that value can be expressed in percentage. This indicator plays significant role in assessing the level of water resource management and agricultural productivity in a region. Having irrigation facilities leads to area expansion, productivity and access. Regional/local level irrigation improves food security and cumulatively adds to national food security. Role of irrigation is very crucial in social and cultural development of the society and paves a way toward agricultural growth and development. It was witnessed during green revolution that large scale production of grains was result of agricultural intensification in which irrigation played important role. Irrigation has positive impact on eradicating poverty, it helps in social cohesion, economic growth and environmental security, it promotes economic and entrepreneurial activities regionally and at a national level, this helps in creating employment for local people.

Percentage of gross irrigated area to gross area sown has been analysed from 1991-2020 in the Hadoti region, from the given data in Table 4.1 it can be clearly seen that gross irrigated area to gross sown area has been increased from 46.43% in 1991 to 53.54% in 2020. Baran district has shown increase in the gross irrigated area to gross sown area since 1991 till 2010 but there was minute decrease has been seen, in 2010 it was 53.38 whereas in 2020 it was 53.31. In Bundi district fluctuating trend is seen, in 2020 gross irrigated area to gross sown area was 59.66%. In Jhalawar district has shown constant increase in the gross irrigated area to gross sown and in 2020 it was 50.04%. In Kota district decreasing trend is seen from 1991 till 2020 gross irrigated area to gross sown area has been decreased, in 1991 it was 57.45% and in

2020 it was 52.17%. Bundi district has highest gross irrigated area to gross sown area in 2020 that was 59.66% and lowest gross irrigated area to gross sown area was in Jhalawar district with 50.04%.

Table 4.1: Percentage of gross irrigated area to gross sown area, 1991-2020

Gross irrigated area to gross sown area (%)					
Years	**Baran**	**Bundi**	**Jhalawar**	**Kota**	**Hadoti Region (Total)**
1991	44.85	59.71	28.72	57.45	46.43
2000	51.33	58.8	29.75	53.06	47.9
2010	53.38	53.33	41.72	53.03	50.01
2020	53.31	59.66	50.04	52.17	53.54

Source: Directorate of Economics and Statistics, Rajasthan

Percentage of gross irrigated area to gross sown area of Hadoti region has been compared between 1991 and 2020 to have better understanding of temporal and spatial changes in cropping intensity pattern. For this purpose, five categories have been made as per variability in different tehsils with respect to percentage of gross irrigated area to gross sown area.

Percentage of gross irrigated area to gross sown area, 1991

High percentage of GIA to GSA (Above 68.63): This category consists of six tehsils that are Digod (81.81), Bundi (77.06), Pipalda (75.47), Mangrol (75.23), Antah (75.23) and Ladpura (74.83). Highest gross irrigated area to gross sown area is in Digod tehsil of Kota district.

Moderate High percentage of GIA to GSA (68.63-58.63): This category consists of six tehsils that are Keshoraipatan (67.92), Indragarh (67.92), Kishanganj (66.81), Baran (64.28), Hindoli (60.85) and Sangod (60.45).

Moderate percentage of GIA to GSA (58.63-48.63): This category comprises of only two tehsils that are Atru (57.77) tehsil of Baran district and Khanpur (55.29) tehsil of Jhalawar district.

Low percentage of GIA to GSA (48.63-38.63): This category comprises of three tehsils that are Nainwa (48.54), Chhipabarod (38.88) and Shahbad (38.72).

Very low percentage of GIA to GSA (Below 38.63): This category has maximum number of tehsils that are eight tehsils namely, Jhalrapatan (38.2), Manoharthana (31.74), Aklera (31.74), Pirawa (31.57), Ramganj Mandi (31.03), Panchpahar (29.74), Chhabra (28.07) and Gangdhar (18.63) has the lowest percentage of gross irrigated area to gross sown area.

Percentage of gross irrigated area to gross sown area, 2020

High percentage of GIA to GSA (Above 59.46): This category comprises of four tehsils that are Bundi (77.02), Ladpura (63.41), Kishanganj (62.81) and Keshoraipatan (60.52). Highest percentage of gross irrigated area to gross sown area in 2020 was in Bundi tehsil of Bundi district.

Moderate High percentage of GIA to GSA (59.46-55.46): Under this category there are only tow tehsils that are Khanpur (57.83) of Jhalawar district and Baran (55.85) of Baran district. Both the tehsils have shown decrease in the gross irrigated area to gross sown area in 2020 when compared to 1991.

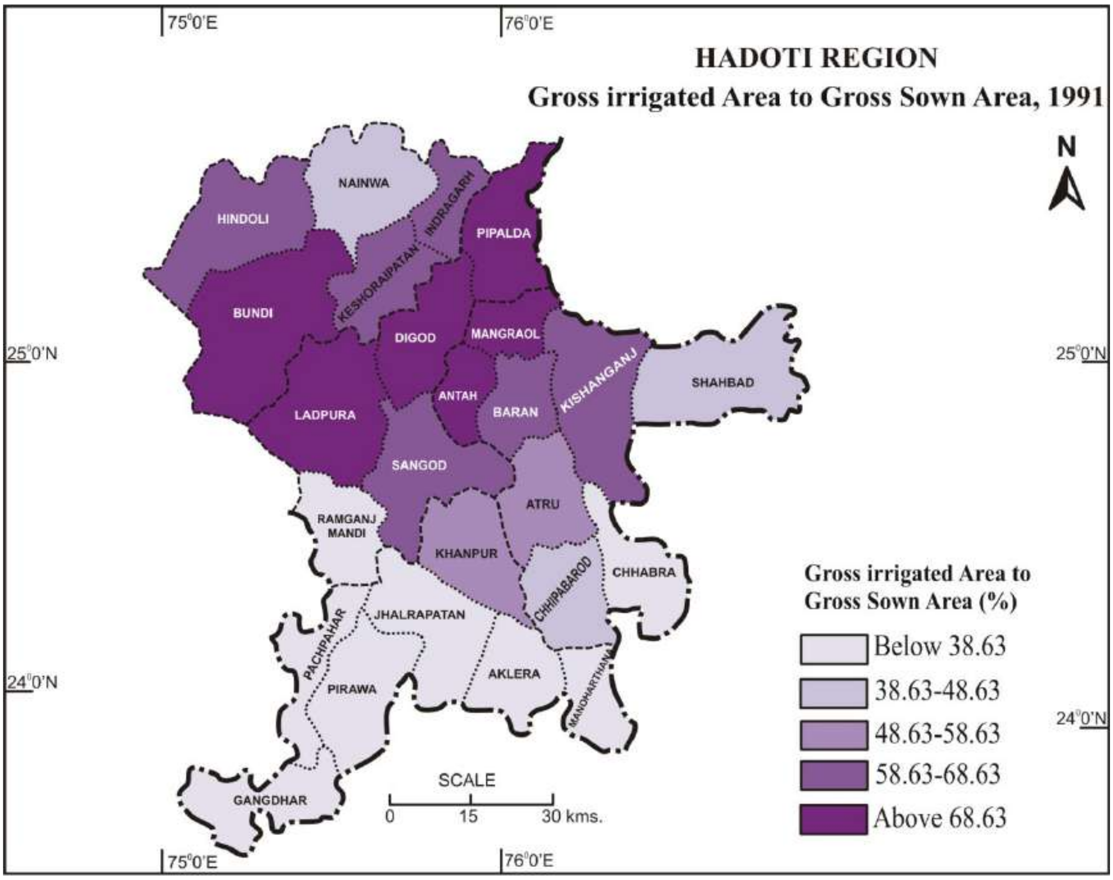
Moderate percentage of GIA to GSA (55.46-51.46): This category has six tehsils that are Sangod (54.89), Hindoli (52.61), Antah (52.12), Mangrol (51.99), Digod (51.94) and Jhalrapatan (51.61), except Jhalapatan tehsil all the remaining tehsils has sown decrease in the gross irrigated area to gross sown area in 2020 when compared to 1991.

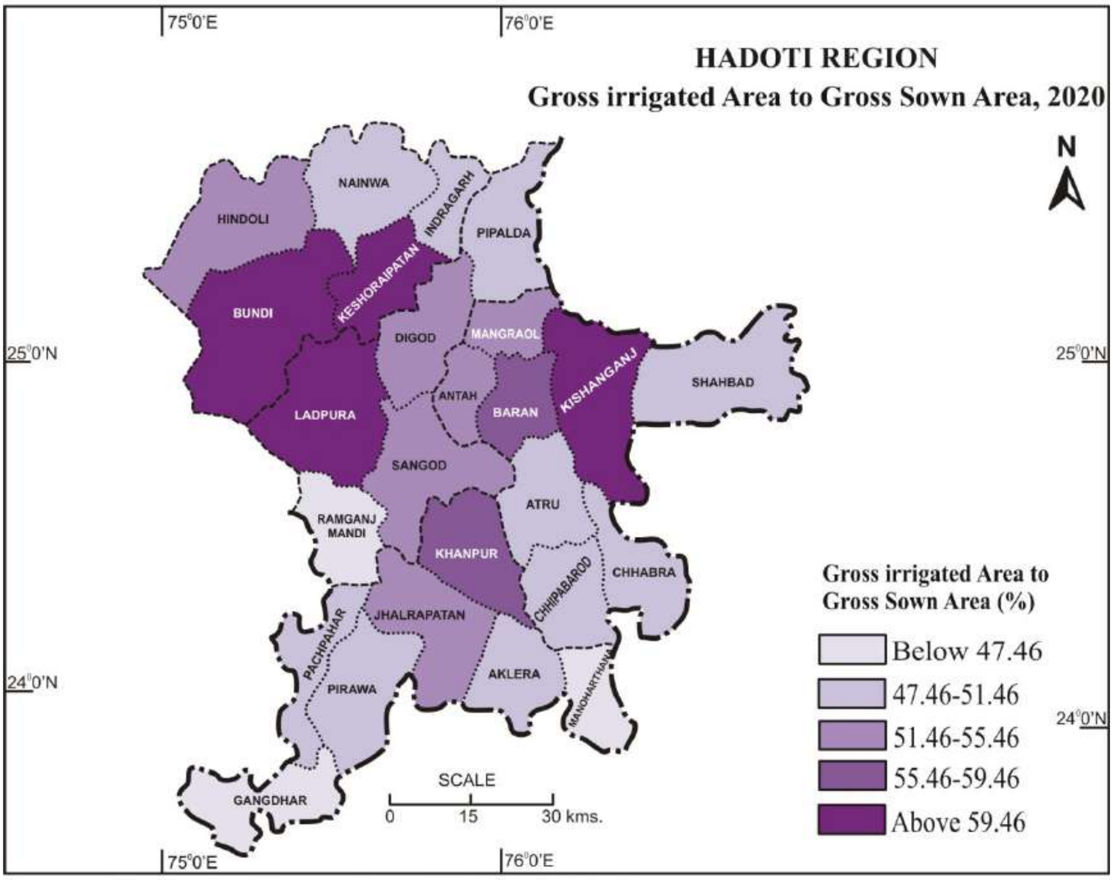
Low percentage of GIA to GSA (51.46-47.46): This category consists of maximum number of tehsils in it that are Atru (51.11), Shahbad (50.85), Panchpahar (50.8), Pirawa (50.64), Pipalda (50.34), Chhabra (50.2), Chhipabarod (50.08), Nainwa (49.34), Indragarh (49.28) and Aklera (48.66).

Very low percentage of GIA to GSA (Below 47.46): This category has only three tehsils that are Manoharthana (46.75), Ramganj Mandi (41.35) and Gangdhar (39.46) has lowest gross irrigated area to gross sown area in 2020. All the three tehsils have shown increase in gross irrigated area to gross sown area when compared with 1991.

Coefficient of variation of gross irrigated area to gross sown area of 1991 is 36.7% and in 2020 it is 14.05% this means that degree of variability in gross irrigated area to gross sown area is higher in 1991.

MAP-4.4





Source : Directorate of Economics and Statistics, Rajasthan.

4.5. Percentage of Gross Sown Area Under HYV Seeds

High yielding variety seeds plays critical role in crop yield. The percentage of gross area sown under HYV seeds is derived by dividing the gross sown area under HYV seeds by the total gross sown area and multiplying it by hundred to express it in percentage. This is important indicator for assessing the adoption of modern agricultural technologies, this has positive impact on crop productivity and food security of the region. HYV seeds helps in improving food security by increasing crop yield and reducing the risk of crop failure.

Area under different HYV seeds has been compared between 1991 and 2020 in Chart 4.2(A) and (B). In 1991 highest area was covered under mustard seeds that was 32% area and in 2020 it was 13%. HYV seeds of wheat covered 30% area in 1991 and it reached to 33% in 2020. HYV seeds of soybean covered 21% area and in 2020 it reached to 38%, which is highest area covered among all HYV seed in 2020. Apart from these HYV seeds other HYV seeds are of rice, maize, chickpea, sorghum, pearl millet and barley which are commonly grown in the Hadoti region.

Percentage of gross sown area under HYV seeds of Hadoti region has been compared between 1991 and 2020 to have better understanding of temporal and spatial changes in percentage of gross sown area under HYV seeds pattern. For this purpose, five categories have been made as per variability in different tehsils with respect to percentage of gross sown area under HYV seeds.

Percentage of gross sown area under HYV seeds, 1991

High percentage of GSA under HYV seeds (Above 70): This category consists of nine tehsils that are Digod (89.05), Keshoraipatan (88.41), Indragarh (88.41), Mangrol (88.14), Antah (88.13), Pipalda (87.46), Bundi (86.3), Ladpura (85.53) and Sangod (71.53). Highest percentage of gross sown area under HYV seeds was in Digod tehsils of Kota district.

Moderate high percentage of GSA under HYV seeds (70-60): This category has only one tehsil that is Nainwa (69.04) of Bundi district.

Moderate percentage of GSA under HYV seeds (60-50): Under this category there is one tehsil that is Hindoli (55.79) of Bundi district.

Low percentage of GSA under HYV seeds (50-40): This category comprises of single tehsil of Jhalawar district that is Ramganj Mandi (47.24).

Chart 4.2 (A) : Area Under HYV Crops (Hectare), 1991

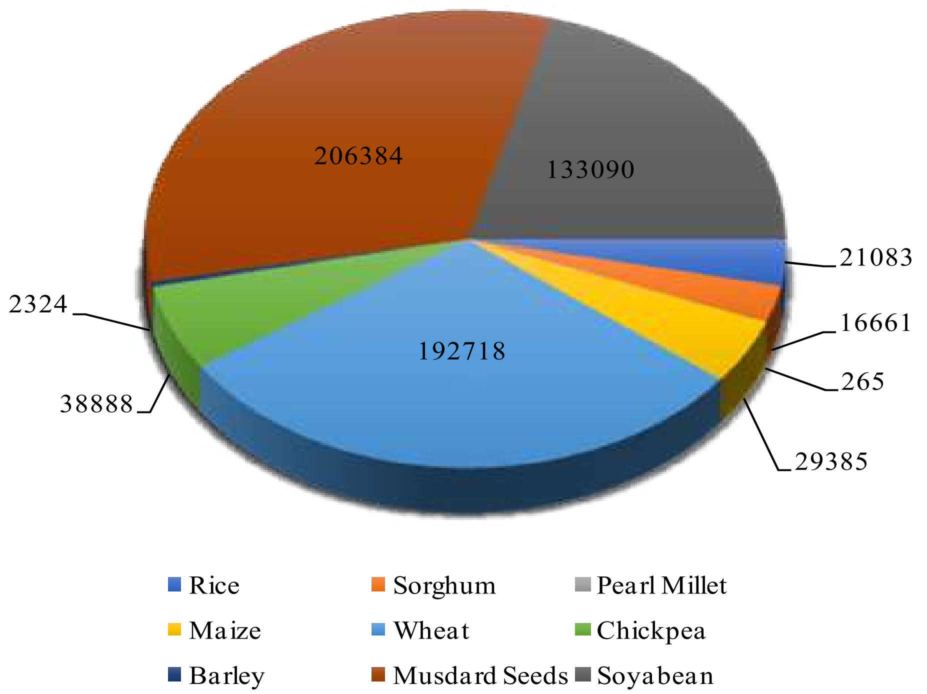
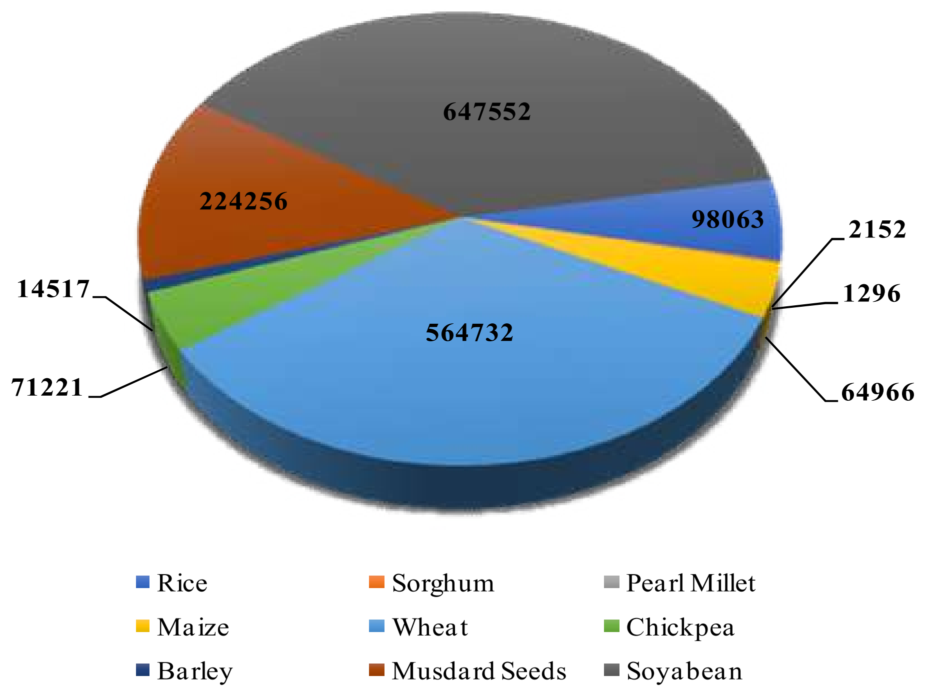


Chart 4.2 (B) : Area Under HYV Crops (Hectare), 2020



Source : Directorate of Economics and Statistics, Rajasthan.

Very low percentage of GSA under HYV seeds (Below 40): This category has maxium number of tehsils that are twelve tehsils namely, Khanpur (7.44), Jhalrapatan (6.24), Baran (6.09), Shahbad (4.09), Chhipabarod (4.07), Atru (4.07), Kishanganj (3.42), Chhabra (3.24), Gangdhar (1.62), Pirawa (1.46), Manoharthana (1.43) and lowest percentage of gross sown area under HYV seeds was in Aklera (1.42) tehsil of Jhalawar district. (Panchpahar tehsil of Jhalawar district, data is not available)

Percentage of gross sown area under HYV seeds, 2020

High percentage of GSA under HYV seeds (Above 90): This category comprises of two tehsils that are Jhalrapatan (121.47) and Gangdhar (99.07) both from Jhalawar district. Both of these tehsils have recorded significant increase in percentage of area under HYV seeds since 1991.

Moderate high percentage of GSA under HYV seeds (90-80): This category comprises of maximum number of tehsils that are nine tehsils namely, Indragarh (86.64), Shahbad (84.56), Ladpura (83.52), Digod (82.95), Chhabra (82.9), Mangrol (82.69), Bundi (82.45), Chhipabarod (82.42) and Sangod (81.15). In Bundi, Mangrol, Digod, Ladpura and Indragarh tehsil has shown decrease in percentage of area under HYV seeds since 1991, whereas remaining tehsils in this category has shown drastic increase.

Moderate percentage of GSA under HYV seeds (80-70): This category comprises of six tehsils that are Antah (79.99), Baran (77.74), Kishanganj (75.78), Atru (75.5), Khanpur (71.96) and Ramganj Mandi (70.69). All the tehsils except Antah have recorded increase in percentage of area under HYV seeds in 2020.

Low percentage of GSA under HYV seeds (70-60): This category comprises of four tehsils that are Hindoli (67.33), Manoharthana (65.7), Pipalda (61.51) and Pirawa (60.81). All the tehsils except Piplada have recorded increase in percentage of area under HYV seeds in 2020.

Very low percentage of GSA under HYV seeds (Below 60): This category comprises of three tehsils that are Keshoraipatan (57.78), Aklera (55.26) and lowest percentage of area under HYV seeds was in Nainwa (50.35) tehsil of Bundi district. (Panchpahar tehsil of Jhalawar district data is not available)

Coefficient of variation for percentage of gross sown area under HYV seeds of 1991 is 100.22% and in 2020 it is 28.86% this means that degree of variability of percentage of gross sown area under HYV seeds is higher in 1991 and more consistent percentage of gross sown area under HYV seeds is recorded in 2020 which means more uniform cropping practices has been adopted in all the tehsils of the region.

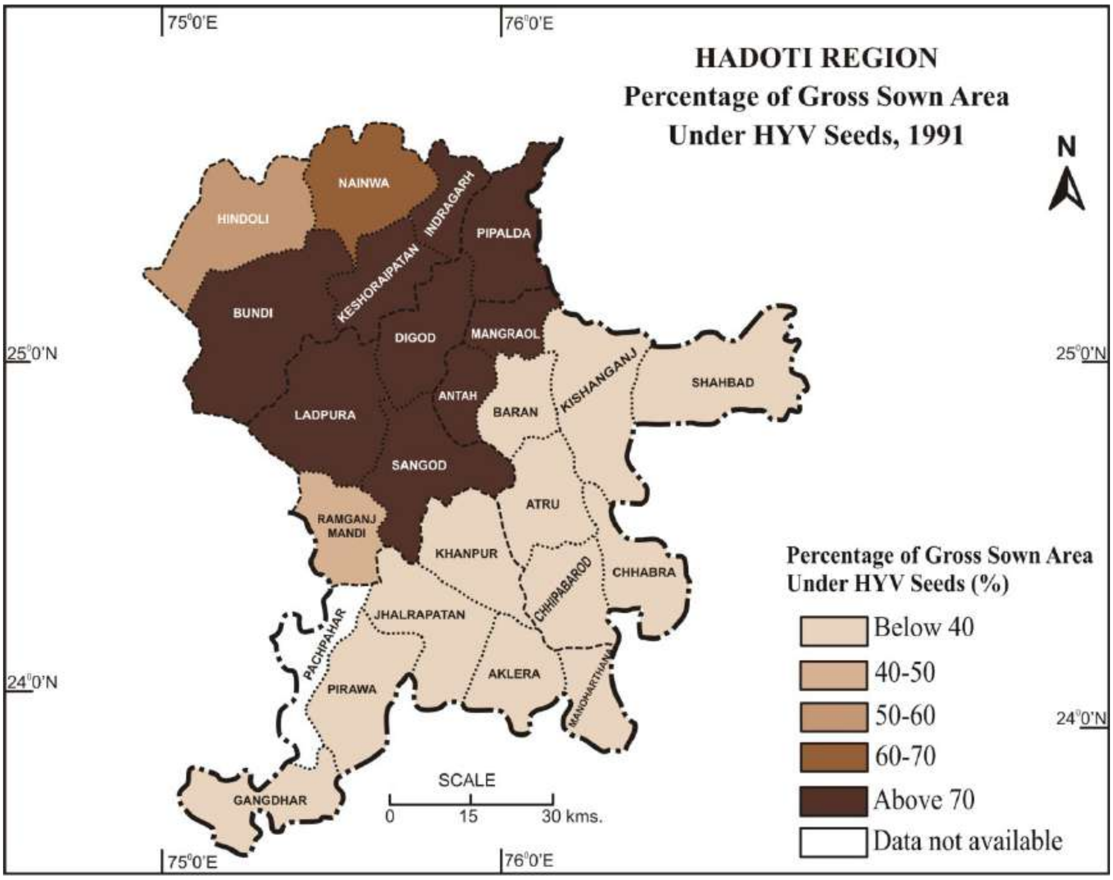
Photoplate 4.3 (A) : High Yielding Variety Maize Field

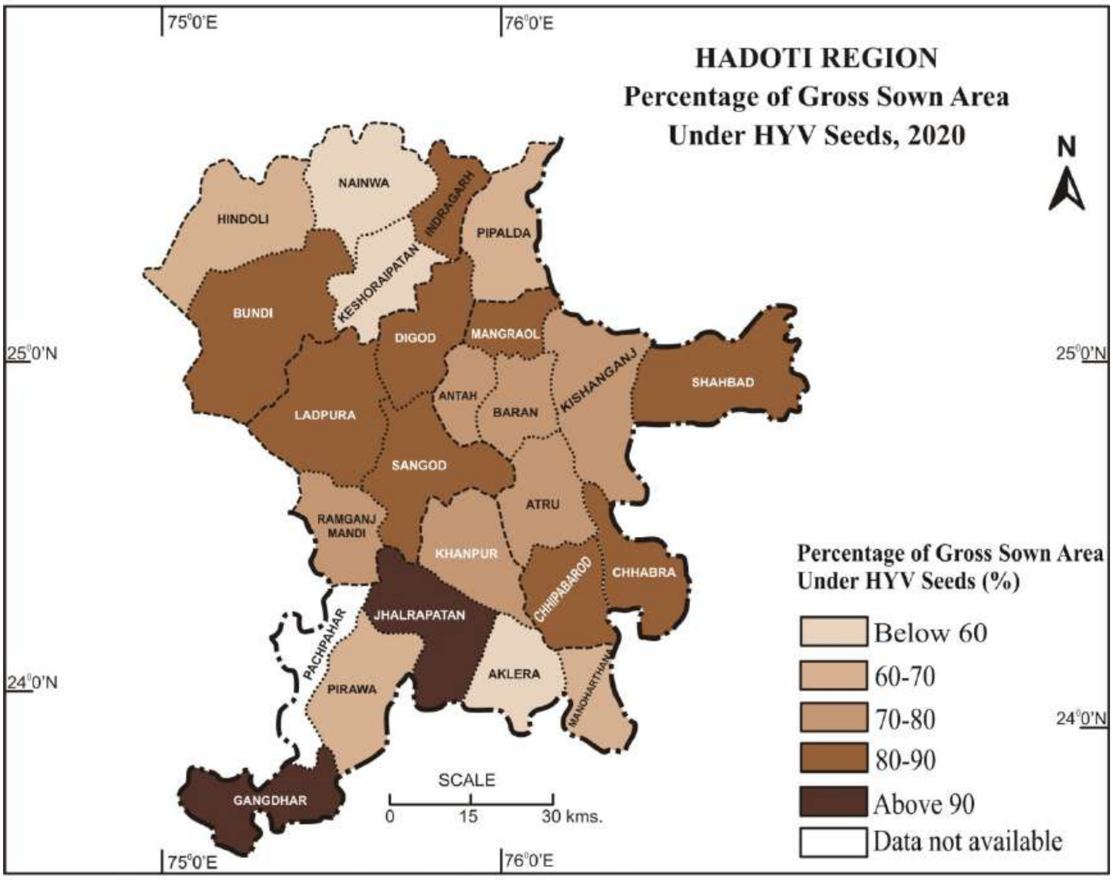
Source: Captured during primary survey, 2023

Photoplate 4.3 (B) : Canal irrigation, Mangrol

Source: Captured during primary survey, 2023

MAP-4.5





Source : Directorate of Economics and Statistics, Rajasthan.

4.6. Consumption of Chemical Fertilizers Per Hectare of Gross Sown Area

Use of chemical fertilizers plays critical role in increasing the productivity of the agricultural produce. Consumption of chemical fertilizers per hectare is a measure through which quantity of chemical fertilizers used in agricultural land on which crops are grown can be derived. Consumption of chemical fertilizers per hectare of gross sown area is calculated by dividing total consumption of chemical fertilizers by the gross sown area and this is expressed as amount of chemical fertilizer applied per hectare of land. Chemical fertilizers act as a significant input in assessing the level of agricultural development.

Consumption of chemical fertilizers per hectare of gross sown area of Hadoti region has been compared between 1991 and 2020 to have better understanding of temporal and spatial changes in consumption of chemical fertilizers per hectare of gross sown area. For this purpose, five categories have been made as per variability in different tehsils with respect to consumption of chemical fertilizers per hectare of gross sown area.

Consumption of chemical fertilizers per hectare of gross sown area, 1991

High consumption of chemical fertilizers (Above 120): This category constsis of three tehsils that are Mangrol (733.27), Antah (733.27) and Ladpura (189.14). Highest consumption of chemical fertilizer was in Mangrol and Antah tehsil of Baran district.

Moderate high consumption of chemical fertilizers (120-90): Under tis category there are three tehsils that are Keshoraipatan (117.29), Indragarh (117.25) and Bundi (112.75).

Moderate consumption of chemical fertilizers (90-60): This category consists of four tehsils that are Jhalrapatan (74.98), Atru (65.59), Hindoli (64.79) and Digod (62.09).

Low consumption of chemical fertilizers (60-30): This category has maxiumum number of tehsils in it that are ten tehsils, Kishanganj (59.08), Pipalda (57.9), Nainwa (54.62), Baran (51.08), Shahbad (49.66), Ramganj Mandi (44.22), Chhipabarod (43.93), Sangod (42.56), Khanpur (40.54) and Chhabra (39.42).

Very low consumption of chemical fertilizers (Below 30): Under this category there are four tehsils that are Gangdhar (28.61), Manoharthana (23.5), Aklera (23.48) and Pirawa (19.24). Lowest consumption of chemical fertilizers was recorded in Pirawa tehsils of Jhalawar district. Panchpahar tehsils of Jhalawar district data was not available.

Consumption of chemical fertilizers per hectare of gross sown area, 2020

High consumption of chemical fertilizers (Above 150): This category consists of four tehsils that are Hindoli (729.38), Nainwa (557.73), Bundi (270.85) and Indragarh (195.05). In 2020 Hindoli tehsils of Bundi district has highest consumption of chemical fertilizers.

Moderate high consumption of chemical fertilizers (150-120): This category comprises of four tehsils that are Jhalrapatan (145.33), Keshoraipatan (130.08), Ladpura (125.38) and Sangod (120.36). All the tehsils in this category have recorded increase in the consumption of chemical fertilizers when compered by 1991 level of consumption of chemical fertilizers.

Moderate consumption of chemical fertilizers (120-90): Under this category there are seven tehsils that are Digod (118.71), Pipalda (115.16), Ramganj Mandi (110.75), Shahbad (93.72), Chhabra (91.87), Mangrol (91.64) and Chhipabarod (91.35). All the tehsils have sown increase in consumption of chemical fertilizers in 2020.

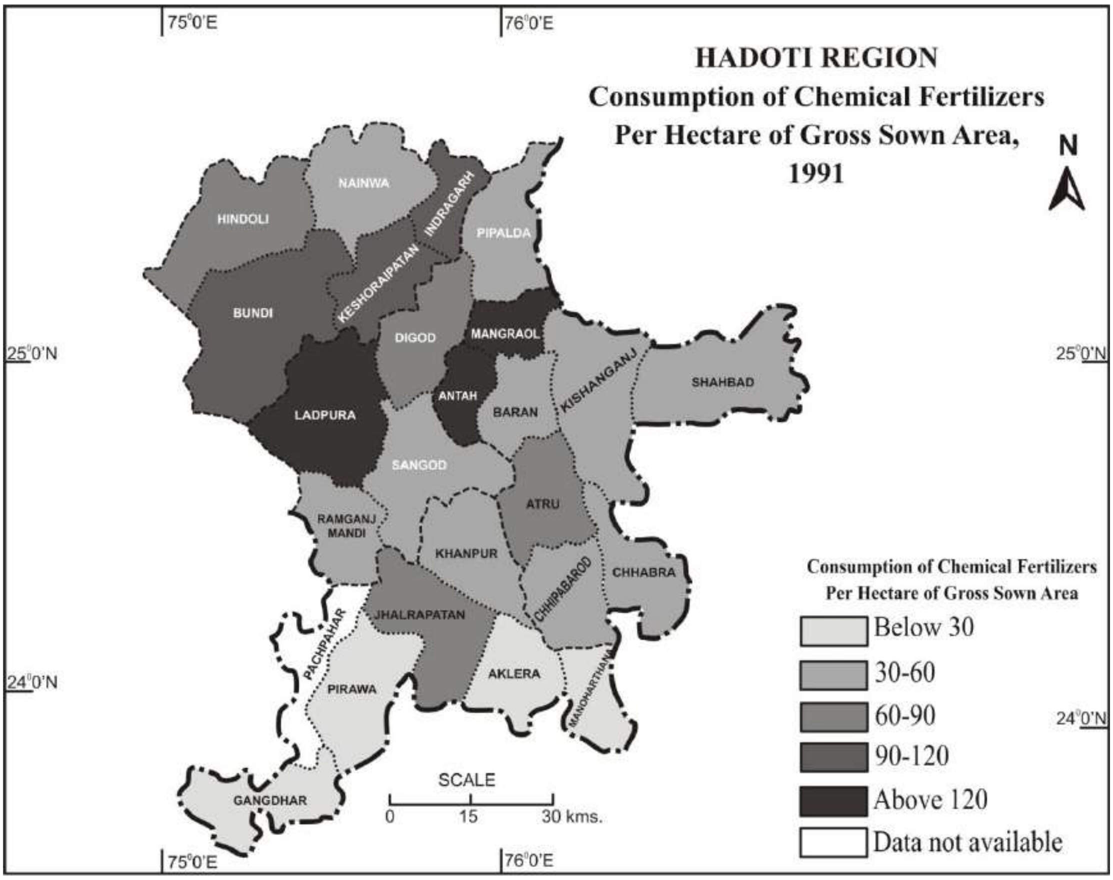
Low consumption of chemical fertilizers (90-60): This category consists of seven tehsils that are Antah (88.65), Baran (86.17), Kishanganj (83.98), Atru (83.67), Khanpur (80.79), Gangdhar (80.16) and Manoharthana (65).

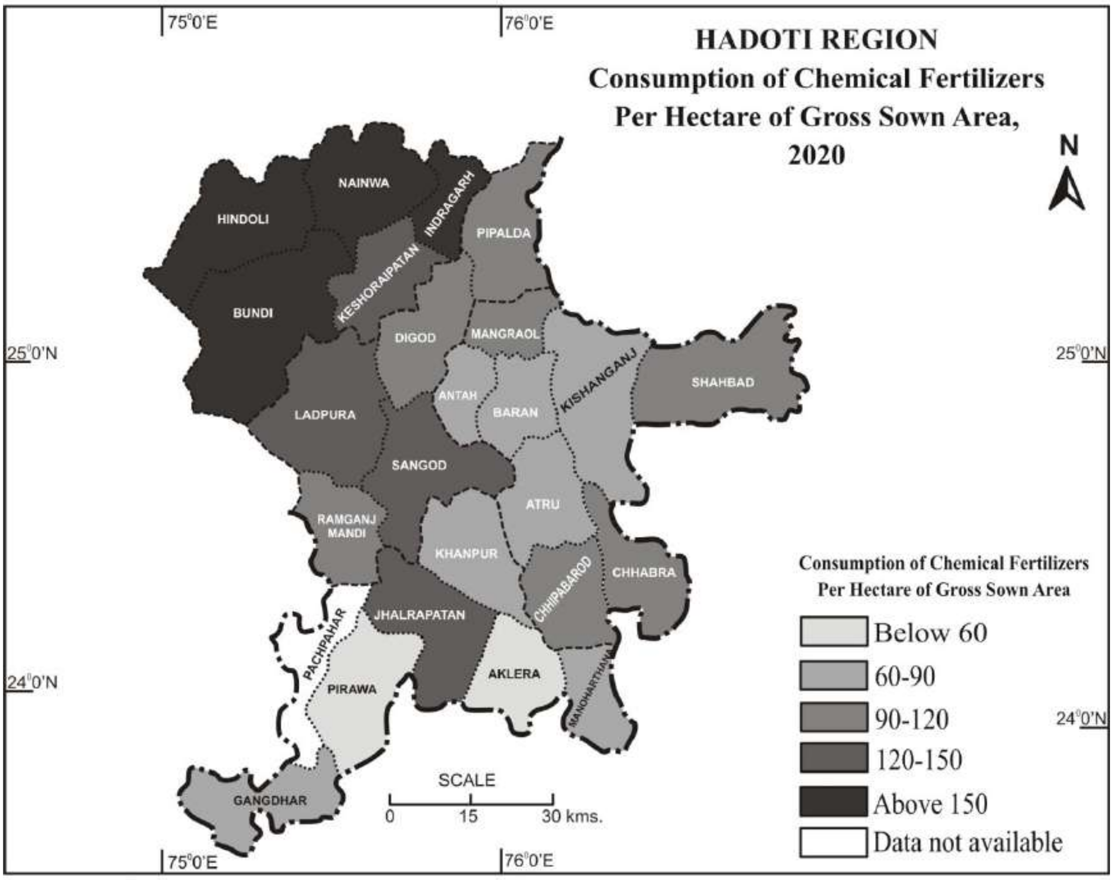
Very low consumption of chemical fertilizers (Below 60): Under this category there are only two tehsils that are Pirawa (57.14) and Aklera (54.64) of Jhalawar district. Lowest consumption of chemical fertilizers was recorded in Akelra tehsil. Panchpahar tehsils of Jhalawar district data was not available.

Coefficient of variation for consumption of chemical fertilizers per hectare of gross sown area of 1991 is 167.2% and in 2020 it is 108.76% this means that degree of variability of consumption of chemical fertilizers per hectare of gross sown area is higher in 1991 and more consistent consumption of chemical fertilizers per hectare of gross sown area is recorded in 2020 which means more uniform agricultural inputs has been adopted in all the tehsils of the region. However, the variability is on higher side in both 1991 and 2020.

Chemical fertilizers that are NPK i.e., Nitrogen which helps in growth of leaves and stems, Phosphorus helps in root growth and flower and fruit development and Potassium helps in overall plant health, disease resistance and stress tolerance. Consumption of chemical fertilizers has been studies from 1991 till 2020 in the Hadoti region in Chart 4.4. From 1995 to 2020 there was constant rise in the quantity of nitrogen-based fertilizers used. Phosphorus-based fertilizers has shown fluctuating trend since 1991. Similar trend has been recorded for potassium-based fertilizers.

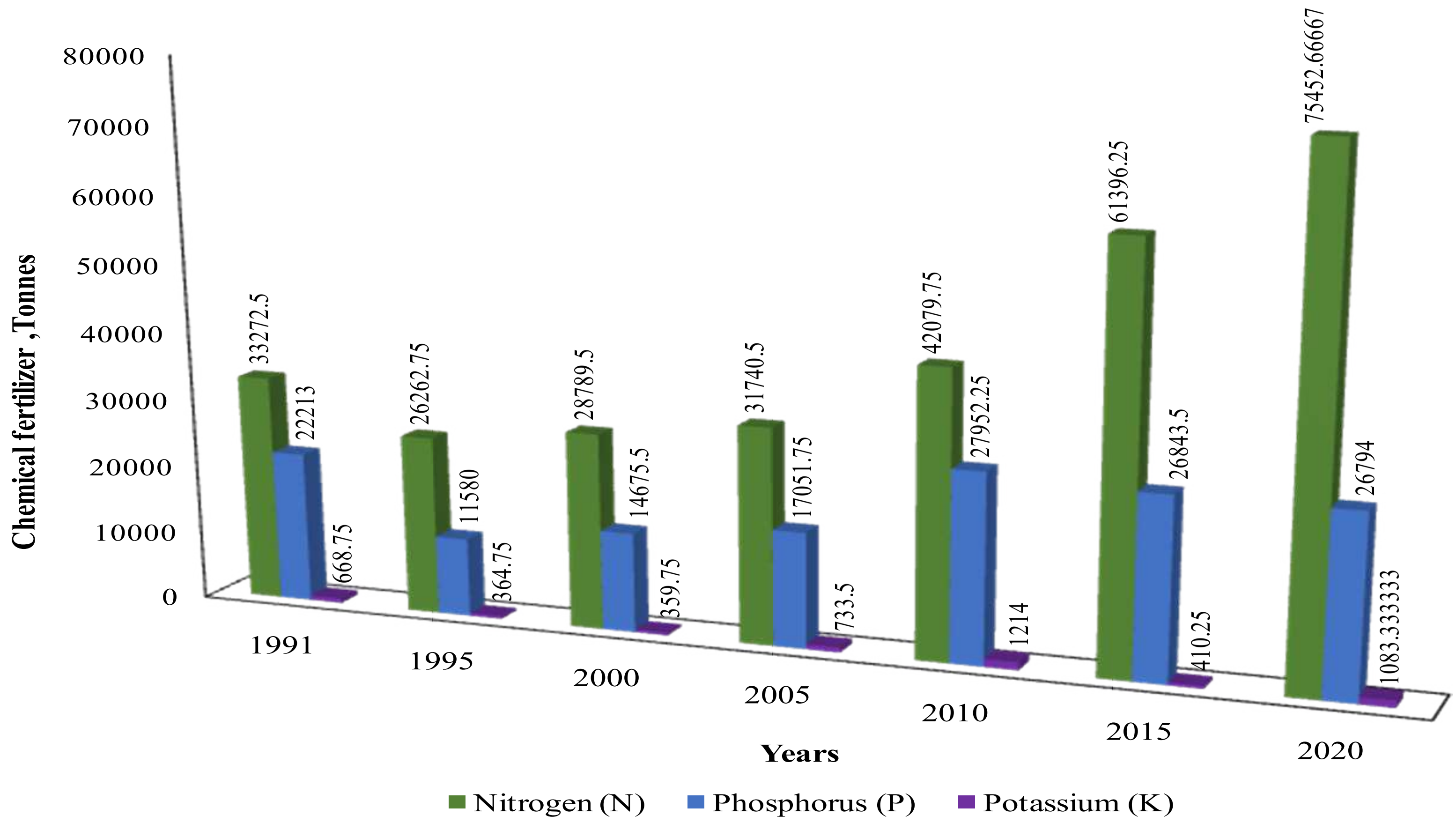
MAP-4.6





Source : Directorate of Economics and Statistics, Rajasthan.

Chart 4.4 : Consumption of Chemical Fertilizer (NPK in Tonne) in Hadoti Region, 1991-2020



4.7. Percentage of Net Irrigated Area by Tube-well to Total Net Irrigated Area

Irrigation with tube-well became very common in Hadoti region, and inter-regional disparities can be witnessed in irrigation by tube-well. Percentage of net irrigated area by tube-well to total net irrigated area is a measure through which proportion of net irrigated area by tube-well is taken out. This is derived by dividing net irrigated area by tube-well by the total net irrigated area and multiplied by hundred so that it can be expressed in percentage. Irrigation by tube-well is very important indicator in assessing the level of investment used in infrastructure and technology in agriculture sector.

Percentage of net irrigated area by tube-well to total net irrigated area of Hadoti region has been compared between 1991 and 2020 to have better understanding of temporal and spatial changes in percentage of net irrigated area by tube-well to total net irrigated area. For this purpose, five categories have been made as per variability in different tehsils with respect to percentage of net irrigated area by tube-well to total net irrigated area.

Percentage of net irrigated area by tube-well to total net irrigated area, 1991

High percentage of NIA by tube-well (Above 25): This category consists of two tehsils that are Baran (48.2) and Shahbad (32.44) both are of Baran district. Highest Percentage of net irrigated area by tube-well to total net irrigated area was in Baran tehsil.

Moderate High percentage of NIA by tube-well (25-20): Under this category are are two tehsils that are Atru (24.87) of Baran tehsil and Sangod (23.01) of Kota district.

Moderate percentage of NIA by tube-well (20-15): This category comprises of three tehsils that are Digod (16.62), Mangrol (16.5) and Antah (16.5).

Low percentage of NIA by tube-well (15-10): This category comprises of two tehsils that are Ladpura (13.98) of Kota district and Kishanganj (10.52) of Baran district.

Very low percentage of NIA by tube-well (Below 10): This category has maximum number of tehsils that are sixteen tehsils Khanpur (6.32), Nainwa (3.34), Pipalda (2.44), Chhabra (1.7), Bundi (1.65), Chhipabarod (0.84), Keshoraipatan (0.76), Indragarh (0.76) other remaining tehsils has no irrigation done by tube-well that are Ramganj Mandi, Gangdhar, Pirawa, Panchpahar, Manoharthana, Aklera, Jhalrapatan, Hindoli.

Percentage of net irrigated area by tube-well to total net irrigated area, 2020

High percentage of NIA by tube-well (Above 60.15): This category consists of eight tehsils that are Ramganj Mandi (100), Atru (94.21), Sangod (93.63), Nainwa (92.74), Baran (92.47), Khanpur (84.51), Chhabra (71.08) and Shahbad (66.54). Highest percentage of net irrigated area by tube-well to total net irrigated area was in Ramganj Mandi. All the tehsils have sown increase in percentage of net irrigated area by tube-well to total net irrigated area.

Moderate High percentage of NIA by tube-well (60.15-45.15): This category consists of two tehsils that are Kishanganj (58.13) and Chhipabarod (52.88) both are in Baran district.

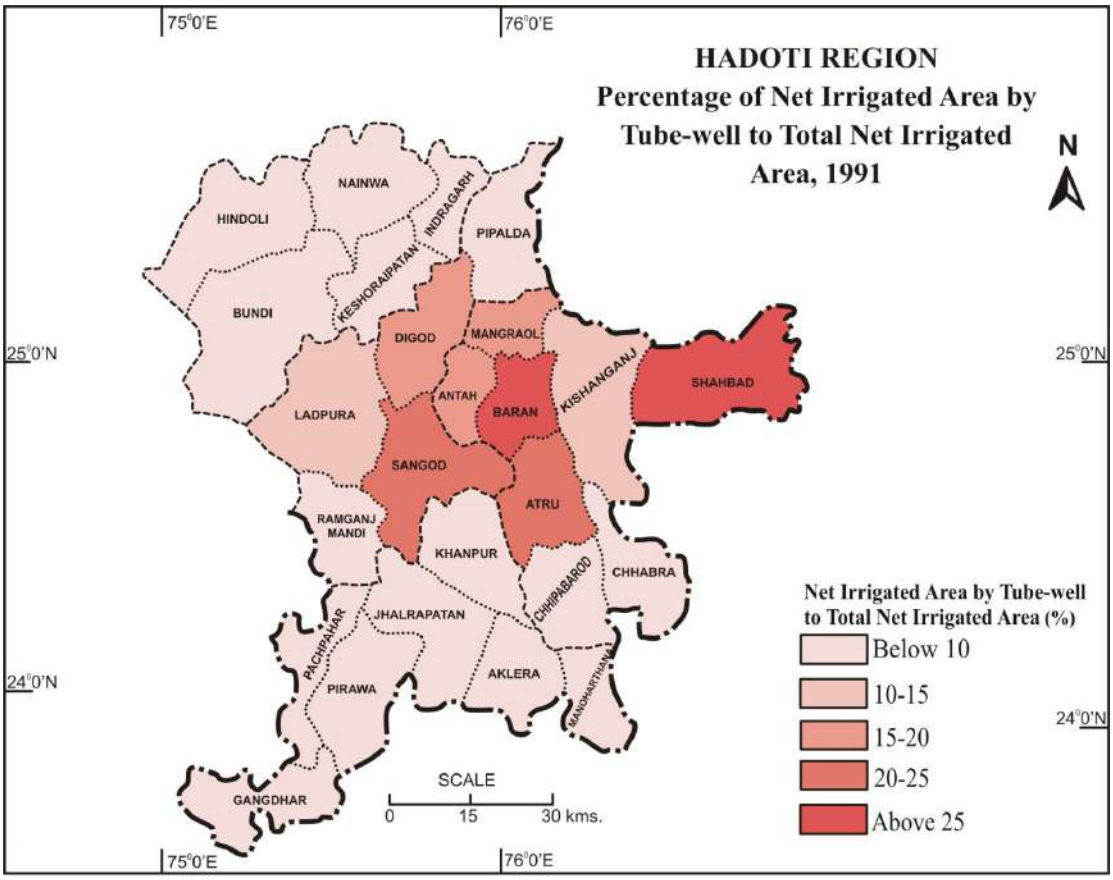
Moderate percentage of NIA by tube-well (45.15-30.15): This category comprises of four tehsils that are Antah (44), Hindoli (40.19), Indragarh (34.96) and Ladpura (30.92).

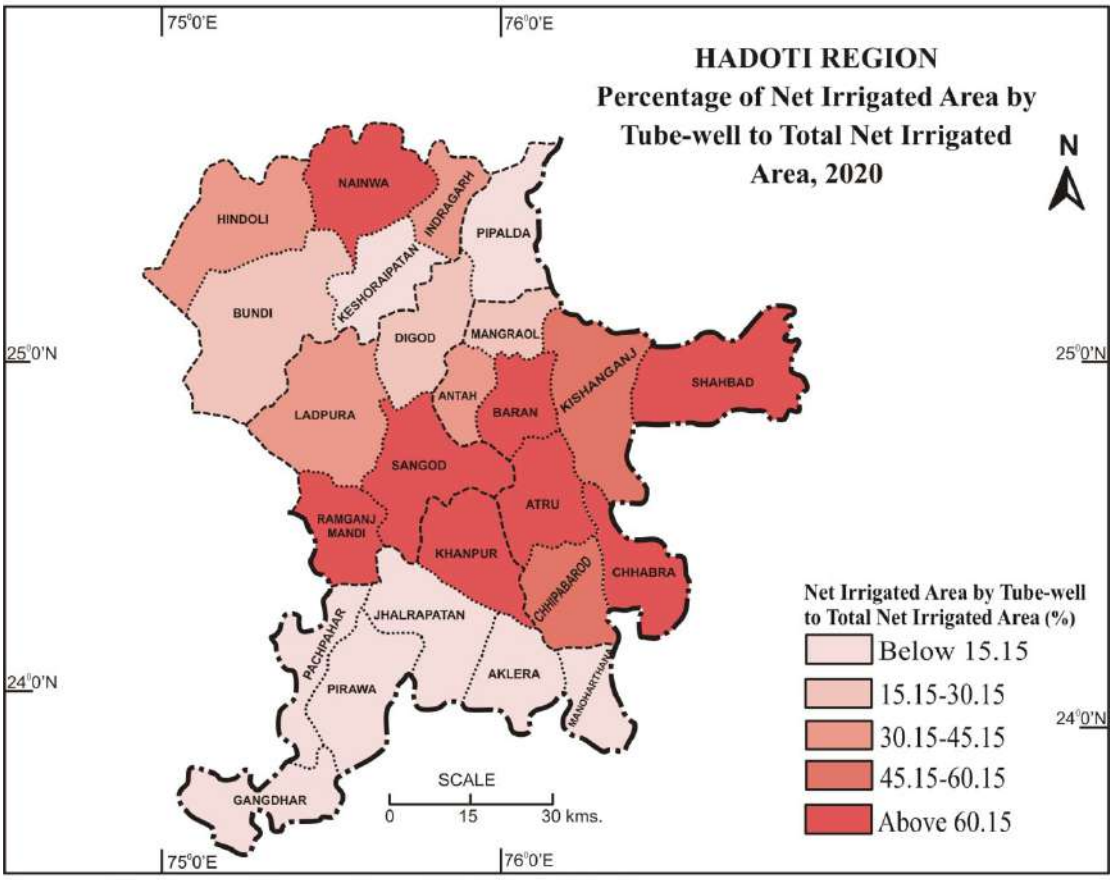
Low percentage of NIA by tube-well (30.15-15.15): Under this category there are only three tehsil that are Mangrol (21.78), Digod (20.69) and Bundi (16.09).

Very low percentage of NIA by tube-well (Below 15.15): This category has maximum number of tehsils that are eight tehsils Pipalda (6.21), Keshoraipatan (6.08), Panchpahar (3.42), Pirawa (1.86), Manoharthana (1.33), Gangdhar (0.91), Aklera (0.88) and Jhalrapatan (0.15) of Jhalawar has lowest percentage of NIA by tube-well.

Coefficient of variation for percentage of net irrigated area by tube-well to total net irrigated area 1991 is 142.15% and in 2020 it is 87.69% this means that degree of variability of percentage of net irrigated area by tube-well to total net irrigated area is higher in 1991 and more consistent percentage of net irrigated area by tube-well to total net irrigated area is recorded in 2020 which means more uniform agricultural inputs in irrigation has been adopted in all the tehsils of the region. However, the variability is on higher side in both 1991 and 2020.

MAP-4.7





Source : Directorate of Economics and Statistics, Rajasthan.

4.8. Percentage of Net Irrigated Area by Canal to Total Net Irrigated Area

Availability of irrigation facilities is very critical for increasing crop productivity. Hadoti region is majorly drained by Chambal River, through Chambal River canal irrigation is done in the region. Percentage of net irrigated area by canal to total net irrigated area is a measure through which proportion of net irrigated area by canal is taken out. This is derived by dividing net irrigated area by canal by the total net irrigated area and multiplied by hundred so that it can be expressed in percentage. Irrigation by canal is very important indicator in assessing the irrigation facilities and the level of investment used in infrastructure and technology in agriculture sector.

Percentage of net irrigated area by canal to total net irrigated area of Hadoti region has been compared between 1991 and 2020 to have better understanding of temporal and spatial changes in percentage of net irrigated area by canal to total net irrigated area. For this purpose, five categories have been made as per variability in different tehsils with respect to percentage of net irrigated area by canal to total net irrigated area.

Percentage of net irrigated area by canal to total net irrigated area, 1991

High percentage of NIA by canal (Above 80): This category consists of four tehsils that are Pipalda (93.94), Keshoraipatan (83.74), Indragarh (83.74) and Digod (82.51). Piplada tehsil of Kota district has highest percentage of net irrigated area by canal to total net irrigated area.

Moderate high percentage of NIA by canal (80-60): Under this category there are four tehsils that are Mangrol (73.92), Antah (73.92), Bundi (73.79) and Ladpura (67.88).

Moderate percentage of NIA by canal (60-40): This category has only one tehsil that is Hindoli (51.41) of Bund district.

Low percentage of NIA by canal (40-20): This category consists of five tehsils that are Kishanganj (35.85), Khanpur (32.64), Baran (30.27), Atru (29.08) and Shahbad (27.43).

Very low percentage of NIA by canal (Below 20): This category consists of maximum number of tehsils that are eleven tehsils Sangod (12.69), Nainwa (7.79), Jhalrapatan (3.15), Panchpahar (1.01), Chhabra (0.95), Pirawa

(0.43). Other remaining tehsils has no irrigation done by canal that are Ramganj Mandi, Gangdhar, Manoharthana, Aklera and Chhipabarod.

Percentage of net irrigated area by canal to total net irrigated area, 2020

High percentage of NIA by canal (Above 72): This category consists of five tehsils that are Pipalda (93.54), Keshoraipatan (88.87), Digod (79.25), Mangrol(78.03) and Bundi (75.35). Highest percentage of net irrigated area by canal to total net irrigated area was in Pipalda tehsil of Kota district.

Moderate high percentage of NIA by canal (72-60): This category consists of only one tehsil that is Ladpura (68.95) of Kota district. In 1991 it was (67.88) and increased to (68.95) percentage of NIA by canal.

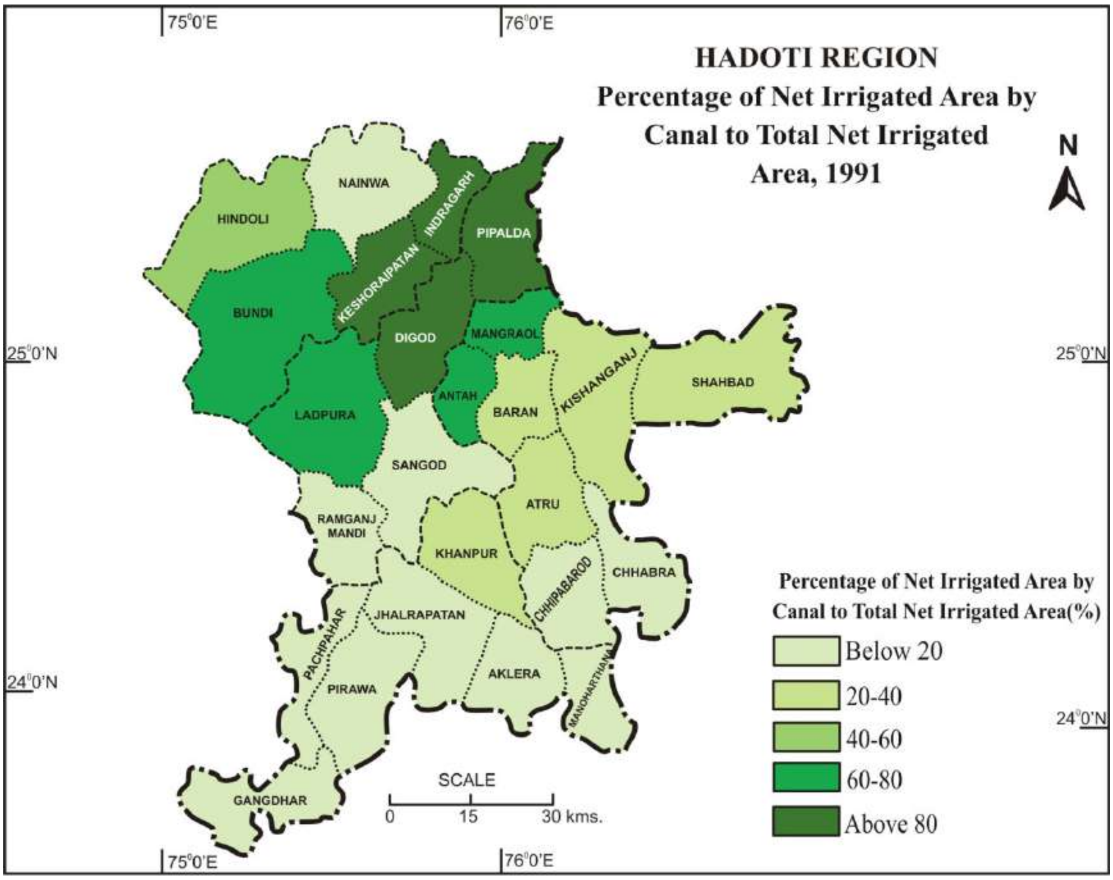
Moderate percentage of NIA by canal (60-48): This category consists of only two tehsils that are Antah (53.49) of Baran district and Indragarh (51.27) of Bundi district.

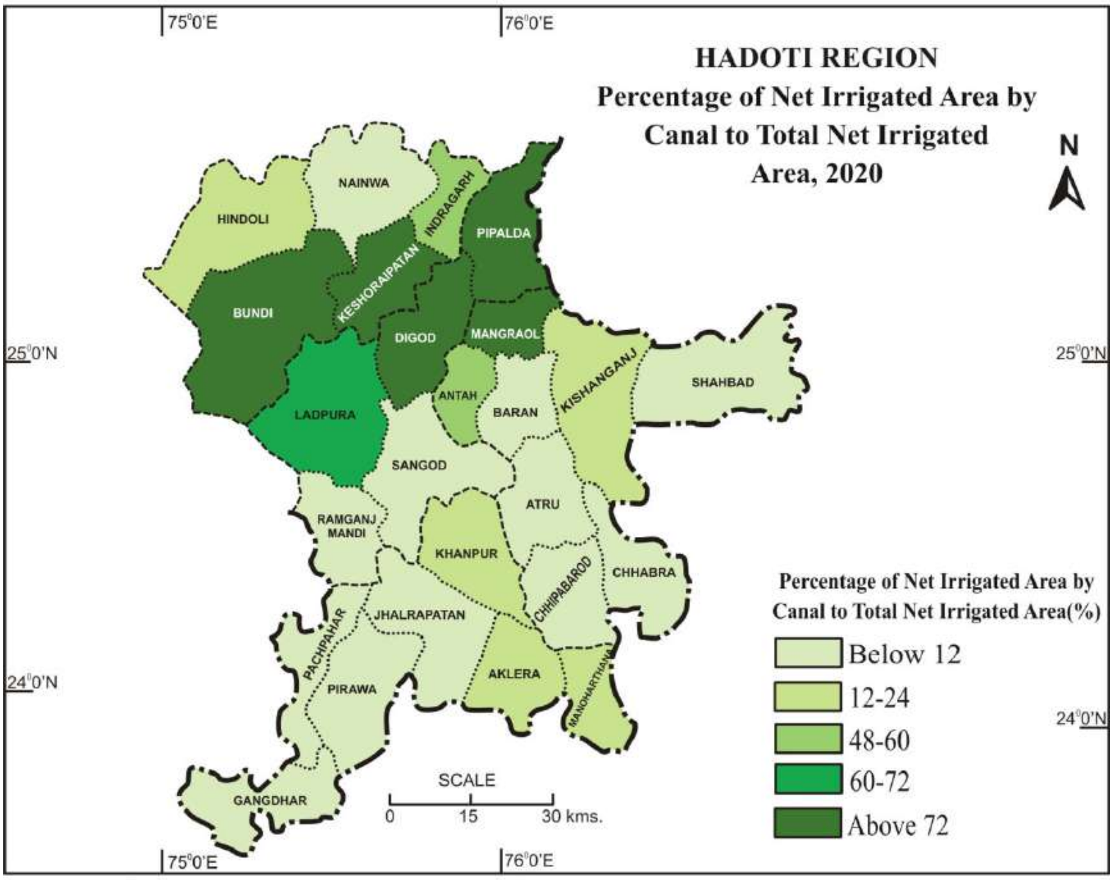
Low percentage of NIA by canal (24-12): Under this category there are five tehsils that are Kishanganj (19.19), Manoharthana (18.44), Hindoli (16.51), Khanpur (14.54) and Aklera (14.33). Aklera and Manoharthana has shown incerse in percentage of net irrigated area by canal whereas other remaining tehsils has shown decrease in percentage of net irrigated area by canal.

Very low percentage of NIA by canal (Below 12): Under this category there are maximum number of tehsils that are twelve tehsils Baran (7.53), Sangod (6.17), Atru (5.16), Chhabra (3.96), Pirawa (2.4), Shahbad (0.83), Jhalrapatan (0.42), Panchpahar (0.39), Chhipabarod (0.22). Other remaining tehsils has no irrigation done by canal that are Ramganj Mandi, Gangdhar, Nainwa,

Coefficient of variation for percentage of net irrigated area by canal to total net irrigated area 1991 is 99.24% and in 2020 it is 119.87% this means that degree of variability of percentage of net irrigated area by canal to total net irrigated area is higher in 2020 and more consistent percentage of net irrigated area by canal to total net irrigated area is recorded in 1991.

MAP-4.8





Source : Directorate of Economics and Statistics, Rajasthan.

4.9. Gross Sown Area Per Tractor

Gross sown area per tractor is very significant indicator in assessing the level of farm mechanisation and efficiency of tractor use. Higher gross sown area per tractor indicates greater level of farm mechanisation and higher tractor utilisation rate, this positively increases agricultural productivity and cropping intensity. Different studies have shown positive effect of farm mechanisation on income generation, productivity of crops, cropping intensity. Gross sown area per tractor has been derived out by dividing gross sown area by number of tractors.

Gross sown area per tractor of Hadoti region has been compared between 1991 and 2020 to have better understanding of temporal and spatial changes in Gross sown area per tractor. For this purpose, five categories have been made as per variability in different tehsils with respect to gross sown area per tractor.

Gross sown area per tractor, 1991

High gross sown area per tractor (Above 395.81): This category consists of seven tehsils that are Gangdhar (1519.03), Manoharthana (1340.2), Aklera (1340.2), Panchpahar (782.01), Chhabra (637.32), Ramganj Mandi (610.79) and Pirawa (430.12). Highest gross sown area per tractor was in Gangdhar tehsils of Jhalawar district.

Moderate high gross sown area per tractor (395.81-315.81): This category comprises of three tehsils that are Chhipabarod (395.18), Jhalrapatan (349.38) and Nainwa (348.49).

Moderate gross sown area per tractor (315.81-235.81): This category consists of only two tehsils that are Khanpur (296.31) of Jhalawar district and Hindoli (244.67) of Bundi district.

Low gross sown area per tractor (235.81-155.81): Under this category there are three tehsils that are Shahbad (232.33), Atru (200.51) and Sangod (196.48).

Very low gross sown area per tractor (Below 155.81): This category consists of maxium number of tehsils that are Baran (124.6), Kishanganj (110.69), Indragarh (92.25), Keshoraipatan (92.09), Antah (91.26), Mangrol (91.07), Ladpura (86.18), Digod (79.23), Pipalda (76.55) and Bundi (75.81) has lowest gross sown area per tractor.

Photoplate 4.4 (A) : Tractor with harvester

Source: Captured during primary survey, 2023

Photoplate 4.4 (B) : Combine harvester

Source: Captured during primary survey, 2023

Gross sown area per tractor, 2020

High gross sown area per tractor (Above 142.01): This category consists of seven tehsils that are Gangdhar (308.62), Chhabra (189.63), Manoharthana (182.56), Aklera (158.78), Nainwa (153.19), Panchpahar (146.45) and Ramganj Mandi (144.83). Highest gross sown area per tehsil was in Gangdhar tehsil of Jhalawar district.

Moderate high gross sown area per tractor (142.01-117.01): This category consists of two tehsils that are Pirawa (131.97) of Jhalawar district and Shahbad (121.73) of Baran district.

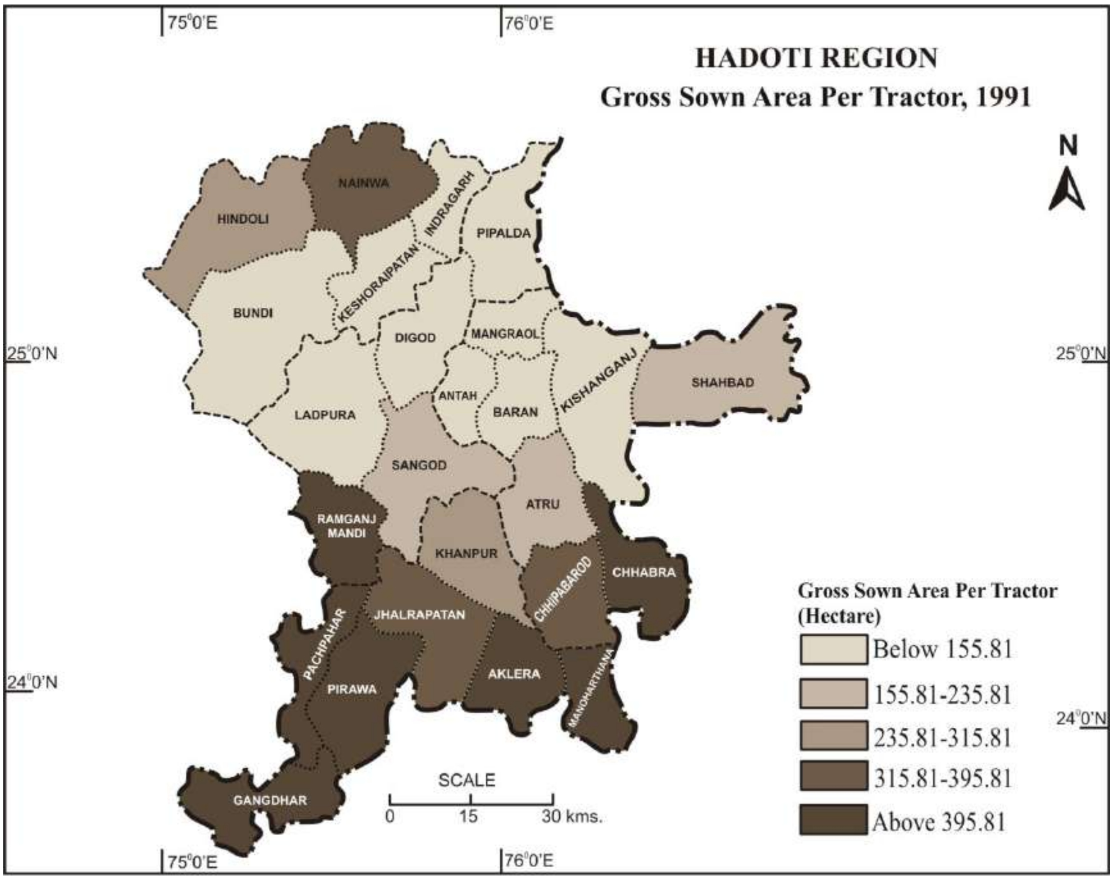
Moderate gross sown area per tractor (117.01-92.01): Under this category there are four tehsils that are Indragarh (111.07), Hindoli (107.45), Jhalrapatan (102.23) and Chhipabarod (93.11).

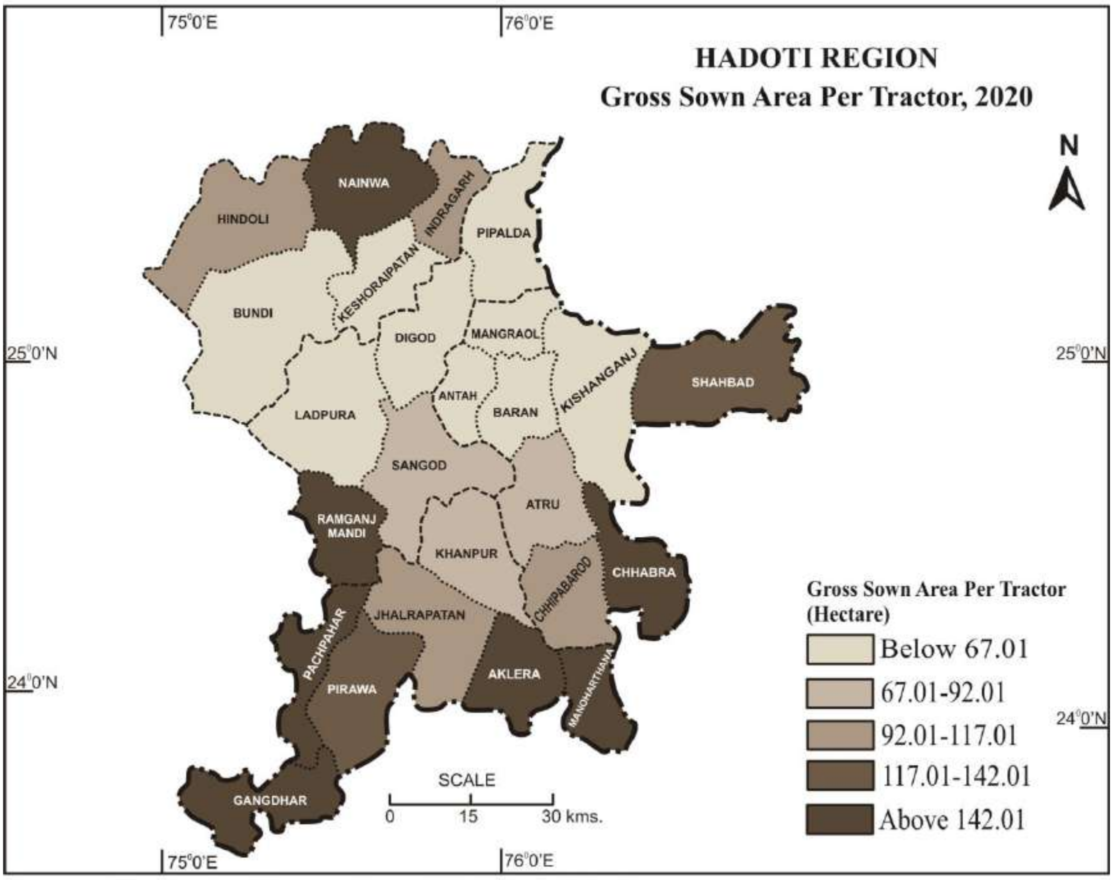
Low gross sown area per tractor (92.01-67.01): This category comprises of three tehsils that are Khanpur (74.31), Sangod (70.45) and Atru (67.21).

Very low gross sown area per tractor (Below 67.01): This category has maximum number of tehsils that are nine tehsils, Baran (64.54), Kishanganj (63.12), Antah (62.21), Pipalda (58.95), Mangrol (52.66), Keshoraipatan (49.61), Digod (48.97), Ladpura (44.94) and Bundi (42.01) has lowest gross sown area per tractor.

Coefficient of variation for gross sown area per tractor 1991 is 108.35 % and in 2020 it is 58.32% this means that degree of variability of gross sown area per tractor is higher in 1991 and more consistent gross sown area per tractor is recorded in 2020 which means more uniform farm mechanization has been adopted in all the tehsils of the region. However, the variability is on higher side in both 1991 and 2020. The decrease in coefficient of variation is seen in year 2020 suggests that variability and dispersion has been decreased in gross sown area per tractor in the Hadoti region. It also implies that usage of tractors has become homogenous and more even in the region. This has been possible because of increased farm mechanization in the logging tehsils of the region. Technological advancement along with the policy implementation and its execution has shown these positive results in improving agricultural sector of the region.

MAP-4.9





Source : Directorate of Economics and Statistics, Rajasthan.

4.10. Density of livestock

Livestock is considered domesticated animals raised in agricultural setting to provide diversified products for consumption such as milk, egg, meat, leather etc. Livestock plays very important role in the agricultural sector because the income produced out of it. Livestock provides as a source of livelihood and employment in the region. Mixed farming is more sustainable which involves both raising of crops and domestication of livestock. Density of livestock has been derived by dividing total livestock by total land area in square kilometre. Density of livestock is a measure to look the level of agricultural development in the Hadoti region.

Density of livestock of Hadoti region has been compared between 1991 and 2020 to have better understanding of temporal and spatial changes in density of livestock. For this purpose, five categories have been made as per variability in different tehsils with respect to density of livestock.

Density of livestock, 1991

High density of livestock (Above 166.05): This category consists of eight tehsils that are Hindoli (216.53), Manoharthana (198.38), Nainwa (181.47), Panchpahar (176.36), Gangdhar (174.16), Chhipabarod (171.87), Indragarh (171.49) and Mangrol (166.33). Highest livestock density was in Hindoli tehsils of Bundi district.

Moderate high density of livestock (166.05-156.05): This category consists of three tehsils that are Bundi (164.89), Aklera (158.78) and Pirawa (157.16).

Moderate density of livestock (156.05-146.05): Under this category there are six tehsils that are Digod (155.86), Ramganj Mandi (155.1), Jhalrapatan (154.54), Khanpur (151.61), Baran (151.6) and Keshoraipatan (148.8).

Low density of livestock (146.05-136.05): This category consists of three tehsils that are Antah (145.34), Atru (141.81) and Pipalda (136.99).

Very low density of livestock (Below 136.05): This category consists of five tehsils that are Sangod (134.7), Chhabra (131.89), Kishanganj (120.53), Ladpura (114.2) and Shahbad (86.05) of Baran district has lowest livestock density.

Density of livestock, 2020

High density of livestock (Above 142.12): This category consists of eight tehsils that are Aklera (250.9), Manohar thana (230.99), Mangrol (180.35), Gangdhar (178.09), Jhalrapatan (170.59), Panchpahar (166), Chhipabarod (163.75) and Hindoli (163.01). Highest density of livestock was in Aklera tehsil of Jhalawar. Except Hindoli and Chhipabarod tehsil all remaining tehsils has shown increase in density of livestock.

Moderate high density of livestock (142.12-132.12): Under this category there are five tehsils that are Chhabra (140.78), Antah (140.65), Baran (136.28), Pirawa (134.33) and Nainwa (134.19). Chhabra tehsil of Baran district has shown increase whereas remaining tehsils had shown decrease in livestock density.

Moderate density of livestock (132.12-122.12): Under this category there are five tehsils that are Khanpur (128.65), Ramganj Mandi (128.59), Indragarh (123.48), Pipalda (122.78) and Atru (122.51). All these tehsils have recorded decrease in density of livestock in 2020.

Low density of livestock (122.12-112.12): This category consists of four tehsils that are Keshoraipatan (120.17), Ladpura (118.3), Digod (116.63) and Sangod (116.16). Only in Ladpura tehsil of Kota district has recorded increase in livestock density among all the tehsils of this category.

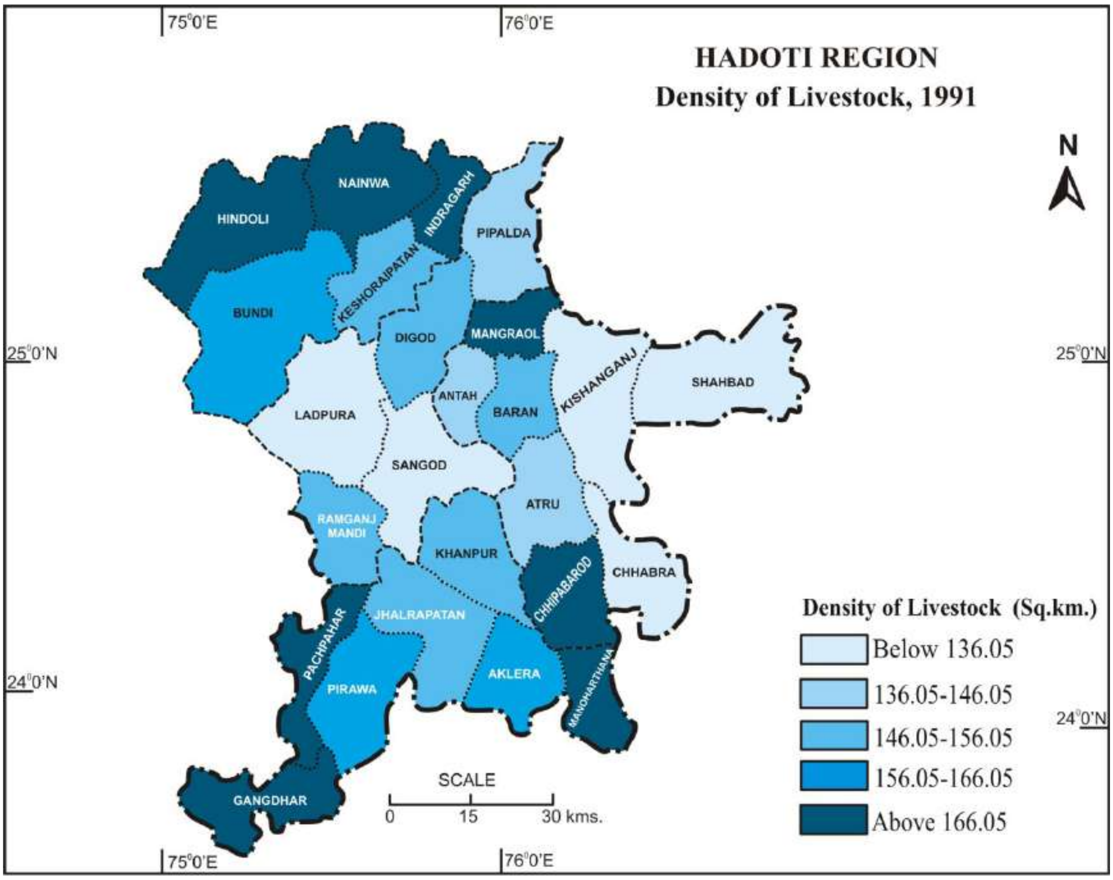
Very low density of livestock (Below 112.12): This category comprises of three tehsils that are Kishanganj (109.06), Bundi (107.79) and Shahbad (82.12) has lowest density of livestock in 2020. All these tehsils in this category have recorded decrease in density of livestock in 2020.

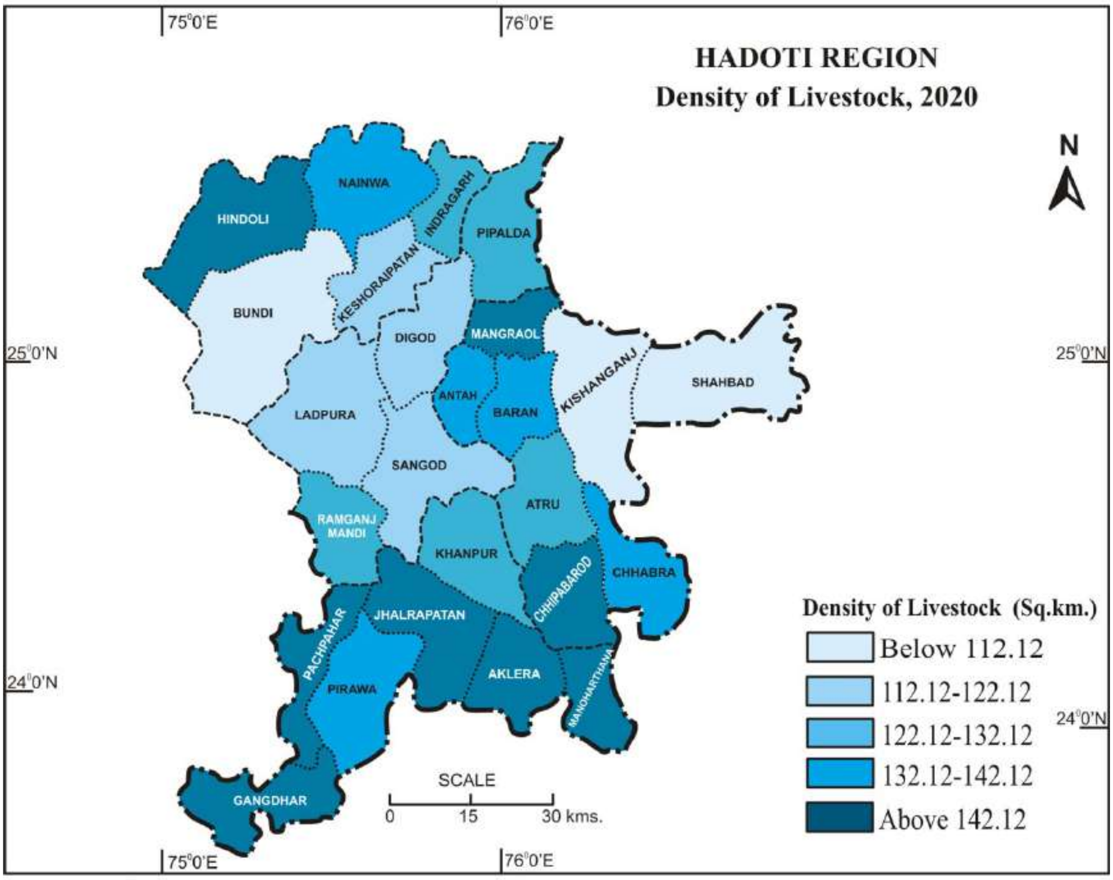
Coefficient of variation for density of livestock 1991 is 17.31 % and in 2020 it is 26.47% this means that degree of variability of density of livestock is higher in 2020 and more consistent density of livestock is recorded in 1991.

4.11. Livestock Facilities

Livestock facilities are very important for animal health and welfare, productivity and efficiency, environmental protection, food safety and quality and it also positively contributes in economic development. These livestock facilities incudes veterinary hospitals, dispensaries, village centres for animals, artificial insemination centres, mobile veterinary clinic in the Hadoti region. So, this becomes very important measure for assessing the level of development in animal production sector.

MAP-4.10





Source : Directorate of Economics and Statistics, Rajasthan.

Livestock facilities of Hadoti region has been compared between 1991 and 2020 to have better understanding of temporal and spatial changes in Livestock facilities. For this purpose, five categories have been made as per variability in different tehsils with respect to livestock facilities.

Livestock facilities, 1991

High livestock facilities (Above 21): This category consists of three tehsils that are Jhalrapatan (26), Bundi (24) and Ladpura (21). Highest availability of livestock facilities was in Jhalrapatan tehsil of Jhalawar district.

Moderate high livestock facilities (20-16): Under this category there are three tehsils that are Keshoraipatan (20), Hindoli (20) and Nainwa (17).

Moderate livestock facilities (15-11): This category comprises of three tehsils that are Pirawa (13), Manoharthana (12) and Khanpur (12).

Low livestock facilities (10-6): This category comprises of four tehsils that are Kishanganj (10), Atru (7), Antah (6) and Chhipabarod (6).

Very low livestock facilities (Below 5): Under this category there are maximum number of tehsils that are Sangod (5), Pipalda (5), Baran (5), Ramganj Mandi (4), Digod (4), Gangdhar (4), Indragarh (4), Shahbad (4), Chhabra (3), Aklera (2), Mangrol (2) and Panchpahar (1) of Jhalawar district has lowest availability of livestock facilities in the Hadoti region.

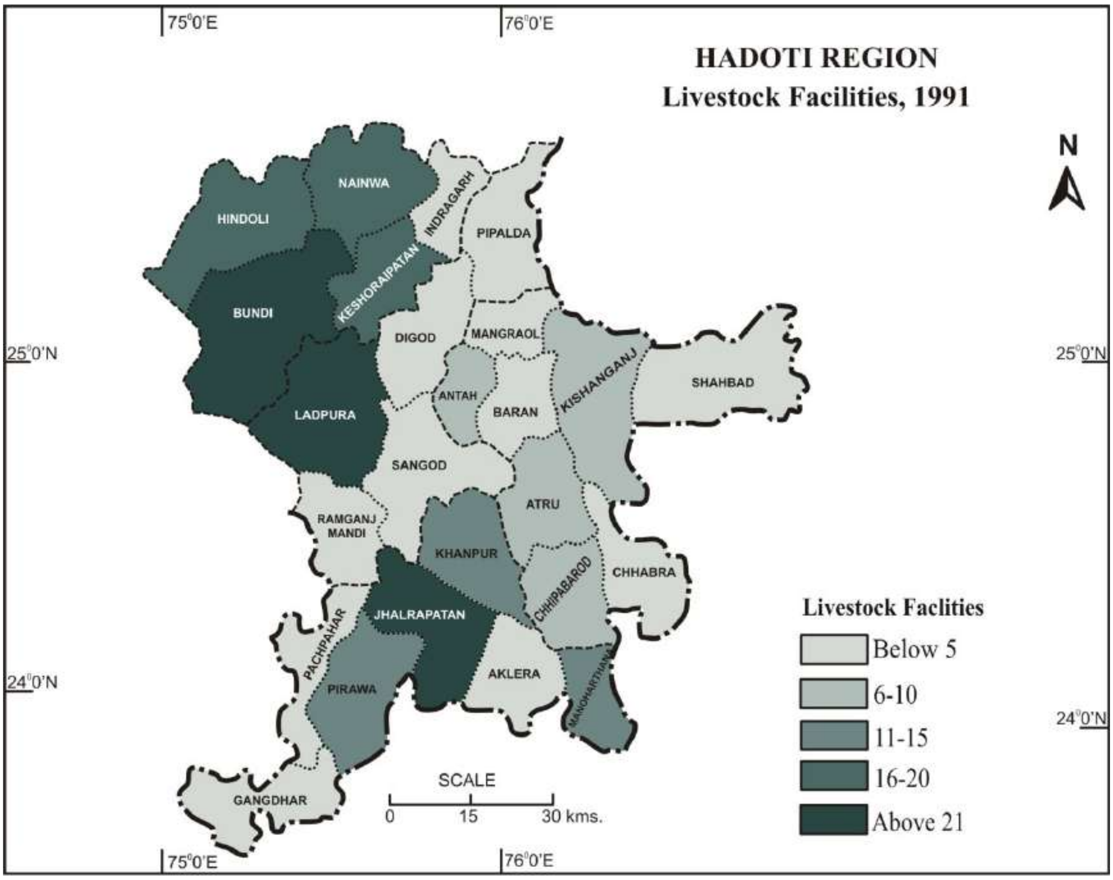
Livestock facilities, 2020

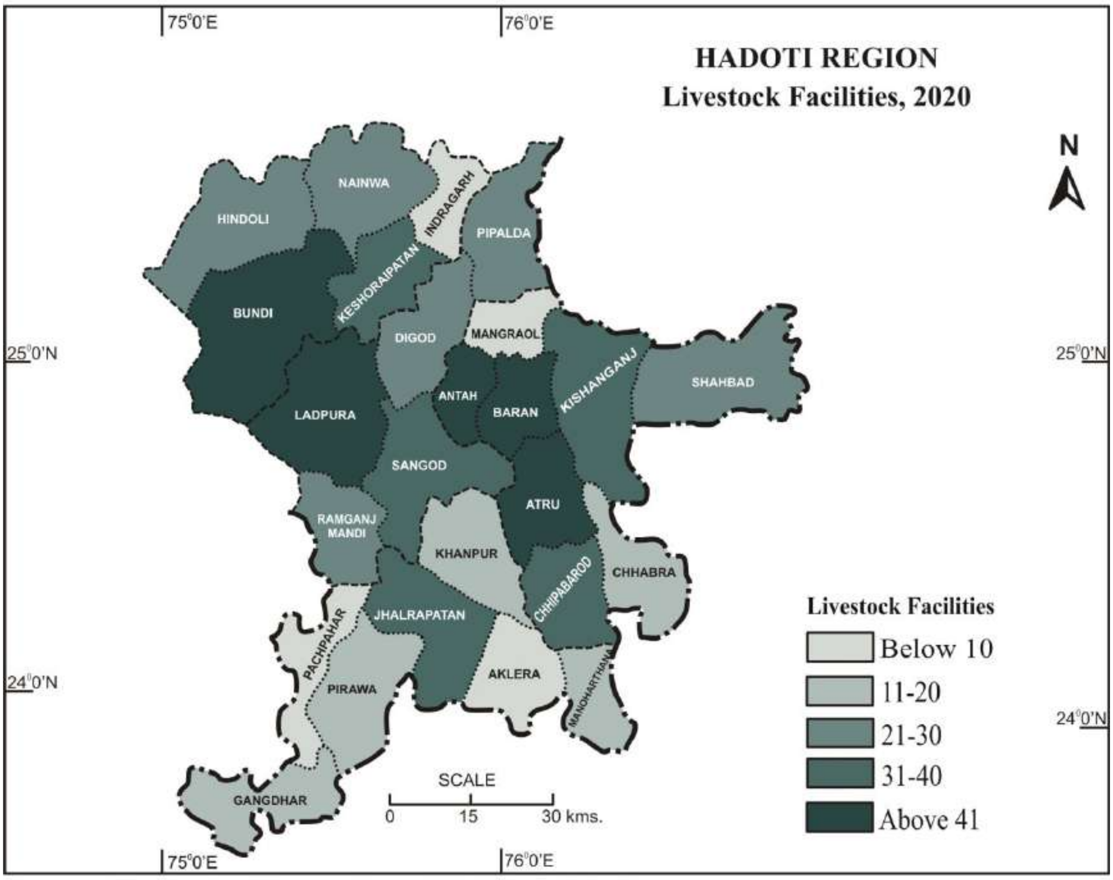
High livestock facilities (Above 41): This category consist of five tehsils that are Antah (80), Atru (46), Baran (46), Bundi 945) and Ladpura (41). Highest availability of livestock facilities was recorded in Antah tehsil of Baran district. All the tehsils of this category have shown increase in livestock facilities.

Moderate high livestock facilities (40-31): This category comprises of five tehsils that are Jhalrapatan (34), Chhipabarod (34), Sangod (32), Keshoraipatan (32) and Kishanganj (32). All the tehsils of this category have shown increase in livestock facilities.

Moderate livestock facilities (30-21): This category comprises of six tehsils that are Nainwa (28), Ramganj Mandi (27), Hindoli (26), Shahbad (26), Digod (24) and Pipalda (21). All the tehsils of this category have shown increase in livestock facilities.

MAP-4.11



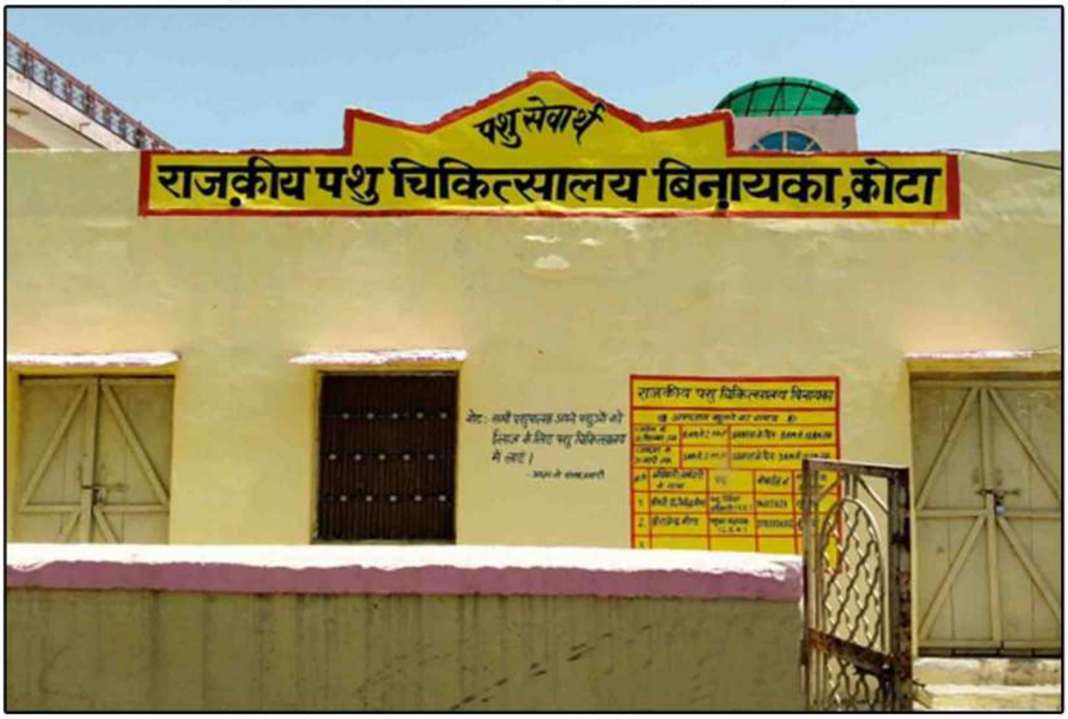


Source : Directorate of Economics and Statistics, Rajasthan.

Photoplate 4.5 (A) : Veterinary Hospital, Jajawar, Nainwa

Source: Captured during primary survey, 2023

Photoplate 4.5 (B) : Veterinary Hospital, Binayaka, Kota



Source: Captured during primary survey, 2023

Low livestock facilities (20-11): This category comprises of five tehsils that are Pirawa (18), Khanpur (18), Gangdhar (17), Manoharthana (17) and Chhabra (14).

Very low livestock facilities (Below 10): Under this category there are four tehsils that are Indragarh (3), Panchpahar (2), Mangrol (2) and Aklera (1) of Jhalawar tehsil has lowest availability of livestock facilities. In Indragarh tehsil decrease in availability of livestock facilities has been recorded. This category shows that the range in the availability of livestock facilities is widely spread.

Coefficient of variation livestock facilities for 1991 is 80.17 % and in 2020 it is 65.47% this means that degree of variability in availability livestock facilities is higher in 1991 and more consistent livestock facilities is recorded in 2020. However, variability in availability in livestock facilities is on higher side.

4.12. Level of Agricultural Development

There are eleven indicators selected for calculating the Composite Index of Agricultural Development, these indicators are Cropping Intensity, Per Capita Agricultural Production, Productivity of Food Grains, Percentage of Gross Irrigated Area to Gross Area Sown, Percentage of Gross Sown Area Under HYV Seeds, Consumption of Chemical Fertilizers Per Hectare of Gross Sown Area, Percentage of Net Irrigated Area by Tube well to Total Net Irrigated Area, Percentage of Net Irrigated Area by Canal to Total Net Irrigated Area, Gross Sown Area Per Tractor, Density of Livestock and Livestock Facilities. Based on the existing literature it is found that by considering the given indicators level of agricultural development can be calculated. Understanding the composite index of agricultural development will show the progress of Hadoti region from 1991 till 2020 and based on this holistic assessment can be done. This will help in identifying the lagging tehsils and based on this policy decision making can be done. Resource allocation can be done in better way and awareness can be spread so that lagging tehsil can perform better.

Level of agricultural development is been compared between 1991 and 2020 so that temporal and spatial analysis can be done in a better manner. Five categories are made based on composite score values of agricultural development that are high, moderate high, moderate, low, very low.

Level of Agricultural Development, 1991

High agricultural development (Above 0.36): This category consists of six tehsils that are Bundi (0.86) of Bundi district with highest score followed by Mangrol (0.7), Antah (0.67), Digod (0.6), Ladpura (0.39) and Hindoli (0.38).

Moderate high agricultural development (0.36-0.11): There are three tehsils under this category that are Keshoraipatan (0.27), Pipalda (0.2) and Indragarh (0.16).

Moderate agricultural development (0.11–(-)0.14): This category comprises of five tehsils that are Sangod (-0.01), Atru (-0.05), Baran (-0.05), Kishanganj (-0.06) and Manoharthana (-0.11).

Low agricultural development ((-)0.14 - (-)0.39): There are six tehsils in this category that are Jhalrapatan (-0.16), Gangdhar (-0.17), Nainwa (-0.19), Aklera (-0.36), Khanpur (-0.36) and Chhipabarod (-0.38). Under this category majority tehsils are of Jhalawar district.

Very agricultural development (Below -0.39): There are five tehsils in this category that are Ramganj Mandi (-0.4), Panchpahar (-0.4), Pirawa (-0.43), Shahbad (-0.46) and Chhabra (-0.64) of Baran district is on the last spot in the whole region.

Level of Agricultural Development, 2020

High agricultural development (Above 0.38): This category comprises of three tehsils that are Bundi (0.6) of Bundi district on the top position in both 1991 and 2020, however the score value of bundi tehsil has decreased when compared with 1991. Other tehsils are Keshoraipatan (0.51) and Antah (0.42).

Moderate agricultural development (0.38-0.1): There are maximum number of tehsils in this category that are Digod (0.25), Sangod (0.23), Hindoli (0.22), Baran (0.22), Mangrol (0.2), Chhabra (0.14), Kishanganj (0.14) and Chhipabarod (0.1). Except Mangrol, Digod, Hindoli all remaing tehsils of this category has shown increase in the composite score value in 2020.

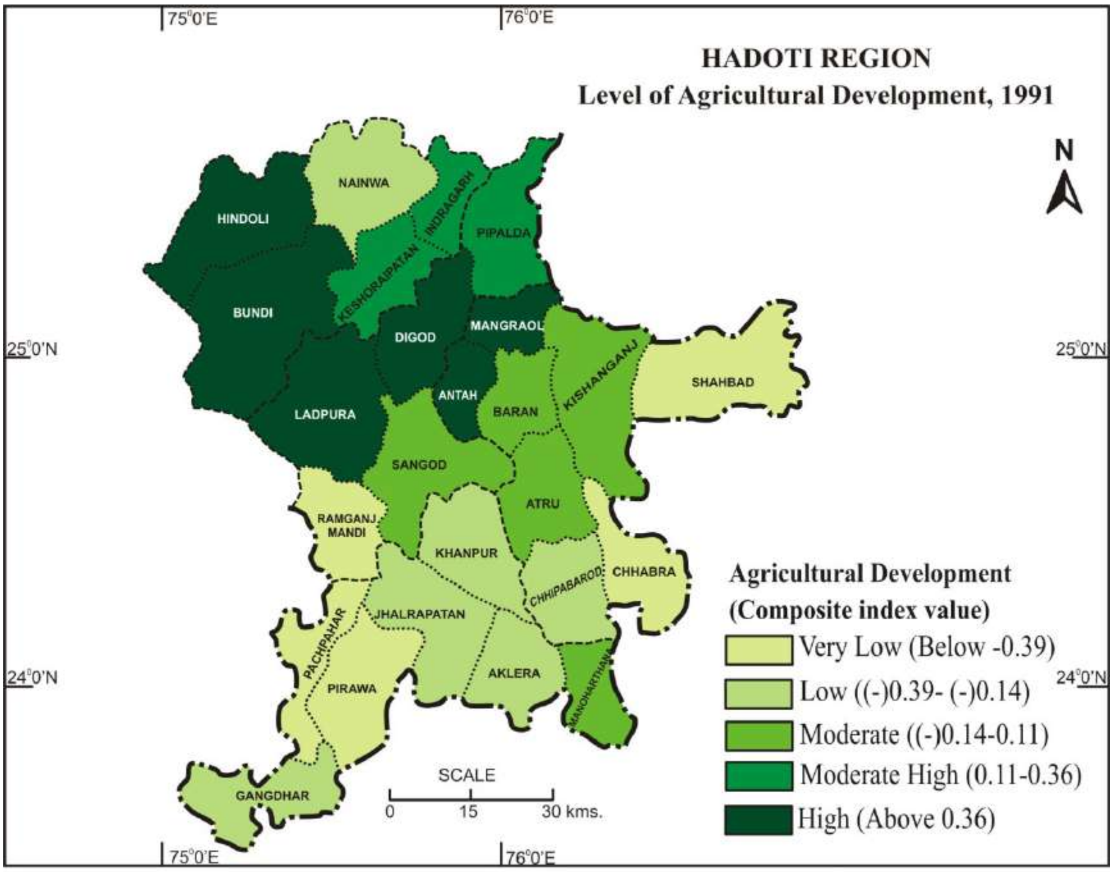
Moderate agricultural development (0.1- (-)0.18): There seven tehsils under this category that are Ladpura (0.07), Atru (0.07), Pipalda (0.05), Nainwa (-0.09), Jhalrapatan (-0.15), Ramganj Mandi (-0.16) and Indragarh (-0.16). Except Indargarh, Pipalda and Ladpura tehsil all remaning tehsils have incersed their composite index score in 2020 when compared with 1991.

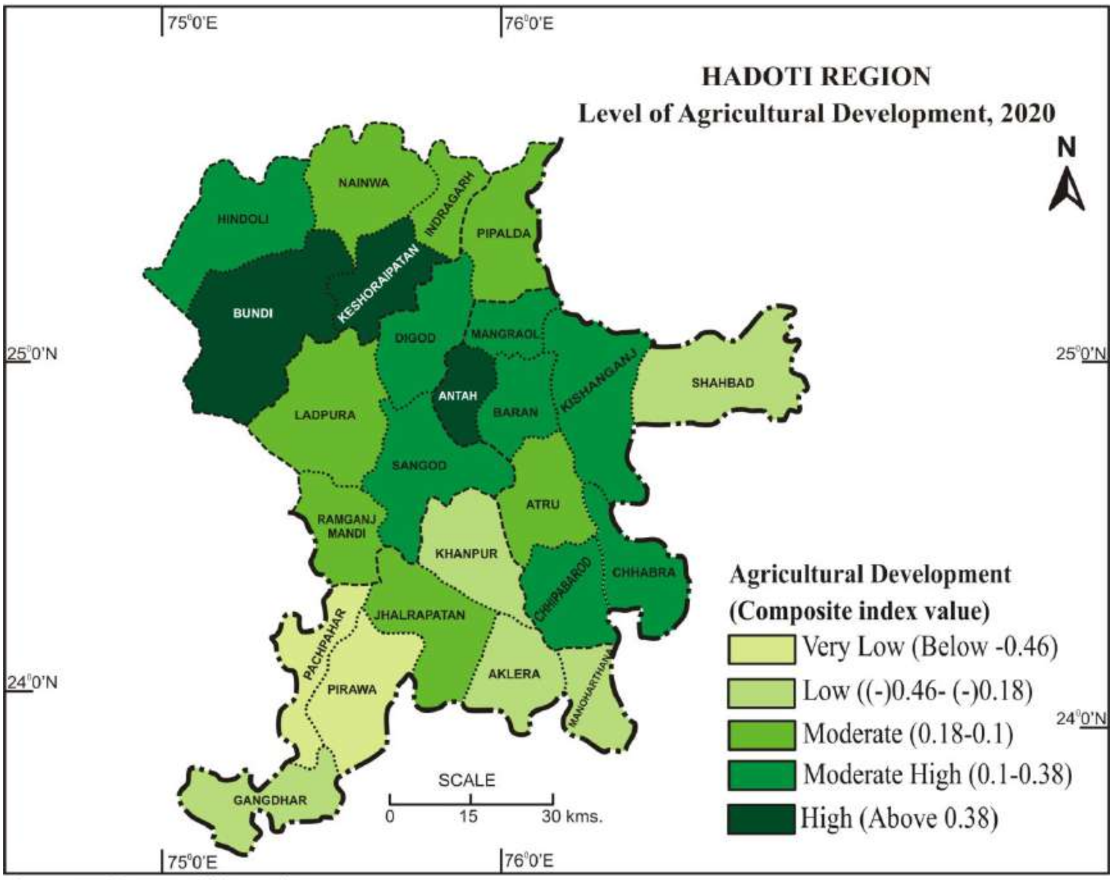
Low agricultural development ((-)0.18-(-)0.46): This category comprises of five tehsils that are Shahbad (-0.22), Manoharthana (-0.23), Khanpur (-0.23), Gangdhar (-0.36) and Aklera (-0.41). Khanpur and Shahbad tehsil has shown improvement in their score in 2020.

Very low agricultural development (Below (-)0.46): There are only two tehsils in this category that are Pirawa (-0.47) and Panchpahar (-0.74) on the lowest position from whole region. Both the tehsils are from Jhalawar district and their score values has decreased from 1991 in 2020.

Tehsils which are lagging in agricultural development are those which are not doing good in various indicators such as low cropping intensity, per capita agricultural production is low, productivity of food grains is not in par with whole region, percentage of gross irrigated area to gross area sown is low, low consumption of chemical fertilizers per hectare of gross sown area, Percentage of Net Irrigated Area is low and high dependency on monsoon, mechanization of farm is poor, density of livestock and livestock facilities are not adequate. Panchpahar, Pirawa, Kanpur, Aklera, Gangdhar and Shahbad are the most lagging tehsils and majority tehsils are of Jhalawar district. Whereas tehsils of Bundi district are performing fairly in all agriculture related indictors.

MAP-4.12





Source : Computed by author

CHAPTER – 5

LEVEL OF INFRASTRUCTURAL DEVELOPMENT

CHAPTER – 5

LEVEL OF INFRASTRUCTURAL DEVELOPMENT

Infrastructure plays significant role in building sustainable future and facilitate in achieving long term development goals which benefits the society as a whole. Various studies have shown that economic and social infrastructure both are positively correlated and have positive linkages with economic growth of a region. Both the quality and efficient infrastructure are crucial to reach the full potential of growth impulses. In the recent times infrastructure and economic growth have become very important aspect in the development prospects. Infrastructure demand has expanded significantly in the recent times due to increased globalization, urbanization and technological progress. Increasing population pressure and economic development at the same pace is putting pressure on existing infrastructure facilities, it becomes the need to address these challenges so that infrastructure development can foster economic growth. Infrastructure can be defined as an interconnected set of structural elements that gives framework to support the entire structure of development. The physical components intertwined in a system which provides accessibility to commodities and services that enables to reach up to better societal living conditions. Various economist and urban planners have classified infrastructure into two parts that is physical infrastructure and social infrastructure. Physical infrastructure helps directly in economic growth whereas quality of life and standards of living gets better with good social infrastructure.

Assessing the level of infrastructural development is very significant in looking the composite level of development in the Hadoti region. For analysing the level of infrastructural development various indicators has been taken that are primary schools per 1000 of population, secondary schools per 1000 of population, senior secondary schools per 1000 of population, educational institutions per 10 sq. km of area, allopathic healthcare institutions per 1000 of population, AYUSH healthcare institutions per 1000 of population, healthcare institutions per 100 sq. km of area, percentage of households with electricity connection, percentage of households getting tap water from treated source, percentage of households availing banking services and cooperative society per 1000 of population.

5.1. Primary Schools Per 1000 of Population

Primary schools provide initial level of education to children. They help in improving children's awareness and reduces inter-generational poverty and gender stereotype. Primary schools are pre-requisite in changing the social background of the society. Primary schools per 1000 of population has been calculated by dividing total number of primary schools by total population and multiplying it by 1000.

Primary schools per 1000 ofpopulation has been analysed from 1991 to 2011. Five categories have been made which ranges between high to low primary schools per 1000 ofpopulation.

Primary Schools Per 1000 of Population, 1991

High number of primary schools per 1000 of population (Above 1.57): This category comprises of three tehsils, two tehsils from Jhalawar district that are Jhalrapatan (1.58) and Manohar thana (1.63). One tehsil from Bundi district that is Keshoraipatan (1.79), it has highest number of primary schools per 1000 of population.

Moderate high number of primary schools per 1000 of population (1.57-1.27): This category consists of three tehsils that are Chhabra (1.27), Gangdhar (1.44) and Antah (1.52).

Moderate number of primary schools per 1000 of population (1.27-0.97): Under this category there are five tehsils that are Chhipabarod (0.97), Atru (0.98), Kishanganj (1.02), Nainwa (1.03) and Shahbad (1.16). Only Nainwa tehsil is of Bundi district, remaining tehsils are from Baran district.

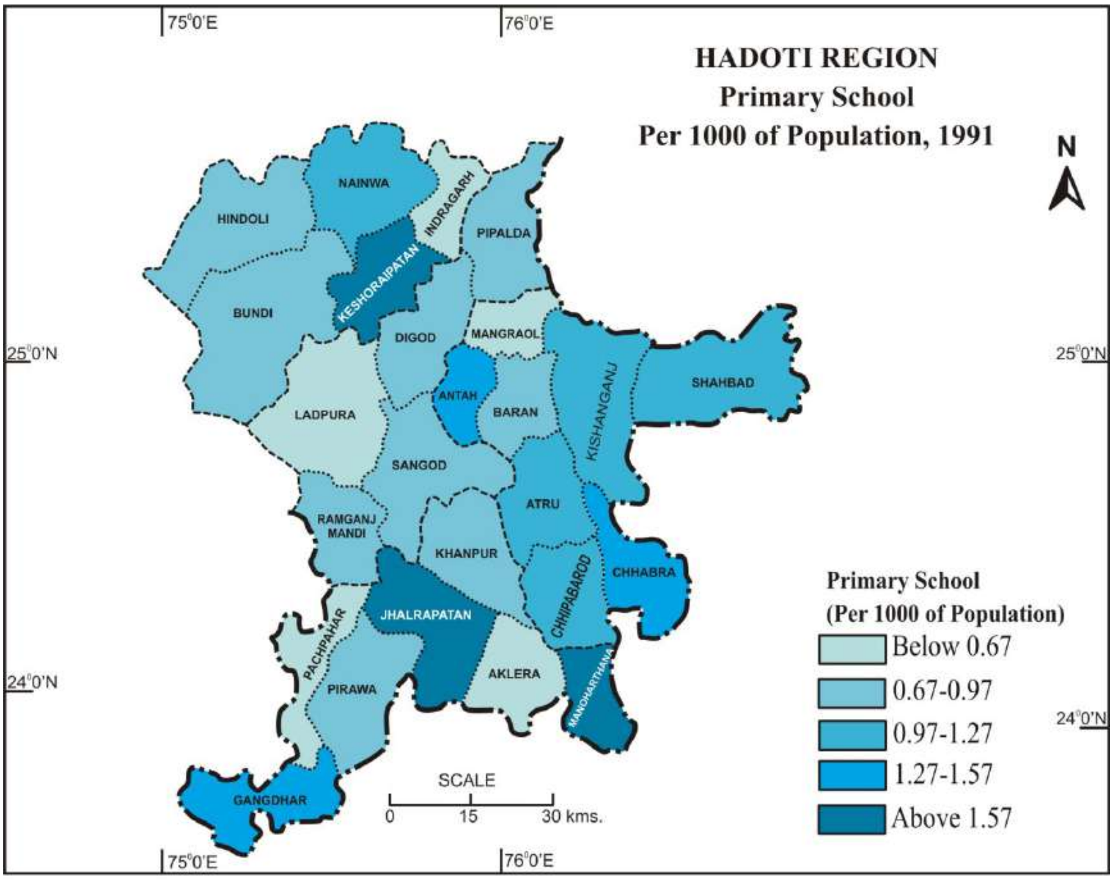
Low number of primary schools per 1000 of population (0.97-0.67): This category comprises of maximum number of tehsils that are nine tehsils Sangod (0.96), Khanpur (0.94), Pirawa (0.93), Hindoli (0.93), Digod (0.9), Bundi (0.87), Pipalda (0.83), Baran (0.76) and Ramganj Mandi (0.67).

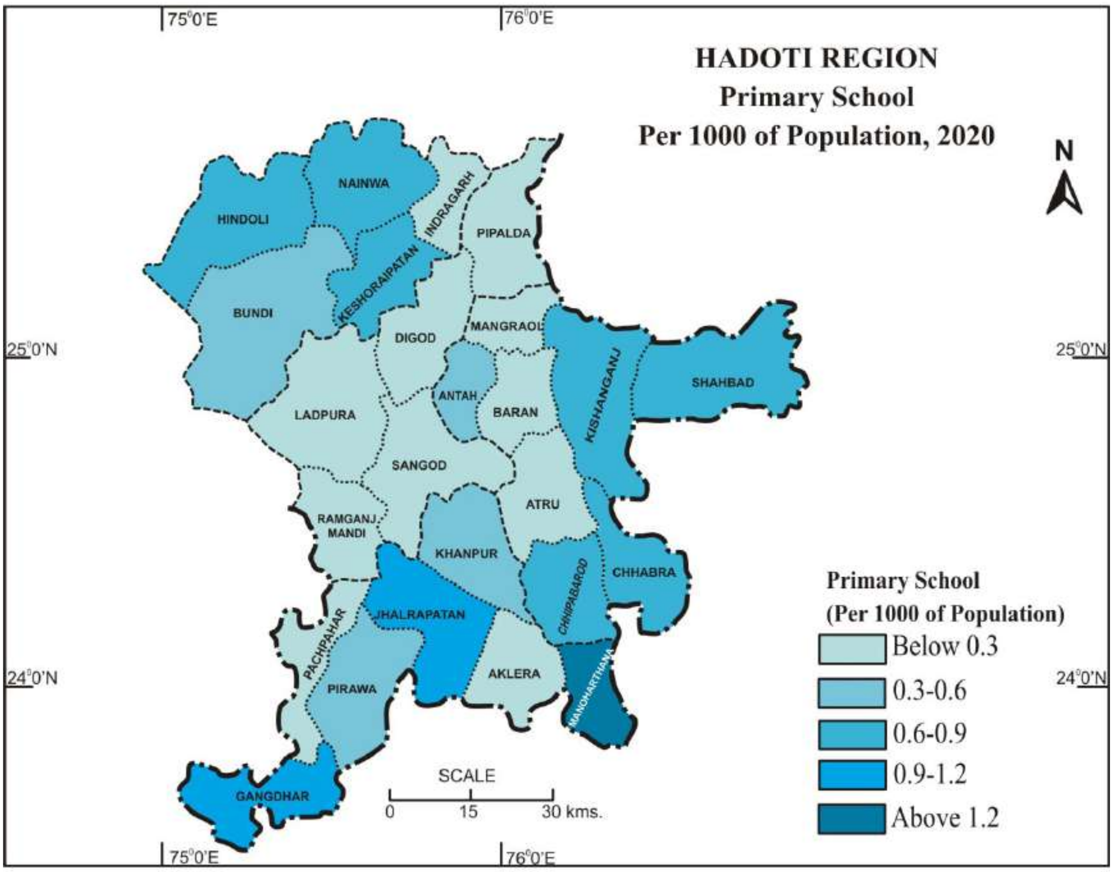
Very low number of primary schools per 1000 of population (Below 0.67): This category has five tehsils that are Ladpura (0.46), Indragarh (0.16), Mangrol (0.1), Panchpahar (0.09) and Aklera (0.07). Lowest number of primary schools per 1000 of population was recorded in Aklera tehsil of Baran district.

Primary Schools Per 1000 of Population, 2020

High number of primary schools per 1000 of population (Above 1.2): There is only one tehsil with highest number of primary schools per 1000 of population was recorded in Manoharthana (1.25) of Jhalawar tehsil. Number of primary schools per thousand of population has been reduced in 2020 whereas in 1991 top spot was with Keshoraipatan tehsil of Bundi district.

MAP-5.1





Source : Directorate of Economics and Statistics, Rajasthan.

Moderate high number of primary schools per 1000 of population (1.2-0.9): This category consists of only two tehsils that are Jhalrapatan (1.06) and Gangdhar (1.02). Number of primary schools per thousand of population has been reduced in 2020 when compared by 1991.

Moderate number of primary schools per 1000 of population (0.9-0.6): Under this category there are seven tehsils that are Hindoli (0.85), Kishanganj (0.73), Nainwa (0.66), Keshoraipatan (0.65), Chhabra (0.65) and Shahbad (0.61). Shahbad, Nainwa, Chhipabarod and Kishanganj in 1991 were in the same category but number of primary schools per thousand of population has been reduced in 2020 when compared by 1991.

Low number of primary schools per 1000 of population (0.6-0.3): This category comprises of four tehsils that are Antah (0.55), Pirawa (0.48), Khanpur (0.47) and Bundi (0.44). This category has also shown reduction in number of primary schools per 1000 of population.

Very low number of primary schools per 1000 of population (Below 0.3): This category has maximum number of tehsils that are Atru (0.28), Baran (0.16), Sangod (0.1), Ramganj Mandi (0.07), Pipalda (0.07), Ladpura (0.05), Digod (0.04), Panchpahar (0.03), Aklera (0.03), Mangrol (0.03) and Indragarh with no primary schools per 1000 of population.

Coefficient of variation for primary schools per 1000 of population 1991 is 51.94% and in 2020 it is 85.44% this means that degree of variability of primary schools per 1000 of population is higher in 2020. The variability is on higher side in both 1991 and 2020.

5.2. Upper Primary Schools Per 1000 of Population

Upper primary schools are the first step toward formal education system. They play very significant role in overall development of child. These schools establish academic foundation and helps in introducing problem-solving and critical thinking approach in student. Under this segment of schooling child develops social and emotional quotient which helps in personal growth and prepares student for the secondary schooling. Upper primary schools per 1000 of population has been calculated by dividing total number of upper primary schools by total population and multiplying it by 1000.Upper primary schools per 1000 of population has been analysed from 1991 to 2011. Five categories have been made which ranges between high to low primary schools per 1000 of population, with this better understanding of spatial and temporal changes can be established.

Upper Primary Schools Per 1000 of Population, 1991

High number of upper primary schools per 1000 of population (Above 0.41): This category consists of only two tehsils that are Keshoraipatan (0.53) of Bundi district has the highest number of upper primary schools per 1000 of population and Antah (0.45) of Baran district.

Moderate high number of upper primary schools per 1000 of population (0.41-0.31): This category consists of four tehsils that are Baran (0.35), Jhalrapatan (0.34), Atru (0.32) and Nainwa (0.31).

Moderate number of upper primary schools per 1000 of population (0.31-0.21): This category consists of maximum tehsils that are thirteen tehsils namely, Ladpura (0.3), Digod (0.29), Manoharthana (0.29), Bundi (0.29), Pirawa (0.28), Khanpur (0.28), Sangod (0.27), Pipalda (0.26), Chhipabarod (0.26), Kishanganj (0.24), Hindoli (0.22), Chhabra (0.22) and Gangdhar (0.21).

Low number of upper primary schools per 1000 of population (0.21-0.11): Under this category there are three tehsils that are Shahbad (0.16), Ramganj Mandi (0.15) and Indragarh (0.12).

Very low number of upper primary schools per 1000 of population (Below 0.11): This category also has three tehsils in it that are Panchpahar (0.06), Aklera 90.03) and Mangrol (0.01) of Baran district has lowest number of upper primary schools per 1000 of population in the Hadoti region.

Upper Primary Schools Per 1000 of Population, 2020

High number of upper primary schools per 1000 of population (Above 0.5): This category consists of six tehsils that are Manoharthana (1) of Jhalawar district has highest number of upper primary schools per 1000 of population, followed by Jhalrapatan (0.97), Khanpur (0.79), Pirawa (0.73), Keshoraipatan (0.69) and Gangdhar (0.63). All the tehsils are from Jhalawar district and all the tehsils in this category has shown increase in number of upper primary schools per 1000 of population in 2020 when compared with 1991.

Moderate high number of upper primary schools per 1000 of population (0.4-0.5): This category has four tehsils that are Atru (0.49), Chhabra (0.47), Nainwa (0.44) and Antah (0.41). Except Antah tehsil of Baran district remaining tehsils within this category has shown increase in number of upper primary schools per 1000 of population in 2020 when compared with 1991.

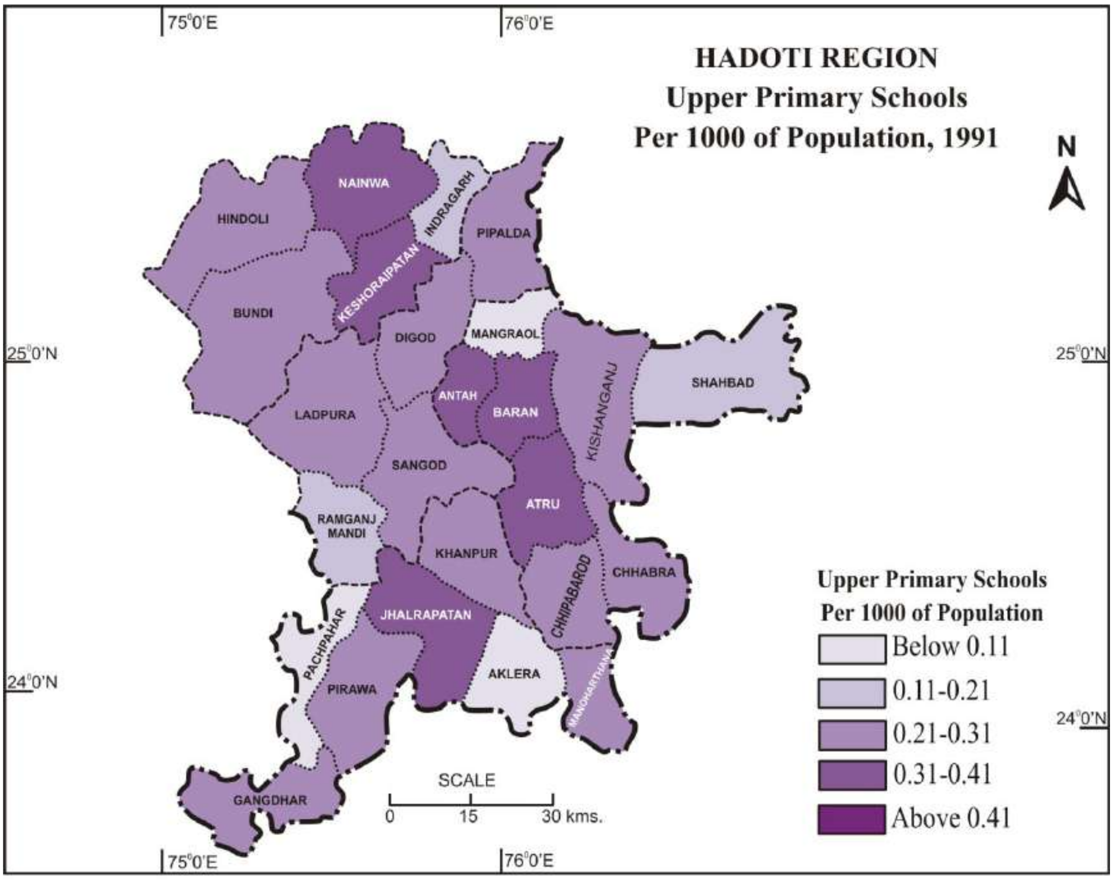
Photoplate 5.1 (A) : Upper Primary School, Udpuriya, Manoharthana

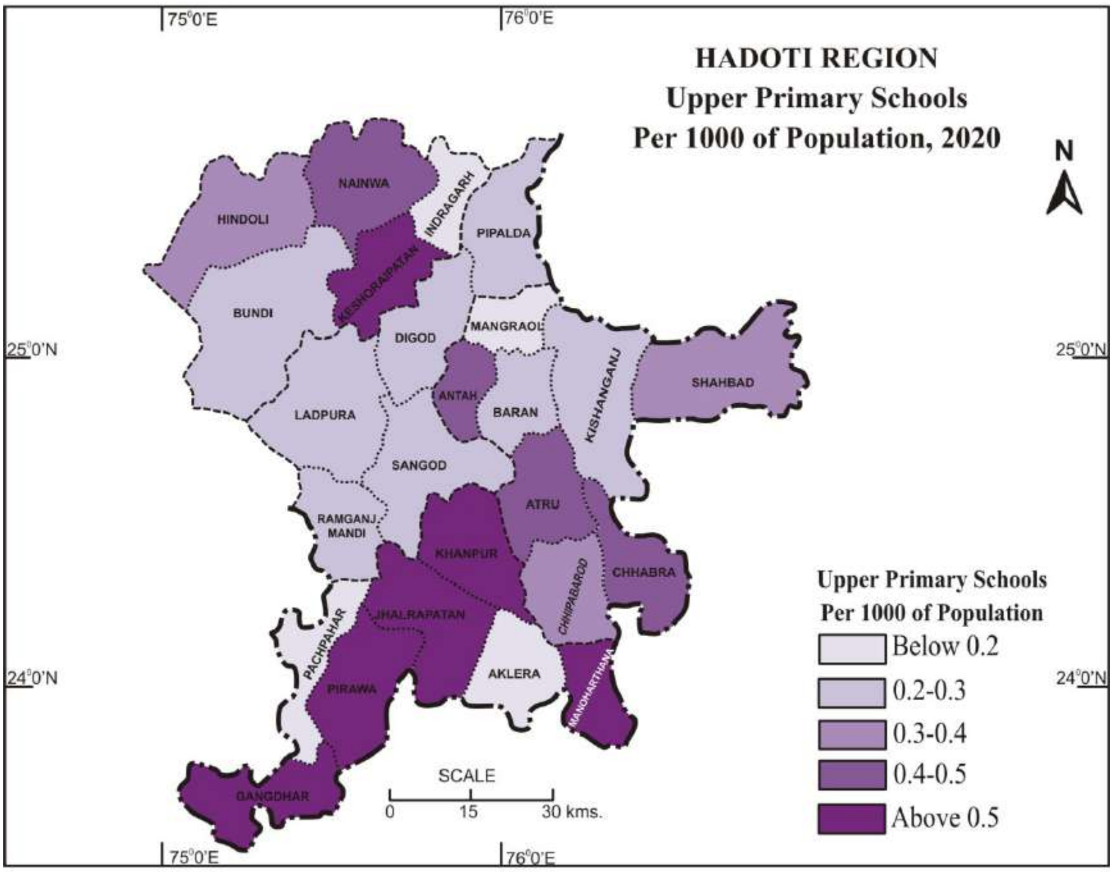
Source: Captured during primary survey, 2023

Photoplate 5.1 (B) : Senior Secondary School, Ramganj Balaji, Bundi

Source: Captured during primary survey, 2023

MAP-5.2





Source : Directorate of Economics and Statistics, Rajasthan.

Moderate number of upper primary schools per 1000 of population (0.3-0.4): There are three tehsils under this category that are Shahbad (0.34), Hindoli (0.33) and Chhipabarod (0.33). All the tehsils in this category have shown increase in number of upper primary schools per 1000 of population in 2020 when compared with 1991.

Low number of upper primary schools per 1000 of population (0.2-0.3): This category consists of eight tehsils that are Ramganj Mandi (0.28), Ladpura (0.26), Pipalda (0.26), Baran (0.26), Digod (0.24), Sangod (0.23), Bundi (0.22) and Kishanganj (0.22).

Very low number of upper primary schools per 1000 of population (Below 0.2): There are four tehsils under this category that are Aklera (0.12), Panchpahar (0.11), Mangrol (0.02) and Indragarh with no upper primary schools.

Coefficient of variation for upper primary schools per 1000 of population 1991 is 47.35% and in 2020 it is 68.98% this means that degree of variability of upper primary schools per 1000 of population is higher in 2020. The variability is on higher side in both 1991 and 2020.

5.3. Senior Secondary and Secondary Schools Per 1000 of Population

Senior secondary and secondary schools are very important in future prospects of an individual. These schools prepare individual for higher education and within this time period students figure out their career opportunities and develops life skills. This stage in education helps in socialization and networking and helps in fulfilment of personal goals and fosters growth. Access to education is very crucial in reduction poverty and unemployment and overall well-being in the region. Senior secondary and secondary schools per 1000 of population has been calculated by dividing total number of senior secondary and secondary schools by total population and multiplying it by 1000. Senior secondary and secondary schools per 1000 of population has been analysed from 1991 to 2011. Five categories have been made which ranges between high to low senior secondary and secondary schools per 1000 of population, with this better understanding of spatial and temporal changes can be established.

Senior Secondary and Secondary Schools Per 1000 of Population, 1991

High number of senior secondary and secondary schools per 1000 of population (Above 0.14): This category consists of three tehsils that are Antah (0.19) of Baran district has highest number of senior secondary and secondary schools followed by Ladpura (0.16) and Keshoraipatan (0.16)

Moderate high number of senior secondary and secondary schools per 1000 of population (0.14-0.11): This category consists of seven tehsils that are Atru (0.13), Nainwa (0.12), Baran (0.12), Ramganj Mandi (0.11), Digod (0.11), Jhalrapatan (0.11) and Bundi (0.11).

Moderate number of senior secondary and secondary schools per 1000 of population (0.11-0.08): Under this category there are eight tehsils that are Pipalda (0.1), Shahbad (0.1), Kishanganj (0.1), Sangod (0.09), Pirawa (0.09), Khanpur (0.09), Hindoli (0.09) and Gangdhar (0.08).

Low number of senior secondary and secondary schools per 1000 of population (0.08-0.05): There are three tehsils under this category that are Manoharthana (0.07), Chhabra (0.07) and Indragarh (0.05).

Very low number of senior secondary and secondary schools per 1000 of population (Below 0.05): This category has four tehsils that are Chhipabarod (0.04), Panchpahar (0.03), Mangrol (0.03) and Aklera (0.02) of Jhalawar district has lowest number of senior secondary and secondary schools per 1000 of population in the Hadoti region.

Senior Secondary and Secondary Schools Per 1000 of Population, 2020

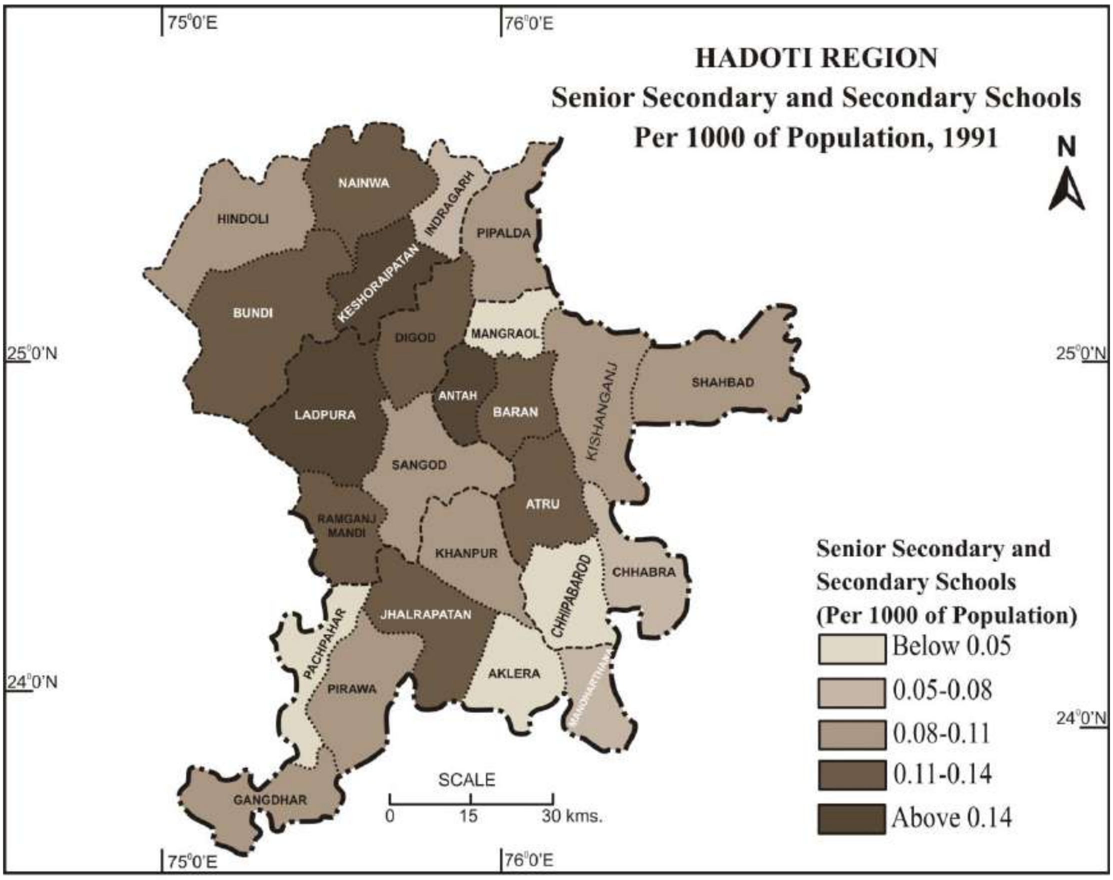
High number of senior secondary and secondary schools per 1000 of population (Above 0.42): This category consists of six tehsils that are Keshoraipatan(0.69), Jhalrapatan (0.46), Antah (0.46), Khanpur (0.44), Manoharthana (0.43) and Bundi (0.42). Increase in number of schools has been recorded in 2020.

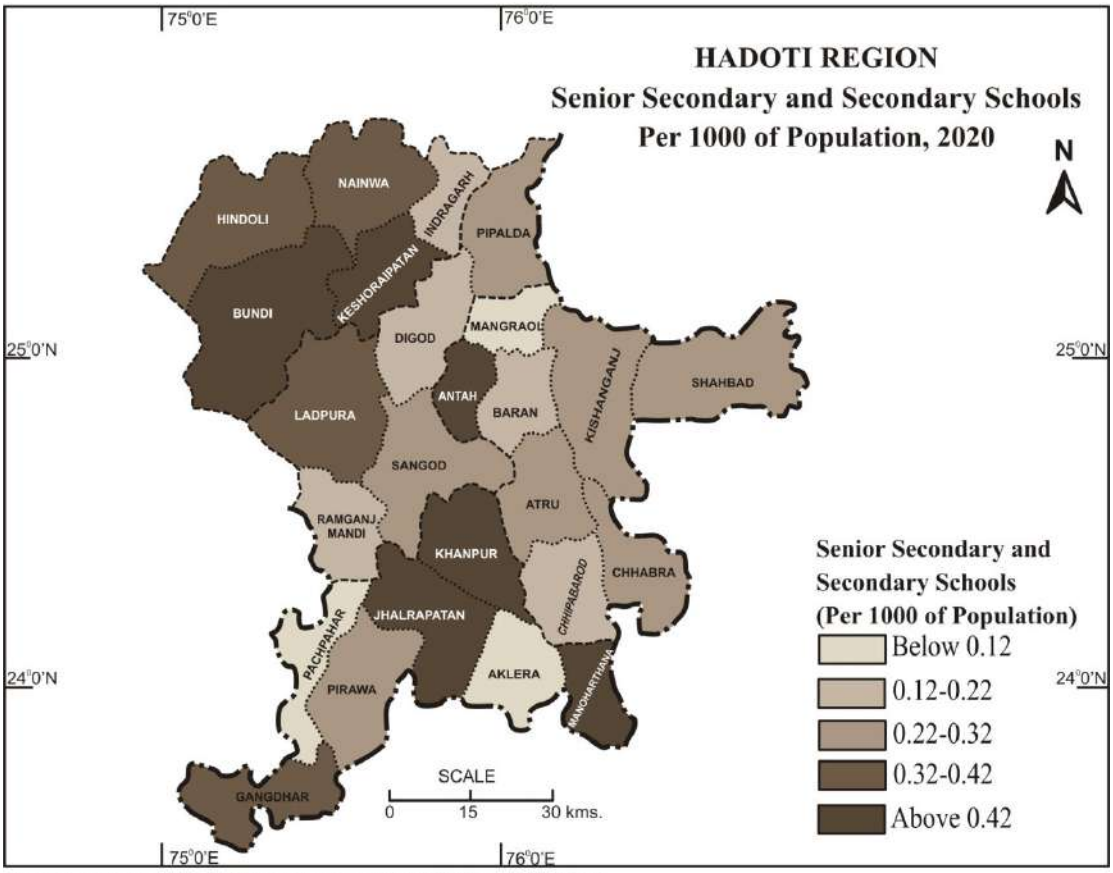
Moderate high number of senior secondary and secondary schools per 1000 of population (0.42-0.32): Under this category there are four tehsils that are Nainwa (0.4), Ladpura (0.35), Hindoli (0.35) and Gangdhar (0.34). Increase in number of schools has been recorded in 2020.

Moderate number of senior secondary and secondary schools per 1000 of population (0.32-0.22): This category comprises of seven tehsils that are Pirawa (0.3), Atru (0.28), Pipalda (0.24), Shahbad (0.24), Kishanganj (0.23), Sangod (0.22) and Chhabra (0.22). Increase in number of schools has been recorded in 2020.

Low number of senior secondary and secondary schools per 1000 of population (0.22-0.12): Under this category there are five tehsils that are Digod (0.2), Indragarh (0.2), Chhipabarod (0.2), Baran (0.17) and Ramganj Mandi (0.13).

MAP-5.3





Source : Directorate of Economics and Statistics, Rajasthan.

Very low number of senior secondary and secondary schools per 1000 of population (Below 0.12): This category comprises of three tehsils that are Panchpahar (0.08), Aklera (0.07) and Mangrol (0.02) of Baran district has lowest number of senior secondary and secondary schools per 1000 of population in the Hadoti region.

Coefficient of variation for senior secondary and secondary schools per 1000 of population 1991 is 43.93% and in 2020 it is 52.83% this means that degree of variability of senior secondary and secondary schools per 1000 of population is higher in 2020. The variability is on higher side in both 1991 and 2020.

5.4. Educational Institutions Per 10 Km^2 of Area

Easy accessibility to educational institution is very crucial in transforming the society. Evenly spread educational institution within the region provides higher educational opportunities. Having higher number of educational institutions fosters collaboration and knowledge exchange with various institutions. Accessibility and affordability of educational institution has positive impact on economic development along with social and cultural enrichment. Number of schooling institutions in a region are determined by educational policy of a country. Educational institutions per 10km^2 of area is calculated by dividing total number of educational institutions by the total area in sq km and multiplying by 10.

Educational institutions per 10km^2 of area have been analysed from 1991 to 2011. Five categories have been made which ranges between high to low educational institutions per 10 km^2 of area, with this better understanding of spatial and temporal changes can be done.

Educational Institutions Per 10 Km^2 of Area, 1991

High number of educational institutions per 10 km^2 of area (Above 3.35): This category comprises of three tehsils that are Ladpura (4.07) of Kota district has highest density of educational institutions per 10 km^2 of area followed by Jhalrapatan (3.74) and Keshoraipatan (3.35).

Moderate high number of educational institutions per 10 km^2 of area (3.35-2.55): Under this category there are three tehsils that are Antah (3.28), Manoharthana (3.22) and Baran (2.78).

Moderate number of educational institutions per 10 km^2 of area (2.55-1.75): Under this category there are maximum number of tehsils that are Gangdhar (2.23), Ramganj Mandi (1.97), Pirawa (1.94), Chhabra (1.93), Bundi(1.88), Khanpur(1.79), Chhipabarod(1.79), Digod(1.78) and Atru (1.78).

Low number of educational institutions per 10 km^2 of area (1.75-0.95): This category comprises of five tehsils that are Sangod (1.72), Pipalda (1.71), Nainwa (1.68), Hindoli (1.4) and Kishanganj (1.03).

Very low number of educational institutions per 10 km^2 of area (Below 0.95): This category consists of five tehsils that are Shahbad (0.8), Indragarh (0.51), Panchpahar (0.32), Mangrol (0.24) and Aklera (0.15) of Jhalawar district has lowest number of educational institutions per 10 sq. km of area.

Educational Institutions Per 10 Km^2 of Area, 2020

High number of educational institutions per 10 km^2 of area (Above 4.17): There are four tehsils under this category that are Jhalrapatan (6.93) of Jhalawar district has highest number of educational institutions per 10 km^2 of area followed by Manoharthana (6.05), Ladpura (5.23) and Keshoraipatan (4.45). All the tehsils in this category have recorded increase in educational institutions density per 10 sq km.

Moderate high number of educational institutions per 10 km^2 of area (4.17-3.17): Under this category there are only two tehsils that are Gangdhar (3.64) of Jhalawar district and Antah (3.28) of Baran district.

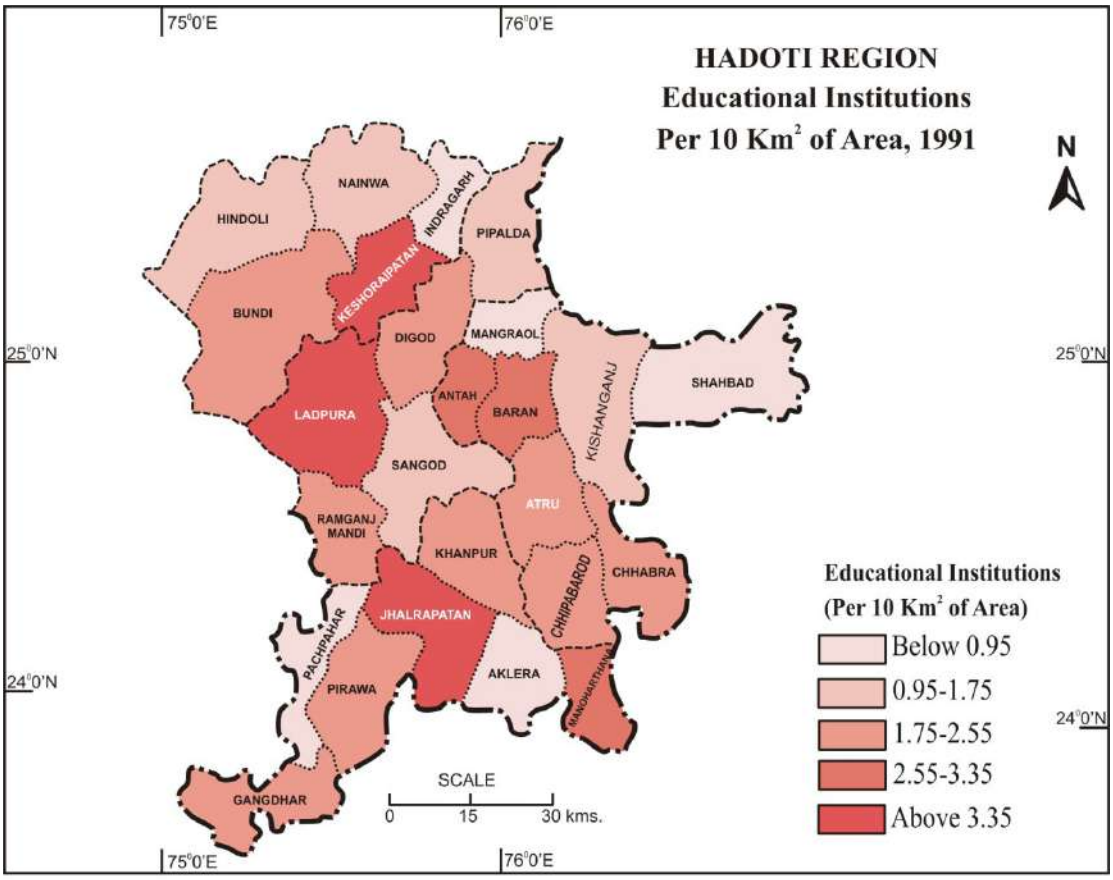
Moderate number of educational institutions per 10 km^2 of area (3.17-2.17): This category comprises of seven tehsils that are Pirawa (3.11), Khanpur (3.1), Chhabra (2.56), Chhipabarod (2.55), Hindoli (2.54), Nainwa (2.48) and Bundi (2.36). Mixed pattern is recorded some tehsils has shown increase whereas some has recorded decrease in density of educational institutions per 10 sq. km of area.

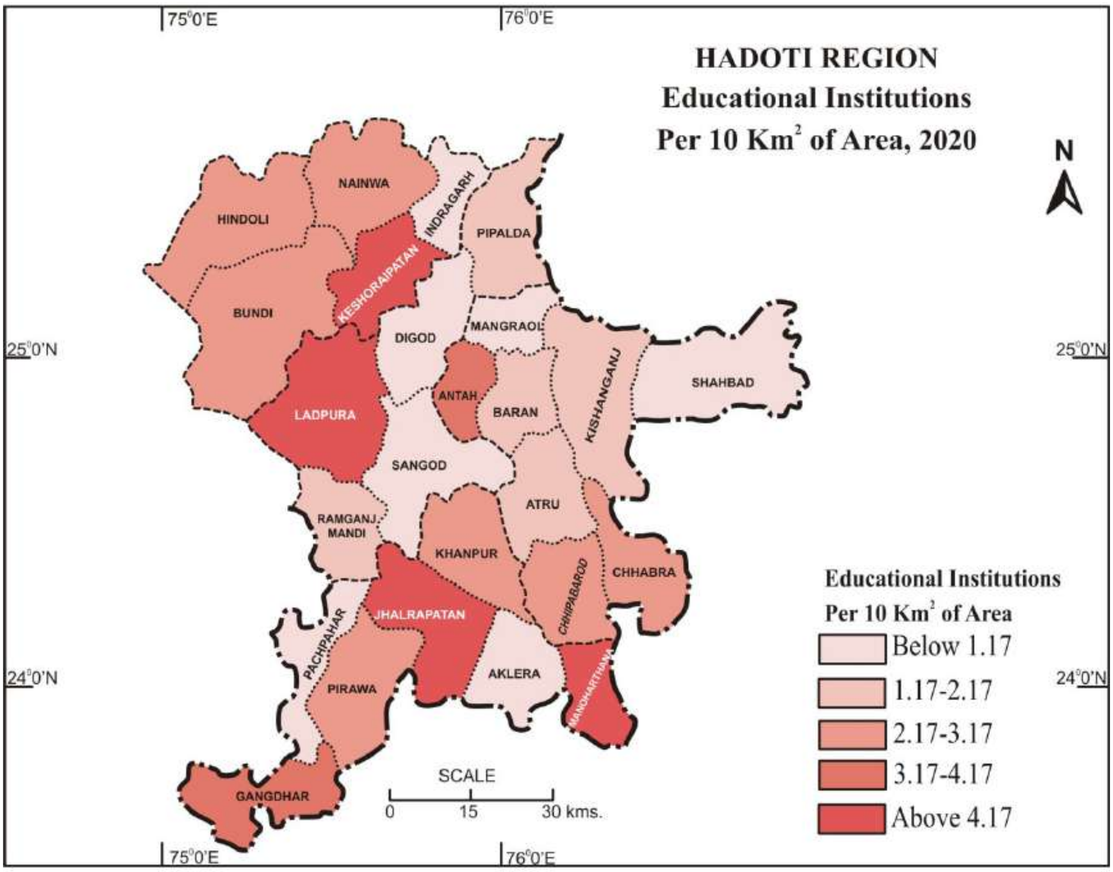
Low number of educational institutions per 10km^2 of area (2.17-1.17): This category consists of five tehsils that are Baran (2.05), Atru (1.87), Ramganj Mandi (1.67), Kishanganj (1.38) and Pipalda (1.18).

Very low number of educational institutions per 10 km^2 of area (Below 1.17): Under this category there are seven tehsils that are Shahbad (1.16), Sangod (1), Digod (0.89), Panchpahar (0.56), Aklera (0.49), Indragarh (0.39) and Mangrol (0.17) of Baran district has lowest number of educational institutions per 10 km^2 of area.

Coefficient of variation for educational institutions per 10 km^2 of area 1991 is 56.69% and in 2020 it is 72.19% this means that degree of variability of educational institutions per 10 km^2 of area is higher in 2020. The variability is on higher side in both 1991 and 2020.

MAP-5.4





Source : Directorate of Economics and Statistics, Rajasthan.

5.5. Allopathic Healthcare Institutions Per 1000 of Population

In the recent times allopathic healthcare institutions has emerged as a conventional choice of majority. These institutions are very crucial for having healthy population in a region. Allopathic healthcare institutions are important in emergency and trauma care, helps in chronic disease prevention, specialized care and are equipped with technological advancement and they play significant role in research and innovation field. Having appropriate proportion of medical facilities in proportion of population in an area is very important in measuring level of socio-economic development. Allopathic healthcare institutions per 1000 of population has been calculated by dividing total number of allopathic healthcare institutions by total population and multiplying it by 1000.

Allopathic healthcare institutions per 1000 of population has been analysed from 1991 to 2011. Five categories have been made which ranges between high to low allopathic healthcare institutions per 1000 of population, with this better understanding of spatial and temporal changes can be established.

Allopathic Healthcare Institutions Per 1000 of Population, 1991

High number of allopathic healthcare institutions per 1000 of population (Above 0.41): This category consists of two tehsils that are Antah (0.48) of Baran district has the highest density of allopathic healthcare institutions per 1000 of population, followed by Keshoraipatan (0.42) of Bundi district.

Moderate high number of allopathic healthcare institutions per 1000 of population (0.41-0.33): This category comprises of four tehsils that are Jhalrapatan (0.4), Gangdhar (0.39), Manoharthana (0.35) and Atru (0.34).

Moderate number of allopathic healthcare institutions per 1000 of population (0.33-0.25): This category consists of maximum number of tehsils that are Sangod (0.31), Pirawa (0.31), Nainwa (0.31), Shahbad (0.31), Khanpur (0.29), Digod (0.28), Pipalda (0.28), Kishanganj (0.28), Chhabra (0.27), Hindoli (0.26), Bundi (0.25) and Chhipabarod (0.25).

Low number of allopathic healthcare institutions per 1000 of population (0.25-0.17): Under this category there are only two tehsils that are Ramganj Mandi (0.23) and Baran (0.21).

Very low number of allopathic healthcare institutions per 1000 of population (Below 0.17): This category comprises of five tehsils that are Ladpura (0.1), Indragarh (0.06), Panchpahar (0.02), Aklera (0.02) and Mangrol (0.01).

Allopathic Healthcare Institutions Per 1000 of Population, 2020

High number of allopathic healthcare institutions per 1000 of population (Above 0.82): This category has only one tehsil of Baran district that is Antah (1.03). There is increase recorded in density of allopathic healthcare institutions.

Moderate high number of allopathic healthcare institutions per 1000 of population (0.82-0.62): This category consists of two tehsils of Baran district that is Atru (0.75) and Shahbad (0.65). There is increase recorded in density of allopathic healthcare institutions in both the tehsils when compared to 1991.

Moderate number of allopathic healthcare institutions per 1000 of population (0.62-0.42): This category comprises of six tehsils that are Kishanganj (0.55), Chhabra (0.53), Manoharthana (0.51), Keshoraipatan (0.5), Chhipabarod (0.5) and Gangdhar (0.49). There is increase recorded in density of allopathic healthcare institutions in all the tehsils under this category when compared to 1991.

Low number of allopathic healthcare institutions per 1000 of population (0.42-0.22): Under this category there are maximum number od tehsils that are Jhalrapatan (0.4), Pirawa (0.39), Khanpur (0.37), Baran (0.35), Sangod (0.33), Nainwa (0.32), Digod (0.28), Hindoli (0.28), Pipalda (0.27) and Bundi (0.22).

Very low number of allopathic healthcare institutions per 1000 of population (Below 0.22): This category comprises of six tehsils that are Ramgan Mandi (0.17), Ladpura (0.05), Indragarh (0.03), Mangrol (0.03), Panchpahar (0.02) and Aklera (0.02).

Coefficient of variation for allopathic healthcare institutions per 1000 of population 1991 is 49.17% and in 2020 it is 68.1% this means that degree of variability of allopathic healthcare institutions per 1000 of population is higher in 2020. The variability is on higher side in both 1991 and 2020.

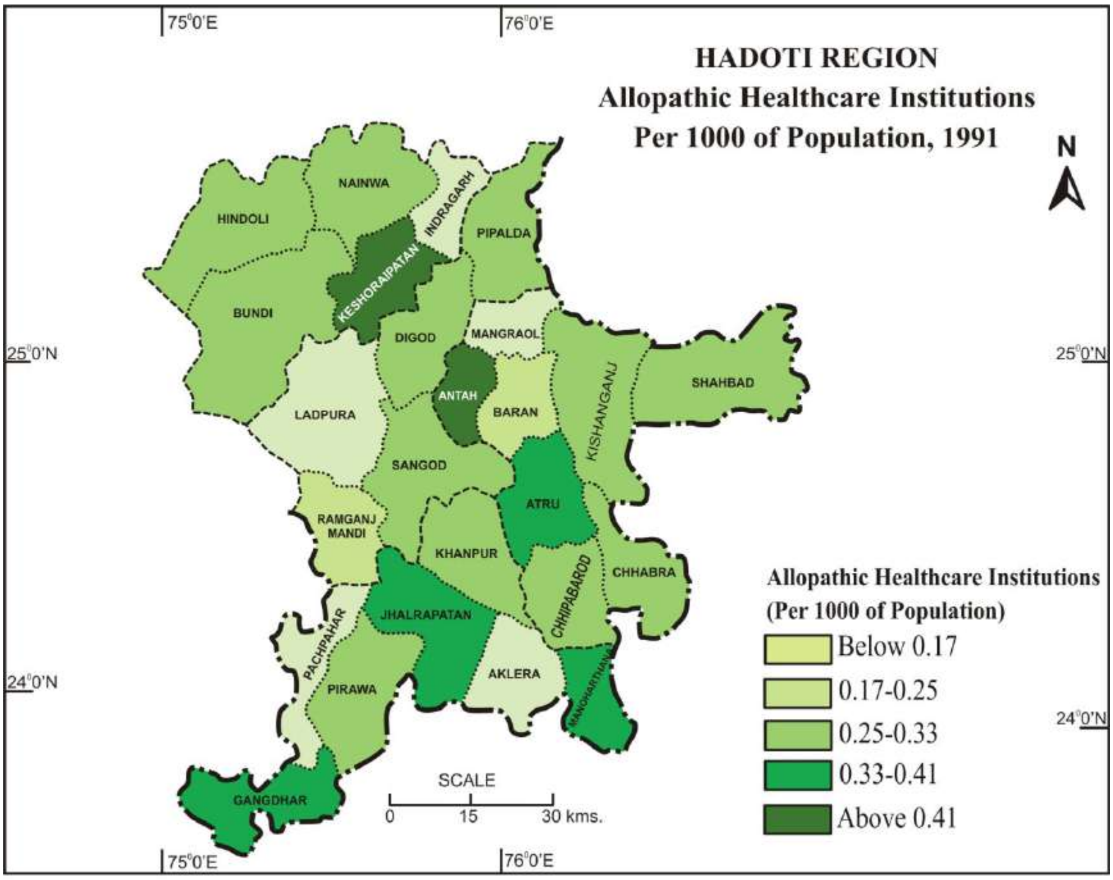
Photoplate 5.2 (A) : Healthcare Centre, Rampuriya, Kishanganj

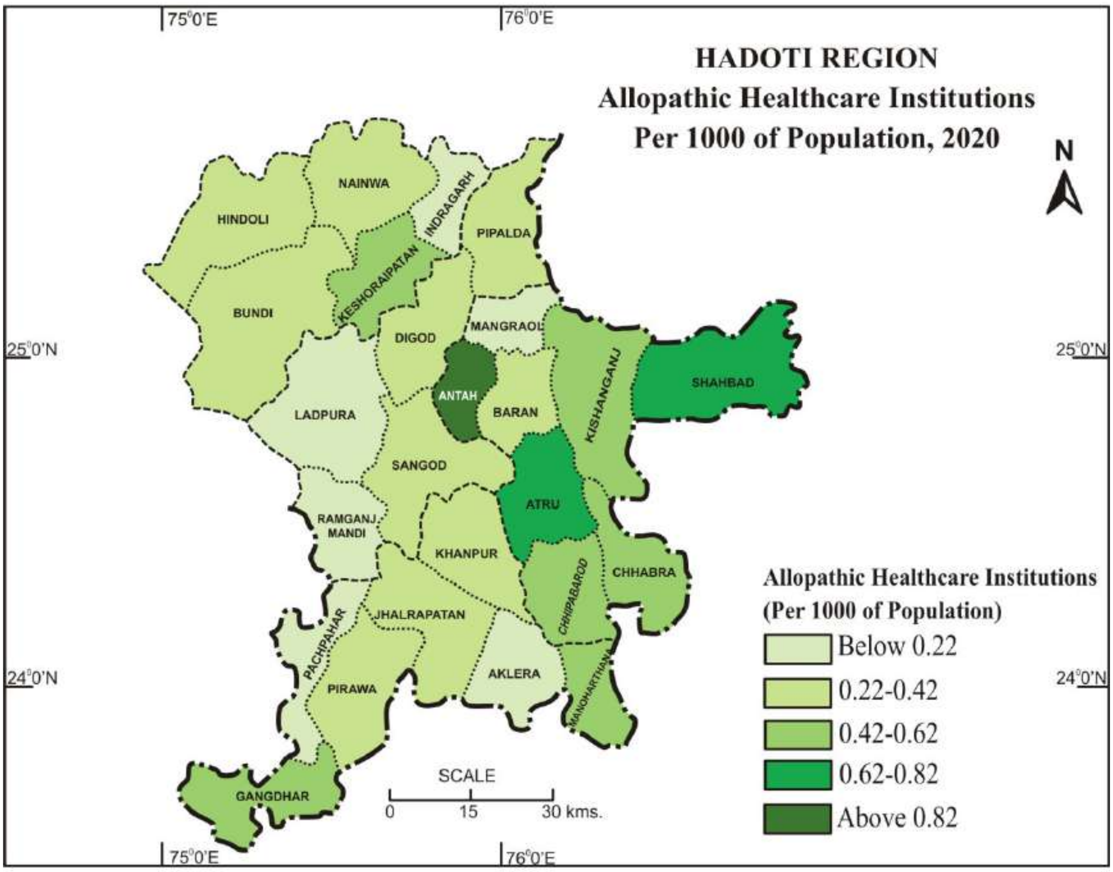
Source: Captured during primary survey, 2023

Photoplate 5.2 (B) : Primary health centre, Digod, Kota

Source: Captured during primary survey, 2023

MAP-5.5





Source : Directorate of Economics and Statistics, Rajasthan.

5.6. AYUSH Healthcare Institutions Per 1000 of Population

AYUSH is an acronym of Ayurveda, Yoga and Naturopathy, Unani, Siddha, Sowa-Rigpa and Homeopathy. This comes under traditional healthcare in India, it is a amalgamation of traditional knowledge, skills and practices indigenous to different culture, which based on beliefs, experiences and theories. This is important for therapeutic, prevention, restorative and diagnosis of overall health of individual. AYUSH healthcare institutions per 1000 of population has been calculated by dividing total number of AYUSH healthcare institutions by total population and multiplying it by 1000.

AYUSH healthcare institutions per 1000 of population has been analysed from 1991 to 2011. Five categories have been made which ranges between high to low AYUSH healthcare institutions per 1000 of population, with this better understanding of spatial and temporal changes can be done.

AYUSH Healthcare Institutions Per 1000 of Population, 1991

High number of AYUSH healthcare institutions per 1000 of population (Above 0.12): This category consists of four tehsils that are Keshoraipatan (0.15) of Bundi district has the highest density of allopathic healthcare institutions per 1000 of population followed by Antah (0.13), Gangdhar (0.12) and Jhalrapatan (0.12).

Moderate high number of AYUSH healthcare institutions per 1000 of population (0.12-0.09): Under this category there are seven tehsils that are Nainwa (0.11), Hindoli (0.11), Pirawa (0.1), Pipalda (0.09), Manoharthana (0.09), Khanpur (0.09) and Atru (0.09).

Moderate number of AYUSH healthcare institutions per 1000 of population (0.09-0.06): There are seven tehsils under this category that are Sangod (0.08), Chhabra (0.08), Digod (0.07), Chhipabarod (0.07), Ramganj Mandi (0.06), Bundi (0.06) and Baran (0.06).

Low number of AYUSH healthcare institutions per 1000 of population (0.06-0.03): Under this category there are only two tehsils that are Shahbad (0.05) of Baran district and Ladpura (0.03) of Kota district.

Very low number of AYUSH healthcare institutions per 1000 of population (Below 0.03): This category consists of five tehsils that are Indragarh (0.02), Panchpahar (0.01), Kishanganj (0.01), Aklera and Mangrol has no AYUSH healthcare institutions,

AYUSH Healthcare Institutions Per 1000 of Population, 2020

High number of AYUSH healthcare institutions per 1000 of population (Above 0.13): There is only one tehsil under this category with highest number of AYUSH healthcare institutions per 1000 of population is Keshoraipatan (0.14)of Bundi district. However, there is decrease in the proportion of AYUSH institutions to population in 2020.

Moderate high number of AYUSH healthcare institutions per 1000 of population (0.13-0.1): This category consists of one tehsil that is Antah (0.11) of Baran district.

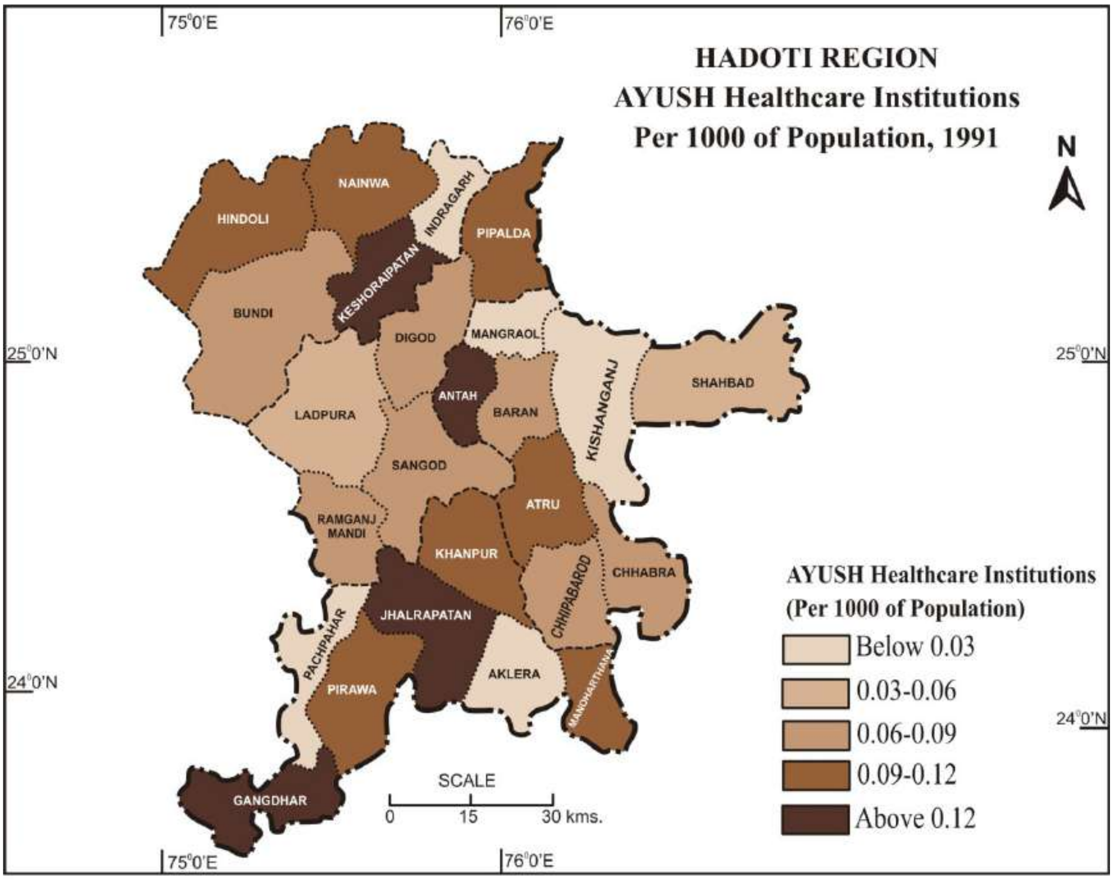
Moderate number of AYUSH healthcare institutions per 1000 of population (0.1-0.07): This category consists of maximum number of tehsils that are Gangdhar (0.09), Baran (0.09), Pirawa (0.08), Nainwa (0.08), Hindoli (0.08), Sangod (0.07), Manoharthana (0.07), Jhalrapatan (0.07), Khanpur (0.07), Chhipabarod (0.07), Atru (0.07) and Kishanganj (0.07).

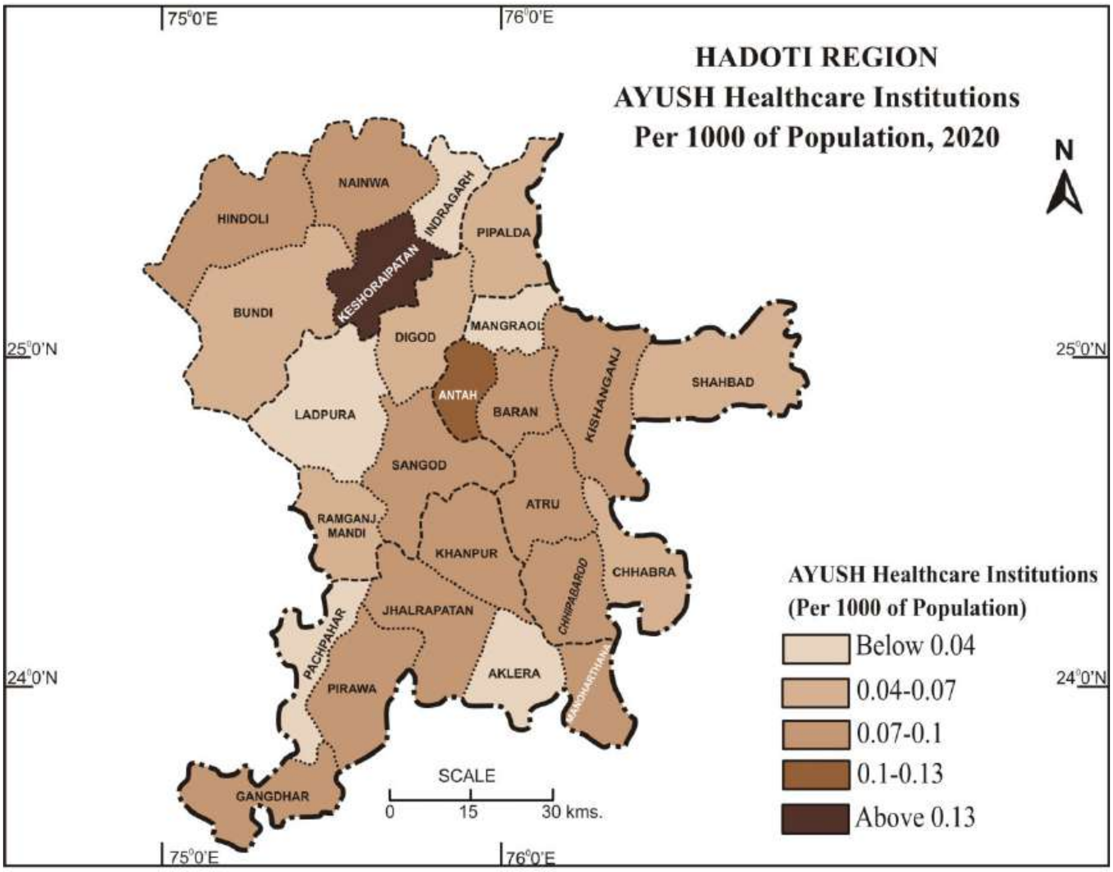
Low number of AYUSH healthcare institutions per 1000 of population (0.07-0.04): This category comprises of six tehsils that are Pipalda (0.06), Shahbad (0.06), Digod (0.05), Bundi (0.05), Chhabra (0.05) and Ramganj Mandi (0.04).

Very low number of AYUSH healthcare institutions per 1000 of population (Below 0.04): This category comprises of five tehsils that are Indragarh (0.02), Mangrol (0.02), Ladpura (0.01), Panchpahar (0.01) and Aklera (0.01) of Jhalawar district has lowest number of AYUSH institution in proportion to the population. Aklera and Mangrol has shown increase in 2020.

Coefficient of variation for AYUSH healthcare institutions per 1000 of population 1991 is 58.51% and in 2020 it is 51.27% this means that degree of variability of AYUSH healthcare institutions per 1000 of population is higher in 2020. The variability is on higher side in both 1991 and 2020.

MAP-5.6





Source : Directorate of Economics and Statistics, Rajasthan.

5.7. Healthcare Institutions Per 100 Km^2 of Area

Healthcare institutions are vital in providing medical services and promotes in overall well-being of individual. Accessibility to healthcare institutions is very important as they provide medical facilities, emergency and trauma care, disease prevention and control, along with imparting health education in the society. From development perspective evaluating spatial access to healthcare services helps in monitoring the level of development in the region. Healthcare institutions per 10 km^2 of area is calculated by dividing total number of healthcare institutions by the total area in km^2 and multiplying by 10.

Healthcare institutions per 10 km^2 of area have been analysed from 1991 to 2011. Five categories have been made which ranges between high to low healthcare institutions per 10 km^2 of area, with this better understanding of spatial and temporal changes can be done.

Healthcare Institutions Per 100 Km^2 of Area, 1991

High number of healthcare institutions per 100 km^2 of area (Above 37): There is only one tehsil under this category that is Ladpura (107) of Kota district, has highest number of healthcare institutions per 10 km^2 of area.

Moderate high number of healthcare institutions per 100 km^2 of area (36-29): Under this category there are two tehsils and both have district headquarter in it. These tehsils are Baran (35) and Jhalrapatan (34).

Moderate number of healthcare institutions per 100 km^2 of area (28-21): This category comprises of only one tehsil that is Antah (25) of Baran district.

Low number of healthcare institutions per 100 km^2 of area (20-13): This category consists of eight tehsils that are Bundi (19), Ramganj Mandi (18), Digod (15), Manoharthana (15), Keshoraipatan (15), Sangod (13), Pirawa (13) and Nainwa (13).

Very low number of healthcare institutions per 10 km^2 of area (Below 12): This category consists of maximum number of tehsils that are Pipalda (12), Gangdhar (12), Khanpur (12), Chhabra (12), Atru (12),Chhipabarod (10), Hindoli (9), Panchpahar (8), Indragarh (7), Mangrol (7), Shahbad (6), Kishanganj (6) and Aklera (5) of Jhalawar district has lowest number of healthcare institutions per 10 km^2 of area.

Healthcare Institutions Per 100 Km^2 of Area, 2020

High number of healthcare institutions per 100 km^2 of area (Above 40): This category consists of four tehsils that are Jhalrapatan (74) of Jhalawar district has highest number of healthcare institutions per 10 km^2 of area followed by Baran (71), Antah (57) and Bundi (52).

Moderate high number of healthcare institutions per 100 km^2 of area (39-32): Under this category there are three tehsils that are Ladpura (38), Keshoraipatan (37) and Ramganj Mandi (34).

Moderate number of healthcare institutions per 100 km^2 of area (31-24): Under this category there are four tehsils that are Atru (30), Pirawa (29), Manoharthana (25) and Chhabra (24).

Low number of healthcare institutions per 100 km^2 of area (23-16): This category consists of seven tehsils that are Gangdhar (22), Digod (21), Khanpur (20), Nainwa (20), Chhipabarod (20), Sangod (18) and Pipalda (17).

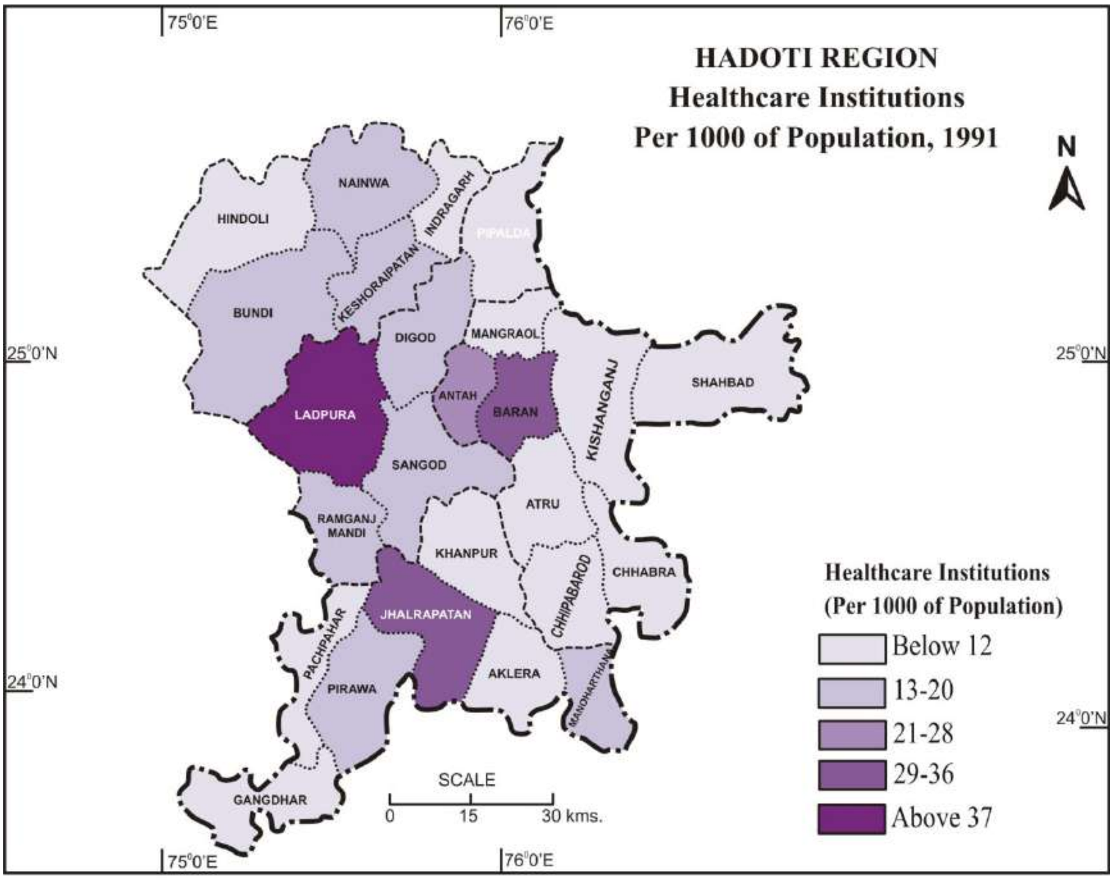
Very low number of healthcare institutions per 100 km^2 of area (Below 15): This category comprises of seven tehsils that are Hindoli (15), Shahbad (15), Kishanganj (15), Indragarh (13), Panchpahar (12), Aklera (10) and Mangrol (8) Jhalawar district has lowest number of healthcare institutions per 10 km^2 of area.

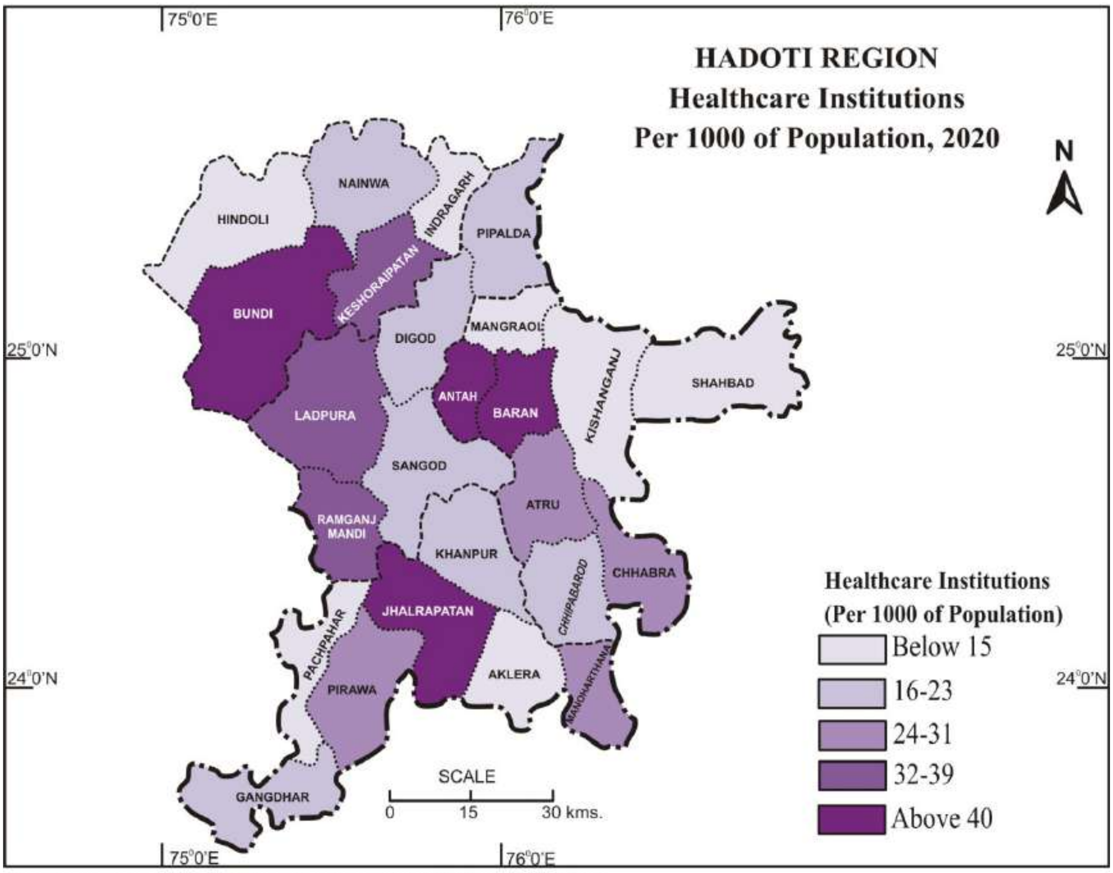
Coefficient of variation for healthcare institutions per 100 km^2 of area 1991 is 114.45% and in 2020 it is 64.82% this means that degree of variability of healthcare institutions per 100 km^2 of area is higher in 1991. The variability is on higher side in 1991 when compared with 2020.

Photoplate 5.3 : Community Health Centre, Mandana, Kota

Source: Captured during primary survey, 2023

MAP-5.7





Source : Directorate of Economics and Statistics, Rajasthan.

5.8. Percentage of Households with Electricity Connection

Accessibility to electricity is crucial factor in the socio-economic development of the region. In the recent times modern economic activities and convenient lifestyle is not possible without electricity. Different studies have shown that there is a positive effect of increased number of hours of electricity with individual level of satisfaction and well-being along with economic development. Percentage of households with electricity connection has been calculated by dividing number of households with electricity connection by total number of household and multiplied by 100.

Percentage of households with electricity connection analysed for census year 2011. Five categories have been made which ranges between high to low percentage of households with electricity connection. Due to non-availability of data for 1991 has not been interpreted.

Percentage of Households with Electricity Connection, 2011

High percentage of households with electricity connection (Above 82.28): This category comprises of six tehsils that are Ladpura (95.83) of Kota district has highest connections followed by Panchpahar (89.21), Ramganj Mandi (88.71), Baran (87), Khanpur (85.05) and Antah (84.22).

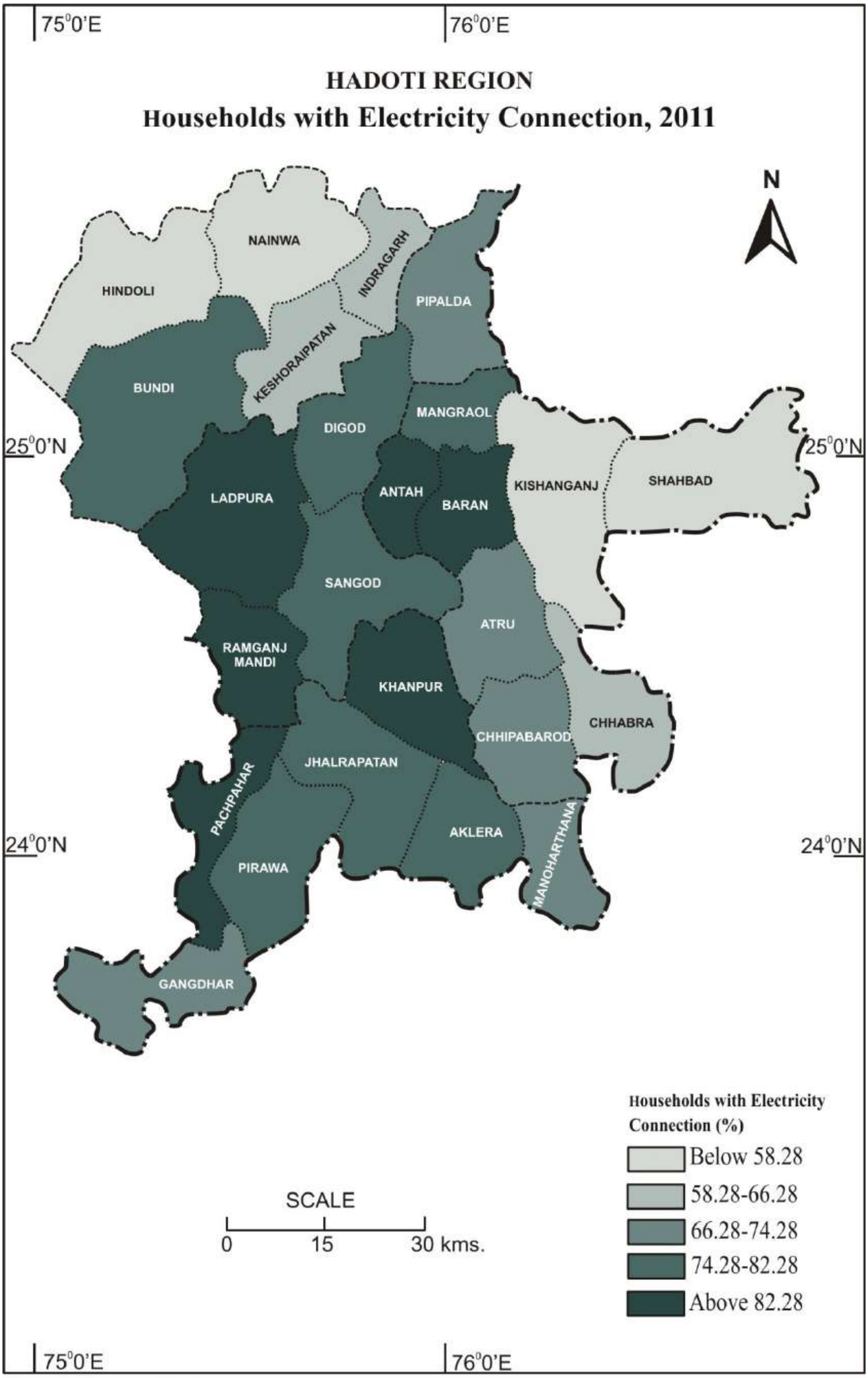
Moderate high percentage of households with electricity connection (82.28-74.28): This category comprises of seven tehsils that are Sangod (81.25), Jhalrapatan (80.1), Digod (79.84), Bundi (76.96), Mangrol (76.1), Pirawa (75.27) and Aklera (74.59).

Moderate percentage of households with electricity connection (74.28-66.28): Under this category there are five tehsils that are Atru (73.27), Gangdhar (72.75), Pipalda (68.2), Manoharthana (67.58), Chhipabarod (67.57).

Low percentage of households with electricity connection (66.28-58.28): There are only three tehsils under this category that are Keshoraipatan (65.69), Chhabra (64.78) and Indragarh (60.21).

Very low percentage of households with electricity connection (Below 58.28): This category consists of four tehsils that are Hindoli (50.99), Kishanganj (49.99), Nainwa (44.54) and Shahbad (34.28) has lowest electricity connections.

MAP-5.8



Source : Census of India

5.9. Percentage of Households Getting Tap Water from Treated Source

Clean water supply to every household is key component in socio-economic development. Clean drinking water is important in maintaining public health, sanitation and hygiene. Having healthier individual have positive impact on economy of the region. When higher number of households having access to clean drinking water in the region promotes social equity, which promotes inclusive development. Percentage of households getting tap water from treated source has been calculated by dividing number of households with getting tap water from treated source by total number of household and multiplied by 100.

Percentage of households getting tap water from treated source analysed for census year 2011. Due to non-availability of data for 1991 has not been interpreted.

Percentage of Households Getting Tap Water from Treated Source, 2011

High percentage of households getting tap water from treated source (Above 42.46): This category comprises of two tehsils that are Ladpura (72.3) of Kota district has highest household followed by Ramganj Mandi (54.16) of Jhalawar district.

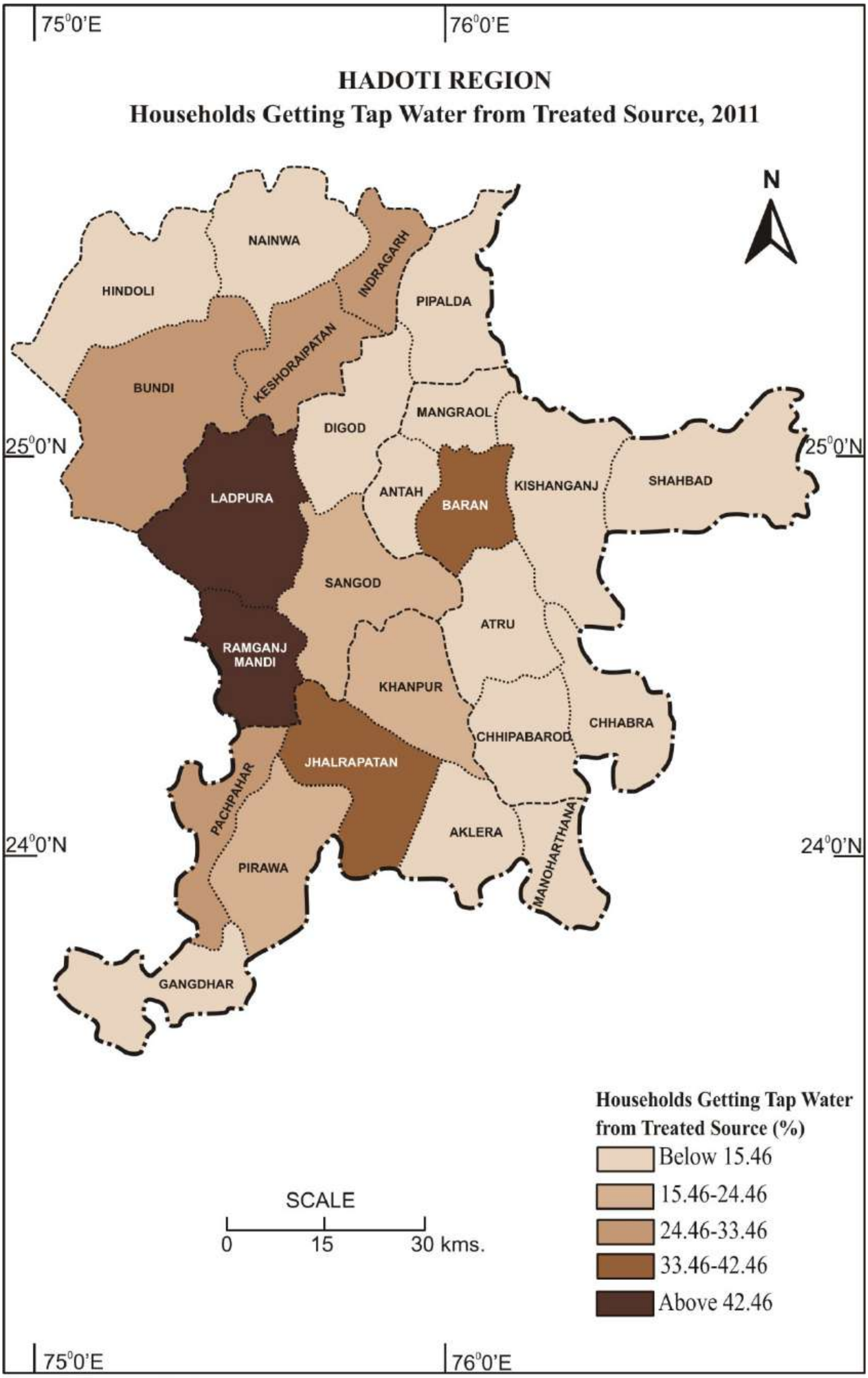
Moderate high percentage of households getting tap water from treated source (42.46-33.46): This category consists of two tehsils that are Baran (41.93) and Jhalrapatan (41.78).

Moderate percentage of households getting tap water from treated source (33.46-24.46): Under this category there are four tehsils that are Indragarh (27.35), Keshoraipatan (25.97), Bundi (25.79) and Panchpahar (25.33).

Low percentage of households getting tap water from treated source (24.46-15.46): This category comprises of three tehsils that are Khanpur (20.79), Pirawa (16.55) and Sangod (16.21).

Very low percentage of households getting tap water from treated source (Below 15.46): This category comprises of maximum number of tehsils that are Pipalda (14.64), Chhabra (14.51), Atru (14.5), Digod (14.46), Mangrol (14.13), Nainwa (13.93), Antah (13.87), Gangdhar (13.77), Chhipabarod (11.06), Kishanganj (10.24), Aklera (10.2), Manoharthana (10.07), Shahbad (8) and Hindoli (6.46) with lowest percentage of households.

MAP-5.9



Source : Census of India

Photoplate 5.4 (A) : Drinking water pipe connection, Khushiyara, Kishanganj

Source: Captured during primary survey, 2023

Photoplate 5.4 (B) : Regional Rural Bank, Ramganj, Keshoraipatan

Source: Captured during primary survey, 2023

5.10. Percentage of Households Availing Banking Services

Financial inclusion is very important in promoting economic growth and fosters social development. Demographic shift in the region has impact on income level and lifestyle aspirations, this becomes key aspect of economic growth. Government has taken various steps for improving financial inclusion. Percentage of households availing banking facilities has been calculated by dividing number of households availing banking facilities by total number of household and multiplied by 100.

Percentage of households availing banking facilities analysed for census year 2011. Five categories have been made which ranges between high to low percentage of households availing banking facilities. Due to non-availability of data for 1991 has not been interpreted.

Percentage of Households Availing Banking Services, 2011

High percentage of households availing banking facilities (Above 78.81): This category comprises of three tehsils that are Nainwa (83.76) of Bundi district with highest percentage followed by Hindoli (82.7) and Kishanganj (81.01).

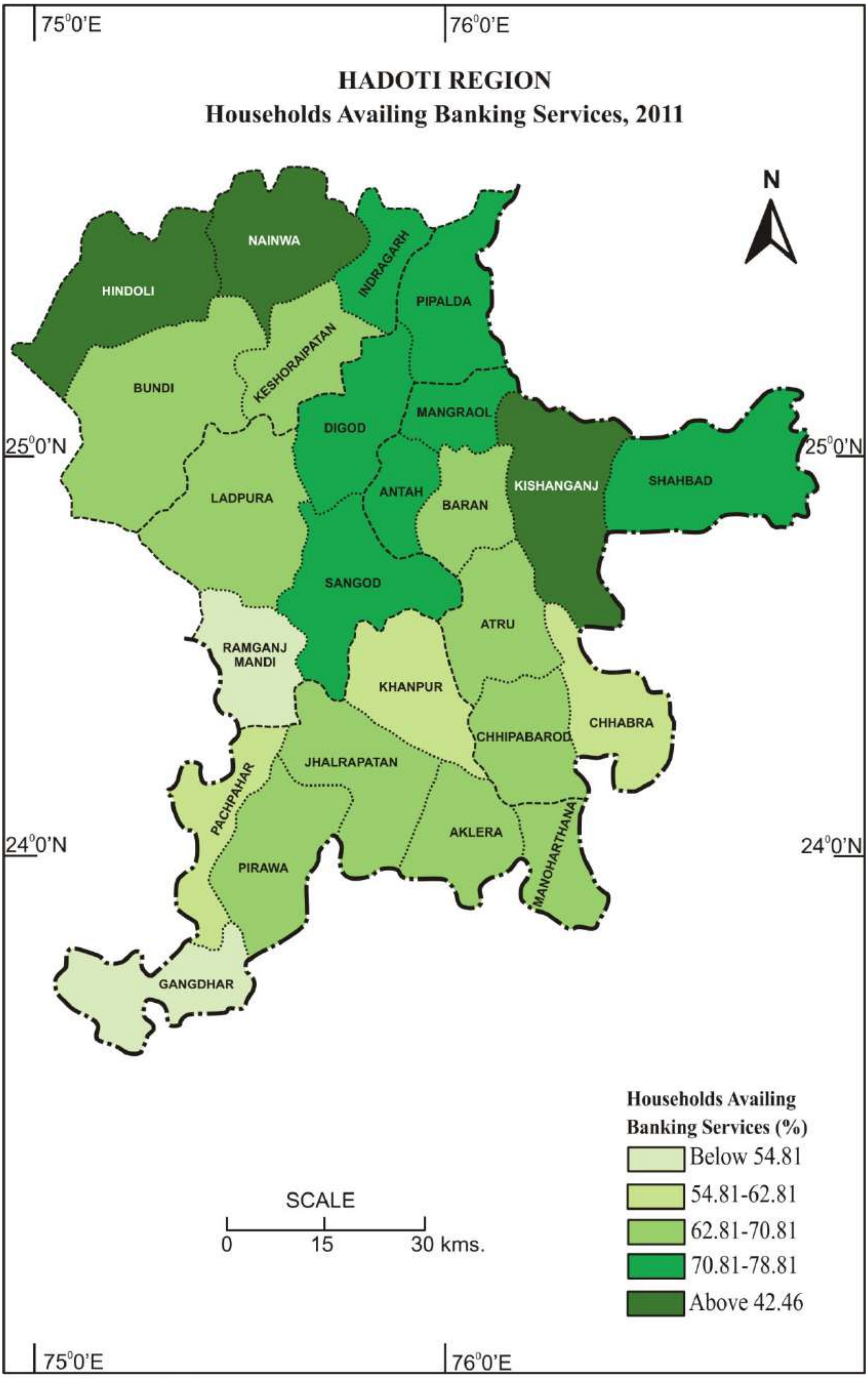
Moderate high Percentage of households availing banking facilities (78.81-70.81): Under this category there are seven tehsils that are Pipalda (75.32), Sangod (75.07), Shahbad (75.07), Antah (74.34), Digod (73.15), Indragarh (73.09) and Mangrol (72.27).

Moderate high Percentage of households availing banking facilities (70.81-62.81): Maximum number of tehsils are under this category that are Manoharthana (70.18), Chhipabarod (69.65), Keshoraipatan (69.18), Atru (69.1), Aklera (68.45), Pirawa (68.23), Baran (67.94), Ladpura (65.91), Bundi (65.74) and Jhalrapatan (63.47).

Low high Percentage of households availing banking facilities (62.81-54.81): This category comprises of three tehsils that are Panchpahar (60.35), Chhabra (58.36) and Khanpur (58.3).

Very low high Percentage of households availing banking facilities (Below 54.81): There are two tehsils under this category that are Ramganj Mandi (53.56) and Gangdhar (46.81) of Jhalawar district with lowest percentage of households.

MAP-5.10



Source : Census of India

5.11. Cooperative Society Per 1000 of Population

Cooperative society have positive impact in the development process. They are very crucial for the economic development and poverty alleviation. It also fosters social cohesion and integration among the community, as they are based on idea of democratic decision making. It helps in empowerment local people, with knowledge sharing and skill development through this sustainable development can be envisaged. Having appropriate proportion of cooperative society in proportion of population in an area is very important in measuring level of socio-economic development. Cooperative society per 1000 of population has been calculated by dividing total number of cooperative societies by total population and multiplying it by 1000.

Cooperative society per 1000 of population has been analysed from 1991 to 2011. Five categories have been made which ranges between high to low Cooperative society per 1000 of population, with this better understanding of spatial and temporal changes can be established.

Cooperative Society Per 1000 of Population, 1991

High number of cooperative societies per 1000 of population (Above 0.5): This category consists of five tehsils that are Antah (0.94) of Baran district has highest number of cooperative societies per 1000 of population, followed by Keshoraipatan (0.78), Digod (0.63), Jhalrapatan (0.6) and Nainwa (0.55).

Moderate high number of cooperative societies per 1000 of population (0.5-0.4): Under this category there are seven tehsils that are Manoharthana (0.49), Kishanganj (0.47), Baran (0.47), Sangod (0.46), Bundi (0.44), Pirawa (0.42) and Atru (0.42).

Moderate number of cooperative societies per 1000 of population (0.4-0.3): This category comprises of six tehsils that are Pipalda (0.39), Khanpur (0.38), Hindoli (0.38), Ladpura (0.35), Gangdhar (0.35) and Shahbad (0.34).

Low number of cooperative societies per 1000 of population (0.3-0.2): There are three tehsils in this category that are Ramganj Mandi (0.23), Chhipabarod (0.23) and Chhabra (0.21).

Very low number of cooperative societies per 1000 of population (Below 0.2): Under this category there are four tehsils that are Panchpahar (0.06), Aklera (0.03). Indragarh and Mangrol has no cooperative society.

Cooperative Society Per 1000 of Population, 2020

High number of cooperative societies per 1000 of population (Above 0.6): This category consists of six tehsils that are Keshoraipatan (1.46) of Bundi district has highest cooperative society followed by Sangod (1.13), Digod (1.08), Hindoli (0.88), Bundi (0.78) and Pipalda (0.65). All the tehsils under this category have recorded increase in cooperative society in proportion of population.

Moderate high number of cooperative societies per 1000 of population (0.6-0.5): Under this category there are three tehsils that are Gangdhar (0.59), Pirawa (0.57) and Jhalrapatan (0.51).

Moderate number of cooperative societies per 1000 of population (0.5-0.4): This category has maximum number of tehsils that are Ladpura (0.49), Baran (0.49), Nainwa (0.47), Mangrol (0.44), Khanpur (0.42) and Ramganj Mandi (0.4).

Low number of cooperative societies per 1000 of population (0.4-0.3): This category consists of five tehsils that are Antah (0.39), Kishanganj (0.37), Atru (0.36), Panchpahar (0.33) and Shahbad (0.33).

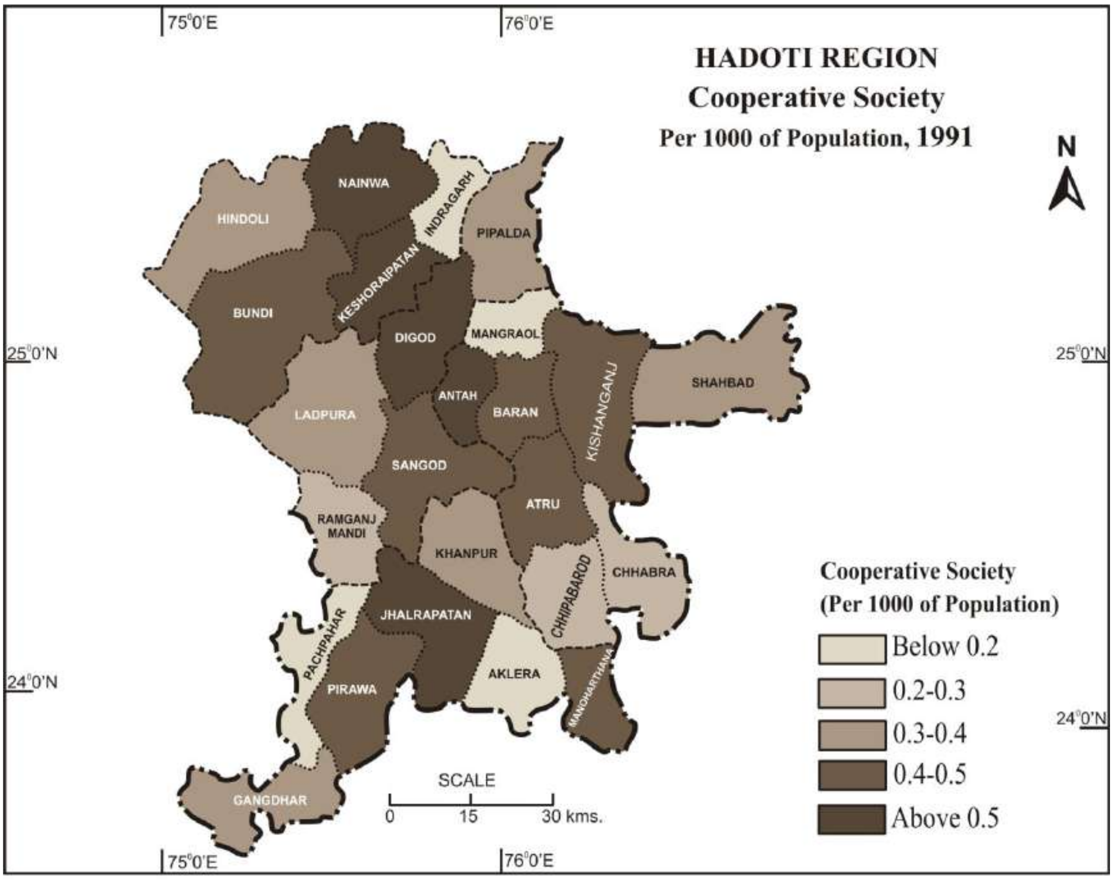
Very low number of cooperative societies per 1000 of population (Below 0.3): This category consists of five tehsils that are Chhipabarod (0.24), Chhabra (0.24), Manoharthana (0.23), Aklera (0.21) and Indragarh tehsil of Bundi district has no cooperative society.

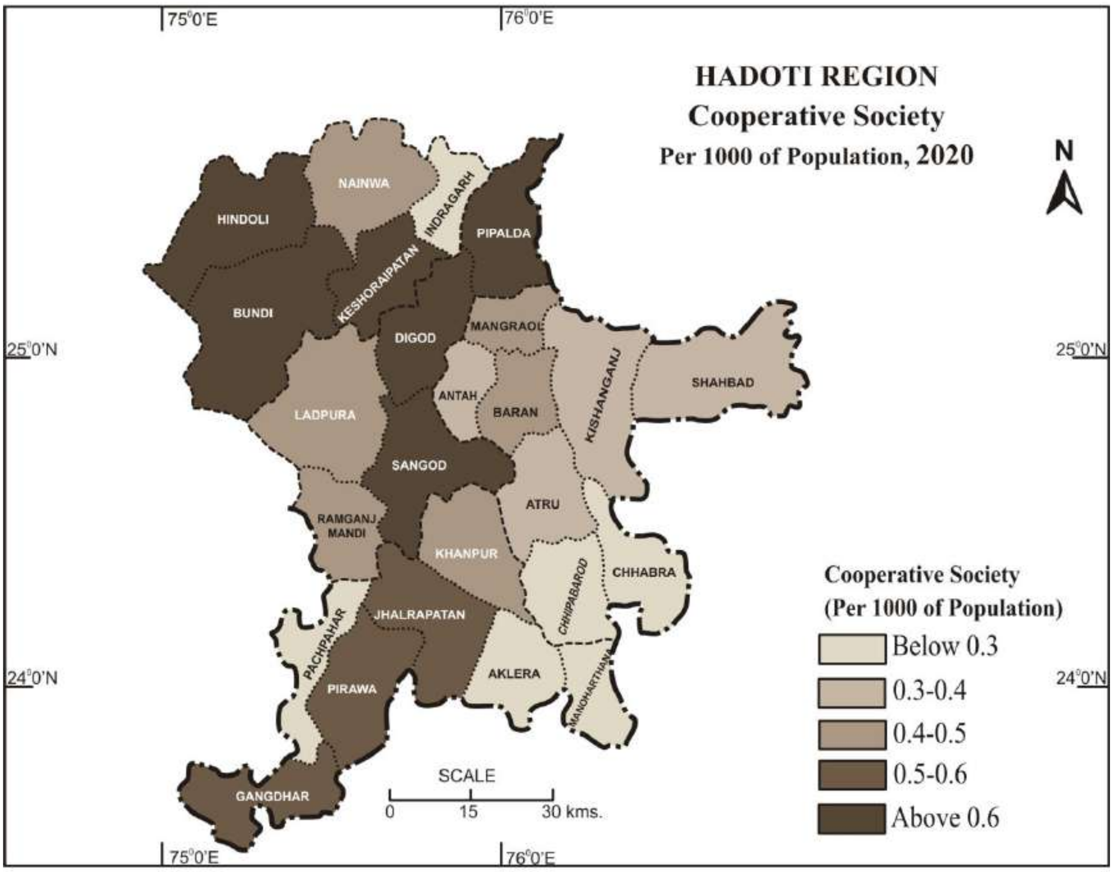
Coefficient of variation for cooperative societies per 1000 of population 1991 is 59.2% and in 2020 it is 62.65% this means that degree of variability of cooperative societies per 1000 of population is higher in 2020. The variability is on higher side in both 1991 and 2020.

Photoplate 5.5 : Cooperative society, Papdi, Indargarh

Source: Captured during primary survey, 2023

MAP-5.11





Source : Directorate of Economics and Statistics, Rajasthan.

5.12. Level of Infrastructural Development

Infrastructural development of Hadoti region has been calculated by taking eleven indicators that are Primary Schools Per 1000 of Population, Upper Primary Schools Per 1000 of Population, Senior Secondary Schools Per 1000 of Population, Educational Institutions Per 10 Sq. Km of Area, Allopathic Healthcare Institutions Per 1000 of Population, AYUSH Healthcare Institutions Per 1000 of Population, Healthcare Institutions Per 100 Sq. Km of Area, Percentage of Households with Electricity Connection, Percentage of Households Getting Tap Water from Treated Source, Percentage of Households Availing Banking Services, Cooperative Society Per 1000 of Population. Infrastructural development is directly related with region's socio-economic growth. Economic growth is dependent of infrastructural facilities available. Well-developed infrastructure puts foundation on which region begins to develop. Education and healthcare infrastructure are considered very crucial. Educational institutes enable students to acquire knowledge which helps in employment generation. Similarly, health care institutes support the well-being of individual, here affordability and accessibility to healthcare institute is very important.

Level of infrastructural development has been calculated for 1991 and 2011. This will allow to have the analysis of both temporal and spatial pattern of infrastructural development level. Data has been categorised under five categories that are very high, high, moderate, low, very low level of socio-cultural development.

Level of Infrastructural Development, 1991

High infrastructuraldevelopment (Above1.2): This category consists of two tehsils that are Antah (1.56) of Baran district with top position followed by Keshoraipatan (1.48) of Bundi tehsil.

Moderate high infrastructuraldevelopment (1.2-0.5): This category comprises of Jhalrapatan (1.03), Ladpura (0.64) and Manoharthana (0.5). Jhalawar and Ladpura tehsil have district headquarter in it, resulted in more infrastructural development.

Moderate infrastructural development (0.5-(-)0.2): There are maximum number of tehsils in this category that are Nainwa (0.37), Baran (0.32), Gangdhar (0.31), Atru (0.3), Digod (0.21), Pirawa (0.15), Sangod (0.09), Bundi (0.07), Khanpur (0.06), Pipalda (0.03), Hindoli (-0.04) and Chhabra (-0.1).

Low infrastructural development ((-)0.2–(-)0.9): There are four tehsils under this category that are Shahbad (-0.25), Ramganj Mandi (-0.26), Kishanganj (-0.26), Chhipabarod (-0.3). Except Ramganj Mandi all remaing tehsils are of Baran district.

Very low infrastructural development (Below (-)0.9): This category comprises of four tehsils that are Indragarh (-1.26), Panchpahar (-1.45), Mangrol (-1.59) and Aklera (-1.6) of Jhalawar district has the lowest composite score value.

Level of Infrastructural Development, 2020

High infrastructural development (Above 0.68): There are three tehsils under this category that are Keshoraipatan (1.07), of Bundi district is on top position followed by Jhalrapatan (1.06) and Antah (0.77). Except Jhalrapatan both tehsils have recorded decrease in the score value.

Moderate high infrastructural development (0.68-0.28): There are only two tehsils in this category that are Manoharthana (0.58) of Jhalawar district and Baran (0.28) of Baran district. Manoharthana score has increased in 2020 whereas Baran has shown decrease in its score value.

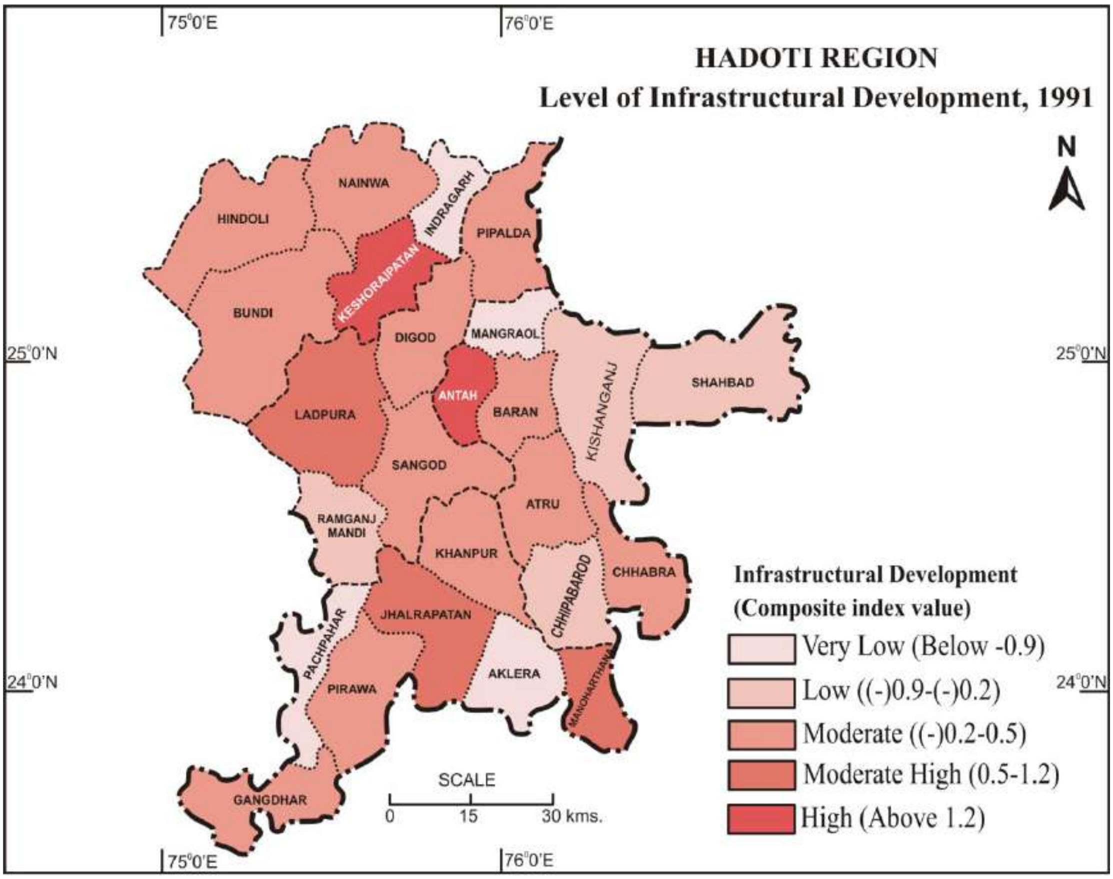
Moderate infrastructural development (0.28–(-)0.12): This category has maximum number of tehsils that are Ladpura (0.23), Pirawa (0.23), Khanpur (0.19), Gangdhar (0.16), Bundi (0.15), Hindoli (0.11), Nainwa (0.07), Atru (0.07), Sangod (-0.03) and Chhipabarod (-0.12).Pirawa, Khanpur, Bundi, Hindoli, Chhipabarod has improved 2020 when compared with 1991.

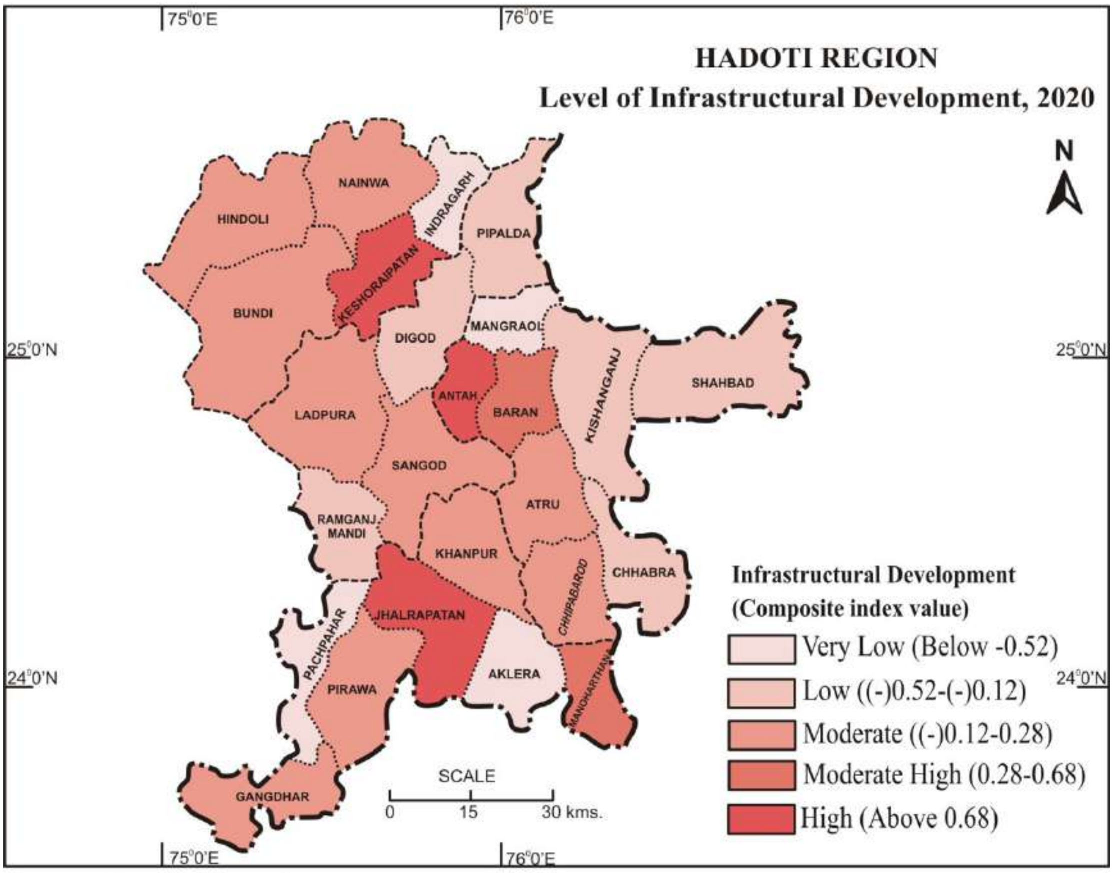
Low infrastructural development ((-)0.12–(-)0.52): This category comprises of six tehsils that are Kishanganj (-0.16), Digod (-0.17), Chhabra (-0.22), Ramganj Mandi (-0.26), Pipalda (-0.28) and Shahbad (-0.33). Except Kishanganj tehsil of Baran district remaining district has not improved their infrastructure whereas Ramganj Mandi has shown constant values both in 2020 and 1991.

Very low infrastructural development (Below (-) 0.52): This category consists of four tehsils that are Panchpahar (-0.78), Indragarh (-0.85), Mangrol (-0.85) and Aklera (-0.92) of Jhalawar district is on the bottom position in the whole region however the score value of Aklera has improved in 2020 but same position has been held by it as in 1991.

The reason for poor performance in infrastructural development is because of low outreach of infrastructural facilities such as educational institutes, healthcare institutes, poor availability of clean drinking water and other basic facilities are lacking. All the infrastructural facilities have been calculated in proportion to the population which has shown low per capita availability of infrastructure in the region. Low performing tehsil are Aklera, Panchpahar, Mangrol, Chhabra, Indargarh, Ramganj Mandi, Pipalda and Digod all these tehsils lie in the peripheral part of the region. Ladpura tehsil is under moderate infrastructural category is due to low representativeness of infrastructure in proportion to the population of the tehsil however, the maximum facilities are in the Ladpura tehsil.

MAP-5.12





Source : Computed by author

CHAPTER – 6

ASSESSING THE SOCIO-ECONOMIC DEVELOPMENT THROUGH SAMPLE SURVEY

CHAPTER – 6

ASSESSING THE SOCIO-ECONOMIC DEVELOPMENT THROUGH SAMPLE SURVEY

Level of socio-economic development through different indicators has been calculated done using secondary data at tehsil level. It is very important to have village level understanding of development patterns in the tehsil. The latest secondary data was available of 2020, and to have insights in the recent trends of development sample survey was conducted in 2023. The sample survey results will help in making evidence-based policy for the betterment of the people living in the region and will be beneficial for inclusive and sustainable growth of the region. Based on the available literature various approaches has been used while calculating the level of development. Earlier major aspect of development was considered, economic growth for this Gross Domestic Product and Gross National Product has been calculated for evaluating inter-state disparities. Over the time these approaches focused mainly on monetary gains and they were severely criticised that they don't consider the social aspects while calculating the disparities. Gradually index was prepared which comprised of both economic and social indices of development known as Composite Index of Development. Based on the secondary data available economic growth has been witnessed since 1990s in the region but still the social indicators such education, health Infrastructure etc are not performing fairly in the contribution in the overall development. So, it becomes very crucial to have in depth analysis of social indicators of the region.

In 1990, Human Development Index and composite index of development were considered by different scholars and got wide attention and was considered more accurate way of looking development levels. With the passage of time Human Development Index was criticised for its selective indicators considered for the calculation. This criticism of Human Development Index paved the way for Millennium Development Goals, it has wide range of indicators along with the eighteen targets to be achieved. Based on various literature available and considering wide variety of indicators, a Composite Index of Development has been calculated for the Hadoti region. It has been conceptualised that development is away of improving people's lives so, that they can attain the freedom and well-being in individuals' life. Development can't be look in isolation, understanding the economic growth, social progress, infrastructural development, environmental sustainability, regional competitiveness is crucial in understating overall development.

For analysing the regional disparities in socio-economic development, sample survey was conducted and based on the results of the survey composite index of development was formulated by taking twenty-nine indicators from both social and economic aspects.

Following indicators are taken for calculating composite index of development:

1. Literacy Rate
2. Illiteracy
3. Cultivators
4. Agricultural Labourers
5. Others (Except cultivators and agricultural labourers)
6. Crude Work Participation Rate
7. Dependency Ratio
8. Annual Household Income
9. Agricultural Productivity (Quintal/Bigha)
10. HYV Seeds
11. Chemical Fertilizers (Kg/Bigha)
12. Irrigated Area by Tubewell (%)
13. Irrigated Area by Canal (%)
14. Irrigated Area by Well (%)
15. Mechanization of Farm
16. Livestock per Household
17. Livestock Facilities
18. Primary Schools
19. Upper Primary Schools
20. Secondary and Senior secondary Schools
21. Minimum Distance to School (Km)
22. Hospitals
23. Minimum Distance to Hospitals (Km)
24. Drinking Water from Tap/Govt Tanks (%)
25. Drinking Water from Handpump (%)
26. Drinking Water from Borewell (%)
27. Percentage of Households with Latrine
28. Percentage of Individuals Availing Banking Facilities
29. Cooperative society

By taking all the above twenty-nine indicators composite index of development was calculated which is a standardized score for every tehsil of the Hadoti region. Stratified random sampling was done in twenty-five tehsils of four district that are Baran, Bundi, Jhalawar and Kota. From each tehsil two villages were selected for sampling; total 50 villages were selected. From every village ten households were surveyed; total 500 households were interviewed.

Table 6.1: Tehsil-wise Composite Score of Development and Rank

S.No.	Tehsil	Composite Score	Rank
1.	Baran	-0.19	16
2.	Kishanganj	-0.23	17
3.	Shahbad	-0.46	24
4.	Atru	0.46	4
5.	Chhabra	-0.49	25
6.	Chhipabarod	0	10
7.	Antah	0.21	8
8.	Mangrol	0.76	1
9.	Hindoli	0.68	2
10.	Nainwa	-0.04	13
11.	Indragarh	-0.05	14
12.	Keshoraipatan	-0.01	11
13.	Bundi	0.48	3
14.	Khanpur	0.14	9
15.	Jhalrapatan	0.35	6
16.	Aklera	-0.29	19
17.	Manohar Thana	-0.17	15
18.	Panchpahar	-0.28	18
19.	Pirawa	-0.34	20
20.	Gangdhar	-0.44	23
21.	Pipalda	-0.37	21
22.	Digod	0.28	7
23.	Ladpura	0.41	5
24.	Ramganj Mandi	-0.38	22
25.	Sangod	-0.02	12

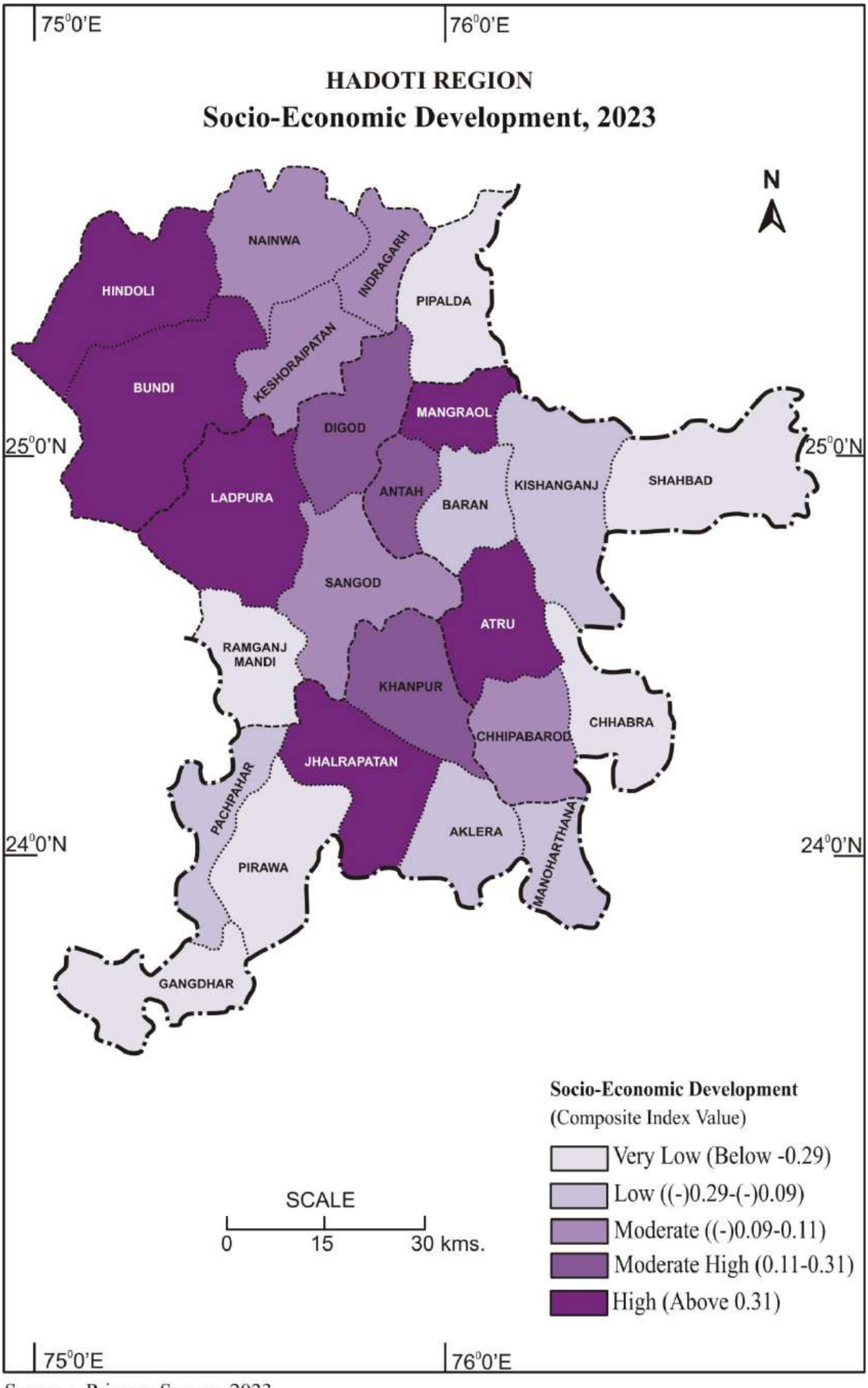
Source: Calculated by author based on sample survey, 2023

Table 6.2: Composite Index of Development based on sample villages

S. No.	Composite Index of Development	Tehsils	Sample Villages	No. of households surveyed
1.	High (Above 0.31)	Mangrol	Mal Bamori and Seemlya	20
		Hindoli	Chatarganj and Karkhedi	20
		Bundi	Ballop Gaon and Ramganj Balaji	20
		Atru	Ummedganj and Baldevpura	20
		Ladpura	Mandana and Rasoolpur Kheda	20
		Jhalrapatan	Haripura and TeendharRooparel	20
2.	Moderate High (0.31 to 0.11)	Digod	Mundla and Ummedpura	20
		Antah	Ummedganj and Baldevpura	20
		Khanpur	Chand Kheri and Sarola Kalan	20
3.	Moderate (0.11 to -0.09)	Chhipabarod	Bhagwanpura and Kankarda	20
		Keshoraipatan	Ramganj and Deikhera	20
		Sangod	Laxmipura and Ghanaheda	20
		Nainwa	Jajawar and Diyali	20
		Indragarh	Makhida and Papdi	20
4.	Low (-0.09 to -0.29)	Manoharthana	Saredi and Udpuriya	20
		Baran	Khedli and Batwada	20
		Kishanganj	Rampuriya and Hirapur	20
		Panchpahar	Mishroli and Pagariya	20
		Aklera	Ametha and Katphala	20
5.	Very Low (Below -0.29)	Chhabra	Parodiya and Godya	20
		Shahbad	Khushiyara and Momoni	20
		Gangdhar	Jamuniya and Guwalad	20
		Ramganj Mandi	Antarliya and Julmi	20
		Pipalda	Chanda and Piplada Khurd	20
		Pirawa	Hemara and Pithakheri	20
Total		**25**	**50**	**500**

Source: Calculated by author based on table 6.1, sample survey, 2023

MAP-6.1



Source : Primary Survey, 2023

Level of Development of Hadoti Region, 2023

Development level of the region has been categorized under five categories that are High, Moderate high. Moderate, Low and Very Low.

High level of development (Above 0.31): This category consists of six tehsils that are Mangrol (0.76) of Baran district is on the first position, followed by Hindoli (0.68), Bundi (0.48), Atru (0.46), Ladpura (0.41) and Jhalrapatan (0.35).

Moderate high level of development (0.31 to 0.11): Under this category there are three tehsils that are Digod (0.28), Antah (0.21) and Khanpur (0.14).

Moderate level of development (0.11 to -0.09): This category consists of five tehsils that are Chhipabarod (0), Sangod (-0.02), Nainwa (-0.04), Keshoraipatan (-0.01), and Indragarh (-0.05).

Low level of development (-0.09 to -0.29): This category comprises of five tehsils that are Manoharthana (-0.17), Baran (-0.19), Kishanganj (-0.23), Panchpahar (-0.28) and Aklera (-0.29).

Very low level of development (Below - 0.29): Under this category there are six tehsils that are very less developed in terms of socio-economic aspects, these tehsils are Pirawa (-0.34), Pipalda (-0.37), Ramganj Mandi (-0.38), Gangdhar (-0.44), Shahbad (-0.46) and Chhabra (-0.49) of Baran district has lowest score of composite index of development.

From table 6.3 it can be analysed that high and very low level of development category has equal proportion of tehsils that are six tehsils each which makes to 24 percentage of the area in both the categories. Moderate high level of development has lowest share of tehsils which is 12 percentage. Moderate and low level of development category has same number of tehsils that are five tehsils each which makes 20 percentage of tehsils cover in each category. From high level of development category Bundi district has maximum share of tehsils that is 40 percent and lowest is in Jhalawar tehsil there is only 14.28 percent of tehsil cover under high development category. From very low development category Kota district has 40 percent of tehsils and lowest is from Bundi district.

Table 6.3: District-wise Tehsils in Different Category in Level of Socio-Economic Development, 2023

S. No.	Level of Socio-Economic Development	Baran	Bundi	Jhalawar	Kota	Total Tehsils
1.	High	2 (25)	2 (40)	1 (14.28)	1 (20)	6 (24)
2.	Moderate High	1 (12.5)	0 (0)	1 (14.28)	1 (20)	3 (12)
3.	Moderate	1 (12.5)	3 (60)	0 (0)	1 (20)	5 (20)
4.	Low	2 (25)	0 (0)	3 (42.85)	0 (0)	5 (20)
5.	Very Low	2 (25)	0 (0)	2 (28.57)	2 (40)	6 (24)
Total		**8 (100)**	**5 (100)**	**7 (100)**	**5 (100)**	**25 (100)**

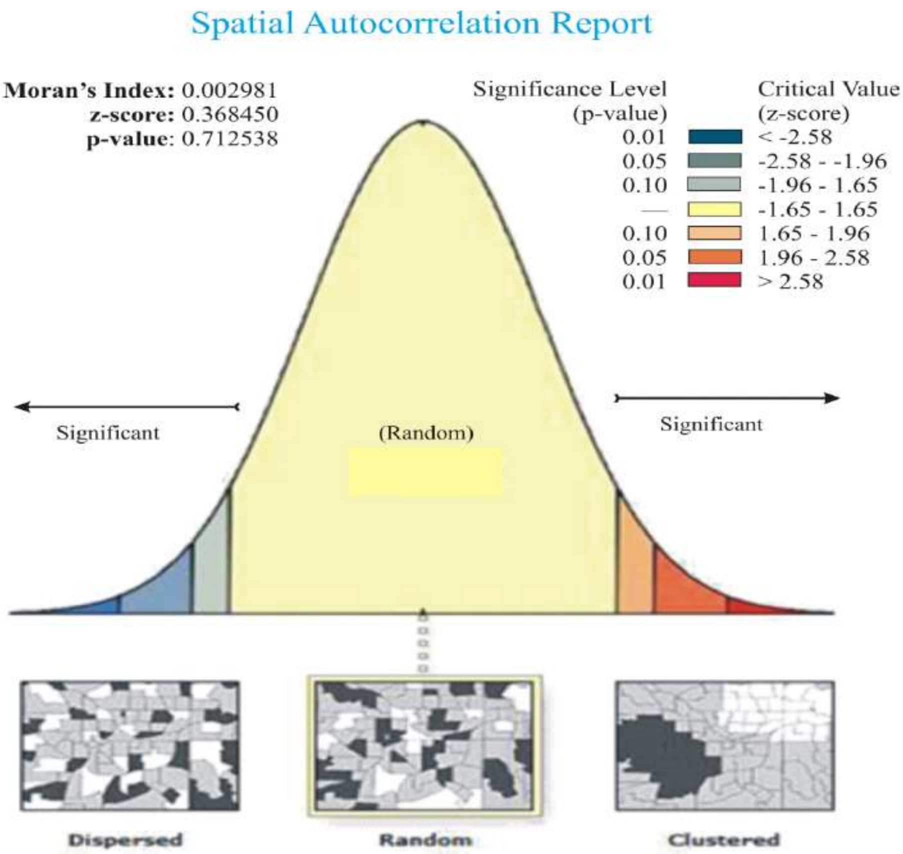
Source: Calculated by author based on table 6.1 and 6.2, sample survey, 2023

Development can be defined when quality of life along with the welfare of individual is fulfilled. Developmental schemes on paper and their implementation have wide gap due to which ground reality are shown in a distorted manner. All the poorly developed tehsils lie in the peripheral part of the region, these tehsils are Chhabra, Shahbad, Gangdhar, Ramganj Mandi, Pipalda and Pirawa. The reason of low development is due poorly developed infrastructure and wellbeing of individual. Social indicators like literacy rate, dependency ratio, sanitation, drinking water availability, minimum distance to schools and hospitals along with the economic indicators such average annual income, crude work participation rate, agricultural productivity, occupation type, banking services, role of cooperative societies etc does not perform properly in these tehsil. Whereas in tehsils where these indicators performed fairly were under the high level of development category, and there are six tehsils that are Jhalrapatan, Ladpura, Atru, Bundi, Hindoli and Mangrol. Out of six tehsils three tehsils consists of district headquarters in it, due to administrative setup maximum infrastructural development is concentrated here which has eventually increased the socio-economic development in the respective tehsils.

Spatial Autocorrelation

For checking whether there is clustering of highly developed and less developed tehsils spatial auto correlation using inverse distance conceptualisation with help of Global Moran's I method had been done. According to the summary report provided it gives Moran's Index value of 0.002981 which indicates towards weak positive spatial autocorrelation this value ranges between -1 and +1. Z-score of 0.368450 is less than the critical value of 1.96 (at a 95% confidence level), means that spatial pattern observed is not significantly different from a random spatial pattern p-value of 0.712538 is much greater than the typical significance level of 0.05, further confirming that spatial pattern is not statistically significant and could have occurred by chance.

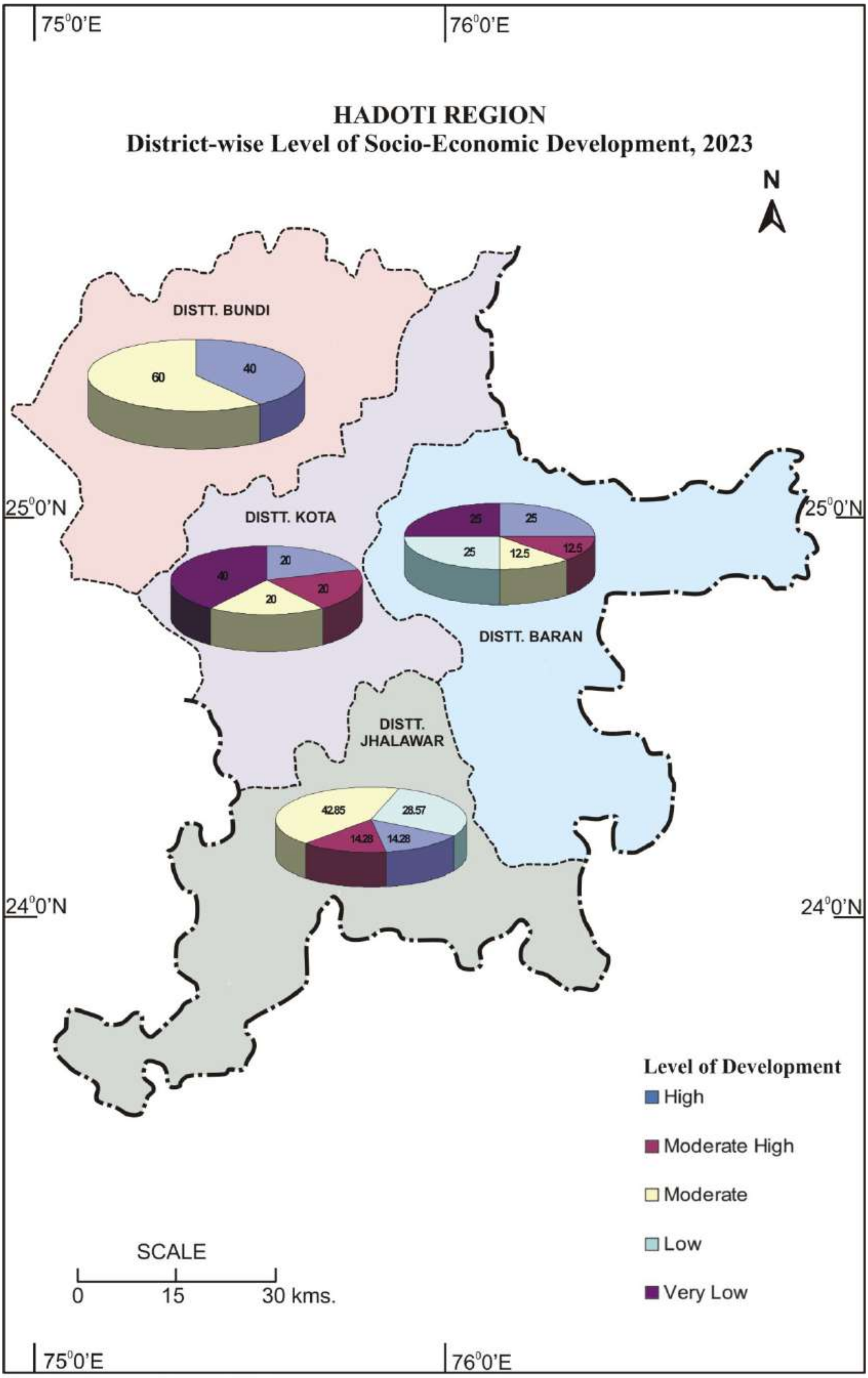
Spatial auto correlation analysis suggests that the spatial pattern of level of socio-economic development does not exhibit a statistically significant level of clustering or dispersion, and largely indistinguishable from a random spatial distribution.



Given the z-score of 0.368450162044, the pattern does not appear to be significantly different than random.

Global Moran's I Summary	
Moran's Index	0.002981
Expected Index	-0.041667
Variance	0.014684
z-score	0.36845
p-value	0.712538

MAP-6.2



Source : Primary Survey, 2023

Photoplate 6.1 (A) : Field Survey by Author

Source: Captured during primary survey, 2023

(B) : Field Survey by Author

Source: Captured during primary survey, 2023

CHAPTER – 7

DEVELOPMENT CORRELATION MATRIX

7.1. Composite Index of Development

7.1.1. Level of Socio-Economic Development, 1991

7.1.2. Level of Socio-Economic Development, 2020

7.1.3. Hypothesis test results

7.2. Matrix of Correlation

7.2.1. Correlation between Composite Development Index and Socio-Cultural Development

7.2.2. Correlation between Composite Development Index and Agricultural Development

7.2.3. Correlation between Composite Development Index and Infrastructural Development

CHAPTER – 7

DEVELOPMENT CORRELATION MATRIX

Measuring development and correlating individual indicator with composite index of development shows the importance of every indicator, this broadens the scope of understanding development beyond the economic development. This correlation matrix helps in identifying key indicators functional in the improving standard of living. Development correlation matrix will help in tracking the importance of different indicators and the intensity which they have in pushing development further of the Hadoti region. This will also help in identifying the development indicators which have negative correlation with development and based on this policy decision can be made in the right direction.

7.1. Composite Index of Development

The approach used for calculating Composite Score of Socio-Economic Development is through Z-Score by transforming selected indicators value into standardised value and then all the indicator's standardised values were added and lastly the average value was calculated by dividing total Z-Score value by number of total indicators in order to get the Composite Index of Development of each tehsil of the region. Total thirty-three indicators were used for 1991 and thirty-six indicators were used in calculating Composite Index of Development for 1991 and 2020. List of indicators used for calculation are:

1. Density of Population
2. Sex Ratio
3. Literacy Rate
4. Gap in Male-Female Literacy Rate
5. Percentage of Urban Population
6. Percentage of Main Workers
7. Crude Work Participation Rate
8. Density of Workers
9. Percentage of Agricultural Labourers
10. Percentage of Cultivators
11. Percentage of Household Industry Workers

12. Percentage of Other Workers
13. Dependency Ratio
14. Infant Mortality Rate
15. Cropping Intensity
16. Per Capita Agricultural Production
17. Productivity of Food Grains
18. Percentage of Gross Irrigated Area to Gross Area Sown
19. Percentage of Gross Sown Area Under HYV Seeds
20. Consumption of Chemical Fertilizers Per Hectare of Gross Sown Area
21. Percentage of Net Irrigated Area by Tube well to Total Net Irrigated Area
22. Percentage of Net Irrigated Area by Canal to Total Net Irrigated Area
23. Gross Sown Area Per Tractor
24. Density of Livestock
25. Livestock Facilities
26. Primary Schools Per 1000 of Population
27. Upper Primary Schools Per 1000 of Population
28. Senior Secondary Schools Per 1000 of Population
29. Educational Institutions Per 10 Sq. Km of Area
30. Allopathic Healthcare Institutions Per 1000 of Population
31. AYUSH Healthcare Institutions Per 1000 of Population
32. Healthcare Institutions Per 100 Sq. Km of Area
33. Percentage of Households with Electricity Connection
34. Percentage of Households Getting Tap Water from Treated Source
35. Percentage of Households Availing Banking Services
36. Cooperative Society Per 1000 of Population

Indicator number 33, 34, 35 data were not available for the year 1991 so, it was not used while calculating the development level. Whereas these three indicators are considered very crucial while calculating development that's why there are used in calculating level of development for year 2020. The data taken for computing socio-economic development for year 1991 and 2020 was from secondary sources like Census of India and Directorate of economics and statistics, Rajasthan

7.1.1. Level of Socio-Economic Development, 1991

(1) **High level of socio-economic development (Above 0.41):**
This category comprises of three tehsils that are Ladpura (0.77) of Kota district on the top position in the whole region followed by Antah (0.57) and Keshoraipatan (0.42).

(2) **Moderate high level of socio-economic development (0.41-0.21):**

This category also comprises three tehsils that are Jhalrapatan (0.39) followed by Bundi (0.29) and Manoharthana (0.28).

(3) **Moderate level of socio-economic development (0.21-0.01):**

There are three tehsils under this category that are Hindoli (0.12), Baran (0.05), Digod (0.04), Pirawa (0.04) and Nainwa (0.01).

(4) **Low level of socio-economic development (0.01-(-)0.19):**

This category consists of maximum number of tehsils that are Gangdhar (-0.02), Ramganj Mandi (-0.1), Sangod (-0.11), Mangrol (-0.14), Pipalda (-0.14), Chhipabarod (-0.17) and Khanpur (-0.19).

(5) **Very low level of socio-economic development (Below (-)0.91):**

This category consists of six tehsils that are Indragarh (-0.26), Kishanganj (-0.27), Aklera (-0.35), Chhabra (-0.38), Panchpahar (-0.38) and Shahbad (-0.39) of Baran district was found to be on the bottom position in the whole region.

7.1.2. Level of Socio-Economic Development, 2020

(1) **High level of socio-economic development Above 0.31:** There are two tehsils under this category that are Ladpura (0.56) of Kota district on the top position, in 1991 Ladpura was on the same spot as it is in 2020. And the other tehsil is Keshoraipatan (0.46) of Bundi district, it has improved its score in 2020. Ladpura tehsil has maximum facilities and historically it was considered very important and in present context also Ladpura has developed because it is considered as a core tehsil of Kota district, all the infrastructure and industrial growth has been concentrated in Kota city.

(2) **Moderate high level of socio-economic development 0.31-0.11:** This category consists of six tehsils that are Antah (0.29), Jhalrapatan (0.27), Sangod (0.26), Baran (0.23), Bundi (0.22), Manoharthana (0.15). Only Baran and Sangod has improved their score in 2020 when compared with 1991. Jhalrapatan and Baran tehsils have district headquarter in it due to which maximum development has taken place here.

(3) **Moderate level of socio-economic development 0.11 - (-)0.09:** This category comprises of nine tehsils that are Hindoli (0.05), Ramganj Mandi (0.05), Digod (0.02), Pipalda (0.01), Atru (-0.01), Chhipabarod

(-0.04), Nainwa (-0.06), Khanpur (-0.06) and Chhabra (-0.08). Except Ninwa, Digod and Hindoli all other remaining tehsils of this category has improved their score in 2020.

(4) **Low level of socio-economic development (-)0.09 - (-)0.29:** There are four tehsils under this category that are Pirawa (-0.11), Kishanganj (-0.17), Gangdhar (-0.18) and Mangrol (-0.2). Only Kishangang tehsil of Baran district has improved other remaining tehsils of this category has improved their score in 2020.

(5) **Very low level of socio-economic development Below (-)0.29:** This category comprises of four tehsils that are Shahbad (-0.33), Indragarh (-0.38), Panchpahar (-0.46) and Aklera (-0.49) of Jhalawar district is on bottom position in 2020. Only Sahabad has improved its score with very less difference in 2020 other remaining tehsils has shown decrease in their score in 2020 when compared with 1991. In this category majority tehsils lie in the peripheral part of the region and Panchpahar, Akelar, Shahbad borders Madhya Pradesh. Here distance decay rule is applicable while understanding the development level. Other factor of backwardness is the dominance of tribal culture in Shahbad tehsil of Baran district. Lagging tehsils have not performed satisfactorily in all the indicators of socio-economic development resulted in their backwardness.

Table 7.1 : Tehsil-wise Composite Score of Development, 1991 and 2020

S.No.	Tehsils	Composite Score 1991	Composite Score 2020
1.	Baran	0.05	0.23
2.	Kishanganj	-0.27	-0.17
3.	Shahbad	-0.39	-0.33
4.	Atru	-0.09	-0.01
5.	Chhabra	-0.38	-0.08
6.	Chhipabarod	-0.17	-0.04
7.	Antah	0.57	0.29
8.	Mangrol	-0.14	-0.2
9.	Hindoli	0.12	0.05
10.	Nainwa	0.01	-0.06
11.	Indragarh	-0.26	-0.38

12.	Keshoraipatan	0.42	0.46
13.	Bundi	0.29	0.22
14.	Khanpur	-0.19	-0.06
15.	Jhalrapatan	0.39	0.27
16.	Aklera	-0.35	-0.49
17.	Manoharthana	0.28	0.15
18.	Panchpahar	-0.38	-0.46
19.	Pirawa	0.04	-0.11
20.	Gangdhar	-0.02	-0.18
21.	Pipalda	-0.14	0.01
22.	Digod	0.04	0.02
23.	Ladpura	0.77	0.56
24.	Ramganj Mandi	-0.1	0.05
25.	Sangod	-0.11	0.26

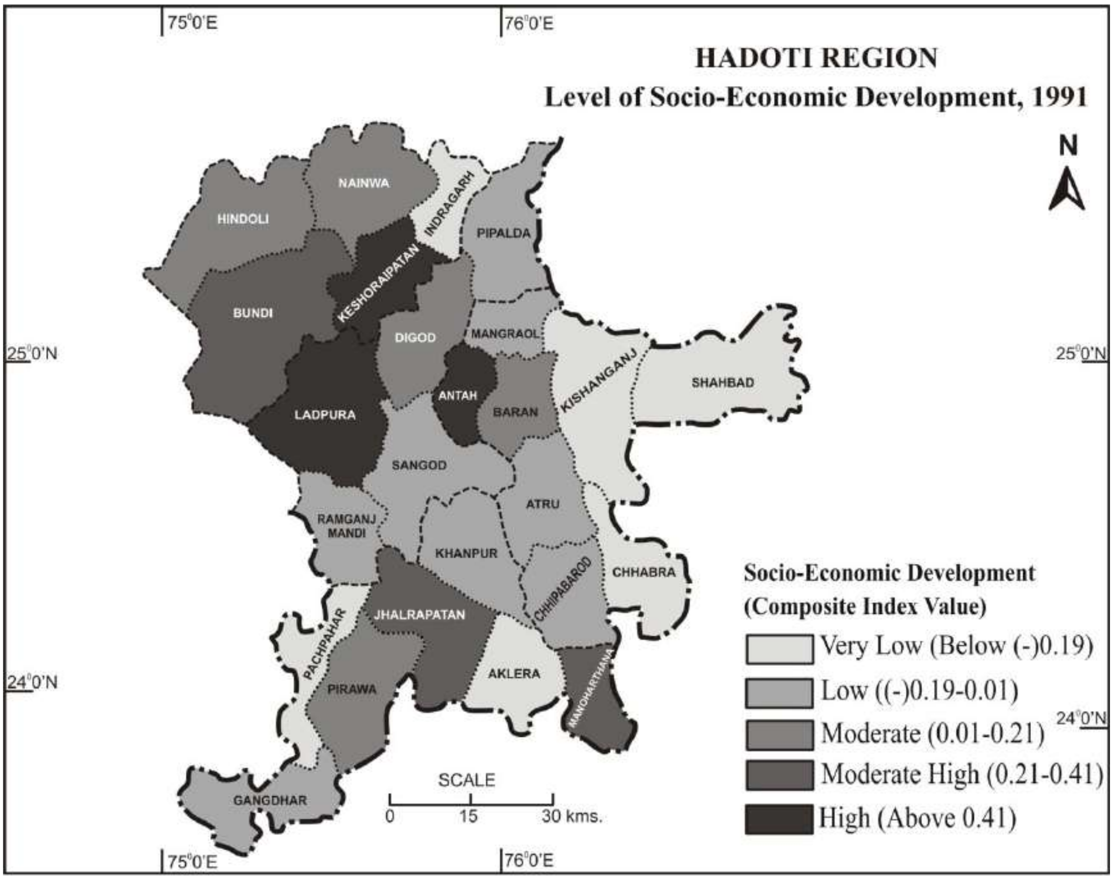
Source: Computed from 36 indicators

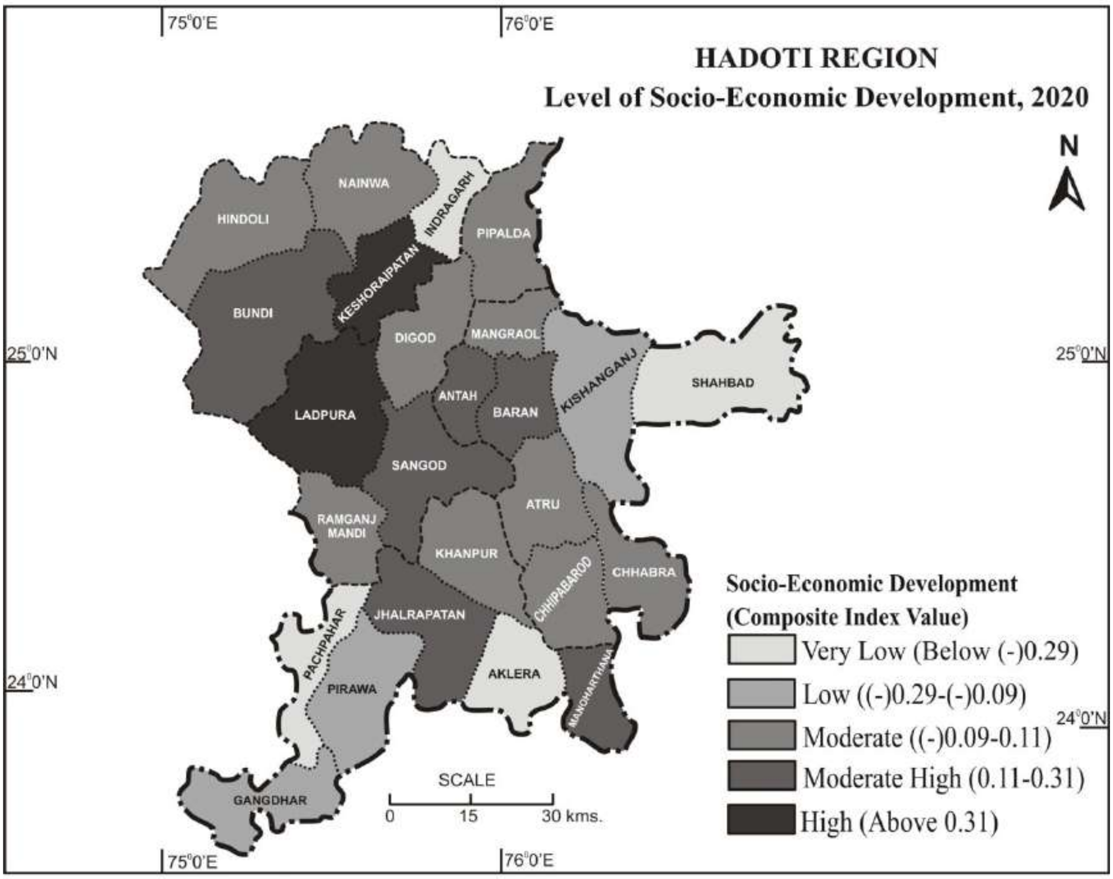
Table 7.2 : District-wise Tehsils in Different Category in Level of Socio-Economic Development, 1991

S.No.	Level of Socio-Economic Development	Baran	Bundi	Jhalawar	Kota	Total Tehsils
1.	High	1 (12.5)	1 (20)	0 (0)	1 (20)	3 (12)
2.	Moderate High	0 (0)	1 (20)	2 (28.57)	0 (0)	3 (12)
3.	Moderate	1 (12.5)	2 (40)	1 (14.28)	1 (20)	5 (20)
4.	Low	3 (37.5)	0 (0)	2 (28.57)	3 (60)	8 (32)
5.	Very Low	3 (37.5)	1 (20)	2 (28.57)	0 (0)	6 (24)
Total		**8 (100)**	**5 (100)**	**7 (100)**	**5 (100)**	**25 (100)**

Source: Computed from table 7.1

Map-7.1





Source : Computed by author

From Table 7.2 it can be analysed that in 1991 maximum tehsils are in low development category in the Hadoti region and it accounts for 32% of tehsils of the region, followed by very low developed category which consists of 24% of tehsils in it. Based on the statistics it can be concluded that in 1991, 56% tehsils of Hadoti region are lagging behind in development. In Baran district low and very low developed tehsils are 75%, this shows that out of four district Baran district is the most backward district in the region and it is followed by Jhalawar district which accounts for 57.14% tehsils in low and very low developed category. Kota district maximum tehsils are under Low development category which shows concentration of development in certain tehsils only. High level of development can be seen in Kota and Bundi district both of them accounts for 20% of tehsils in this category. Bundi district has maximum share of tehsils in high and moderate high development category that is 40% tehsils. In moderate development category Bundi has 40% of tehsils which is maximum percentage share out of four districts. Overall, in the Hadoti region 24% of tehsils are high and moderate high developed. Bundi district has least percentage of tehsils that is 20% in very low development category. Kota district has no tehsil under very low development. Out of all four districts Bundi is found to be the most developed district in the Hadoti region it accounts for 60% tehsils in high, moderate high and moderate development category.

From Table 7.3 level of socio-economic development of different districts can be analysed. In 2020 Moderate development category has maximum share of tehsils that is 36% in the Hadoti region, followed by Moderate high category that is 24%. When development level is compared with 1991 there is improvement recorded in the moderate development category in 2020. Low and very low developed tehsils share is 32% which has been improved by 24%. Low development category has improved by 8% in 2020 similarly moderate high development tehsils increase has been recorded in 2020 by 12%. High developed tehsils have shown decrease in their share by 4% in 2020. Overall, all Hadoti region has improved in 2020 by reducing the percentage share of tehsils from low and very low development category.

From individual district point of view Jhalawar district has maximum share of tehsils in low and very low development category that is 57.14%, earlier in 1991 this position was held by Baran district but in 2020 Baran district has improved its development levels. The second most lagging district in 2020 is Baran district with 37.5% of tehsils in low and very low development category. Bundi has only 20% tehsil in very low category. Kota has no tehsil in both low and very low development, Kota has also improved with respect to 1991. There are no high developed tehsils in Baran and Jhalawar district. Kota and Bundi has 20% tehsil share in high developed category. All the Kota districts tehsils fall in high, moderate high and moderate development category. In Bundi district 80% tehsils are in high, moderate high and moderate level of development. Based on the statistics it can be analysed that Kota district has the maximum development and it is followed by Bundi in 2020.

Table 7.3: District-wise Tehsils in Different Category in Level of Socio-Economic Development, 2020

S.No.	Level of Socio-Economic Development	Baran	Bundi	Jhalawar	Kota	Total Tehsils
1.	High	0 (0)	1 (20)	0 (0)	1 (20)	2 (8)
2.	Moderate High	2 (25)	1 (20)	2 (28.57)	1 (20)	6 (24)
3.	Moderate	3 (37.5)	2 (40)	1 (14.28)	3 (60)	9 (36)
4.	Low	2 (25)	0 (0)	2 (28.57)	0 (0)	4 (16)
5.	Very Low	1 (12.5)	1 (20)	2 (28.57)	0 (0)	4 (16)
Total		**8 (100)**	**5 (100)**	**7 (100)**	**5 (100)**	**25 (100)**

Source: Computed from table 7.1

Level of development varies in the Hadoti region some tehsils are doing good whereas some tehsils are lagging behind every tehsil performance on the parameters of development depends on historical factors, demographic attributes, agricultural development, industrial development along with the infrastructural development with special emphasis on education and health facilities. Regional disparities in the level of development of the Hadoti region can be seen in both 1991 and 2020. Based on the existing data set it can be noted that target specific policies and programmes are required for specific district so that holistic development of Hadoti region can be done. Development is a dynamic concept which keeps on evolving with time so, time-based analysis of Hadoti region becomes very important in assessing the development patterns.

7.1.3. Hypothesis test results

To check statistically that Hadoti region has improved in the level of socio-economic development, hypothesis has been tested using T-Test using paired two sample means method. The rational behind choosing the paired two sample means methods is because two data points (1991 and 2020) are being compared with respect to socio-economic development. The composite index value has been taken from the same region twice. This method is considered appropriate for comparing independent two sample test. Both the data set of 1991 and 2020 are normally distributes as per the Kolmogorov Smirnov test of normality.

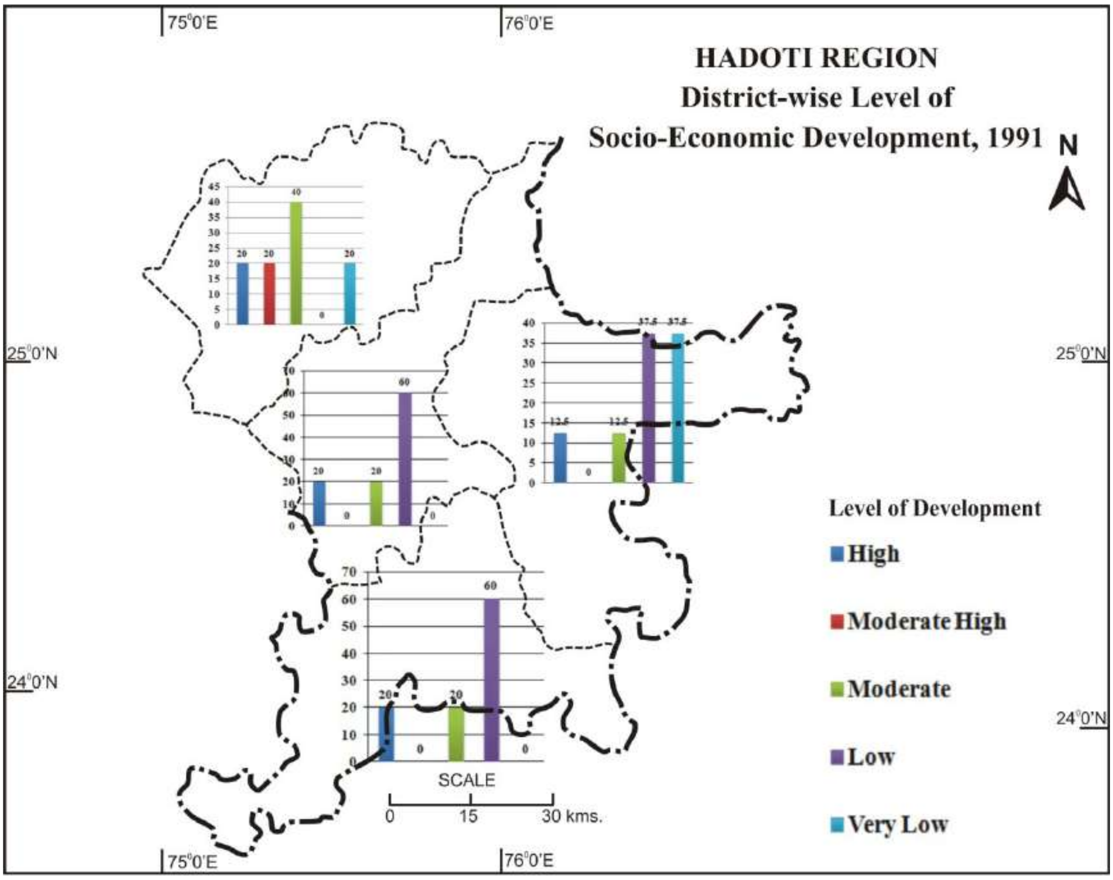
Null hypothesis (H0): There is no significant difference in socio-economic development level of 1991 and 2020.

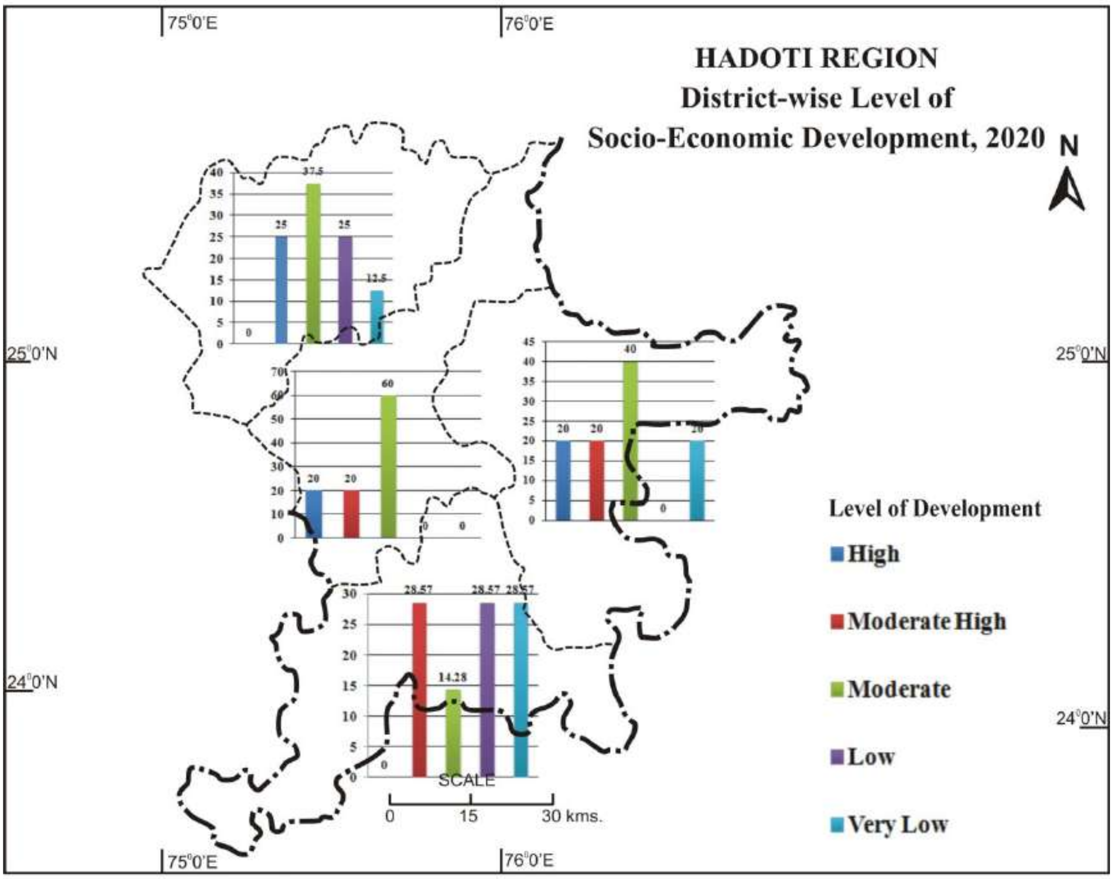
Alternative hypothesis (Ha): There is significant difference in socio-economic development level of 1991 and 2020.

The hypothesis has been tested at the significance level of 0.05 and the observed p-value was 0.5 which is greater than significance level of 0.05. this statistically states that we fail to reject the null hypothesis. This shows that the socio-economic development of Hadoti was same in both the comparative data set of 1991 and 2020. The test results do not provide sufficient evidences to suggest that Hadoti region's development has been improved or changed between 1991 and 2020. This result also gives insight that Hadoti region in terms of development level has remained stable during 1991 till 2020.

The indicators which are chosen for computing development level are in proportion to the population size. The positive changes in the indicators have been seen between the period of 1991 and 2020 but these positive changes were in absolute values of the indicators example: increase in number of primary, secondary schools when compared with 1991 in 2020, where as when number of primary and secondary schools per 1000 of population was calculated they had not increased in proportion to the population. This shows that there is a huge gap between haves and have nots. This hypothesis test results shows that there is a huge potential for the development of Hadoti region. The level of socio- economic development has been analysed both temporally (longitudinally) and spatially so that development levels can be analysed in a holistic manner. Acceptance of null hypothesis opens new door for exploring other dimensions of the development and this paves the way that in future further temporal analysis of the development is required so that we can check that positive growth in social- economic aspects is taking place in the region or not. Development is a dynamic concept it keeps on changing evolving with time and with passing time methods of computing development should be evolved.

MAP-7.2





Source : Computed by author

7.2. Matrix of Correlation

Correlation helps in establish the relationship between two variables. For assessing the degree of dependency of variables on each other and studying cause and effect relation can be done with the help of correlation. It depicts the relative movement between the two variables, which is linear in nature. It shows the extent and direction of relationship between the variables. In correlation two variables are represented as X and Y, here X is independent variable and Y is dependent variable. For calculating the coefficient of correlation Karl Pearson formula.

$$r=\frac{\sum(X-\bar{X})(Y-\bar{Y})}{\sqrt{\sum(X-\bar{X})^2}\sqrt{\sum(Y-\bar{Y})^2}}$$

Where,

$\bar{X}$ is mean of variable X

$\bar{Y}$ is mean of variable Y

r is coefficient of correlation

Coefficient of correlation values lies between -1 to +1. Coefficient of correlation value of +1 means positive relationship between the two variables and -1 means there is negative correlation between the variables. When the coefficient of correlation value is zero means there is no relationship between the variables

7.2.1. Correlation between Composite Development Index and Socio-Cultural Development

Coefficient of correlation was calculated for year 1991 and 2020 between fourteen indicators of socio-cultural development and composite development index. Table 7.4 is showing the results obtained after the calculation. Ten indicators are showing positive correlation whereas four indicators have negative correlation.

Ten indicators have positive correlation and four indicators has negative correlation. It is very important to understand that correlation does not implies to causation always, it only helps in understanding the relationship in better way. Density of population in showing positive correlation with composite development level in both 1991 and 2020 it implies that region has strong social networks and human capital which can be beneficial in elevating the economic growth. Literacy rate correlation with composite index of development has become positively stronger in 2020 when compared with 1991. Literacy is very important indicator in overall development of the region it depicts better human resource in the region, value of coefficient is

+0.58 in 1991 and +0.51 in 2020. Similarly gap in male female literacy has shown positive correlation which is indeed a very crucial indicator for literacy representativeness for different gender and shows elevates gender equity and empowerment in the region. When women also get equal access to education it helps in getting better jobs and empowers them in decision making which positively impact other socio-cultural indicators. Percentage of urban population has positive correlation; higher the urbanization shows better infrastructure and services more economic opportunities which act as pull factor for people living in rural areas of the region. Percentage of main worker, density of workers and percentage of household industry workers all three have positive correlation but it does not have very strong correlation. These factors are very important in understanding the labour force participation in economic activities, economic productivity, employment opportunities in the region, income and standard of living along with human capital development. Other workers include people engaged in tertiary and service sector which implies to better income and higher economic productivity hence it is showing positive correlation of +0.51 in 1991 and +0.44 in 2020. Correlation between percentage of agricultural labourer and composite index of development is showing weak positive correlation, understanding relationship is very complex This indicates that region has more resilience towards traditional labour incentive farming methods which results in lower agricultural productivity when compared with high technology driven farming region. However, this trend will reverse with time when region will progress in the direction of economic diversification and more urbanization will take place. Dependency ratio has negative correlation of -0.39 in 1991 and -0.19 in 2020, this shows there is higher economic burden on the working population. Higher dependency ratio also impacts labour market and productivity. Higher dependency also indicates towards the demographic transition, region has reached to a stage where it has declining fertility and increasing life expectancy, here in the region actual bases of population is higher which if utilised properly will act as driver of social and economic growth. Infant mortality rate has negative correlation with composite index of development in 1991 it was -0.05 and in 2020 it established very weak positive relation with coefficient value of +0.01 this signifies that healthcare infrastructure is often associated with better healthcare because of improved accessibility and affordability to medical facilities. Particularly with infant mortality other factors also plays significate role these factors are nutrition and sanitation, public awareness and education, economic conditions of the society and government health policies. When it comes to the negative correlation of the sex ratio with composite development index, this relationship becomes very complex to be established because there are multiple socio-cultural and economic factors which defines it. However, it is worth emphasising moving towards gender equality and addressing gender related imbalance paves way forward for sustainable development of the region.

Table 7.4: Correlation between Composite Development Index and Socio-Cultural Development, 1991 and 2020

S.No.	Indicators of Socio-Cultural Development	Value of Coefficient (1991)	Value of Coefficient (2011)
1.	Density of Population	+0.58	+0.51
2.	Sex Ratio	-0.07	-0.33
3.	Literacy Rate	+0.43	+0.51
4.	Gap in Male-Female Literacy Rate	+0.28	+0.47
5.	Percentage of Urban Population	+0.58	+0.5
6.	Percentage of Main Workers	+0.29	+0.18
7.	Crude Work Participation Rate	-0.29	-0.06
8.	Density of Workers	+0.53	+0.5
9.	Percentage of Agricultural Labourers	+0.33	+0.36
10	Percentage of Cultivators	-0.43	-0.3
11.	Percentage of Household Industry Workers	+0.38	+0.17
12.	Percentage of Other Workers	+0.51	+0.44
13.	Dependency Ratio	-0.39	-0.19
14.	Infant Mortality Rate	-0.05	+0.01

Source: Computes by author based on secondary data of 1991 and 2020

7.2.2. Correlation between Composite Development Index and Agricultural Development, 1991 and 2020

Coefficient of correlation was calculated for year 1991 and 2020 between eleven indicators of agricultural development and composite development index. Table 7.5 is showing the results obtained after the calculation. Nine indicators are showing positive correlation whereas two indicators have negative correlation.

In the Hadoti region agriculture is very important economic activity understanding the role of indicators related to agriculture in development becomes very crucial. Cropping intensity of agriculture is having positive correlation with composite index of development, but it is not very strong correlation but it refers that when cropping intensity increases the development level also increases. Hadoti region has inclination towards the higher cropping intensity. Per Capita Agricultural Production has shown positive correlation with composite index of development that is +0.05 in 1991 and +0.26 in 2020. This signifies that production level determines the economic growth, food security, rural development, pave way for adoption of newer technology and innovation it can be seen that correlation between the two is becoming stronger over the time. Higher production also helps in market integration both at domestic and international level. Productivity of Food Grains and composite index of development coefficient of correlation was +0.25 in 1991 and in 2020 it was +0.41, it increased with time suggest that more the productivity of food grain more the level of development. This signifies that region is moving towards food security and there are lower chances of hunger and malnutrition in the region which will in the long run will help in poverty alleviation. Percentage of gross irrigated area to gross area sown correlation between composite index of development was +0.38 in 1991 and +0.4 in 2020. This refers to more the irrigated area more will be the agricultural productivity and increasing correlation also shows that sources of irrigation has been increased over the time in the Hadoti region.

Table 7.5: Correlation between Composite Development Index and Agricultural Development, 1991 and 2020

S.No.	Indicators of Agricultural Development	Value of Coefficient (1991)	Value of Coefficient (2020)
1.	Cropping Intensity	+0.27	+0.25
2.	Per Capita Agricultural Production	+0.05	+0.26
3.	Productivity of Food Grains	+0.25	+0.41
4.	Percentage of Gross Irrigated Area to Gross Area Sown	+0.38	+0.42
5.	Percentage of Gross Sown Area Under HYV Seeds	+0.43	+0.33
6.	Consumption of Chemical Fertilizers Per Hectare of Gross Sown Area	+0.33	+0.13
7.	Percentage of Net Irrigated Area by Tube well to Total Net Irrigated Area	-0.01	+0.08
8.	Percentage of Net Irrigated Area by Canal to Total Net Irrigated Area	+0.35	+0.34
9.	Gross Sown Area Per Tractor	-0.22	-0.44
10.	Density of Livestock	+0.08	-0.26
11.	Livestock Facilities	+0.69	+0.69

Source: Computes by author based on secondary data of 1991 and 2020

There is a weak positive correlation between percentage of gross sown area under HYV seeds and consumption of chemical fertilizers per hectare of gross sown area with composite index of development it suggests that region does not have that of agricultural productivity and technological adoption, knowledge transfer and resource management, this shows that region's agricultural development needs more inputs. There is a weak positive correlation between composite index of development and percentage of net irrigated area by tube well to total net irrigated area and percentage of net irrigated area by canal to total net irrigated area this signifies that other sources of irrigation apart from monsoon are very important in determining the agricultural production in the region however, with the statistics it can be noted that region has improved irrigation facilities with time. Correlation between livestock facilities and composite index of development was +0.69 in both 1991 and 2020. It refers that good livestock medical facilities and other related infrastructure is very important for healthy livestock in the region, livestock related productivity is very crucial in diversifying the sources of farmer's income. Correlation between gross sown area per tractor and composite index of development coefficient value was -0.22 in 1991 and -0.44 in 2020 it depicts that lack of farm mechanization. Density of livestock and composite index of development has negative correlation in 2020 which can be looked with a perspective that region is having occupation diversification and livestock sector is losing its scope.

Table 7.6: Correlation between Composite Development Index and Infrastructural Development, 1991 and 2020

S. No.	Indicators of Infrastructural Development	Value of Coefficient (1991)	Value of Coefficient (2020)
1.	Primary Schools Per 1000 of Population	+0.41	+0.17
2.	Upper Primary Schools Per 1000 of Population	+0.68	+0.35
3.	Senior Secondary Schools Per 1000 of Population	+0.72	+0.63
4.	Educational Institutions Per 10 Sq. Km of Area	+0.84	+0.64
5.	Allopathic Healthcare Institutions Per 1000 of Population	+0.39	+0.25
6.	AYUSH Healthcare Institutions Per 1000 of Population	+0.47	+0.47
7.	Healthcare Institutions Per 100 Sq. Km of Area	+0.7	+0.66
8.	Percentage of Households with Electricity Connection	DNA	+0.5

9.	Percentage of Households Getting Tap Water from Treated Source	DNA	+0.36
10.	Percentage of Households Availing Banking Services	DNA	+0.04
11.	Cooperative Society Per 1000 of Population	+0.65	+0.54

Source: Computes by author based on secondary data of 1991 and 2020
DNA: Data Not Available

7.2.3. Correlation between Composite Development Index and Infrastructural Development

Coefficient of correlation was calculated for year 1991 and 2020 between eleven indicators of infrastructural development and composite development index. Table 7.6 is showing the results obtained after the calculation. All the infrastructure related indicators are showing positive correlation. It signifies that infrastructure is very important for the development of the Hadoti region. For three indicators that are percentage of households with electricity connection, percentage of households getting tap water from treated source and percentage of households availing banking services recent data was not available that's why census data of 2011 has been used.

There is positive correlation between composite index of development and primary, upper primary, secondary and senior secondary schools per 1000 of population this signifies that education plays very crucial role in overall development of the Hadoti region, when a greater number of schools become available to the population it improves overall literacy rate which positively favours in development of human capital with social advancement which helps in fetching better economic opportunities. This also suggests that government is investing in right direction which will help in improving the overall level of development of the region. Educational institutions per 10 Sq. km of area correlation coefficient value is +0.84 in 1991 and +0.64 in 2020 it indicates more the density of educational institutes more will be the level of development. Accessibility to educational institutes is very important as it helps in elevating the literacy rate. Allopathic healthcare institutions per 1000 of population correlation with composite index of development was +0.39 in 1991 and in 2020 there was weak positive coefficient of correlation of +0.25, it true that healthcare and development goes hand in hand but accessibility and affordability of medical facilities plays significant role in overall wellbeing of people living in the region. Correlation between composite index of development and AYUSH healthcare institutions per 1000 of population was +0.47 in both 1991 and 2020. AYUSH healthcare institutions are important in improving the way of living in a healthy manner in a long run.

There was positive correlation between healthcare institutions per 100 sq. km of area and composite index of development implies that people living in the region are having access to healthcare facilities which positively impacts in reducing mortality rate and helps in fighting communicable and non-communicable diseases. This positive relation also shows that government is investing in right direction. Correlation between composite index of development and percentage of households with electricity connection is +0.5 in 2011. Electricity connection is associated with improved quality of life for individual and communities and this positively impact social development. It supports infrastructural development and economic growth of the region. There is a positive correlation between composite index of development and percentage of households getting tap water from treated source, coefficient of correlation is +0.36 in 2011. This indicates that region has presence of functional water supply but it is not established properly. Water form treated source is very important in promoting health and sanitation which reduces risk of waterborne diseases in the region. It also reflects that region is putting efforts in safeguarding water resource and aiming towards protecting the environment. There is a weak positive correlation with percentage of households availing banking services in 2011, access to banking services contributes in economic development, when greater number of households availing banking services indicates towards financial inclusion which facilitates savings, access to credit and capital and investment and the people of the region are having financial literacy. It is also important for having financial stability in the region. Correlation between composite index of development and cooperative society per 1000 of population in 1991 it is +0.65 and in 2020 it is +0.54. Cooperative society plays significant role in promoting overall development, it helps in economic growth, social empowerment because they are inclusive in nature and abides to democratic decision making and encourages participation of marginalised section, it also helps in decision making and facilitates overall holistic and sustainable development of the region.

All the indicators of socio-economic development are vital in improving the level of development of the Hadoti region. Correlation matrix is very important in understating the relationship between every indicator with composite index of development. However, correlation cannot be miss understood as a factor of causation but it is significant in understanding role of indicators which they are have in development. Along with this policy making can be done in right direction so that maximum benefit can be taken out for the communities living in the Hadoti region.

CONCLUSION
AND
SUGGESTIONS

Conclusion and Suggestions

Conclusion

Socio-economic changes in the region results in development disparities which can be seen widely across the space. Development disparities are prominent in the developing countries. These development disparities can be observed at different scales that are inter and intra-regional, rural and urban, rural and rural, urban and urban. The development trajectory followed by India resulted in imbalanced regional development, which created a need for looking development from regional perspective and from the past experiences it became clear that that all the regions are physically and culturally different from each other, which creates different development requirements and it is necessary to address them differently. Hadoti region of Rajasthan holds very unique position in the state. Hadoti region is a distinct geomorphic region of Rajasthan state. Region is surrounded by Vindhyan hill ranges and malva plateau. In Baran district sedimentary rocks belonging to Vindhyan super group occupy north western part and the Baran district is been divided into rocky upland, pediplains and alluvial plains. Geological formation of Baran district consists of sandstone, limestone and shale of Bhander group of Vindhyan super group, the basement overlain by Deccan trap basal. At some places a thin alluvial cover is also found. Bundi district has flat to undulating terrain with small isolated mounds. It is divided into two parts by northeast-southwest trending Vindhyan range. District has topographical gradient from southwest to northeast in southern part of the range and the northern part of the ridge the gradient is generally from west to east. Highest elevation in Bundi district is found in the southern part. The Jhalawar district lies at the edge of Malwa plateau which has an area of low hills and shallow plains. The district can be categorised under 5 physical divisions that are the Mukandhara range, the hills of Dag, the plateau region with low rounded hills, Central plains of Pachpahar and Jhalarapatan, and the plain of Khanpur between two arms of Mukandhara. The south Jhalawar has characteristic of the Malwa plateau and it has area of rounded bare hills interspersed by plains. The Jhalawar plain is a wide belt which stretches from Bhawanimandi in the west to Asnawar in the east and it is bounded by Mukandhara hills in the northern, eastern and southern side. Physiographically, Kota district has undulating topography with gentle plains, it can be categorized as rugged topography. Slopes from south to north. In the south of the district there is 145 km long Mukandara range of Vindhayn hills. Maximum hill height is in village Borabas in Ladpura block and minimum hill height is found at Khatoli in Itawa block. Southern part of the Baran district constitutes of basaltic flow and about 16% area of Baran district is covering Chhabra and Chhipabarod blocks. North eastern part of district with Anta, Atru, Baran, Kishanganj and

Shahbad block has sandstone, limestone and shale of lower Bhander group with makes 84% of area of the district. The exposed rocks are part of meta-sedimentaries belonging to Vindhyan super group which is overlain by Deccan basal and quaternary alluviam. Geologically, the rock formation of Bundi district in upper part that is in northeast - southwest belongs to Bhilwara super group and lower part of the district belongs to Vindhyan super group In the Bhilwara Super Group rocks of Hindoli, Mangalwar & Jahajpur Groups are exposedon the surface. Vindhyan sedimentary sequences have occupied northeastern to southern part of the Bundi district. These are categorized as upper Vindhyan Super Group (100-600 m.y.) and it is separated from Bhilwara Super Group by a major reverse fault known as Great Boundary Fault. The Groups of Vindhyan Super Group i.e., Kaimur, Rewa & Bhander and their formations are well exposed in the district on the upper surface. Geological Framework of Jhalawar district is underlain by rocks of Vindhyan super group and Deccan traps. Around 60% of the district is covered by Deccan traps. The Vindhyans category comprises of lower and upper Vindhyans which is represented by Jhalrapatan sandstone, Suket shale and limestone, Kaimur sandstone, Rewa shale, sandstone and conglomerate, Ganugarh shales, whereas in lower Bhander sandstone and limestone. The Vindhyan sandstone and shale form linear hills from north west to south east. These hills are exposed around Jhalawar town and to its north east and north west. These rocks in the district are overlain by twelve basaltic flows. Near Dag and Kolvi, the flows have undergone wide spread laterization. Both fossiliferous and non-fossiliferous clay, chert, limestone beds are also present in the area. The entire region of Dag, Pirawa, Manoharthana and parts of Bakani and Jhalrapatan blocks are covered by Deccan traps. The northern part of the Jhalawar district consists of Khanpur block is occupied by sandstone and limestone of lower Bhander group. The hill ranges comprising of shale, sandstone and conglomerates belong to Rewa and Kaimur groups of upper Vindhyan. Semri group belonging to Lower Vindhyan group is exposed in parts of Jhalrapatan block. Geologically, Kota district consists of Vindhyan super group which forms the part of Great Vindhyan basin. Further Vindhyan Super Group is divided into Khorip, Kaimur, Rewa and Bhander Groups comprising Sandstones, Shales and Limestone. 70% of the area in the district is of Bhander group. Deccan trap formation is found in the southern part of the district which consists of Khairabad block. Rewa and Kaimur group of rock are found in small patches in Khairabad, Sangod and Ladpura block. Geomorphology and geology make the Hadoti region very diverse and distinct. The physiography of the region makes its potentially fit for mineral exploration and development of the subsidiary industries in the region which can further boost the economic development of the region.

The temperature data of Hadoti region has been analysed from 1990-2020, as per the data the average annual temperature was recorded 27.24°

Celsius. Between 1990-2000 average annual temperature was 27.08° Celsius. The period between 2000-2010 it was recorded 27.26° Celsius and between the period of 2010-2020 it was 27.42° Celsius. Which shows that there is slight increase in the average annual temperature. Generally, region has very hot summers dry and winters are very cold. The average relative humidity between the period of 1990-2020 has been recorded 47.44%. Hadoti region falls on south-eastern part of Rajasthan, which is on the windward side of the Aravalli ranges so, it receives fair amount of rainfall. The data of rainfall in Hadoti region has been analysed from 1970 till 2020. From statistical calculation it can be derived that rainfall is not highly inconsistent within the region but district wise it can be observed that rainfall is erratic. The normal annual rainfall in the Hadoti region is being recorded as 821.2 mm. the rainfall in the region starts from July and last till September. In the past ten years i.e., from 2010-2020 the average annual rainfall has increased in the region. Baran district comes under the arid to semi-arid type of climatic zone according to the meteorological classification given by India Meteorological Department. The normal annual average rainfall for the district between 1970-2020 is 894.12 mm. However, the annual average rainfall recorded between the period 2000 – 2011 has been 707 mm. from 2011 to 2020 average annual rainfall was recorded 1083.98 mm. The normal average annual rainfall in the Bundi district is 681.3 mm. Since 1973 till 2020, it was observed that the distribution of rainfall is quite uniform in the district except for Indergarh block where the average annual rainfall of 50 years is higher than other blocks. The amount of rainfall received by the district is fairly good. District average annual rainfall is 681.3 mm. Average annual rainfall between 1970-2020 recorded in the Jhalawar district 934.5 mm. The western part of the district has lesser rains than the eastern part of the district. However, the annual average rainfall recorded between the period 2000 – 2011 has been 792.22 mm and from 2011 to 2020 average annual rainfall was recorded 1104.07 mm. Average annual rainfall in the Kota district for the period 1970- 2020 is 777.34 mm. However, average annual rainfall for the period 2001 to 2011 is 746.64 mm and from 2011 to 2020 average annual rainfall was recorded 875.5626 mm. The Hadoti region falls in river Chambal basin and the region is being drained by perennial Chambal River along with its tributaries. The rivers and the streams of the Baran district belong to the Chambal River system. The rivers in the district drain through undulating plain that slopes from southeast to northwest. In Bundi district Chambal is the most prominent River and there are some important small tributaries like Dungari, Bhimlat, Mej, Bajian, Sugll and Kupalet. The rivers and streams of the entire Jhalawar district belong to the Chambal system. Except in the Gangdhar tehsil, the general flow of the river is from south to north. The rivers of Jhalawar district can be divided into two groups: the western group and eastern group. The western rivers consist of Ahu, Piplaj, Kyasri, Kantli, Rawa, Kalisindh and Chandrabhaga. The eastern rivers constitute of Parwan, Andheri, Newaj, Ghar and Ujar. Here rivers have deep bed with the result the water level is below that of the surrounding area. Drainage density in most part of the Jhalawar district varies from 0.5 to 0.7 km/km2. Drainage density lie between 0.7 to more than1km/km2 in the south-eastern and south western parts of the district. In the north central part of the district, drainage density is low and ranges between 0.3 to 0.5 km/km2.In Kota district also Chambal River is the major river. The land slopes from south to north and it is drained by the river Chambal and its tributaries. The Chambal River runs through rugged topography with undulating plains. Chambal is the major perennial river in the district. Its tributaries are Kalisindh, Parvan and Parvati, which are also perennial in nature. There are mixed variety of soil category can be found in the Hadoti region. In Baran district majority soil is alluvial in nature which are generally non-calcareous. Soils colour varies from dark brown to black, which is mainly found in plains. Black Kachri soils are found in Baran and Mangrol tehsils which is highly fertile. In the southern and eastern part of the district red gravelly loam hilly soils are found. In Bundi district five types of soils are found that are lithosol and regosols of hills which covers 21.74% area of the district in parts of Talera, Hindoli and Nainwa. Yellowish – brown soils of foot hills with 16.14% area of the district in parts of Hindoli and Nainwa. Recent alluvium with 33.26% area of district n parts of Talera, and Keshoraipatan. Brown soils-saline phase it covers 13.99% area of the district it is found parts of Hindoli and Nainwa. Lastly Black soils covers 14.87% area of Bundi district and it is found in parts of Talera. In Jhalawar district major soil category is black cotton soil. Recent alluvium in plain area and regosols are present in few pockets of the district. In Kota district majority soil is alluvial in nature. Soil colour varies from deep to very deep brown with texture varying from clayey loam to clay and it is generally non-calcareous. This type of soil occurs in plains. The climatic conditions, drainage basin of Chambal River provides the natural irrigation facilities, from alluvial to mixed black soil is found which is considered good for diverse corps ranging from coarse grain to rice and horticultural crops in the region which make it suitable for further agricultural development. The geographic area of the Hadoti region is 24204 Sq.Km and the area under the forest cover is 1335.43 Sq. Km which 25.6% of area. The maximum forest cover is found in Baran district which is around 32.16%. Lowest forest cover is found in Jhalawar District with 20% of area. Bundi district has 27.14%area under forest followed by Kota district which has 25.6% area under forest. Baran district comes under the central India floristic province and this region in botanical terms supports teak forests. The forest's main composition is Kaldhi (Anogeissus pendula forests), Sagwan (Tectona grandis forests) and grasslands. The Kaldhi forests are gregarious in nature and the common associates of dhonkara, are khair, bor, gurjan, jhinjha, tendu, kakon (Flacourtia indica), chhola and khirani etc. In the upper reaches and plateau region of the district, it has dhav (Anogeissus latifolia), salar, gurjan and kadaya. Kaldhi trees which are generally of 5 m high. These forests are commomly found in Chhabra, Chhipabarod, Shahbad and Shergarh. Chhabra, Kishanganj and Nahargarh ranges have the Sagwan forests. Its growth is superior in Soondas (cut up lands) of river Parvati. Sagwan trees varies in height from 3 to 7 m. It provides timber which is used for furniture. Inferior quality teak is found on the northern most limits in India. It is commonly associated with chhola, khair, kaldhi, salar, tendu, safeddhav, gurjan, kalam and sadadia. The grasslands are also found in the district and the main grasses found here are Aristida, Ergrostis, Chloris, Heteropogon and Thomaeum etc. Important forest products here are Tendu patta and other items are fireweed honey and wax grass etc.In the Bundi district forest are divided into five ranges that are, Bundi, Nainwa, Hindoli, Baroondhan and Kaprain. The forests in the Bundi district fall under the subsidiary edaphic type of tropical dry deciduous forest as per Champion's classification. The hills in the district are well stocked with forests. Commonly found species are Dhokra (Anogeissus pendula) and Kher (Acacia Catechu). Other tree species are Babul (Acacia Arabica), Beri (Zizyphus Jujuba), Khirni (Wrightia tomentosa), Tendu (Diospyres melanoxylon), Salar (Boswellia serrata), and Khejra (Prosopiesspecigera). The forest products are timber, charcoal, grass, honey and gum. Katha is extracted from the 'Kher' trees and the Khirni wood is extensively used for making wooden toys while tendu leaves are used for making "beedi". The leaves of Dhokra tree are used for tanning leather and its wood provides props, rafters and agricultural implements for local use. In the Jahlawar district forests are largely of Kaldi (Anogeissus pendula) sub type. Anogeissus pendula generally occupies the lower and gentler slope of hills in the district but also extends to the tops of small hillocks and ridges with the good quality soil. With respect to flora, the district categorized in two main sub-divisions - southern tropical dry deciduous forests and the subsidiary edaphic type of dry tropical forest. The forest, which have scattered of teak (tectoma grandis) are found in the Manoharthana and Aklera forest ranges. The common varity of teak are the Dhokra (Anogeissus Latifolia), Tendu (Diospyros Malanoxylon), Khair (Acacia Catechu), Gurjan (Lannea Caromandelica), Bahera (Terminallabellerica), Salaran (Boswellia Serata), Mohwa (Bassia Latifolia), Beel (Aeglemarmelos), Achar (BuchananiaLatifolial),Kulk (Streceulia),Salar (TermnaliaTomntosa), Gatbor (ZizyphusXylopyra). Major grasses found here in the district are Ratada, Khhas, Posad and Sum.The Kota district has a rich forest belt. The forests in the district are mainly concentrated in the south-western and central portions on the Mukundara hills. The main sub-types of forests are Anogeissus Pendula Forest, Miscellaneous Forest and Babul (Acacia Arabica Wild) are found in the district. The main variety of flora species found in Anogeissus Pendula forests are Dhokra (Anogeissus latifolia wall) which are mixed with Gurjan (Lannea coromandelica HouttMerr), Bel (Aegle marmelos), Tendu (Diosoyros) Tomentosa Roxb) etc. And the miscellaneous forests include Khejra (Acacia leucophlaea Willd), Khair

(Accia catechu willd), Bel (Aegle marmelos), Kalam (Kadam) (Staphegyneparvifolia Roxb), Amaltas (Cassia fistula Linn), Bahera (Terminalia belerica Roxb), Gurjan (Lannea coromandelica), Kohra (Terminalia arjuna), etc. The main variety of flora found in forests of the third sub-type is Babul mixed with Khejra (Acacia leucophloeawilld). Other trees found in the Kota district are namely, Dhau (Anogeissuslatifolia wall), Bahera (Terminalia belerica Roxb), Mahuwa (Madhuca indica Grrel), Karaya or Kara (SterculiaurensRoxb), Salar (Boswelia Serrata Roxb). Gular (Ficus, glomerata), Jamun (Syzygium Cumini), Neem (Azadirachta indica), Pipal (Ficus religiosa), Aam (Mangifera indica), and Semal (Salmaliamalbarica), Chhola (Dhak) (Butea mono spermaLomak), Shisham (Dalbergis sissoo Roxb), Sadaria (Terminalia tomentosa).Kanwas and Morak rages have many grass Birs. The common variety of grasses which are found in Darah Valley and some blocks of Ladpura range are Lapla (Aristid depressaretz). Polard (Apludamuticalinn), Karar (Dichanthium, annulatum Fore, Stapl), Bhalki (Chrvsopogan fulvus spreng Dc Chiov) and (Chlonaveriegata), Ratarda (ThemedaquadrivulvisDkata), Surwal (roni) (Heteropogancontortus). The major forest produce are timber, fire wood and charcoal and Minor forest produce includes gum, rasins, tandu leaves, honey etc. Total forest area by legal status in Hadoti region changes has been observed from 1990 till 2020. The total forest area in the region was more or less consistent since 1990 but decrease has been seen in 2015 after 2015 it again reached to 6438.85 Sq.Km of area under forest. Reserved forest category has also shown mixed trends, maximum area under reserved forest category has been recorded in 2005 with 2143.67 Sq.Km. with respect to protected forest category consistency has been found with slight drop in 2015. Highest variability in forest area under unclassed category has been seen. Highly diverse variety of vegetation can positively support the tribal population of the region by having minor forest produce which are their source of livelihood, source of livelihood for tribal can be further strengthen by government support. By increasing the vegetation cover the ecological and environmental health of the region can be strengthened.

Land is the very important resource for agriculture, a primary source of livelihood for majority of Hadoti region, rural population depends upon. Population pressure of both human and livestock is main deciding factor in allocation of land to different economic and non-economic activities. With changing prospect of demand for food, feed and fibre, technological changes and rate of economic development, requires land for non-agricultural uses and this increases competition for the land resource. There is increasing trends in absolute population growth in the region and expansion of industrial expansion, this has degraded the land resources and has caused depletion and environmental degradation. Changes in land use of Hadoti region has been compared between 1991 and 2020 land use. Area under forest has shown increase of 1.4% and in 2020 Hadoti region has forest cover of 25.3%. this increase in forest has been recorded because of implementation of afforestation polices of government. Land not available for cultivation has shown increase of 0.8%, this increase is resulted because of construction of houses, roads and railways, factories etc and with increasing population and urbanization land use composition has been changed. Permanent pasture and other grazing land have been declined due to increasing population pressure and there is reduction of common property resources and livestock livelihood has been oriented towards commercial aspect. Land under miscellaneous tree crops and groves has been increased due to afforestation. Culturable waste land has declined by 2.68 % this is because of extension of cultivation to culturable waste land with the help of irrigation facilities and land reclamation and land development measures. Fallow land other than current fallow and Current fallow land has been reduced due to extension of cultivation. Net sown area, Gross cropped area and Area sown more than once has increased drastically this is because of modernization of agricultural practices with the help of irrigation, fertilizers, changing cropping pattern and increasing crop yield rate this has resulted increase of more area under agricultural land in Hadoti region. The push and pull factor to settle in urban area is playing very significant role in changing the morphology of the urban areas. 1991 and 2020 land use show that there is need of proper planning of urban area so that the population needs of the region can be catered.

Considering the study area and its importance in the state, this research work has attempted to quantify the level of socio-economic development of the Hadoti region of the Rajasthan. Through this study the lagging tehsils are identified from the perspective that these lagging tehsils can be pushed forward in development process. The Hadoti region is rich in natural resources and the human capital but both are underutilised. It has been found that development was concentrated round the administrative tehsils and other tehsils of the region were not that developed.

Regional development and planning, a branch of geography is considered as an important branch which is associated with individual welfare and spatial development by reducing regional inequalities. Different scholars across the world from developed and developing countries have worked on examining and analysing and evaluating the socio-economic dynamics of different regions, they had formulated various techniques, criteria and methods in order to determine the level of development and disparities. Regional imbalance and inequality have been perceived differently by different schools of thoughts in geography. Neo classical theories on development postulated that inequality and regional imbalance arise due to market imperfection and persistent institutional bottlenecks which causes obstruction in resource mobility. By some scholars it is believed that regional inequality is by product of development. Scholars from developing countries believes that colonial exploitation has shaped the present economy of colonial countries and resulted in regional imbalance on the global scale. Whereas in the recent time geographers focus has been inclined toward to behavioural aspect of the development, this was the outcome of human factor contributing in development apart from economic factors.

Geographical analysis of socio-economic development of a region is very important in reducing region-based disparities within a country and it gives deeper insight in sustainable development of a region. This study will help in regional development in Hadoti region in the coming time followed by polices made by government by keeping the regional perspective in mind while formulation of target specific policy as it well said and interpreted that one size doesn't fit for the large population which have diversity in terms of social status, religion, economic status of the society. Welfare of the society and harmonized regional development is very important target in economic policy – making, it is very important to realize a balance between political stability and people's participation in the development of any region.

This study gives the explanation and solution to the prevailing problem which has been identified as a research problem. And overall, this will help in making space more balanced with equitable distribution of resource in Hadoti region and at large at country level. Through the approach of regional development, the Hadoti region as well as the country can enter in the age of high mass consumption. It provides the understanding of overall socio-economic development along with its cause and effects in the region. This study will also highlight the indicators which have maximum impact of the development of the region. It will give the insights on the potential underlying the Hadoti region through which development can be speeded up in the state of Rajasthan.

This study gives evidence-based results which can be used while formulating policies and strategies in reducing the disparities in the region and development can boosted up along with the inclusive growth and welfare of the individual. The temporal analysis done in study will help in evaluating the trends of development in the region, which in long run act as a benchmark in evaluation of overall progress and effectiveness of the policies implemented for development purpose. This study will be a contribution to the existing research pool of the previous work done on regional development and particularly going to add new avenues in development of Hadoti region. And it will enhance the existing work by including geographical dimension to the regional problems. Overall, this study will assist in decision making, allocation of resources, and taking target-oriented intervention for development and improvement of standard of living of the people residing in the Hadoti Region.

India being a developing country we are continuously looking for a suitable model of development for our country which caters all need as per our requirement. India being a vast country with varying diversity each regions development within the country are at different levels. In the recent times, development has become a major concern for policy makers, academicians, bureaucrats etc. Study of development level by different disciple varies greatly. However, the discipline of geography studies regional imbalances with greater depth and it focuses on balanced regional development. The aim of this research work is to analyse the level of development in Hadoti region. Past studies suggests that in early stages of development, imbalanced regional development takes place which exists in advanced stage of development. Due to regional imbalance polarization process takes place, instead of spread effect of development, focal point of growth develops in the region and peripheries shows imbalanced regional growth and in long run this imbalance persists because of circulatory causation process. Development is a process which takes place in stages, change in stages takes place due to structural changes in the society, which shifts the path from low level of development to advanced stages. Development is a process which cannot be achieved by all regions at same time because every region in itself is different from other region so, the prerequisite for development of a region will differ from one another. Imbalance regional development is a universal phenomenon. Most advanced and developed countries of world like U.S.A, Japan etc also faces unequal level of regional development. Regional imbalanced growth is a contemporary problem which requires solution-based approach. Similarly, Hadoti region in Rajasthan is such an area which requires attention so that the regional imbalanced growth of a region can be balanced.

The government policies in the past and recent time had tried to solve the problem of regional imbalances, but these policies were partially achieved their target in eliminating disparities. If look entire in India big metropolitan cities are so over burden due to which quality of services get deteriorated in these cities, within these cities push factors are so strong, that the place of origin of migration turns into periphery and these region in long run lacks in development. All this cause disparity at the inter-state and intra-district level. Due to lake in decentralised development peripheries always shown imbalanced growth. By keeping all these points in mind Hadoti region is untouched region in Rajasthan which shows variations in different aspect of socio- economic factors of development, which requires priority-based development so that the population of region can develop to their potential and at large region can develop at par with nation. Due to globalization society has witnessed socio-economic changes and it has resulted in development disparities because diffusion of innovation takes time to spread evenly. Hadoti region is drained majorly with Chambal River which forms bad land topography, the region has very unique physiography and the type of problems faced by the people living in this region requires a solution through which proper planning with sustainable development can be undertaken in the region.

This study has been conducted at the tehsils level. The tehsil level study has been done because of availability of the secondary data. Along with this tehsil can be considered as basic unit of development as it acts as a focal point for a lower level of administrative activities, policy implementation and monitoring in the region. Considering all the facts tehsils level analysis has been done for finding the socio-economic level of development of Hadoti region.

This study has been done on secondary data and a comparative analysis has been drawn between 1991 and 2020 level of development. So, that both temporal and spatial changes can be observed in depth. Along with this field survey has been done at a village level so, that validity of results from the secondary data can be established, the filed survey was conducted in the year 2023. Primary data was be collected from the field through interview schedule, and focused group discussion was done so that more clarity have been established. Primary data was substantiated with the help of self-observation. For the collection of the primary data, stratified random sampling was done, whole Hadoti region was divided into strata and these strata were the districts of the region. There are four districts that are., Baran, Bundi, Kota and Jhalawar. These four districts consist of twenty-five tehsils, and from these twenty-five tehsils randomly two villages each were selected. And from each village the households were randomly selected and random sampling was done in the village based on the questionnaire prepared. Size of sample was optimum so, that the error during data representation has been minimised.

For quantifying the level of development at the tehsil level various meaningful indicators has been selected, which are measurable in nature. In total there are 36 indicators, 16 indicators are related socio-cultural aspects, 11 indicators related to agricultural development and 11 indicators are related to infrastructural development. The level of socio-economic development has been measured with the help of composite index calculated from selected indicators. All the selected indicators were transformed to standardized score/Z-Score and summation of all the indicators Z-Score values has been done and the summation value was divided by total number of indicators in order to get tehsil-wise composite score of development. The composite index of development was calculated separately for demographic and cultural development, agricultural development and infrastructural development. Lastly, a composite index of development was calculated for all the indicators. For every indicator coefficient of variance has been calculated of 1991 and 2020 of each indicator so that relative variability can be measured. Coefficient of variation will help in comparing the data set of 1991 and 2020. Coefficient of variation helps in identifying the consistency and stability of the variables. This statistical measure is helpful in decision making and reaching to the statistical inferences.

Study of demographic characters of study area was very crucial in understanding the Hadoti region properly, dynamics of humans and their interaction with the ecosystem. Demographic data analysis is pivotal in quantifying population processes and their underlying phenomena which has provided critical contribution in the diversity of population in Hadoti region. Studying population ecology paves the way to understand the drivers of changes over the time and space, especially with demography it is relevant to understand survival rate, growth, reproduction etc of population structure. Hadoti region consists of 24353.34 sq. km of area. The total population as per the census of India, 2011 was 5698623. Density of population was 234 person per square kilometre and the sex ratio was 925 females per thousand of male population. The temporal changes of population growth have been analysed because it is considered significant for understanding the economic prospects of the region, population projections also help in identifying the changing needs of people and highlights the surplus and deficit resources within the region and findings as per the 1941-2011 data there is increase in absolute population for both male and female population. There is no fix pattern established in decadal change of population growth rather fluctuating trend in decadal change in population has been seen. With respect to density of population higher variability was found in 2011 when compared with 1991. In the region sex ratio was found favourable to females in tehsils of Jhalawar and Baran which were least developed districts from the region. Gap in male-female literacy rate was significant in the whole region, this gap in literacy implies patriarchal society. Hadoti region is not highly urbanized majority population resides in the rural parts, however the trends establish that there is an increase of urban population in the region. It shows that people are looking for better opportunities which are available in the urban areas of the region. The composition of the working population of the region is attributed towards the agricultural sector, and it shows the dominance of agricultural economy in the region. Crude workforce participation rate has been improved in 2011 when compared with 1991. This increase in workforce participation rate is very important for overall development of the region because it majorly contributes in the economic growth, lowers the unemployment rate and increases the gross domestic product of the region and these factors positively inculcate social inclusion and equity. There is increase in the density of workers in the region which shows the potential demographic transition. Gradually the economy of the region is sifting from agriculture sector towards the secondary, tertiary and the service sector. However, there is a huge share of agricultural labourers and their share has not improved significantly over the time. The share off cultivators has been decreased in 2011. Due to the changing demography region is witnessing higher dependency ratio, the region has younger population then the elderly population this increases the economic burden on the working population, if the potential of the youth utilised properly Hadoti region can expect speedy development. Infant mortality has been improved in the Hadoti region which indicates towards the better medical facilities and increased public awareness. Based on the composite index of socio-cultural development, regional disparities were prevalent in socio-cultural development of the region in both 1991 and 2011. In 2011 the score values showed improvement in maximum tehsils of the region.

Agriculture sector is a backbone of the region, physical factors like fertile soil along with natural irrigation sources are present in the region which positively supports agricultural development, based on the finding the region has still not utilised its full potential of agricultural growth. The cropping intensity has been increased in 2020 and along the region uniform cropping patterns has been adopted. Per capita agricultural production has been improved consistently which critical for the food security of the region. With the adaptation of modern technology along with increase in gross cropped area the productivity of the food grains has been increased tremendously from 1991 till 2015 but productivity of food grain has been decreased in 2020, which indicates towards more research and innovation along with increased farm mechanisation. Irrigation facilities has been improved in the region. Use of HYV seeds and chemical fertilizers had supported the food productivity in the region. From 1995 till 2020 increasing trend has been found in consumption of chemical fertilizer rich in nitrogen. There are different modes of irrigation found in the region some tehsils showed the dominance of tube well and on the other hand canal irrigation was dominant in some tehsils. When it comes to farm mechanisation region is not performing up to the mark, similar pattern has been seen in density of livestock which is showing decreasing trends. Level of agricultural development has been calculated by taking eleven indicators it has been found that composite score of agricultural development has increased with minimum changes. This indicates towards the requirement of improving the agriculture sector of the region because it holds huge potential. Agricultural development was concentrated in the central part of the Hadoti region while the peripheral tehsils like Shahbad, Manoharthana, Pirwa, Panchpahar were lagging behind.

Infrastructural development composite score was calculated and disparities at tehsil level were prevalent in the region, this shows that there is need for more infrastructure development in the region. Twelve indicators were used while computing the composite index of infrastructural development. All the indicators used were in proportion of the population. The availability of primary schools in proportion to the population has been decreased in 2020 when compared from 1991, this highlights urgent need of having a greater number of primary schools so that education can be provided to maximum number of people in the region. Upper primary, secondary, senior secondary schools have been increased in the region but their increase in not significant for the impactful increase in level of development. The density of educational institutions per square kilometre has been increased in 2020. The temporal changes have shown improvement in education infrastructure, education is one of the most crucial factor for social upliftment and economic growth so, more focused approach is required to improve the education infrastructure. Allopathic and AYUSH healthcare infrastructure in proportion of the population has been marginally improved in 2020 from 1991. Density of healthcare infrastructure was not found to be satisfactory. This shows that the most important determinants of development that is health and education are lagging behind which hampers the growth of the region. Electricity connections and households getting tap water from treated source are concentrated in urban areas and the tehsils with administrative centres, these tehsils are Ladpura, Baran, Jhalrapatan and Bundi and the tehsils which are lacking these basic infrastructural facilities are bordered by Madhya Pradesh they are Shahbad and Manohar thana. Some tehsils of Bundi district such as Nainwa and Hindoli are not performing well. Satisfactory financial inclusion has been observed in the region but financial literacy has to be improved for harnessing the maximum benefits out of it. Number of cooperative societies in proportion to the population has improved marginally in 2020 from 1991. This has to bee improved more because they have important role in empowering local people. Composite index of infrastructural development has been calculated by taking eleven indicators it has been found that infrastructural development has been done in 2020 in the underperforming tehsils of 1991, these tehsils are Aklera, Panchpahar, Indargarh, Mangrol and the tehsils like Jhalrapatan, Ladpura, Bundi, Baran has not improved their infrastructure significantly.

Analysis of socio-economic development of Hadoti region has been done at a village level based on primary survey so that comprehensive interpretation of development level can be done. Based on twenty-nine indicators composite index was prepared and it was found that Chhabra, Shahbad, Gangdhar, Ramganj Mandi, Pipalda and Pirawa were poorly developed tehsils and they lie in the peripheral part of the region. Low development level in these tehsils is because of poorly developed infrastructure and individual’s wellbeing. Apart from this social indicator like literacy rate, sanitation, dependency ratio drinking water availability, distance to schools and hospitals and the economic indicators such average annual income, occupation type, crude work participation rate, agricultural intensity and productivity, banking services, role of cooperative societies and other contributing factors are not performing in right direction in these tehsils.

Whereas in tehsils such as Jhalrapatan, Ladpura, Atru, Bundi, Hindoli and Mangrol all these indicators have performed fairly resulted in high level of development among these tehsils. Out of these six tehsils three of them consists district headquarters within them, because of administrative setup maximum concentration of infrastructure has improved the overall socio-economic development among these tehsils. Based on the primary survey all four districts of the Hadoti region has not shown uniform pattern of development. Maximum tehsils of the region were under low and very low development category, this creates way ahead in improving the development level of the lagging tehsils.

From the analyses it was found that in 1991 maximum tehsils were in low development category in the Hadoti region and it accounts for 32% of tehsils of the region, followed by very low developed category which consists of 24% of tehsils in it. Based on the statistics it can be concluded that in 1991, 56% tehsils of Hadoti region are lagging behind in development. In Baran district low and very low developed tehsils are 75%, this shows that out of four district Baran district is the most backward district in the region and it is followed by Jhalawar district which accounts for 57.14% tehsils in low and very low developed category. Kota district maximum tehsils are under Low development category which shows concentration of development in certain tehsils only. High level of development can be seen in Kota and Bundi district both of them accounts for 20% of tehsils in this category. Bundi district has maximum share of tehsils in high and moderate high development category that is 40% tehsils. In moderate development category Bundi has 40% of tehsils which is maximum percentage share out of four districts. Overall, in the Hadoti region 24% of tehsils are high and moderate high developed. Bund district has least percentage of tehsils that is 20% in very low development category. Kota district has no tehsil under very low development. Out of all four districts Bundi is found to be the most developed district in the Hadoti region it accounts for 60% tehsils in high, moderate high and moderate development category. In 2020 Moderate development category has maximum share of tehsils that is 36% in the Hadoti region, followed by Moderate high category that is 24%. When development level is compared with 1991 there is improvement recorded in the moderate development category in 2020. Low and very low developed tehsils share is 32% which has been improved by 24%. Low development category has improved by 8% in 2020 similarly moderate high development tehsils increase has been recorded in 2020 by 12%. High developed tehsils have shown decrease in their share by 4% in 2020. Overall, all Hadoti region has improved in 2020 by reducing the percentage share of tehsils from low and very low development category. From individual district point of view Jhalawar district has maximum share of tehsils in low and very low development category that is 57.14%, earlier in 1991 this position was held by Baran district but in 2020 Baran district has improved its development levels. The second most lagging district in 2020 is Baran district with 37.5% of tehsils in low and very low development category. Bundi has only 20% tehsil in very low category. Kota has no tehsil in both low and very low development, Kota has also improved with respect to 1991. There are no high developed tehsils in Baran and Jhalawar district. Kota and Bundi has 20% tehsil share in high developed category. All the Kota districts tehsils fall in high, moderate high and moderate development category. In Bundi district 80% tehsils are in high, moderate high and moderate level of development. Based on the statistics it can be analysed that Kota district has the maximum development and it is followed by Bundi in 2020. Level of development varies in the Hadoti region some tehsils are doing good whereas some tehsils are lagging behind every tehsil performance on the parameters of development depends on historical factors, demographic attributes, agricultural development, industrial development along with the infrastructural development with special emphasis on education and health facilities. Regional disparities in the level of development of the Hadoti region can be seen in both 1991 and 2020. Based on the existing data set it can be noted that target specific policies and programmes are required for specific district so that holistic development of Hadoti region can be done. Development is a dynamic concept which keeps on evolving with time so, time-based analysis of Hadoti region becomes very important in assessing the development patterns.

To check statistically that Hadoti region has improved in the level of socio-economic development, hypothesis has been tested using T-Test using paired two sample means method. The rationale behind choosing the paired two sample means methods is because two data points (1991 and 2020) are being compared with respect to socio-economic development. the composite index value has been taken from the same region twice. This method is considered appropriate for comparing independent two sample test. Both the data set of 1991 and 2020 are normally distributes as per the Kolmogorov Smirnov test of normality. The hypothesis has been tested at the significance level of 0.05 and the observed p-value was 0.5 which is greater than significance level of 0.05. This statistically states that we fail to reject the null hypothesis. This shows that the socio-economic development of Hadoti was same in both the comparative data set of 1991 and 2020. The test results do not provide sufficient evidences to suggest that Hadoti region's development has been improved or changed between 1991 and 2020. This result also gives insight that Hadoti region in terms of development level has remained stable during 1991 till 2020. The indicators which are chosen for computing development level are in proportion to the population size. The positive changes in the indicators have been seen between the period of 1991 and 2020 but these positive changes were in absolute values of the indicators example: increase in number of primary, secondary schools when compared with 1991 in 2020, whereas when number of primary and secondary schools per 1000 of population was calculated they had not increased in proportion to the population. This shows that there is a huge gap between haves and have nots. This hypothesis test results shows that there is a huge potential for the development of Hadoti region. The level of socio- economic development has been analysed both temporally (longitudinally) and spatially so that development levels can be analysed in a holistic manner. Acceptance of null hypothesis opens new door for exploring other dimensions of the development and this paves the way that in future further temporal analysis of the development is required so that we can check that positive growth in social-economic aspects is taking place in the region or not. Development is a dynamic concept it keeps on changing evolving with time and with passing time methods of computing development should be evolved.

Correlation matrix was prepared and all the socio-economic development indicators were correlated with composite index of development which was based on the secondary data. Infrastructural indicators such as upper primary, secondary and senior secondary schools, density of healthcare institutions, cooperative society, livestock facilities have shown strong positive correlation with composite index of development. Indicators such as literacy rate people engaged in service sector, farm mechanization and productivity of food grains are important indicators of the socio-economic development. With respect to temporal change in the development level it has been found that there was improvement in 2020 in some tehsils which were in low and very low level of development category in 1991 and the tehsils with high and moderate high level of development has been increased in 2020. Regional disparities in the level of socio-economic development within the region are very prominent and relatively most developed tehsils are located in the central parts of the region, moderate developed tehsils are found adjacent to the high developed tehsils and low developed tehsils are scattered and majority of them are concentrated in the peripheral part of the region that borders Madhya Pradesh and Tonk district of Rajasthan. All the indicators of socio-economic development are vital in improving the level of development of the Hadoti region. Correlation matrix is very important in understating the relationship between every indicator with composite index of development. However, correlation cannot be miss understood as a factor of causation but it is significant in understanding role of indicators which they are have in development. Along with this policy making can be done in right direction so that maximum benefit can be taken out for the communities living in the Hadoti region.

Suggestions

It is very important to have appropriate strategies to achieve balanced regional development. Development is multi dimensional process which stands for transformation of the society. Balanced and qualitative, multi-faceted growth is the main objective of the development. Regional development is incomplete without considering environmental and ecological balance. A balanced regional development can be achieved through spatial strategies, management and organization along with the institutional framework. This can be done with macro framework with respect to areal differentiation at a preliminary stage.

Development of Hadoti region is crucial for overall development of Rajasthan. The regional planning of the region should be focused upon improving the quality of life and increasing the standard of living. Resources available in the region should be utilised in a manner that it doesn't compromise the needs of future generation. There is requirement of structural changes in the economy and the demography of the region. There was prevalence of vertical inequality in the region which is needed to be addressed. Regional inequality in development level should be minimised so that depressed tehsils of the region can be uplifted.

Hadoti region requires optimum land use planning where maximum use of land can be drawn without zero wasteland. The study has shown that education and health infrastructure are very important in the development of the region but they are not performing well, policy making and implementation should be in a direction for the improvement of both the sectors of education and health can be done. Hadoti region has underlying potential in its human resources, it is very important to understand demographic processes so that allocation and quality of service can be served well. Future projection is demographic data will help in understanding the present and future needs of the region.

Diversification of the economy is required in the region because major section of the workers are engaged in agricultural sector. Gap in rural urban dived is need to be minimised, urban centre that is Kota city has huge potential of industrialisation. Developing the Kota city as a core centre of the region should not be on the cost of remaining three districts. Industrial development should be focused on generating adequate employment in the region, it should be cost effective. The industrial development to the region should be agricultural oriented so that maximum benefits can be taken out from both the sectors of the economy, here more focus can be put the existing chemical fertilizer industries in the region. Industrial development should be decentralised and more agro-based industries can be established here. Along with the industrial development transport sector should as apart of total package of development.

Integrated rural development is the most suitable approach for the Hadoti region, this approach should take into consideration the economic base, quality of life and physical environment. To achieve balanced development focus should be on modern scientific farming and proper development of allied activities such as horticulture and livestock rearing which can help in agricultural activities, mining and quarrying will help in building strong economic base and will help in generating additional income. Other developments which can be done in the region are establishment of biogas pants at tehsil level, processing of waste generated from plants and animals should be done through scientific approach by including locals in the procedure, will certainly make the rural life more attractive.

Rural redevelopment programmes focusing on planning and development through scientific approach by creating new layouts, with proper drainage network along with protected water supply. Better quality of life can be archived in the country side with help of proper rural road connectivity, regular electricity supply, organization of rural markets with strong supply chain mechanism which can connect rural market with the regional markets at district level. Regional trade can be made strong by training artisans and helping them by providing raw material and connecting them at national and global level trade. This will help in achieving sustainable economic life in the rural setup and this will improve the quality of life in the rural areas.

Construction of utility complex at every village as apart of rural reconstruction will be beneficial for the development. At a grass root level all the facilities are needed to be improved so that rural areas can become more habitable by the youths so that increased migration towards urban areas such as Kota city can be controlled. Model village can be established at every panchayat level.

The strategy for agricultural development has to be multi-faceted. It should target technological, institutional factors like credit to the farmers, farm mechanisation, cooperative societies, use of fertilizers and HYV seeds, based on this spatial framework should be prepared. Bio-technology and innovation in field of HYV seeds, chemical fertilizers, genetic cropping should be incorporated in the agricultural development plan. GIS and remote sensing application in agriculture sector should be used. There were certain tehsils in the region where irrigation facilities were not adequate so, the irrigation deficit area are need to be taken care. For environmental sustainability soil testing should be consider must so that use of chemical fertilizers can be rationalised. All the inhabitant of the region should have access to the required nutrients from the food crop. Productivity of agricultural output should be increased so that farmers income can also be increased. Stages for agricultural development are :

(1) Facilitation of agricultural inputs,

(2) Provision of cash transaction offered at credit facilities,

(3) Availability and creation of warehouse and storage facilities along with the co-operative societies,

(4) Establishment of more water and soil testing laboratories in the region at panchayat level,

(5) There should be information bureau at tehsil level along with the library,

(6) Provision for providing training and extension services,

(7) Regular survey of land use, cropping pattern and agricultural activities along with the success stories which show cases the innovation and diffusion,

(8) There should be rural youth club and self-help groups at panchayat level.

Infrastructural development is vital in regions integration. Dynamism in the region is derived from infrastructural development. Infrastructural services per capita index is very low in the region. Rural parts of region are lacking clean water supply, frequent power cut off shows the need to have qualitative improvement in the region. Quality of service delivery should be focused on rather just increasing the quantum of infrastructure. The spectrum of infrastructural services in the region is need to be expanded in the peripheral parts of the region. Better infrastructural services can be provided to the inhabitants of region through commercial management, competition and wider involvement of the population.

For development of urban areas in the Hadoti region it is required to have urban decentralisation as per the provisions mention in the constitution. Based on current level of urbanization reform linked investment in urban areas of the region is needed. The target of urban investment should be on asset creation and management of the urban centres. Proper development of urban transportation with the approach of integrated transport and land use planning. Urban development policies can be integrated at local, state and national level with a perspective of creating sustainable city. Urban institutions should be strengthened and their roles should be clarified. Urban development program should focus on capacity building. Urban areas of the Hadoti region, most importantly the Kota city requires the second-generation urban reforms which focuses on innovative financing, monitoring and regulating urban actives and land use changes, public-private partnership and role of non-governmental organization should be taken into consideration. Lastly, climate change and environmental and ecological health should be maintained at the cost of urban development, for which environmental impact assessment should be done with active participation on the local communities.

Development is journey towards improving quality of life and increasing standards of living, it can be achieved with blend of modern and traditional knowledge of community. For holistic regional development community participation along with the policy makers is considered very important for the Hadoti region.

SUMMARY

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Regional development and planning, a branch of geography is considered as an important branch which is associated with individual welfare and spatial development by reducing regional inequalities. Considering the study area and its importance in the state, this research work has attempted to quantify the level of socio-economic development of the Hadoti region of the Rajasthan. Through this study the lagging tehsils are identified from the perspective that these lagging tehsils can be pushed forward in development process. The Hadoti region is rich in natural resources and the human capital but both are underutilised. It has been found that development was concentrated round the administrative tehsils and other tehsils of the region were not that developed.

Geographical analysis of socio-economic development of a region is very important in reducing region-based disparities within a country and it gives deeper insight in sustainable development of a region. This study gives evidence-based results which can be used while formulating policies and strategies in reducing the disparities in the region and development can boosted up along with the inclusive growth and welfare of the individual. The temporal analysis done in study will help in evaluating the trends of development in the region, which in long run act as a benchmark in evaluation of overall progress and effectiveness of the policies implemented for development purpose. Overall, this study will assist in decision making, allocation of resources, and taking target-oriented intervention for development and improvement of standard of living of the people residing in the Hadoti Region.

This study has been conducted at the tehsils level. Secondary data and primary datahas been utilised and comparative analysis has been drawn between 1991 and 2020 level of development. For quantifying the level of development at the tehsil level various meaningful indicators has been selected, which are measurable in nature. In total there are 36 indicators, 16 indicators are related socio-cultural aspects, 11 indicators related to agricultural development and 11 indicators are related to infrastructural development. The level of socio-economic development has been measured with the help of composite index calculated from selected indicators.The composite index of development was calculated separately for demographic and cultural development, agricultural development and infrastructural development. Lastly, a composite index of development was calculated for all the indicators. For every indicator coefficient of variance has been calculated of 1991 and 2020 of each indicator so that relative variability can be measured.

Study of demographic characters of study area was very crucial in understanding the Hadoti region properly, dynamics of humans and their interaction with the ecosystem. The findings as per the 1941-2011 data there is increase in absolute population for both male and female population. There is no fix pattern established in decadal change of population growth rather fluctuating trend in decadal change in population has been seen. With respect to density of population higher variability was found in 2011 when compared with 1991. In the region sex ratio was found favourable to females in tehsils of Jhalawar and Baran which were least developed districts from the region. Gap in male-female literacy rate was significant in the whole region, this gap in literacy implies patriarchal society. Hadoti region is not highly urbanized majority population resides in the rural parts however; the trends establish that there is an increase of urban population in the region. It shows that people are looking for better opportunities which are available in the urban areas of the region. The composition of the working population of the region is attributed towards the agricultural sector, and it shows the dominance of agricultural economy in the region. Crude workforce participation rate has been improved in 2011 when compared with 1991. This increase in workforce participation rate is very important for overall development of the region because it majorly contributes in the economic growth, lowers the unemployment rate and increases the gross domestic product of the region and these factors positively inculcate social inclusion and equity. There is increase in the density of workers in the region which shows the potential demographic transition. Gradually the economy of the region is shifting from agriculture sector towards the secondary, tertiary and the service sector. However, there is a huge share of agricultural labourers and their share has not improved significantly over the time. The share of cultivators has been decreased in 2011. Due to the changing demography region is witnessing higher dependency ratio, the region has younger population then the elderly population this increases the economic burden on the working population, if the potential of the youth utilised properly Hadoti region can expect speedy development. Infant mortality has been improved in the Hadoti region which indicates towards the better medical facilities and increased public awareness. Based on the composite index of socio-cultural development, regional disparities were prevalent in socio-cultural development of the region in both 1991 and 2011. In 2011 the score values showed improvement in maximum tehsils of the region.

Agriculture sector is a backbone of the region, physical factors like fertile soil along with natural irrigation sources are present in the region which positively supports agricultural development, based on the finding the region has still not utilised its full potential of agricultural growth. The cropping intensity has been increased in 2020 and along the region uniform cropping patterns has been adopted. Per capita agricultural production has been improved consistently which critical for the food security of the region. With the adaptation of modern technology along with increase in gross cropped area the productivity of the food grains has been increased tremendously from 1991 till 2015 but productivity of food grain has been decreased in 2020, which indicates towards more research and innovation along with increased farm mechanisation. Irrigation facilities has been improved in the region. Use of HYV seeds and chemical fertilizers had supported the food productivity in the region. From 1995 till 2020 increasing trend has been found in consumption of chemical fertilizer rich in nitrogen. There are different modes of irrigation found in the region some tehsils showed the dominance of tubewell and on the other hand canal irrigation was dominant in some tehsils. When it comes to farm mechanisation region is not performing up to the mark, similar pattern has been seen in density of livestock which is showing decreasing trends. Level of agricultural development has been calculated by taking eleven indicators it has been found that composite score of agricultural development has increased with minimum changes.

Infrastructural development composite score was calculated and disparities at tehsil level were prevalent in the region, this shows that there is need for more infrastructure development in the region. Twelve indicators were used while computing the composite index of infrastructural development. All the indicators used were in proportion of the population. The availability of primary schools in proportion to the population has been decreased in 2020 when compared from 1991, this highlights urgent need of having a greater number of primary schools so that education can be provided to maximum number of people in the region. Upper primary, secondary, senior secondary schools have been increased in the region but their increase in not significant for the impactful increase in level of development. The density of educational institutions per square kilometre has been increased in 2020. The temporal changes have shown improvement in education infrastructure, education is one of the most crucial factors for social upliftment and economic growth so, more focused approach is required to improve the education infrastructure. Allopathic and AYUSH healthcare infrastructure in proportion of the population has been marginally improved in 2020 from 1991. Density of healthcare infrastructure was not found to be satisfactory. This shows that the most important determinants of development that is health and education are lagging behind which hampers the growth of the region. Electricity connections and households getting tap water from treated source are concentrated in urban areas and the tehsils with administrative centres. Satisfactory financial inclusion has been observed in the region but financial literacy has to be improved for harnessing the maximum benefits out of it. Number of cooperative societies in proportion to the population has improved marginally in 2020 from 1991. This has to be improved more because they have important role in empowering local people.

Composite index of infrastructural development has been calculated by taking eleven indicators it has been found that infrastructural development has been done in 2020 in the underperforming tehsils of 1991, these tehsils are Aklera, Panchpahar, Indargarh, Mangrol and the tehsils like Jhalrapatan, Ladpura, Bundi, Baran has not improved their infrastructure significantly.

Analysis of socio-economic development of Hadoti region has been done at a village level based on primary survey so that comprehensive interpretation of development level can be done. Based on twenty-nine indicators composite index was prepared and it was found that Chhabra, Shahbad, Gangdhar, Ramganj Mandi, Pipalda and Pirawa were poorly developed tehsils and they lie in the peripheral part of the region. Low development level in these tehsils is because of poorly developed infrastructure and individual's wellbeing. Apart from this social indicator like literacy rate, sanitation, dependency ratio drinking water availability, distance to schools and hospitals and the economic indicators such average annual income, occupation type, crude work participation rate, agricultural intensity and productivity, banking services, role of cooperative societies and other contributing factors are not performing in right direction in these tehsils. Whereas in tehsils such as Jhalrapatan, Ladpura, Atru, Bundi, Hindoli and Mangrol all these indicators have performed fairly resulted in high level of development among these tehsils. Out of these six tehsils three of them consists district headquarters within them, because of administrative setup maximum concentration of infrastructure has improved the overall socio-economic development among these tehsils. Based on the primary survey all four districts of the Hadoti region has not shown uniform pattern of development. Maximum tehsils of the region were under low and very low development category, this creates way ahead in improving the development level of the lagging tehsils.For checking whether there is clustering of highly developed and less developed tehsils spatial auto correlation using inverse distance conceptualisation with help of Global Moran's I method had been done. Spatial auto correlation analysis suggests that the spatial pattern of level of socio-economic development does not exhibit a statistically significant level of clustering or dispersion, and largely indistinguishable from a random spatial distribution.

From the analyses it was found that in 1991 maximum tehsils were in low development category in the Hadoti region and it accounts for 32% of tehsils of the region, followed by very low developed category which consists of 24% of tehsils in it. Based on the statistics it can be concluded that in 1991, 56% tehsils of Hadoti region are lagging behind in development. In Baran district low and very low developed tehsils are 75%, this shows that out of four district Baran district is the most backward district in the region and it is followed by Jhalawar district which accounts for 57.14% tehsils in low and very low developed category. Kota district maximum tehsils are under Low development category which shows concentration of development in certain tehsils only. High level of development can be seen in Kota and Bundi district both of them accounts for 20% of tehsils in this category. Bundi district has maximum share of tehsils in high and moderate high development category that is 40% tehsils. In moderate development category Bundi has 40% of tehsils which is maximum percentage share out of four districts. Overall, in the Hadoti region 24% of tehsils are high and moderate high developed. Bund district has least percentage of tehsils that is 20% in very low development category. Kota district has no tehsil under very low development. Out of all four districts Bundi is found to be the most developed district in the Hadoti region it accounts for 60% tehsils in high, moderate high and moderate development category. In 2020 Moderate development category has maximum share of tehsils that is 36% in the Hadoti region, followed by Moderate high category that is 24%. When development level is compared with 1991 there is improvement recorded in the moderate development category in 2020. Low and very low developed tehsils share is 32% which has been improved by 24%. Low development category has improved by 8% in 2020 similarly moderate high development tehsils increase has been recorded in 2020 by 12%. High developed tehsils have shown decrease in their share by 4% in 2020. Overall, all Hadoti region has improved in 2020 by reducing the percentage share of tehsils from low and very low development category. From individual district point of view Jhalawar district has maximum share of tehsils in low and very low development category that is 57.14%, earlier in 1991 this position was held by Baran district but in 2020 Baran district has improved its development levels. The second most lagging district in 2020 is Baran district with 37.5% of tehsils in low and very low development category. Bundi has only 20% tehsil in very low category. Kota has no tehsil in both low and very low development, Kota has also improved with respect to 1991. There are no high developed tehsils in Baran and Jhalawar district. Kota and Bundi has 20% tehsil share in high developed category. All the Kota districts tehsils fall in high, moderate high and moderate development category. In Bundi district 80% tehsils are in high, moderate high and moderate level of development. Based on the statistics it can be analysed that Kota district has the maximum development and it is followed by Bundi in 2020. Level of development varies in the Hadoti region some tehsils are doing good whereas some tehsils are lagging behind every tehsil performance on the paraments of development depends on historical factors, demographic attributes, agricultural development, industrial development along with the infrastructural development with special emphasis on education and health facilities. Regional disparities in the level of development of the Hadoti region can be seen in both 1991 and 2020. Based on the existing data set it can be noted that target specific policies and programmes are required for specific district so that holistic development of Hadoti region can be done.

To check statistically that Hadoti region has improved in the level of socio-economic development, hypothesis has been tested using T-Test using paired two sample means method. Both the data set of 1991 and 2020 are normally distributes as per the Kolmogorov Smirnov test of normality. The hypothesis has been tested at the significance level of 0.05 and the observed p-value was 0.5 which is greater than significance level of 0.05. this statistically states that we fail to reject the null hypothesis. This shows that the socio-economic development of Hadoti was same in both the comparative data set of 1991 and 2020. The test results do not provide sufficient evidences to suggest that Hadoti region's development has been improved or changed between 1991 and 2020. This result also gives insight that Hadoti region in terms of development level has remained stable during 1991 till 2020. The indicators which are chosen for computing development level are in proportion to the population size. The positive changes in the indicators have been seen between the period of 1991 and 2020 but these positive changes were in absolute values of the indicators example: increase in number of primary, secondary schools when compared with 1991 in 2020, whereas when number of primary and secondary schools per 1000 of population was calculated they had not increased in proportion to the population. The level of socio- economic development has been analysed both temporally (longitudinally) and spatially so that development levels can be analysed in a holistic manner. Acceptance of null hypothesis opens new door for exploring other dimensions of the development and this paves the way that in future further temporal analysis of the development is required so that we can check that positive growth in social- economic aspects is taking place in the region or not. Development is a dynamic concept it keeps on changing evolving with time and with passing time methods of computing development should be evolved.

Correlation matrix was prepared and all the socio-economic development indicators were correlated with composite index of development which was based on the secondary data. Infrastructural indicators such as upper primary, secondary and senior secondary schools, density of healthcare institutions, cooperative society, livestock facilities have shown strong positive correlation with composite index of development. Indicators such as literacy rate people engaged in service sector, farm mechanization and productivity of food grains are important indicators of the socio-economic development. With respect to temporal change in the development level it has been found that there was improvement in 2020 in some tehsils which were in low and very low level of development category in 1991 and the tehsils with high and moderate high level of development has been increased in 2020. Regional disparities in the level of socio-economic development within the region are very prominent and relatively most developed tehsils are located in the central parts of the region; moderate developed tehsils are found adjacent to the high developed tehsils and low developed tehsils are scattered and majority of them are concentrated in the peripheral part of the region that borders Madhya Pradesh and Tonk district of Rajasthan.

Based on the results found from the current study it is very important to have appropriate strategies to achieve balanced regional development. Development is multi-dimensional process which stands for transformation of the society. Balanced and qualitative, multi-faceted growth is the main objective of the development. Regional development is incomplete without considering environmental and ecological balance. A balanced regional development can be achieved through spatial strategies, management and organization along with the institutional framework. This can be done with macro framework with respect to areal differentiation at a preliminary stage.

Development of Hadoti region is crucial for overall development of Rajasthan. The regional planning of the region should be focused upon improving the quality of life and increasing the standard of living. Resources available in the region should be utilised in a manner that it doesn't compromise the needs of future generation. There is requirement of structural changes in the economy and the demography of the region. There was prevalence of vertical inequality in the region which is needed to be addressed. Regional inequality in development level should be minimised so that depressed tehsils of the region can be uplifted.

Development is journey towards improving quality of life and increasing standards of living, it can be achieved with blend of modern and traditional knowledge of community. For holistic regional development community participation along with the policy makers is considered very important for the Hadoti region.

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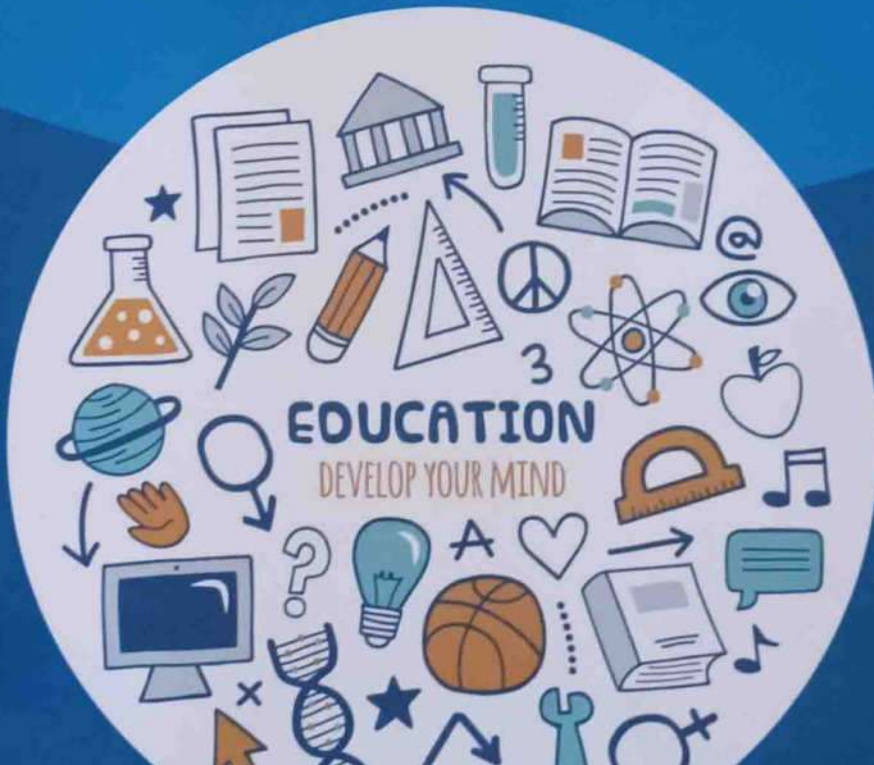

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Role of Livestock Sector in Sustainable Livelihood Security in Hadoti Region, Rajasthan

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***Abstract:** This paper discusses the livestock sector of Hadoti region of Rajasthan, and various challenges associated with livestock sector in the region. The paper attempt to shows the structure of livestock sector with help of temporal and spatial distribution of livestock with the help of Z-score values and its contribution in the economy of the region. It gives insight on the sustainable development of economy with the help of livestock and, suggests steps for livelihood security from livestock in the region. Livestock production is important to be developed on the basis of intensification in Hadoti region for increasing livestock productivity and put emphasis on livelihood diversification in the region.*

***Keywords:** Livestock, Livelihood security, livelihood diversification, Sustainable Development.*

I. Introduction

Livestock sector plays very important role in socio-economic development of a region. Agriculture and allied activities are not performing well in contribution to the economy. However, there is a huge potential underlying in livestock sector. In Rajasthan having livestock is considered as a social indicator and is playing a very important role in self-sufficiency of an individual family. Besides, it has vast scope in generating income on regular basis.

In Hadoti region of Rajasthan many people rely on agriculture sector as source of their income, but due climate change and lack of infrastructure in the Hadoti region will not help to increase the income in a sustainable manner. Livestock is interwoven with agriculture since ages and plays a vital role in economy of a region. Recently livestock production is likely to undergoing significant changes with respect to population adjustment, production efficiency, intensification to respond to increasing demand for animal-based food. Presently livestock production is heading towards more intense and mixed system.

Studying livestock sector of Hadoti region in is important because it servers two purpose. Firstly, it helps to identify the region's need for the development of the livestock sector. Secondly, it will help to diversify the sources of income in such a manner that everyone in the region is benefited.

Hadoti region geographically is south eastern region of Rajasthan, it is bordered by Malva plateau on the east, Aravalli range on the west and Marwar region on the south west. The region is drained by major river Chambal River along with its tributaries like Kalisindh, Parvati, Chakan etc. Due to predominance of fluvial topography in the region it constitutes alluvial soil with the mixture of black soil.

Hadoti region is on the windward side of Aravalli rages i.e., on southeast of Rajasthan, due to which it receives good amount of precipitation through south west monsoon. Region comprises of 4 districts i.e., Kota, Bundi, Jhalawar and Baran. The economy of the Hadoti region is mainly dependent on agriculture, chemical and fertilizer industries, along with naturally occurring Kota stone and other minerals.

II. Objective of the Research Paper

To study the spatial and temporal distributional pattern of livestock in Hadoti region and analyzing the contribution of livestock sector in the economy of the Hadoti region. Lastly, suggesting the measures for improving the livestock sector with respect to livelihood security of the region.

III. Methodology

For the representation of the temporal data bar graph are used. And for spatial data representation Arc GIS software is used to produce tehsil-wise distribution of livestock in Hadoti region. Sources of data is Department of Animal Husbandry Rajasthan, Directorate of economics and statistics, Rajasthan and Census of India.

For showing the spatial distribution of livestock in Hadoti region Z- score has been calculated to find out how much deviation is there from the mean value of the livestock in different tehsils of the region.

Method of calculation: Different attributes are taken like total population of cow, buffalo, sheep, goat, horse, donkey, camel, pig, dog, rabbit at tehsil level.

With the help of this method, total livestock population was converted into standardized score so that the comparation of livestock in different tehsils of Hadoti region can be done easily.

$$Z = \frac{x - \mu}{\sigma}$$

Where,

Z represents standard score/Z-score

x represents observed value

μ represents mean of the sample

σ represents standard deviation of the sample

Positive Z - score values means that the individual value is greater than the mean and negative Z – score means that the individual value is smaller than the mean. And Z – score of 0 is equal to the mean.

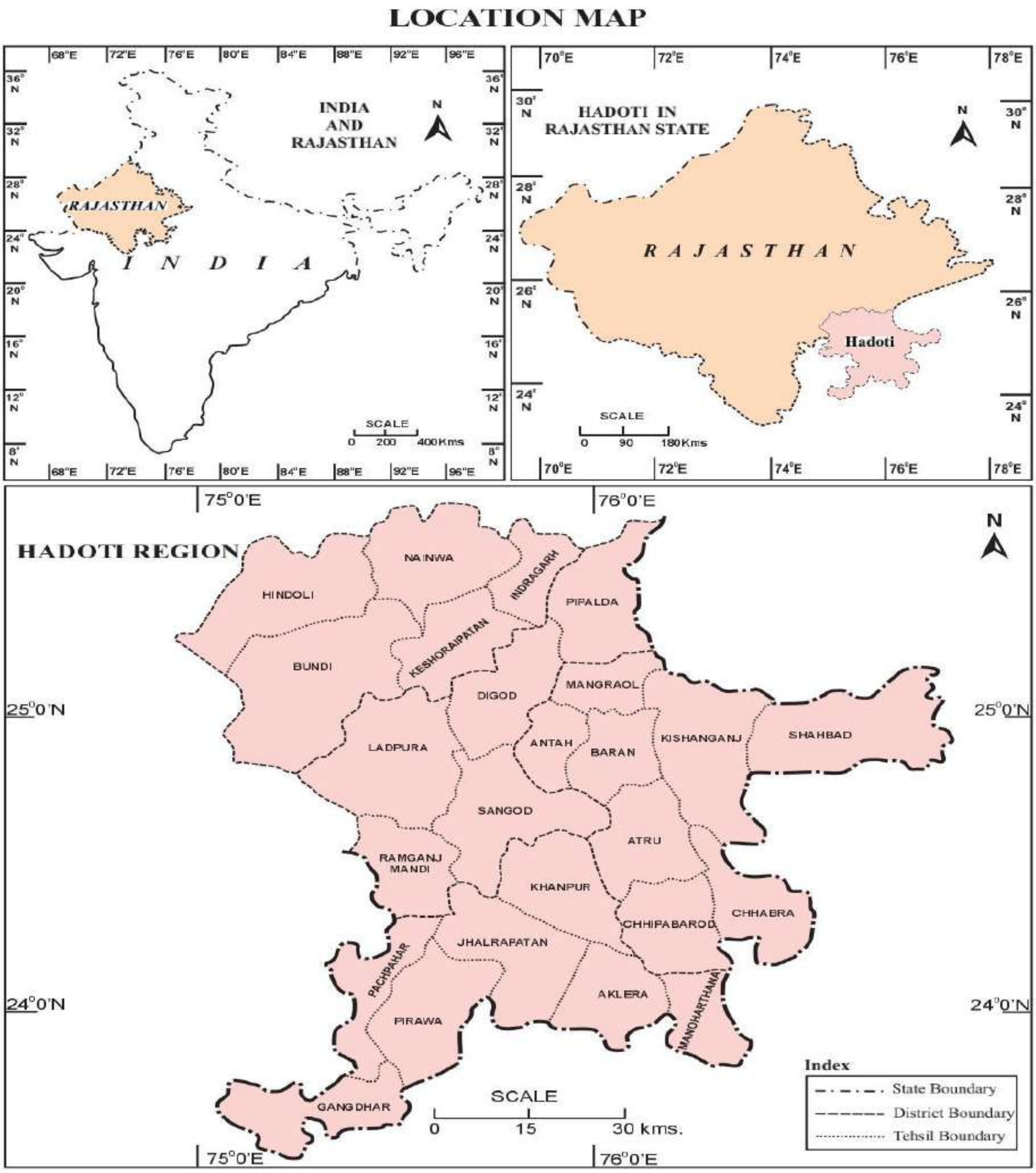

Fig.1: Location map of study area

IV. Temporal Data Analysis of Live Stock

For temporal analysis, data has been collected from Department of Animal Husbandry Rajasthan, Directorate of economics and statistics, Rajasthan. Data which includes total livestock of Hadoti region along with the major livestock such as cow, buffalo, sheep, goat and pig.

As per figure:1, depicts data of Hadoti region temporal changes in livestock population from 15th livestock census i.e., 1992 till 19th livestock population i.e., 2012. If we analyze the data set it is very clear that there is decline in overall population of livestock in the region. A major decline is seen in cow and sheep population. Whereas goat's population is showing slight decline. Drastic increase is seen in buffalo population and and slight increase is notes in pig population.

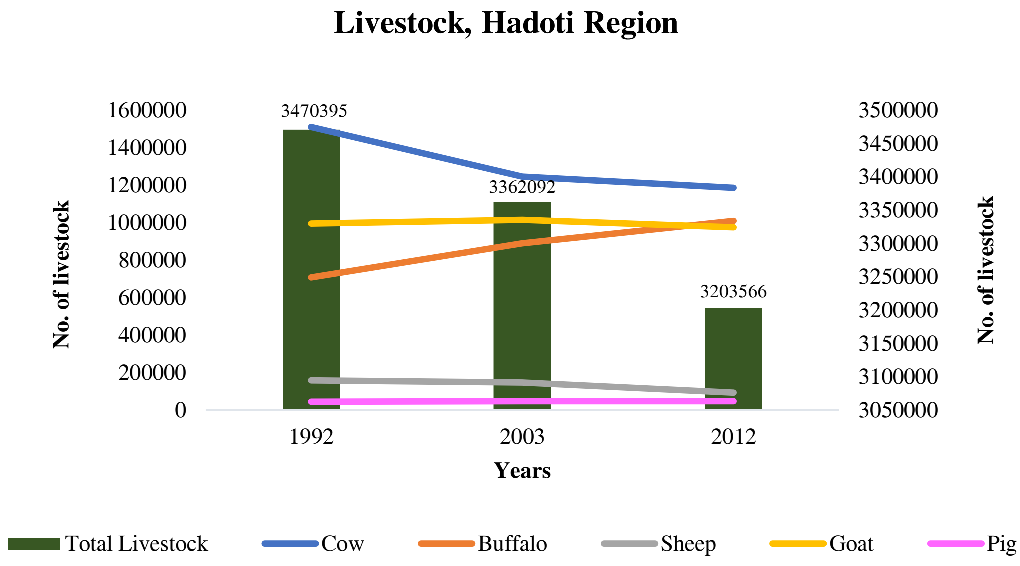

Fig. 2: Livestock, Hadoti Region

V. Spatial Data Analysis of Live Stock Distribution

Table 1: District-wise Density of Total Livestock, 19th livestock census

Districts	Livestock (No. per sq km)
Baran	115
Bundi	167
Jhalawar	165
Kota	124

Source: 19th livestock census, India

Table 1 depicts district-wise density of livestock in Hadoti region. Maximum density of livestock density is being recorded in Bundi district and least is recorded in Baran district.

Spatial data analysis has been done by calculating Z-score for all the tehsils in Hadoti region. After calculation results are:

Table 2: Tehsil-wise livestock population and Z-score values. (19th livestock census)

Tehsils	Total Livestock	Z-Score
Baran	79649	-1.138
Antah	67632	-1.42
Mangrol	84429	-1.026
Atru	93595	-0.81
Chhabra	102898	-0.592
Chhipabarod	126292	-0.043
Kishanganj	143037	0.349
Shahbad	110071	-0.424
Ladpura	200440	1.697
Digod	113535	-0.342
Pipalda	101241	-0.631
Ramganj mandi	110236	-0.42
Sangod	129645	0.035
Khanpur	120041	-0.19
Jhalrapatan	208295	1.881
Aklera	162867	0.815
Panchpahar	111760	-0.384
Pirawa	133312	0.121

Gangdhar	152471	0.571
Manohar thana	133238	0.119
Bundi	199151	1.666
Keshoraipatan	83562	-1.046
Indragarh	69772	-1.37
Nainwa	154453	0.617
Hindoli	211944	1.967

Source: 19th livestock census, India and calculation done by author.

To have better understanding of Z-score values has been classified into 4 categories i.e., Z-score value based on standard deviation from the mean. Where positive value of Z-score shows better distribution of livestock which is above the mean and negative value of Z-score tehsils have poor distribution of livestock and it is below the mean.

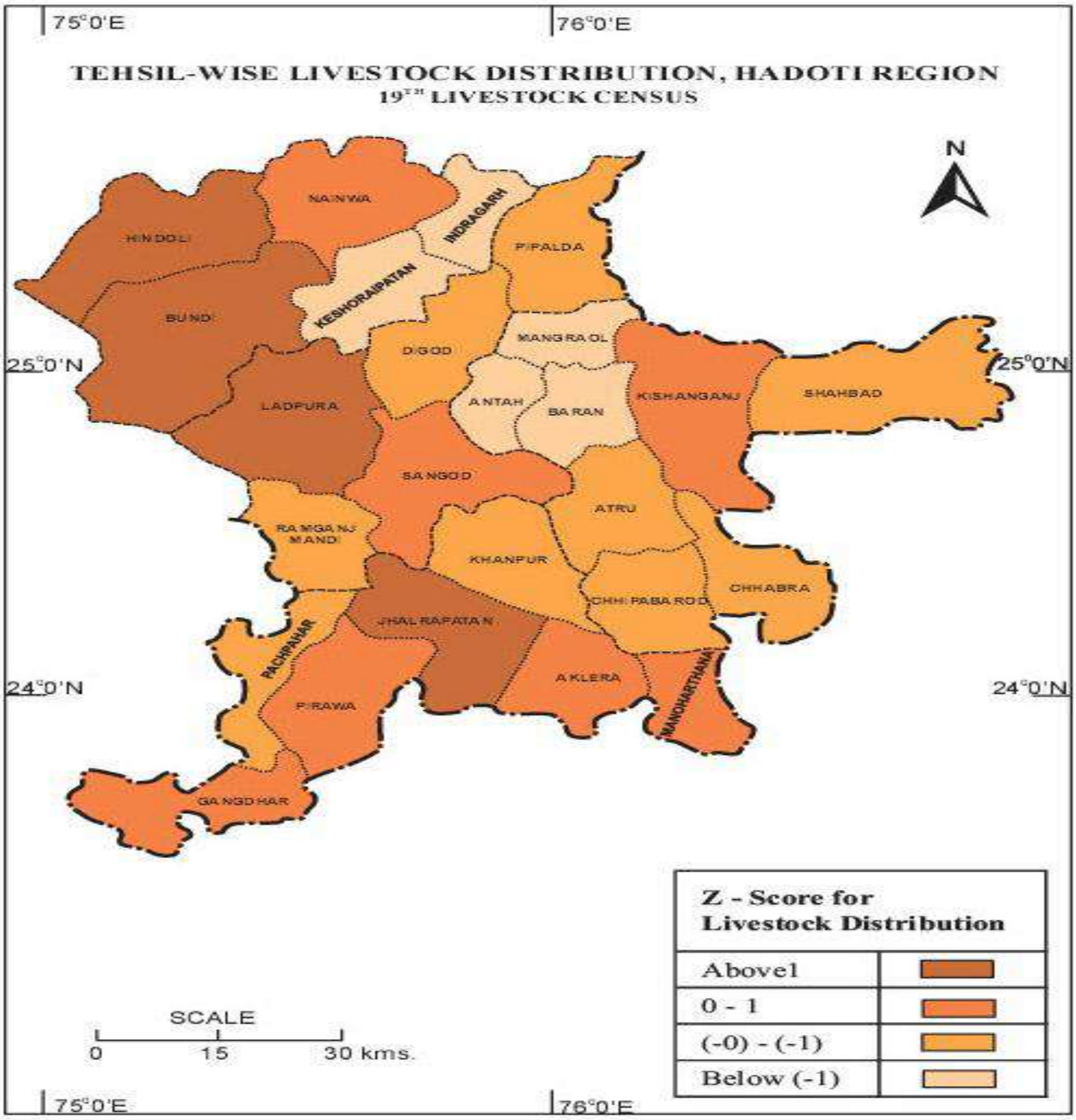

Fig 3: Tehsil- wise livestock distribution, Hadoti region

Table 3: Tehsil-wise deviation of livestock distribution, Hadoti region (19th livestock census)

Deviation from mean	Tehsils
Above 1	Bundi, LadpuraJ halrapatan, Hindoli
0 - 1	Sangod, Manohar thana, Pirawa, Kishanganj, Gangdhar, Nainwa, Aklera
(-0) – (-1)	Atru, Pipalda, Chhabra, Shahbad, Ramganj mandi,

	Panchpahar, Digod, Khanpur, Chhipabarod
Below (-1)	Antah, Indragarh, Baran, Keshoraipatan, Mangrol

VI. Live Stock Related Production and Wholesale Price

From table 4, it can be seen that livestock related production has sown positive increase in wholesale price for various products listed in the table. Livestock differs from crop production because it is less dependent on natural-climate conditions. Therefore, the production from animal husbandry is more or less fixed and circulating production resources, labor is used evenly throughout the year which results in profit from sale of products throughout the year. These trends shows that rapid development of livestock sector plays very important role in providing cheap livestock products such as milk and its by-products, meat etc. And it also helps in increasing employment and income of the people.

Table 4: Wholesale price of livestock production, 1995 - 2019

Price of livestock products in Hadoti region	Years			
S.No.	**1995**	**2005**	**2015**	**2019**
Milk (per Quintal)	1012.5	1385.25	3754.37	4132.5
Goat Meat (per Kg)	64.5	119.75	323.75	381.39
Pork (per Kg)	26	32	80	100
Leather (per quintal)	2060.5	48062.66	41670.75	43431.56

Source: Directorate of economics and statistics, Rajasthan 1997, 2007, 2016, 2018, 2020

VII. Challenges in Sustainable livelihood from Livestock Sector

There are various challenges which are faced by livestock sector in Hadoti region which are listed below:

1. Animal husbandry infrastructure

As per ASEAN livestock report around 60 percent of human diseases are shared with animals and 75 percent of emerging diseases are zoonotic and 25 percent of human infectious diseases burden is on developing countries. Spread of animal husbandry infrastructure is not at par with international standards which makes the region more prone to lose of livestock.

Table 4: Animal husbandry infrastructure of Hadoti region, 2019

Animal husbandry infrastructure		
Districts	**Veterinary hospitals**	**Dispensaries**
Baran	49	4
Bundi	34	4
Jhalawar	41	4
Kota	45	4

Source: Directorate of economics and statistics, Rajasthan, 2020

2. Fodder and nutrition

Lack of proper supply of feed for existing livestock population which highly impacts production and productivity. Due to low yield of cow's milk their population and productivity has drastically declined.

3. Animal breeding

In the whole Hadoti region there is only one semen bank and in the recent time there is no development of new semen bank. There is lack of knowledge regarding indigenous breeds which is resulting in decline of their population. Adequate development research has not satisfied the need for improved livestock.

4. Market for livestock products

Marketing for livestock and livestock products is not developed and organize in the region. There is no designated markets for livestock related products in the whole region where as it is sparsely distributed among local market in various tehsils. Along with it there is lack of institution to organize producer and facilitate market.

5. Lack of trained manpower

In the era of globalization there is wide spread of new technology for livestock sector but due to lack of updated knowledge dissemination has negatively impacted the livestock sector of the region.

6. Slow progress of dairy development programme

Table 5: Dairy development programme related infrastructure, Hadoti region, 2019

Districts	Milk cooperative societies	Milk collection centre	Quantity of collected milk (in litres)	Semen bank development
Baran	Nill	Nill	Nill	0
Bundi	479	112	6374	0
Jhalawar	249	73	6522	0
Kota	326	58	2681	0

Source: Directorate of economics and statistics, Rajasthan, 2020

With increasing demand of dairy related products, dairy development programme is not adequate enough in sporting the current needs of the area.

In the previous research work on district level sustainable livestock production index was calculated in which only Bundi was on rank 12th performed well from Hadoti region other three districts i.e., Kota was on 22th rank, Jhalawar was on 23rd rank and Baran was on 29th rank out of 33 districts of Rajasthan.

VIII. Conclusion

Study concludes, there is need to have diversified sources of livelihood among different sources, livestock sector is one, when mixed with best agricultural practices can change the livelihood dynamics of the Hadoti region. The population of livestock is decreasing in Hadoti region with respect to this there is need to understand the structure of livestock sector and factors which are affecting the growth of livestock sector in the region. So, it is very important to monitor the performance of the livestock sector with the help of quantitative and qualitative measures this will help in achieving the sustainable livelihood from livestock.

IX. Recommendation

For the reduction of regional disparities and improvement in livestock sector can be done with the help of following: Firstly, there is need to arrange the special data in a manner through which poorly performing areas in livestock sector can be highlighted. Secondly, identifying the existing available animal husbandry infrastructural facilities. Thirdly, regional plan should be prepared for making livestock sector more sustainable. It should include all the stakeholders. While formulating such plans local cultural practices and people sentiments should be kept in mind so, that inclusive and holistic policy could be formulated. For dealing challenges in the livestock sector there is need to have diverse livestock breeds which needed to be conserved, better utilization of locally available feeds. And veterinary services and animal health system should be based on OIE guidelines on 'Performance of veterinary services. 'Livestock production also generated animal waste which is at the same time harmful to the environment so, this is needed to be taken care of while fulfilling the commercial demands. With this regard 'Zero-waste' or 'Green ecology livestock production' approach can be adopted.

Lastly, with help of modern technologies, research and development along with regional awareness program me can be run by government with the help of NGOs for knowledge dissemination and adopting new technologies. Which will help in will help in generating sustainable livelihood from the livestock sector. For achieving the success of livestock sector in generating livelihood, it is very necessary to have proper implementation and evaluation of policy.

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REGIONAL VARIATIONS IN HEALTH INFRASTRUCTURE OF HADOTI REGION, RAJASTHAN

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ABSTRACT

Healthy individual is asset to the nation, they contribute in the development of region. Regional development depends upon social, economic and political factors. Development goes hand in hand with infrastructural facilities which indicates towards better quality of life. Health infrastructure is one such important component of development of any region. Health infrastructure is required to be adequate, accessible, affordable to all which eventually led to the well-being of the people. This study has been done by taking eleven (11) indicators of health infrastructure and based on these indicators health development index has been prepared using standard score, followed by determining composite index of health infrastructure development at tehsil level in the region. Further composite index value of health infrastructure development of 1995 and 2020 has been analyzed so, that regional variations in health care facilities can be observed both temporally and spatially. This study has found by analyzing temporal data that health infrastructure development is a process towards achieving wellbeing of an individual, which has resulted in improvement of medical facilities in region and based on spatial analysis it was found that health infrastructure was not uniform across the Hadoti region and regional disparities in the level of health infrastructural development was persistent since 1995 and followed in 2020.

KEYWORDS: Health infrastructure, regional disparity, composite index, development

INTRODUCTION

Healthy individual is important to support individual's function and society at a larger end. A good health is an indicator of wellbeing through which individual can live life with meaning and a purpose. Health infrastructure plays a key role in enhancing overall wellbeing of an individual. With changing complexities of diseases health is no longer viewed as an end product of the development process but it is considered an important contributor to the development of the nation. Good health and development go hand in hand.

Dzau et al. (2017) argue that health infrastructure is a notable indicator for knowing health care distribution provisions and welfare mechanism in a nation. Straub (2008), Aschauer (2000), Macdonald (2008) various studies conducted, established positive impact of infrastructure on economic growth and productivity.

Health infrastructure is crucial component for analyzing welfare mechanism within the country. Main objective of health infrastructure is to focus upon material capacity building in the sphere of public health delivery mechanisms. Health outcome majorly depends on availability and accessibility of health infrastructure. So, it is very important to have good health infrastructural support to have healthy population. For an economy as a whole, health act as an engine of growth. Hati and Rajarshi (2013) states that both infrastructure and outcome work simultaneously in a close association. For understanding healthcare delivery provisions and mechanism in a region health infrastructure plays very important role. Lakshmi and Dukhabandhu (2013) argue that investment plays significant role in creating the infrastructure in private and private sectors.

Reddy and Reddy (1994) sates that in India, private out-of-pocket expenditure is dominate in coast financing health care. Batool and Trilochan (2019) argue that few selected urban centres had hi-tech medical care and uses high end medical technologies whereas a contrasting situation is found in vast majority in India which is being deprived of basic health care facilities. Super specialist doctors majorly concentrated in tier-1 cities or are working abroad due to higher remuneration. This creates a regional divide between rural and urban health infrastructure, due to which rural areas suffers the most. Bhandari et al. (2007) found that proper healthcare facilities are mostly not accessible throughout the year in rural areas. Whereas government and private hospitals are comparatively more accessible in urban areas which are well connected by mettled road.

Health care policy formulation gives utmost significance to health infrastructure which comprises of resources, materials and facilities to individual which are considered significant in promoting good health and well-being and it provides capacity building for communities, and nation at a larger scale so, that it can respond properly to the emergencies, severe health problem and chronic diseases and other related challenges to health. Review of health infrastructure can be done by examining demographic indicators such as infant mortality rate, death rate, birth rate and life expectancy etc.

Studying regional aspect is important for two major reasons. Firstly, regional study will help to identify which region is needed to be considered for the development on the priority basis. Secondly, it will help in providing equal opportunities, facilities and accessibility irrespective of physical or cultural constraints. Organization of health care facilities will be in such a manner that everyone can get benefit from it under the same conditions.

FIG. 01

OBJECTIVES

- To quantify the level of health infrastructure by calculating composite index.
- To analyses level of health infrastructural development from 1995 till 2020.
- To study regional variations in health infrastructure at tehsil level in Hadoti region.

STUDY AREA

Hadoti region geographically falls in south eastern region of Rajasthan. Its geographical coordinates are between longitude 75°15’00” E to 77°25’35” E and latitude 23°45’20” N to 25°53’00” N. It is bordered by Malva plateau on the east, Aravalli range on the west and Marwar region on the south west. The major river flowing in the region is Chambal River and its tributaries that are Kali Sindh, Parvati, Chakan etc.

Region is dominated by fluvial topography, and it constitutes alluvial soil with the mixture of black soil. The region lies on the windward side of Aravalli rages i.e., on southeast, it receives good amount of precipitation through south west monsoon. Region comprises of 4 districts i.e., Kota, Bundi, Jhalawar and Baran. On the west, it is surrounded by Mewar region, in northwest of it there is Ajmer district, in the south it is bordered by Malva plateau and on the east Gird region of Madhya Pradesh. The region is dominated by the Hindi speaking belt, but Rajasthani language with Hadoti dialect is spoken commonly. The economy of the region is mainly dependent on agriculture, chemical and fertilizer industries, along with naturally occurring Kota stone and other minerals.

DATA BASE AND METHODOLOGY

The research paper is based on secondary data which is taken from Directorate of economics and statistics, Rajasthan and Office of chief medical and health officer of Kota, Bundi, Jhalawar and Baran. The study aims to show the level of development of health infrastructure from 1995 till 2020 and spatial variation of health infrastructure at tehsil level. For this purpose, 1995 and 2020 separately composite index of health infrastructure development has been calculated. And for showing regional variations in health infrastructure cartographic techniques has been used and maps has been produced using Arc GIS software.

Calculation has been done using various statistical formulas for which following eleven indicators are taken to calculate status of health infrastructure.

- X_1 – Number of Allopathic Hospitals
- X_2 – Number of Primary health centre
- X_3 – Number of Mini Primary Health Centre
- X_4 – Number of Allopathic Dispensary
- X_5 – Number of Tuberculosis Sanatorium
- X_6 – Number of Surgery Department in Allopathic Hospitals
- X_7 – Number of Ayush Hospitals
- X_8 – Number of Ayush Dispensary
- X_9 – Number of Surgery Department in Ayurvedic Hospitals
- X_{10} – Number of Maternity & Child Welfare

Centre

- X_{11} – Number of Family Welfare Centre

To Determine the level of development composite index have been calculated, which comprises of following steps:

1. Firstly, mean of each indicator has been calculated.
    - $\overline{X} = \frac{x}{N}$

Where *x* = sum of indices

N = number of indices

2. Standard deviation (S) of each indicator has been calculated
    - Standard Deviation of indices

    $\sigma = \sqrt{\sum d^2} / N$

Where $d = \overline{x} - x$ means deviation from actual mean

3. Standard values has been calculated by using the following formula.
    - Standard Score/Z Score

    (Zij) = (X-X)/Sj

Where *X* = Mean of the j^{th} indicators

Sj = STDEV of j^{th} indicator

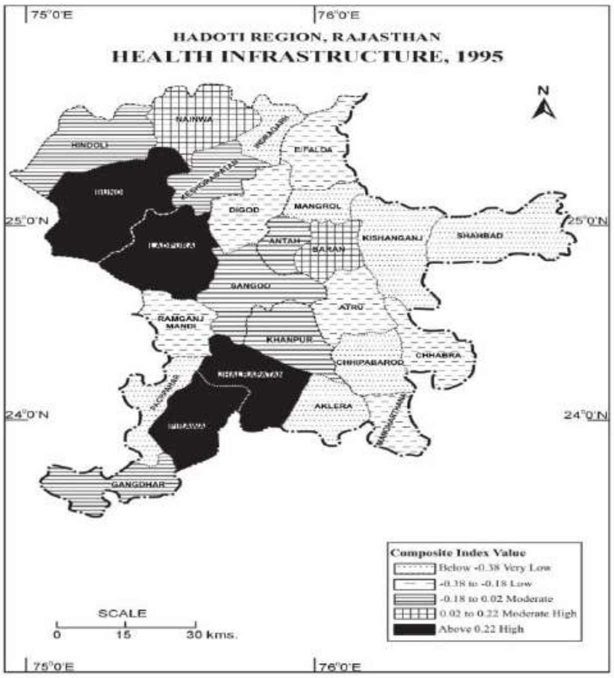
4. Gross values of each tehsil has been calculated by summing up the standardized value of all the indicators.
    - *G.V.* = Sum of total indicators
5. Lastly, composite index has been calculated.
    - *G.V.* = Gross Value

N = Number of Indicators

RESULTS AND DISCUSSION

The composite index of development of health infrastructure has been calculated for separately for every selected indicator. Based on composite index values of each tehsil has been ranked accordingly. In 1995 Ladpura tehsil of Kota district ranked first and Mangrol tehsil of Baran district ranked last whereas in 2020 Jhalrapatan tehsil of Jhalawar district ranked first and Magrol tehsil of Baran district ranked last. From table 02 and table 04 it has been seen that development of all the tehsils is not uniform spatially and temporally. Regional disparities in the level of health infrastructure development in Hadoti region is varying in all the tehsils. The detailed explanation of level of health infrastructure disparities is given below.

FIG.02



Source: Calculated by author from directorate of economics & statistics department, Rajasthan data, 1995

REGIONAL DISPARITIES IN HEALTH INFRASTRUCTURE, 1995

Level of development of health infrastructure in Hadoti region has been categorized under 5 categories that are high, moderate high, moderate, low, very low and low.

High level: High level of health infrastructure is found 4 tehsils here composite value of these tehsil is above 0.22. it comprises of Ladpura (C.I.V. 2.481, Rank 1), Jhalrapatan(C.I.V. 1.687, Rank 2), Bundi (C.I.V. 1.372, Rank 3) and Pirawa (C.I.V. 0.273, Rank 4). Well-developed health infrastructure if found mostly in tehsils which has district headquarter.

Moderate high level: It consists of 2 tehsils Nainwa (C.I.V. 0.177, Rank 5) and Baran (C.I.V. 0.051, Rank 6). This category consists Baran tehsil which has district headquarter in it. The health infrastructure in Hadoti region is polarized toward district headquarter.

Moderate level: It consists of 6 tehsils that are Hindoli (C.I.V. 0, Rank 7), Keshoraipatan (C.I.V. -0.021, Rank 8), Gangdhar (C.I.V. -0.021, Rank 9), Antah (C.I.V. -0.04, Rank 10), Khanpur (C.I.V. -0.153, Rank 11) and Sangod (C.I.V. -0.158, Rank 12). These are the tehsils which has close proximity to the district headquarter.

Low level: This category comprises of 6 tehsils that are Ramganj mandi (C.I.V. -0.194, Rank 13), Digod (C.I.V. -0.199, Rank 14), Pipalada (C.I.V. -0.226, Rank 15), Atru (C.I.V. -0.243, Rank 16), Chhabra (C.I.V. -0.317, Rank 17) and Manohar thana (C.I.V. -0.33, Rank 18). Kota and Baran district has majority of tehsils in this category.

Very low level: This category comprises of tehsils with C.I.V. below -0.38, tehsils are Chhipabarod (C.I.V. -0.452, Rank 19), Indragarh (C.I.V. -0.458, Rank 20), Shahbad (C.I.V. -0.46, Rank 21), Kishanganj (C.I.V. -0.519, Rank 22), Panchpahar (C.I.V. -0.725, Rank 23), Aklera (C.I.V. -0.746, Rank 24) and Mangrol (C.I.V. -0.78, Rank 25). This category has tehsils which lies in the peripheral part of the region with reference to district headquarter. It has majority of the tehsils from Baran district which borders Madhya Pradesh and it is a tribal belt of the region.

TABLE 01: DISTRICT-WISE TEHSILS OF DIFFERENT CATEGORY IN LEVEL OF DEVELOPMENT IN HEALTH INFRASTRUCTURE, 1995

S.No.	Level of Development, 1995	Baran	Bundi	Jhalawar	Kota	Total Tehsils
1.	High	0	1 (20)	2 (28.57)	1 (20)	4 (16)
2.	Moderate High	1 (12.5)	1 (20)	0	0	2 (8)
3.	Moderate	1 (12.5)	2 (40)	2 (28.57)	1 (20)	6 (24)
4.	Low	2 (25)	0	1 (14.28)	3 (60)	6 (24)
5.	Very Low	4 (50)	1 (20)	2 (28.57)	0	7 (28)
	Total	**8 (100)**	**5 (100)**	**7 (100)**	**5 (100)**	**25 (100)**

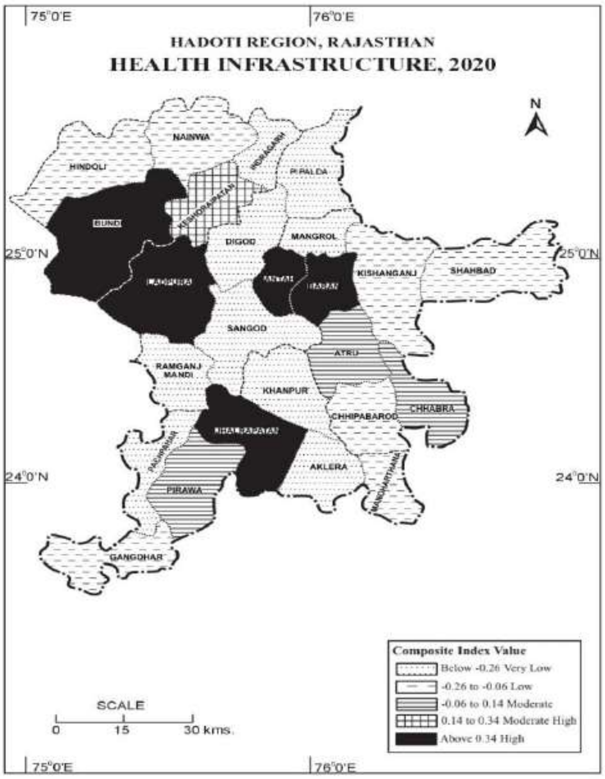
Source: Calculated by author from directorate of economics & statistics department, Rajasthan data, 1995

TABLE 02: COMPOSITE INDEX OF DEVELOPMENT OF HEALTH INFRASTRUCTURE IN HADOTI REGION, 1995

S.No	Tehsils 1995	Gross Value	Composite Index	Rank
1.	Pipalda	-2.486	-0.226	15
2.	Digod	-2.186	-0.199	14
3.	Ladpura	27.286	2.481	1
4.	Ramganj mandi	-2.13	-0.194	13
5.	Sangod	-1.742	-0.158	12
6.	Hindoli	0.005	0	7
7.	Nainwa	1.951	0.177	5
8.	Indragarh	-5.041	-0.458	20
9.	Keshoraipatan	-0.227	-0.021	8
10.	Bundi	15.096	1.372	3
11.	Baran	0.56	0.051	6
12.	Kishanganj	-5.705	-0.519	22
13.	Shahbad	-5.06	-0.46	21
14.	Atru	-2.669	-0.243	16
15.	Chhabra	-3.487	-0.317	17
16.	Chhipabarod	-4.968	-0.452	19
17.	Antah	-0.435	-0.04	10
18.	Mangrol	-8.585	-0.78	25
19.	Khanpur	-1.685	-0.153	11
20.	Jhalrapatan	18.559	1.687	2
21.	Aklera	-8.204	-0.746	24
22.	Manohar thana	-3.63	-0.33	18
23.	Panchpahar	-7.978	-0.725	23
24.	Pirawa	3	0.273	4
25.	Gangdhar	-0.231	-0.021	9

Source: Calculated by author from directorate of economics & statistics department, Rajasthan data, 1995

FIG.03



Source: Calculated by author from directorate of economics & statistics department, Rajasthan data, 2020

REGIONAL DISPARITIES IN HEALTH INFRASTRUCTURE, 2020

Level of development of health infrastructure in Hadoti region of 2020 has been categorized under 5 categories in a similar manner done in 1995, categories are high, moderate high, moderate, low, very low and low. Through this comparative picture can be drawn between 1995 and 2020 health infrastructure development in Hadoti region.

High level: High level of development can be seen in 5 tehsils having C.I.V. above 0.34 and tehsils are Jhalrapatan (C.I.V. 1.669, Rank 1), Ladpura (C.I.V. 1.158, Rank 2), Bundi (C.I.V. 1.1, Rank 3), Baran (C.I.V. 0.908, Rank 4), Antah (C.I.V. 0.414, Rank 5). In 2020 all the district headquarter tehsils has high level of health infrastructure development.

Moderate high level: This category consists of only one tehsil from all 4 districts of Hadoti region and it is Keshoraipatan (C.I.V. 0.167, Rank 6). Similarly, as in 1995 very few tehsils are there in this category.

Moderate level: It consists of three tehsils that are Pirawa (C.I.V. 0.1, Rank 7), Chhabra (C.I.V. 0.077, Rank 8), Atru (C.I.V. -0.005, Rank 9). Atru and Chhabra tehsil are from Baran district which has shown improvement since 1995.

Low level: Low level of development is found in 7 tehsils that are Gangdhar (C.I.V. -0.13, Rank 10), Nainwa (C.I.V. -0.165, Rank 11), Kishanganj (C.I.V. -0.169, Rank12), Manohar thana (C.I.V. -0.171, Rank 13), Hindoli (C.I.V. -0.172, Rank 14), Shahbad (C.I.V. -0.208, Rank 15), Chhipabarod (C.I.V. -0.239, Rank 16). In this category Baran district has most of the tehsils followed by Bundi and Jhalawar district.

Very low level: This category has highest number of tehsils with C.I.V. below -0.26. it has total nine tehsils that are Khanpur (C.I.V. -0.279, Rank 17), Sangod (C.I.V. -0.344, Rank 18), Digod (C.I.V. -0.374, Rank 19), Ramganj mandi (C.I.V. -0.239, Rank 20), Pipalda (C.I.V. -0.469, Rank 21), Panchpahar (C.I.V. -0.514, Rank 22), Indragarh (C.I.V. -0.621, Rank 23), Aklera(C.I.V. -0.657, Rank 24), Mangrol (C.I.V. -0.661, Rank 25). Jhalawar and Kota district has majority of the tehsils with very low development in health infrastructure. This shows that extreme polarization has taken in Kota district and Ladpura tehsil of Kota district has emerged as the most developed tehsils and today it is behaving like a focal point of the Hadoti region in serving best medical facilities.

TABLE 03: DISTRICT-WISE TEHSILS OF DIFFERENT CATEGORY IN LEVEL OF DEVELOPMENT IN HEALTH INFRASTRUCTURE, 2020

S.No.	Level of Development, 2020	Baran	Bundi	Jhalawar	Kota	Total Tehsils
1.	High	2 (25)	1 (20)	1 (14.28)	1 (20)	5 (20)
2.	Moderate High	0	1 (20)	0	0	1 (4)
3.	Moderate	2 (25)	0	1 (14.28)	0	3 (12)
4.	Low	3 (37.5)	2 (40)	2 (28.57)	0	7 (28)
5.	Very Low	1 (12.5)	1 (20)	3 (42.85)	4 (80)	9 (36)
	Total	**8 (100)**	**5 (100)**	**7 (100)**	**5 (100)**	**25 (100)**

Source: Calculated by author from directorate of economics & statistics department, Rajasthan data, 2020

TABLE 04: COMPOSITE INDEX OF DEVELOPMENT OF HEALTH INFRASTRUCTURE IN HADOTI REGION, 2020

S.No	Tehsils 2020	Gross Value	Composite Index	Rank
1.	Pipalda	-5.156	-0.469	21
2.	Digod	-4.109	-0.374	19
3.	Ladpura	12.742	1.158	2
4.	Ramganj mandi	-4.568	-0.415	20
5.	Sangod	-3.779	-0.344	18
6.	Hindoli	-1.895	-0.172	14
7.	Nainwa	-1.817	-0.165	11
8.	Indragarh	-6.836	-0.621	23
9.	Keshoraipatan	1.838	0.167	6
10.	Bundi	12.104	1.1	3
11.	Baran	9.991	0.908	4
12.	Kishanganj	-1.857	-0.169	12
13.	Shahbad	-2.287	-0.208	15
14.	Atru	-0.054	-0.005	9
15.	Chhabra	0.844	0.077	8
16.	Chhipabarod	-2.628	-0.239	16
17.	Antah	4.55	0.414	5
18.	Mangrol	-7.275	-0.661	25
19.	Khanpur	-3.068	-0.279	17
20.	Jhalrapatan	18.355	1.669	1
21.	Aklera	-7.225	-0.657	24
22.	Manohar thana	-1.881	-0.171	13

23.	Panchpahar	-5.658	-0.514	22
24.	Pirawa	1.103	0.1	7
25.	Gangdhar	-1.431	-0.13	10

Source: Calculated by author from directorate of economics & statistics department, Rajasthan data, 1995

CONCLUSION

From the study it can be concluded that regional imbalance is very much prominent within the Hadoti region both temporally and spatially in terms of health infrastructure development. Highly developed health infrastructure in concentrated only in tehsils which have district headquarter in it that are Kota, Bundi, Jhalrapatan and Bundi and there are no changes seen since 1995 till 2020 in this pattern. Poorly developed tehsils are from Baran and Jhalawar and this pattern is consistent since 1995 till 2020. Whereas Kota district has only one highly developed tehsil and all other tehsils falls in very low development category. There is a need to bring down this intra-regional disparity. So, that everybody from the length and breadth of the region can be benefited. This can be done through development of public sector's institutional capability at the central, state and the local level and to adopt strategies which can render quality health care to the neglected and vulnerable segments of the population ,there should be standard protocols and accreditation system for individuals and institutions in order to provide quality and cost effective health care service, for this public-private partnership collaboration can be encouraged, model code of ethics and regulations and other obligations should be followed properly. There should be speedy grievance redressal mechanism and examples should be set for correcting, offenders of medical ethics and other responsibilities. With the upsurge in digital technologies, electronic health record (EHR), tele-medicine and artificial intelligence can be used in medical health care infrastructure.

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Appendix

TABLE 01: DEVELOPMENT INDICATORS OF HEALTH INFRASTRUCTURE IN HADOTI REGION, 1995

1995	Hospitals (Allopathic) (X_1)	Primary Health Centre (X_2)	Mini Primary Health Centre (X_3)	Dispensary (Allopathic) (X_4)	Tuberculosis Sanatorium (X_5)	Surgery Department in Hospitals (Allopathic) (X_6)
Pipalda	0	5	28	1	0	60
Digod	0	7	25	1	0	90
Ladpura	3	6	24	19	1	1535
Ramganj mandi	0	5	30	2	0	95
Sangod	0	5	34	2	0	85
Hindoli	1	5	27	0	0	60
Nainwa	1	7	26	0	0	92
Indragarh	1	0	0	1	0	40
Keshoraipatan	0	4	31	1	0	54
Bundi	2	9	45	1	1	260
Baran	1	4	20	1	0	180
Kishanganj	0	4	24	1	0	54
Shahbad	0	3	21	0	0	54
Atru	0	4	29	2	0	60
Chhabra	0	3	20	0	0	58
Chhipabarod	0	3	24	1	0	48
Antah	0	8	25	2	0	84
Mangrol	0	0	0	0	0	30
Khanpur	0	5	32	0	0	60

Jhalrapatan	2	11	70	1	1	307
Aklera	0	0	0	0	0	36
Manohar thana	0	3	31	0	0	48
Panchpahar	0	0	0	0	0	56
Pirawa	1	7	36	0	0	72
Gangdhar	0	4	40	0	0	54

TABLE 01: CONTINUED

1995	Hospitals (Ayush) (X_7)	Dispensary (Ayush) (X_8)	Surgery Department in Ayurvedic Hospitals (X_9)	Maternity & Child Welfare Centre (X_{10})	Family Welfare Centre (X_{11})
Pipalda	0	11	0	1	1
Digod	0	9	0	1	1
Ladpura	1	17	30	5	6
Ramganj mandi	0	10	0	1	1
Sangod	0	11	0	1	1
Hindoli	0	16	0	0	6
Nainwa	0	15	0	1	7
Indragarh	0	2	0	2	2
Keshoraipatan	0	15	0	1	6
Bundi	1	17	10	2	11
Baran	1	7	5	1	2
Kishanganj	0	1	0	0	1
Shahbad	0	4	0	1	1
Atru	0	10	0	1	1
Chhabra	0	8	0	2	1
Chhipabarod	0	8	0	0	1
Antah	0	10	0	2	1
Mangrol	0	0	0	1	0
Khanpur	1	11	0	0	1
Jhalrapatan	2	26	7	2	6
Aklera	0	0	0	1	1
Manohar thana	0	9	0	1	1
Panchpahar	0	1	0	1	1
Pirawa	1	14	0	2	1
Gangdhar	1	13	0	1	1

TABLE 02: COMPOSITE DEVELOPMENT INDEX OF HEALTH INFRASTRUCTURE IN HADOTI REGION, 1995

1995	Hospitals (Allopathic) (X_1)	Primary Health Centre (X_2)	Mini Primary Health Centre (X_3)	Dispensary (Allopathic) (X_4)	Tuberculosis Sanatorium (X_5)	Surgery Department in Hospitals (Allopathic)

						(X_6)
Pipalda	-0.583	0.185	0.152	-0.117	-0.362	-0.278
Digod	-0.583	0.899	-0.044	-0.117	-0.362	-0.178
Ladpura	3.063	0.542	-0.11	4.706	2.653	4.677
Ramganj mandi	-0.583	0.185	0.283	0.15	-0.362	-0.161
Sangod	-0.583	0.185	0.545	0.15	-0.362	-0.194
Hindoli	0.632	0.185	0.086	-0.385	-0.362	-0.278
Nainwa	0.632	0.899	0.02	-0.385	-0.362	-0.171
Indragarh	0.632	-1.599	-1.683	-0.117	-0.362	-0.346
Keshoraipatan	-0.583	-0.171	0.348	-0.117	-0.362	-0.299
Bundi	1.847	1.613	1.266	-0.117	2.653	0.393
Baran	0.632	-0.171	-0.372	-0.117	-0.362	0.125
Kishanganj	-0.583	-0.171	-0.11	-0.117	-0.362	-0.299
Shahbad	-0.583	-0.528	-0.306	-0.385	-0.362	-0.299
Atru	-0.583	-0.171	0.217	0.15	-0.362	-0.278
Chhabra	-0.583	-0.528	-0.372	-0.385	-0.362	-0.285
Chhipabarod	-0.583	-0.528	-0.11	-0.117	-0.362	-0.319
Antah	-0.583	1.256	-0.044	0.15	-0.362	-0.198
Mangrol	-0.583	-1.599	-1.683	-0.385	-0.362	-0.379
Khanpur	-0.583	0.185	0.414	-0.385	-0.362	-0.278
Jhalrapatan	1.847	2.328	2.905	-0.117	2.653	0.551
Aklera	-0.583	-1.599	-1.683	-0.385	-0.362	-0.359
Manohar thana	-0.583	-0.528	0.348	-0.385	-0.362	-0.319
Panchpahar	-0.583	-1.599	-1.683	-0.385	-0.362	-0.292
Pirawa	0.632	0.899	0.676	-0.385	-0.362	-0.238
Gangdhar	-0.583	-0.171	0.938	-0.385	-0.362	-0.299

TABLE 02: CONTINUED

1995	Hospitals (Ayush) (X_7)	Dispensary (Ayush) (X_8)	Surgery Department in Ayurvedic Hospitals (X_9)	Maternity & Child Welfare Centre (X_{10})	Family Welfare Centre (X_{11})
Pipalda	-0.575	0.191	-0.328	-0.237	-0.534
Digod	-0.575	-0.127	-0.328	-0.237	-0.534
Ladpura	1.221	1.146	4.401	3.717	1.27
Ramganj mandi	-0.575	0.032	-0.328	-0.237	-0.534
Sangod	-0.575	0.191	-0.328	-0.237	-0.534
Hindoli	-0.575	0.986	-0.328	-1.226	1.27
Nainwa	-0.575	0.827	-0.328	-0.237	1.631
Indragarh	-0.575	-1.241	-0.328	0.751	-0.173
Keshoraipatan	-0.575	0.827	-0.328	-0.237	1.27
Bundi	1.221	1.146	1.248	0.751	3.075
Baran	1.221	-0.446	0.46	-0.237	-0.173

Kishanganj	-0.575	-1.4	-0.328	-1.226	-0.534
Shahbad	-0.575	-0.923	-0.328	-0.237	-0.534
Atru	-0.575	0.032	-0.328	-0.237	-0.534
Chhabra	-0.575	-0.286	-0.328	0.751	-0.534
Chhipabarod	-0.575	-0.286	-0.328	-1.226	-0.534
Antah	-0.575	0.032	-0.328	0.751	-0.534
Mangrol	-0.575	-1.559	-0.328	-0.237	-0.895
Khanpur	1.221	0.191	-0.328	-1.226	-0.534
Jhalrapatan	3.017	2.578	0.776	0.751	1.27
Aklera	-0.575	-1.559	-0.328	-0.237	-0.534
Manohar thana	-0.575	-0.127	-0.328	-0.237	-0.534
Panchpahar	-0.575	-1.4	-0.328	-0.237	-0.534
Pirawa	1.221	0.668	-0.328	0.751	-0.534
Gangdhar	1.221	0.509	-0.328	-0.237	-0.534

TABLE 03: DEVELOPMENT INDICATORS OF HEALTH INFRASTRUCTURE IN HADOTI REGION, 2020

2020	Hospitals (Allopathic) (X_1)	Primary Health Centre (X_2)	Mini Primary Health Centre (X_3)	Dispensary (Allopathic) (X_4)	Tuberculosis Sanatorium (X_5)	Surgery Department in Hospitals (Allopathic) (X_6)
Pipalda	0	6	43	0	0	96
Digod	0	13	35	0	0	132
Ladpura	4	5	18	22	1	491
Ramganj mandi	0	7	39	0	0	207
Sangod	0	8	54	0	0	116
Hindoli	2	6	47	0	0	122
Nainwa	2	8	42	0	0	161
Indragarh	2	0	0	0	0	80
Keshoraipatan	3	6	59	0	0	162
Bundi	4	13	59	0	1	886
Baran	3	8	26	0	1	348
Kishanganj	1	8	36	0	0	108
Shahbad	2	4	40	0	0	124
Atru	2	8	47	0	0	128
Chhabra	1	8	31	0	0	98
Chhipabarod	2	2	39	0	0	72
Antah	3	12	48	0	0	162
Mangrol	1	0	0	0	0	30
Khanpur	2	5	50	0	0	110
Jhalrapatan	5	15	96	3	1	775
Aklera	1	0	0	0	0	75
Manohar	1	7	57	0	0	72

thana						
Panchpahar	1	0	0	0	0	75
Pirawa	4	8	57	0	0	202
Gangdhar	2	7	64	0	0	102

TABLE 03: CONTINUED

2020	Hospitals (Ayush) (X_7)	Dispensary (Ayush) (X_8)	Surgery Department in Ayurvedic Hospitals (X_9)	Maternity & Child Welfare Centre (X_{10})	Family Welfare Centre (X_{11})
Pipalda	0	11	0	0	0
Digod	0	8	0	0	0
Ladpura	1	16	30	0	10
Ramganj mandi	0	11	0	0	0
Sangod	0	13	0	0	0
Hindoli	0	18	0	0	8
Nainwa	0	15	0	0	10
Indragarh	2	0	0	0	2
Keshoraipatan	2	20	0	0	9
Bundi	2	20	10	0	14
Baran	4	16	5	1	35
Kishanganj	0	11	0	0	46
Shahbad	0	8	0	0	47
Atru	0	11	0	0	56
Chhabra	1	7	5	1	40
Chhipabarod	0	12	0	0	43
Antah	0	13	0	1	60
Mangrol	0	2	0	1	1
Khanpur	0	12	0	0	7
Jhalrapatan	2	23	12	1	20
Aklera	0	1	0	1	1
Manohar thana	1	9	5	0	8
Panchpahar	1	0	5	1	1
Pirawa	0	18	0	0	13
Gangdhar	0	15	0	0	9

TABLE 04: COMPOSITE DEVELOPMENT INDEX OF HEALTH INFRASTRUCTURE IN HADOTI REGION, 2020

2020	Hospitals (Allopathic) (X_1)	Primary Health Centre (X_2)	Mini Primary Health Centre (X_3)	Dispensary (Allopathic) (X_4)	Tuberculosis Sanatorium (X_5)	Surgery Department in Hospitals (Allopathic) (X_6)
Pipalda	-1.389	-0.136	0.153	-0.226	-0.428	-0.474
Digod	-1.389	1.569	-0.195	-0.226	-0.428	-0.306

Ladpura	1.505	-0.38	-0.934	4.756	2.245	1.374
Ramganj mandi	-1.389	0.107	-0.021	-0.226	-0.428	0.045
Sangod	-1.389	0.351	0.632	-0.226	-0.428	-0.381
Hindoli	0.058	-0.136	0.327	-0.226	-0.428	-0.353
Nainwa	0.058	0.351	0.11	-0.226	-0.428	-0.17
Indragarh	0.058	-1.599	-1.718	-0.226	-0.428	-0.549
Keshoraipata n	0.781	-0.136	0.849	-0.226	-0.428	-0.166
Bundi	1.505	1.569	0.849	-0.226	2.245	3.223
Baran	0.781	0.351	-0.586	-0.226	2.245	0.705
Kishanganj	-0.666	0.351	-0.151	-0.226	-0.428	-0.418
Shahbad	0.058	-0.624	0.023	-0.226	-0.428	-0.343
Atru	0.058	0.351	0.327	-0.226	-0.428	-0.325
Chhabra	-0.666	0.351	-0.369	-0.226	-0.428	-0.465
Chhipabarod	0.058	-1.111	-0.021	-0.226	-0.428	-0.587
Antah	0.781	1.326	0.371	-0.226	-0.428	-0.166
Mangrol	-0.666	-1.599	-1.718	-0.226	-0.428	-0.783
Khanpur	0.058	-0.38	0.458	-0.226	-0.428	-0.409
Jhalrapatan	2.229	2.057	2.459	0.453	2.245	2.704
Aklera	-0.666	-1.599	-1.718	-0.226	-0.428	-0.573
Manohar thana	-0.666	0.107	0.762	-0.226	-0.428	-0.587
Panchpahar	-0.666	-1.599	-1.718	-0.226	-0.428	-0.573
Pirawa	1.505	0.351	0.762	-0.226	-0.428	0.022
Gangdhar	0.058	0.107	1.067	-0.226	-0.428	-0.446

TABLE 04: CONTINUED

2020	Hospitals (Ayush) (X_7)	Dispensary (Ayush) (X_8)	Surgery Department in Ayurvedic Hospitals (X_9)	Maternity & Child Welfare Centre (X_{10})	Family Welfare Centre (X_{11})
Pipalda	-0.618	-0.095	-0.438	-0.611	-0.894
Digod	-0.618	-0.573	-0.438	-0.611	-0.894
Ladpura	0.347	0.7	4.126	-0.611	-0.386
Ramganj mandi	-0.618	-0.095	-0.438	-0.611	-0.894
Sangod	-0.618	0.223	-0.438	-0.611	-0.894
Hindoli	-0.618	1.018	-0.438	-0.611	-0.488
Nainwa	-0.618	0.541	-0.438	-0.611	-0.386
Indragarh	1.313	-1.846	-0.438	-0.611	-0.792
Keshoraipatan	1.313	1.337	-0.438	-0.611	-0.437
Bundi	1.313	1.337	1.083	-0.611	-0.183
Baran	3.243	0.7	0.323	1.571	0.884
Kishanganj	-0.618	-0.095	-0.438	-0.611	1.443
Shahbad	-0.618	-0.573	-0.438	-0.611	1.493
Atru	-0.618	-0.095	-0.438	-0.611	1.951
Chhabra	0.347	-0.732	0.323	1.571	1.138

Chhipabarod	-0.618	0.064	-0.438	-0.611	1.29
Antah	-0.618	0.223	-0.438	1.571	2.154
Mangrol	-0.618	-1.527	-0.438	1.571	-0.843
Khanpur	-0.618	0.064	-0.438	-0.611	-0.538
Jhalrapatan	1.313	1.814	1.388	1.571	0.122
Aklera	-0.618	-1.687	-0.438	1.571	-0.843
Manohar thana	0.347	-0.414	0.323	-0.611	-0.488
Panchpahar	0.347	-1.846	0.323	1.571	-0.843
Pirawa	-0.618	1.018	-0.438	-0.611	-0.234
Gangdhar	-0.618	0.541	-0.438	-0.611	-0.437

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Shivani Meena

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has participated and presented a paper entitled 'Exploring Regional Disparities: Socio-Economic Development of Hadoti Region, Rajasthan' in the 45th Indian Geography Congress International Conference of the National Association of Geographers, India (NAGI) on Focal Theme **Environment, Development and Sustainability : The Exigency of Geography for a Resilient Future** organized by Department of Geography, Savitribai Phule Pune University, Pune from 14th to 16th December 2023.

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(Dept. of Geography,
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Secretary General, NAGI
(Dept. of Geography,
Delhi School of Economics,
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Appendices

Appendix 1

Indicators of Socio-Cultural Development, 1991					
S.No.	**Tehsils**	**Density of population**	**Sex Ratio**	**Literacy Rate**	**Gap inmale-female literacy rate**
1.	Baran	221	902	50.69	37.98
2.	Kishanganj	76	902	25.63	27.53
3.	Shahbad	57	877	27.84	31.49
4.	Atru	125	893	38.37	42.55
5.	Chhabra	124	884	30.81	33.31
6.	Chhipabarod	140	901	30.65	36.09
7.	Antah	151	904	42.57	42.42
8.	Mangrol	167	904	42.57	42.42
9.	Hindoli	113	891	22.16	26.91
10.	Nainwa	115	886	26.62	30.55
11.	Indragarh	156	897	38.76	37.72
12.	Keshoraipatan	135	897	38.76	37.72
13.	Bundi	145	883	37.01	29.21
14.	Khanpur	136	897	41.17	44.69
15.	Jhalrapatan	183	915	40.44	32.31
16.	Aklera	129	913	20.8	24.51
17.	Manoharthana	162	913	20.8	24.51
18.	Panchpahar	172	912	38.1	33.75
19.	Pirawa	149	933	34.15	36.2
20.	Gangdhar	124	941	23.2	23.56
21.	Pipalda	143	889	27.77	31.77
22.	Digod	136	892	32.82	35.08
23.	Ladpura	429	871	54.62	7.82
24.	Ramganj Mandi	212	884	34.25	23.83
25.	Sangod	130	905	34.13	35.16

Appendix 1 (Cont.)

S.No.	Tehsils	Percentage of urban population	Percentage of main workers	CWPR	Worker density
1.	Baran	41.65	86.15	34.9	77.24
2.	Kishanganj	0	87.91	40.85	30.93
3.	Shahbad	0	84.92	42.47	24
4.	Atru	0	80.02	38.88	48.55
5.	Chhabra	16.72	79.01	41.99	52.02
6.	Chhipabarod	11.62	81.83	47.36	66.31
7.	Antah	22.33	85.33	34.33	51.97
8.	Mangrol	22.33	85.33	34.33	59.47
9.	Hindoli	0	83.02	45.32	51.24
10.	Nainwa	9.08	80.01	43.71	50.49
11.	Indragarh	27.49	84.04	37.22	57.95
12.	Keshoraipatan	27.49	84.04	37.22	50.28

13.	Bundi	23.31	90.23	37.86	54.78
14.	Khanpur	8.22	87.59	39.29	53.6
15.	Jhalrapatan	26.67	88.6	44.51	81.24
16.	Aklera	10.58	80.99	49.1	63.54
17.	Manoharthana	10.58	80.99	49.1	79.39
18.	Panchpahar	24.3	94.3	37.56	64.6
19.	Pirawa	13.89	87.22	52.61	78.6
20.	Gangdhar	5.25	92.76	39.65	51.34
21.	Pipalda	0	77.62	38.83	55.65
22.	Digod	0	85.86	36.35	49.36
23.	Ladpura	83.47	95.56	30.04	128.82
24.	Ramganj Mandi	12.4	91.39	39	82.58
25.	Sangod	11.29	75.59	40.75	53.07

Appendix 1 (Cont.)

S.No.	Tehsils	Percentage of agricultural labourers	Percentage of cultivator	Percentage of household industry workers
1.	Baran	14.04	33.14	0.83
2.	Kishanganj	31.12	47.54	0.69
3.	Shahbad	18	56.75	0.62
4.	Atru	19.11	45.78	1.17
5.	Chhabra	12.11	53.39	0.66
6.	Chhipabarod	12.07	59.02	0.19
7.	Antah	17.99	44.9	2.45
8.	Mangrol	17.98	44.9	2.45
9.	Hindoli	7.47	64.01	0.83
10.	Nainwa	6.77	54.77	1.36
11.	Indragarh	13.88	46.84	1.04
12.	Keshoraipatan	13.88	46.84	1.03
13.	Bundi	12.33	43.78	0.66
14.	Khanpur	22.55	51.39	1.16
15.	Jhalrapatan	13.92	50.82	1.27
16.	Aklera	9.68	63.02	1.28
17.	Manoharthana	9.67	63.02	1.28
18.	Panchpahar	20.3	48.99	1.11
19.	Pirawa	19.78	48.39	1.14
20.	Gangdhar	21.64	59.48	1.03
21.	Pipalda	15.14	49.09	0.71
22.	Digod	25.35	44.39	0.76
23.	Ladpura	6.02	9.73	1.46
24.	Ramganj Mandi	9.61	30.06	0.68
25.	Sangod	18.84	39.04	0.98

Appendix 1 (Cont.)

S.No.	Tehsils	Percentage of other workers	Dependency ratio	Infant mortality rate
1.	Baran	11.55	186.53	28
2.	Kishanganj	3.41	144.79	0
3.	Shahbad	4.13	135.45	0
4.	Atru	5.38	157.23	0
5.	Chhabra	6.58	138.16	33
6.	Chhipabarod	3.23	112.12	0
7.	Antah	8.97	191.28	13
8.	Mangrol	8.97	191.29	0
9.	Hindoli	10.7	120.67	14
10.	Nainwa	17.1	128.77	19
11.	Indragarh	22.28	168.66	5
12.	Keshoraipatan	22.28	168.67	7
13.	Bundi	33.46	164.14	19
14.	Khanpur	12.5	154.83	14
15.	Jhalrapatan	22.64	124.68	27
16.	Aklera	7.51	103.67	0
17.	Manoharthana	7.51	103.67	0
18.	Panchpahar	23.9	166.25	0
19.	Pirawa	8.61	111.25	18
20.	Gangdhar	10.61	152.23	53
21.	Pipalda	12.69	157.53	37
22.	Digod	15.35	175.12	14
23.	Ladpura	78.37	232.89	0
24.	Ramganj Mandi	51.04	156.39	15
25.	Sangod	16.73	145.41	15

Appendix 1.1

Composite Index of Socio-Cultural Development, 1991			
S.No.	**Tehsils**	**Gross Values**	**Composite Index**
1.	Baran	-0.31	-0.02
2.	Kishanganj	-6.16	-0.44
3.	Shahbad	-5.71	-0.41
4.	Atru	-4.96	-0.35
5.	Chhabra	-4.61	-0.33
6.	Chhipabarod	0.84	0.06
7.	Antah	-0.98	-0.07
8.	Mangrol	0.56	0.04
9.	Hindoli	0.08	0.01
10.	Nainwa	-0.43	-0.03
11.	Indragarh	-0.15	-0.01
12.	Keshoraipatan	-1.01	-0.07
13.	Bundi	-0.32	-0.02
14.	Khanpur	-2.84	-0.2
15.	Jhalrapatan	6.26	0.45
16.	Aklera	5.14	0.37
17.	Manoharthana	6.41	0.46
18.	Panchpahar	3.44	0.25
19.	Pirawa	4.88	0.35

20.	Gangdhar	-1.12	-0.08
21.	Pipalda	-7.1	-0.51
22.	Digod	-6.79	-0.48
23.	Ladpura	15.96	1.14
24.	Ramganjmandi	3.2	0.23
25.	Sangod	-4.27	-0.3

Appendix 2

Indicators of Socio-Cultural Development,2011					
S.No.	**Tehsils**	**Density of population**	**Sex Ratio**	**Literacy Rate**	**Gap in male-female literacy rate**
1.	Baran	221	902	50.69	37.98
3.	Shahbad	97	927	62.79	30.16
4.	Atru	177	925	69.79	29.01
5.	Chhabra	190	913	63.05	30.06
6.	Chhipabarod	205	937	60.67	31.87
7.	Antah	229	928	71.17	28.04
8.	Mangrol	233	929	70.18	28.87
9.	Hindoli	165	920	55.24	31.75
10.	Nainwa	165	915	58.97	33.99
11.	Indragarh	193	920	65.27	31.31
12.	Keshoraipatan	218	929	68.82	28.61
13.	Bundi	214	925	64.26	26.02
14.	Khanpur	182	925	70.04	30.54
15.	Jhalrapatan	278	943	66.84	26.85
16.	Aklera	226	940	52.3	29.08
17.	Manoharthana	226	954	50	29.39
18.	Panchpahar	252	954	64.53	30.16
19.	Pirawa	205	953	63.65	31.53
20.	Gangdhar	183	958	54.19	28.64
21.	Pipalda	200	931	67.3	28.91
22.	Digod	185	929	71.52	27.07
23.	Ladpura	730	900	81.17	15.5
24.	Ramganjmandi	347	914	70.08	26.22
25.	Sangod	177	935	73.02	-0.17

Appendix 2 (Cont.)

S.No.	**Tehsils**	**Percentage of urban population**	**Percentage of main workers**	**CWPR**	**Worker density**
1.	Baran	55.25	73.62	38.36	129.99
2.	Kishanganj	0	56.79	46.41	54.14
3.	Shahbad	0	63.87	46.7	45.16
4.	Atru	18.44	60.69	46.73	82.76
5.	Chhabra	21.18	70.31	47.91	91.05

6.	Chhipabarod	11.02	68.21	49.29	101.16
7.	Antah	26.97	61.16	42.41	96.98
8.	Mangrol	23.44	63.04	45.48	106.07
9.	Hindoli	0.74	50.76	51.16	84.63
10.	Nainwa	9.94	74.84	40.87	67.36
11.	Indragarh	31.79	70.81	36.72	71.07
12.	Keshoraipatan	29.39	57.36	41.82	91.44
13.	Bundi	27.94	77.81	36.71	78.98
14.	Khanpur	8	67.69	51.15	93
15.	Jhalrapatan	32.03	69.53	45.13	125.59
16.	Aklera	14.69	67.36	49.6	112.06
17.	Manoharthana	7.89	71.12	53.88	121.86
18.	Panchpahar	23.57	76.57	42.48	107.03
19.	Pirawa	6.02	67.06	52.78	108.1
20.	Gangdhar	5.13	67.65	49.11	89.93
21.	Pipalda	0	68.66	67.35	134.86
22.	Digod	0	75.05	59.22	109.47
23.	Ladpura	89.7	88.93	38.2	278.87
24.	Ramganj Mandi	47.28	81.4	52.1	180.8
25.	Sangod	11.73	72.04	64.54	113.99

Appendix 2 (Cont.)

S.No.	Tehsils	Percentage of agricultural labourers	Percentage of cultivator	Percentage of household industry workers
1.	Baran	10.54	21.93	2.35
2.	Kishanganj	19.99	23.94	1.76
3.	Shahbad	17.04	34.15	1.27
4.	Atru	11.65	32.42	1.51
5.	Chhabra	11.7	44.74	1.07
6.	Chhipabarod	13.6	42.91	1.09
7.	Antah	12.13	25.35	1.44
8.	Mangrol	12.32	26.91	5.53
9.	Hindoli	8.79	69.29	1.79
10.	Nainwa	10.51	65.85	2.55
11.	Indragarh	14.85	51.79	1.6
12.	Keshoraipatan	25.26	53.2	2.18
13.	Bundi	14.46	49.64	2.08
14.	Khanpur	34.19	48.5	1.33
15.	Jhalrapatan	28.77	34.05	2.43
16.	Aklera	29.74	56.17	0.94
17.	Manoharthana	22.55	67.46	1.28
18.	Panchpahar	28.23	43.06	1.77
19.	Pirawa	34.41	51.72	1.44
20.	Gangdhar	35.62	46.59	1.59
21.	Pipalda	6.98	19.44	0.62
22.	Digod	17.05	21.34	0.85
23.	Ladpura	2.89	4.34	3.46
24.	Ramganjmandi	6.16	16.2	1.28
25.	Sangod	9.33	22.86	0.87

Appendix 2 (Cont.)

S.No.	Tehsils	Percentage of other workers	Dependency ratio	Infant mortality rate
1.	Baran	38.79	160.71	16
2.	Kishanganj	11.1	115.46	1
3.	Shahbad	11.41	114.14	0
4.	Atru	15.11	114.01	0
5.	Chhabra	12.8	108.73	2
6.	Chhipabarod	10.6	102.89	0
7.	Antah	22.24	135.8	9
8.	Mangrol	18.28	119.85	28
9.	Hindoli	20.14	66.87	3
10.	Nainwa	21.09	113.84	6
11.	Indragarh	31.76	137.99	10
12.	Keshoraipatan	19.36	113.73	1
13.	Bundi	33.82	131.96	14
14.	Khanpur	15.97	95.5	1
15.	Jhalrapatan	34.75	121.6	27
16.	Aklera	13.16	101.61	8
17.	Manoharthana	8.72	85.6	0
18.	Panchpahar	26.94	135.4	8
19.	Pirawa	12.43	89.45	11
20.	Gangdhar	16.2	103.63	19
21.	Pipalda	10.28	50.66	3
22.	Digod	10.85	93.81	7
23.	Ladpura	67.16	172.87	5
24.	Ramganj Mandi	39.16	110.53	6
25.	Sangod	11.03	82.9	5

Appendix 2.1

Composite Index of Socio-Cultural Development, 2011			
S.No.	**Tehsils**	**Gross Values**	**Composite Index**
1.	Baran	2.77	0.2
2.	Kishanganj	-5.97	-0.43
3.	Shahbad	-5.82	-0.42
4.	Atru	-1.86	-0.13
5.	Chhabra	-1.97	-0.14
6.	Chhipabarod	-1.07	-0.08
7.	Antah	-2.59	-0.19
8.	Mangrol	-0.07	-0.01
9.	Hindoli	-1.67	-0.12
10.	Nainwa	-1.86	-0.13
11.	Indragarh	-2.72	-0.19
12.	Keshoraipatan	-0.96	-0.07
13.	Bundi	-0.43	-0.03
14.	Khanpur	-1.84	-0.13
15.	Jhalrapatan	-0.34	-0.02
16.	Aklera	-2.87	-0.21
17.	Manoharthana	1.66	0.12
18.	Panchpahar	0.33	0.02
19.	Pirawa	-1.34	-0.1

20.	Gangdhar	-4.39	-0.31
21.	Pipalda	2.77	0.2
22.	Digod	-0.25	-0.02
23.	Ladpura	16.99	1.21
24.	Ramganj Mandi	6.59	0.47
25.	Sangod	6.93	0.49

Appendix 3

Indicators of Agricultural Development,1991				
S.No.	**Tehsils**	**Cropping intensity**	**Per capita agricultural production**	**Productivity of food grains**
1.	Baran	115.63	132.07	25.12
2.	Kishanganj	134.8	368.18	23.6
3.	Shahbad	127.13	239.51	15.01
4.	Atru	126.99	270.26	27.05
5.	Chhabra	133.23	168.09	8.88
6.	Chhipabarod	142.97	171.47	10.53
7.	Antah	129.71	365.98	27.74
8.	Mangrol	129.71	366	27.74
9.	Hindoli	141.37	312.05	13.92
10.	Nainwa	112.8	209.28	11.56
11.	Indragarh	143.03	240.62	10.66
12.	Keshoraipatan	143.03	240.62	10.66
13.	Bundi	155.03	578.47	24.91
14.	Khanpur	137.47	58.81	5.89
15.	Jhalrapatan	161.05	68.06	6.92
16.	Aklera	147.79	122.07	7
17.	Manoharthana	147.79	122.07	7
18.	Panchpahar	145.74	170.7	10.81
19.	Pirawa	145.09	126.72	8.99
20.	Gangdhar	145.37	241.56	14
21.	Pipalda	121.54	372.04	27.52
22.	Digod	133.35	574.51	29.46
23.	Ladpura	145.37	97.15	28.2
24.	Ramganj Mandi	128.35	203.77	15.74
25.	Sangod	129.32	238.73	26.26

Appendix 3 (Cont.)

S.No.	**Tehsils**	**Percentage of gross irrigated area to gross area sown**	**Percentage of gross sown area under HYV seeds**	**Chemical fertilizers per hectare of gross sown area**
1.	Baran	64.28	6.09	51.08
2.	Kishanganj	66.81	3.42	59.08
3.	Shahbad	38.72	4.09	49.66
4.	Atru	57.77	4.07	65.59
5.	Chhabra	28.07	3.24	39.42
6.	Chhipabarod	38.88	4.07	43.93
7.	Antah	75.23	88.13	733.27

8.	Mangrol	75.23	88.14	733.27
9.	Hindoli	60.85	55.79	64.79
10.	Nainwa	48.54	69.04	54.62
11.	Indragarh	67.92	88.41	117.25
12.	Keshoraipatan	67.92	88.41	117.29
13.	Bundi	77.06	86.3	112.75
14.	Khanpur	55.29	7.44	40.54
15.	Jhalrapatan	38.2	6.24	74.98
16.	Aklera	31.74	1.42	23.48
17.	Manoharthana	31.74	1.43	23.5
18.	Panchpahar	29.74	0	0
19.	Pirawa	31.57	1.46	19.24
20.	Gangdhar	18.63	1.62	28.61
21.	Pipalda	75.47	87.46	57.9
22.	Digod	81.81	89.05	62.09
23.	Ladpura	74.83	85.53	189.14
24.	Ramganj Mandi	31.03	47.24	44.22
25.	Sangod	60.45	71.53	42.56

Appendix 3 (Cont.)

S.No.	Tehsils	Percentage of net irrigated area by tube well to total net irrigated area	Percentage of net irrigated area by canal to total net irrigated area	Gross sown area per tractor
1.	Baran	48.2	30.27	124.6
2.	Kishanganj	10.52	35.85	110.69
3.	Shahbad	32.44	27.43	232.33
4.	Atru	24.87	29.08	200.51
5.	Chhabra	1.7	0.95	637.32
6.	Chhipabarod	0.84	0	395.18
7.	Antah	16.5	73.92	91.26
8.	Mangrol	16.5	73.92	91.07
9.	Hindoli	0	51.41	244.67
10.	Nainwa	3.34	7.79	348.49
11.	Indragarh	0.76	83.74	92.25
12.	Keshoraipatan	0.76	83.74	92.09
13.	Bundi	1.65	73.79	75.81
14.	Khanpur	6.32	32.64	296.31
15.	Jhalrapatan	0	3.15	349.38
16.	Aklera	0	0	1340.2
17.	Manoharthana	0	0	1340.2
18.	Panchpahar	0	1.01	782.01
19.	Pirawa	0	0.43	430.12
20.	Gangdhar	0	0	1519.03
21.	Pipalda	2.44	93.94	76.55
22.	Digod	16.62	82.51	79.23
23.	Ladpura	13.98	67.88	86.18
24.	Ramganj Mandi	0	0	610.79
25.	Sangod	23.01	12.69	196.48

Appendix 3 (Cont.)

S.No.	Tehsils	Density of livestock	Livestock facilities
1.	Baran	151.6	5
2.	Kishanganj	120.53	10
3.	Shahbad	86.05	4
4.	Atru	141.81	7
5.	Chhabra	131.89	3
6.	Chhipabarod	171.87	6
7.	Antah	145.34	6
8.	Mangrol	166.33	2
9.	Hindoli	216.53	20
10.	Nainwa	181.47	17
11.	Indragarh	171.49	4
12.	Keshoraipatan	148.8	20
13.	Bundi	164.89	24
14.	Khanpur	151.61	12
15.	Jhalrapatan	154.54	26
16.	Aklera	158.78	2
17.	Manoharthana	198.38	12
18.	Panchpahar	176.36	1
19.	Pirawa	157.16	13
20.	Gangdhar	174.16	4
21.	Pipalda	136.99	5
22.	Digod	155.86	4
23.	Ladpura	114.2	21
24.	Ramganj Mandi	155.1	4
25.	Sangod	134.7	5

Appendix 3.1

Composite Index of Agricultural Development, 1991			
S.No.	**Tehsils**	**Gross Values**	**Composite Index**
1.	Baran	-0.6	-0.05
2.	Kishanganj	-0.69	-0.06
3.	Shahbad	-5.05	-0.46
4.	Atru	-0.52	-0.05
5.	Chhabra	-7.08	-0.64
6.	Chhipabarod	-4.21	-0.38
7.	Antah	7.39	0.67
8.	Mangrol	7.65	0.7
9.	Hindoli	4.2	0.38
10.	Nainwa	-2.08	-0.19
11.	Indragarh	1.76	0.16
12.	Keshoraipatan	3.01	0.27
13.	Bundi	9.44	0.86
14.	Khanpur	-3.95	-0.36
15.	Jhalrapatan	-1.76	-0.16
16.	Aklera	-3.98	-0.36
17.	Manoharthana	-1.19	-0.11
18.	Panchpahar	-4.37	-0.4
19.	Pirawa	-4.71	-0.43
20.	Gangdhar	-1.88	-0.17

21.	Pipalda	2.15	0.2
22.	Digod	6.63	0.6
23.	Ladpura	4.3	0.39
24.	Ramganj Mandi	-4.38	-0.4
25.	Sangod	-0.09	-0.01

Appendix 4

Indicators of Agricultural Development, 2020				
S.No.	**Tehsils**	**Cropping intensity**	**Per capita agricultural production**	**Productivity of food grains**
1.	Baran	192.52	473.39	48.2
2.	Kishanganj	187.27	1001.59	49.15
3.	Shahbad	176.34	846.33	40.06
4.	Atru	194.85	437.49	38.62
5.	Chhabra	194.05	793.17	37.81
6.	Chhipabarod	194.47	681.54	39.97
7.	Antah	193.34	806.36	45.32
8.	Mangrol	193.76	1069.09	49.94
9.	Hindoli	176.63	750.39	38.82
10.	Nainwa	183.94	92.8	17.6
11.	Indragarh	178.16	518.97	44.47
12.	Keshoraipatan	190.44	2169.13	67.69
13.	Bundi	192.65	1182.67	45.82
14.	Khanpur	182.63	358.61	25.17
15.	Jhalrapatan	181.43	160.02	22.69
16.	Aklera	177.68	297.2	20.78
17.	Manoharthana	183.07	390.26	19.63
18.	Panchpahar	192.52	194.78	23.23
19.	Pirawa	191.63	173.4	23.2
20.	Gangdhar	165.19	266.28	23.03
21.	Pipalda	193.75	993.14	47.85
22.	Digod	195.88	1402.05	47.74
23.	Ladpura	180.86	155.57	45.98
24.	Ramganj Mandi	191.46	107.65	33.69
25.	Sangod	194.55	964.5	47.1

Appendix 4 (Cont.)

S.No.	**Tehsils**	**Percentage of gross irrigated area to gross area sown**	**Percentage of gross sown area under HYV seeds**	**Chemical fertilizers per hectare of gross sown area**
1.	Baran	55.85	77.74	86.17
2.	Kishanganj	62.81	75.78	83.98
3.	Shahbad	50.85	84.56	93.72
4.	Atru	51.11	75.5	83.67
5.	Chhabra	50.2	82.9	91.87
6.	Chhipabarod	50.08	82.42	91.35
7.	Antah	52.12	79.99	88.65

8.	Mangrol	51.99	82.69	91.64
9.	Hindoli	52.61	67.33	729.38
10.	Nainwa	49.34	50.35	557.73
11.	Indragarh	49.28	86.64	195.05
12.	Keshoraipatan	60.52	57.78	130.08
13.	Bundi	77.02	82.45	270.85
14.	Khanpur	57.83	71.96	80.79
15.	Jhalrapatan	51.61	121.47	145.33
16.	Aklera	48.66	55.26	54.64
17.	Manoharthana	46.75	65.7	65
18.	Panchpahar	50.8	0	0
19.	Pirawa	50.64	60.81	57.14
20.	Gangdhar	39.46	99.07	80.16
21.	Pipalda	50.34	61.51	115.16
22.	Digod	51.94	82.95	118.71
23.	Ladpura	63.41	83.52	125.38
24.	Ramganj Mandi	41.35	70.69	110.75
25.	Sangod	54.89	81.15	120.36

Appendix 4 (Cont.)

S. No.	Tehsils	Percentage of net irrigated area by tube well to total net irrigated area	Percentage of net irrigated area by canal to total net irrigated area	Gross sown area per tractor
1.	Baran	92.47	7.53	64.54
2.	Kishanganj	58.13	19.19	63.12
3.	Shahbad	66.54	0.83	121.73
4.	Atru	94.21	5.16	67.21
5.	Chhabra	71.08	3.96	189.63
6.	Chhipabarod	52.88	0.22	93.11
7.	Antah	44	53.49	62.21
8.	Mangrol	21.78	78.03	52.66
9.	Hindoli	40.19	16.51	107.45
10.	Nainwa	92.74	0	153.19
11.	Indragarh	34.96	51.27	111.07
12.	Keshoraipatan	6.08	88.87	49.61
13.	Bundi	16.09	75.35	42.01
14.	Khanpur	84.51	14.54	74.31
15.	Jhalrapatan	0.15	0.42	102.23
16.	Aklera	0.88	14.33	158.78
17.	Manoharthana	1.33	18.44	182.56
18.	Panchpahar	3.42	0.39	146.45
19.	Pirawa	1.86	2.4	131.97
20.	Gangdhar	0.91	0	308.62
21.	Pipalda	6.21	93.54	58.95
22.	Digod	20.69	79.25	48.97
23.	Ladpura	30.92	68.95	44.94
24.	Ramganjmandi	100	0	144.83
25.	Sangod	93.63	6.17	70.45

Appendix 4 (Cont.)

S.No.	Tehsils	Density of livestock	Livestock facilities
1.	Baran	136.28	46
2.	Kishanganj	109.06	32
3.	Shahbad	82.12	26
4.	Atru	122.51	46
5.	Chhabra	140.78	14
6.	Chhipabarod	163.75	34
7.	Antah	140.65	80
8.	Mangrol	180.35	2
9.	Hindoli	163.01	26
10.	Nainwa	134.19	28
11.	Indragarh	123.48	3
12.	Keshoraipatan	120.17	32
13.	Bundi	107.79	45
14.	Khanpur	128.65	18
15.	Jhalrapatan	170.59	34
16.	Aklera	250.9	1
17.	Manoharthana	230.99	17
18.	Panchpahar	166	2
19.	Pirawa	134.33	18
20.	Gangdhar	178.09	17
21.	Pipalda	122.78	21
22.	Digod	116.63	24
23.	Ladpura	118.3	41
24.	Ramganj Mandi	128.59	27
25.	Sangod	116.16	32

Appendix 4.1

Composite Index of Agricultural Development, 2020			
S.No.	**Tehsils**	**Gross Values**	**Composite Index**
1.	Baran	2.39	0.22
2.	Kishanganj	1.58	0.14
3.	Shahbad	-2.37	-0.22
4.	Atru	0.75	0.07
5.	Chhabra	1.54	0.14
6.	Chhipabarod	1.07	0.1
7.	Antah	4.63	0.42
8.	Mangrol	2.24	0.2
9.	Hindoli	2.43	0.22
10.	Nainwa	-0.94	-0.09
11.	Indragarh	-1.71	-0.16
12.	Keshoraipatan	5.66	0.51
13.	Bundi	6.64	0.6
14.	Khanpur	-2.58	-0.23
15.	Jhalrapatan	-1.7	-0.15
16.	Aklera	-4.55	-0.41

17.	Manoharthana	-2.57	-0.23
18.	Panchpahar	-8.1	-0.74
19.	Pirawa	-5.19	-0.47
20.	Gangdhar	-4.01	-0.36
21.	Pipalda	0.56	0.05
22.	Digod	2.72	0.25
23.	Ladpura	0.72	0.07
24.	Ramganj Mandi	-1.77	-0.16
25.	Sangod	2.55	0.23

Appendix 5

Indicators of Infrastructural development, 1991				
S.No.	**Tehsils**	**Primary schools per 1000 of population**	**Upper primary schools per 1000 of population**	**Senior secondary schools per 1000 of population**
1.	Baran	0.76	0.35	0.12
2.	Kishanganj	1.02	0.24	0.1
3.	Shahbad	1.16	0.16	0.1
4.	Atru	0.98	0.32	0.13
5.	Chhabra	1.27	0.22	0.07
6.	Chhipabarod	0.97	0.26	0.04
7.	Antah	1.52	0.45	0.19
8.	Mangrol	0.1	0.01	0.03
9.	Hindoli	0.93	0.22	0.09
10.	Nainwa	1.03	0.31	0.12
11.	Indragarh	0.16	0.12	0.05
12.	Keshoraipatan	1.79	0.53	0.16
13.	Bundi	0.87	0.29	0.11
14.	Khanpur	0.94	0.28	0.09
15.	Jhalrapatan	1.58	0.34	0.11
16.	Aklera	0.07	0.03	0.02
17.	Manoharthana	1.63	0.29	0.07
18.	Panchpahar	0.09	0.06	0.03
19.	Pirawa	0.93	0.28	0.09
20.	Gangdhar	1.44	0.21	0.08
21.	Pipalda	0.83	0.26	0.1
22.	Digod	0.9	0.29	0.11
23.	Ladpura	0.46	0.3	0.16
24.	Ramganj Mandi	0.67	0.15	0.11
25.	Sangod	0.96	0.27	0.09

Appendix 5 (Cont.)

S.No.	Tehsils	Educational Institutions Per 10 Sq. Km of Area	Allopathic Healthcare Institutions Per 1000 of Population	AYUSH Healthcare Institutions Per 1000 of Population
1.	Baran	2.78	0.21	0.06
2.	Kishanganj	1.03	0.28	0.01
3.	Shahbad	0.8	0.31	0.05
4.	Atru	1.78	0.34	0.09
5.	Chhabra	1.93	0.27	0.08
6.	Chhipabarod	1.79	0.25	0.07
7.	Antah	3.28	0.48	0.13
8.	Mangrol	0.24	0.01	0
9.	Hindoli	1.4	0.26	0.11
10.	Nainwa	1.68	0.31	0.11
11.	Indragarh	0.51	0.06	0.02
12.	Keshoraipatan	3.35	0.42	0.15
13.	Bundi	1.88	0.25	0.06
14.	Khanpur	1.79	0.29	0.09
15.	Jhalrapatan	3.74	0.4	0.12
16.	Aklera	0.15	0.02	0
17.	Manoharthana	3.22	0.35	0.09
18.	Panchpahar	0.32	0.02	0.01
19.	Pirawa	1.94	0.31	0.1
20.	Gangdhar	2.23	0.39	0.12
21.	Pipalda	1.71	0.28	0.09
22.	Digod	1.78	0.28	0.07
23.	Ladpura	4.07	0.1	0.03
24.	Ramganj Mandi	1.97	0.23	0.06
25.	Sangod	1.72	0.31	0.08

Appendix 5 (Cont.)

S.No.	Tehsils	Healthcare Institutions Per 100 Sq. Km of Area	Cooperative Society Per 1000 of Population
1.	Baran	35	0.47
2.	Kishanganj	6	0.47
3.	Shahbad	6	0.34
4.	Atru	12	0.42
5.	Chhabra	12	0.21
6.	Chhipabarod	10	0.23
7.	Antah	25	0.94
8.	Mangrol	7	0
9.	Hindoli	9	0.38
10.	Nainwa	13	0.55
11.	Indragarh	7	0
12.	Keshoraipatan	15	0.78
13.	Bundi	19	0.44
14.	Khanpur	12	0.38
15.	Jhalrapatan	34	0.6
16.	Aklera	5	0.03

17.	Manoharthana	15	0.49
18.	Panchpahar	8	0.06
19.	Pirawa	13	0.42
20.	Gangdhar	12	0.35
21.	Pipalda	12	0.39
22.	Digod	15	0.63
23.	Ladpura	107	0.35
24.	Ramganj Mandi	18	0.23
25.	Sangod	13	0.46

Appendix 5.1

Composite Index of Infrastructural Development, 1991			
S.No.	**Tehsils**	**Gross Values**	**Composite Index**
1.	Baran	2.53	0.32
2.	Kishanganj	-2.05	-0.26
3.	Shahbad	-2.03	-0.25
4.	Atru	2.42	0.3
5.	Chhabra	-0.83	-0.1
6.	Chhipabarod	-2.38	-0.3
7.	Antah	12.48	1.56
8.	Mangrol	-12.72	-1.59
9.	Hindoli	-0.33	-0.04
10.	Nainwa	2.97	0.37
11.	Indragarh	-10.06	-1.26
12.	Keshoraipatan	11.87	1.48
13.	Bundi	0.56	0.07
14.	Khanpur	0.48	0.06
15.	Jhalrapatan	8.27	1.03
16.	Aklera	-12.82	-1.6
17.	Manoharthana	3.97	0.5
18.	Panchpahar	-11.61	-1.45
19.	Pirawa	1.22	0.15
20.	Gangdhar	2.47	0.31
21.	Pipalda	0.21	0.03
22.	Digod	1.64	0.21
23.	Ladpura	5.12	0.64
24.	Ramganj Mandi	-2.08	-0.26
25.	Sangod	0.69	0.09

Appendix 6

Indicators of Infrastructural Development, 2020				
S.No.	**Tehsils**	**Primary schools per 1000 of population**	**Upper primary schools per 1000 of population**	**Senior secondary schools per 1000 of population**
1.	Baran	0.16	0.26	0.17
2.	Kishanganj	0.73	0.22	0.23
3.	Shahbad	0.61	0.34	0.24
4.	Atru	0.28	0.49	0.28
5.	Chhabra	0.65	0.47	0.22

6.	Chhipabarod	0.71	0.33	0.2
7.	Antah	0.55	0.41	0.46
8.	Mangrol	0.03	0.02	0.02
9.	Hindoli	0.85	0.33	0.35
10.	Nainwa	0.66	0.44	0.4
11.	Indragarh	0	0	0.2
12.	Keshoraipatan	0.65	0.69	0.69
13.	Bundi	0.44	0.22	0.42
14.	Khanpur	0.47	0.79	0.44
15.	Jhalrapatan	1.06	0.97	0.46
16.	Aklera	0.03	0.12	0.07
17.	Manoharthana	1.25	1	0.43
18.	Panchpahar	0.03	0.11	0.08
19.	Pirawa	0.48	0.73	0.3
20.	Gangdhar	1.02	0.63	0.34
21.	Pipalda	0.07	0.26	0.24
22.	Digod	0.04	0.24	0.2
23.	Ladpura	0.05	0.26	0.35
24.	Ramganj Mandi	0.07	0.28	0.13
25.	Sangod	0.1	0.23	0.22

Appendix 6 (Cont.)

S.No.	Tehsils	Educational Institutions Per 10 Sq. Km of Area	Allopathic Healthcare Institutions Per 1000 of Population	AYUSH Healthcare Institutions Per 1000 of Population
1.	Baran	2.05	0.35	0.09
2.	Kishanganj	1.38	0.55	0.07
3.	Shahbad	1.16	0.65	0.06
4.	Atru	1.87	0.75	0.07
5.	Chhabra	2.56	0.53	0.05
6.	Chhipabarod	2.55	0.5	0.07
7.	Antah	3.28	1.03	0.11
8.	Mangrol	0.17	0.03	0.02
9.	Hindoli	2.54	0.28	0.08
10.	Nainwa	2.48	0.32	0.08
11.	Indragarh	0.39	0.03	0.02
12.	Keshoraipatan	4.45	0.5	0.14
13.	Bundi	2.36	0.22	0.05
14.	Khanpur	3.1	0.37	0.07
15.	Jhalrapatan	6.93	0.4	0.07
16.	Aklera	0.49	0.02	0.01
17.	Manoharthana	6.05	0.51	0.07
18.	Panchpahar	0.56	0.02	0.01
19.	Pirawa	3.11	0.39	0.08
20.	Gangdhar	3.64	0.49	0.09
21.	Pipalda	1.18	0.27	0.06
22.	Digod	0.89	0.28	0.05
23.	Ladpura	5.23	0.05	0.01
24.	Ramganj Mandi	1.67	0.17	0.04
25.	Sangod	1	0.33	0.07

Appendix 6 (Cont.)

S.No.	Tehsils	Healthcare Institutions Per 100 Sq. Km of Area	Percentage of Households Getting Tap Water	Percentage of Households with Electricity Connection
1.	Baran	71	41.93	87
2.	Kishanganj	15	10.24	49.99
3.	Shahbad	15	8	34.28
4.	Atru	30	14.5	73.27
5.	Chhabra	24	14.51	64.78
6.	Chhipabarod	20	11.06	67.57
7.	Antah	57	13.87	84.22
8.	Mangrol	8	14.13	76.1
9.	Hindoli	15	6.46	50.99
10.	Nainwa	20	13.93	44.54
11.	Indragarh	13	27.35	60.21
12.	Keshoraipatan	37	25.97	65.69
13.	Bundi	52	25.79	76.96
14.	Khanpur	20	20.79	85.05
15.	Jhalrapatan	74	41.78	80.1
16.	Aklera	10	10.2	74.59
17.	Manoharthana	25	10.07	67.58
18.	Panchpahar	12	25.33	89.21
19.	Pirawa	29	16.55	75.27
20.	Gangdhar	22	13.77	72.75
21.	Pipalda	17	14.64	68.2
22.	Digod	21	14.46	79.84
23.	Ladpura	38	72.3	95.83
24.	Ramganj Mandi	34	54.16	88.71
25.	Sangod	18	16.21	81.25

Appendix 6 (Cont.)

S.No.	Tehsils	Percentage of Households Availing Banking Services	Cooperative Society Per 1000 of Population
1.	Baran	67.94	0.49
2.	Kishanganj	81.01	0.37
3.	Shahbad	75.07	0.33
4.	Atru	69.1	0.36
5.	Chhabra	58.36	0.24
6.	Chhipabarod	69.65	0.24
7.	Antah	74.34	0.39
8.	Mangrol	72.27	0.44
9.	Hindoli	82.7	0.88
10.	Nainwa	83.76	0.47
11.	Indragarh	73.09	0
12.	Keshoraipatan	69.18	1.46
13.	Bundi	65.74	0.78
14.	Khanpur	58.3	0.42
15.	Jhalrapatan	63.47	0.51
16.	Aklera	68.45	0.21

17.	Manoharthana	70.18	0.23
18.	Panchpahar	60.35	0.33
19.	Pirawa	68.23	0.57
20.	Gangdhar	46.81	0.59
21.	Pipalda	75.32	0.65
22.	Digod	73.15	1.08
23.	Ladpura	65.91	0.49
24.	Ramganj Mandi	53.56	0.4
25.	Sangod	75.07	1.13

Appendix 6.1

Composite Index of Infrastructural Development, 2020			
S.No.	**Tehsils**	**Gross Value**	**Composite Index**
1.	Baran	3.13	0.28
2.	Kishanganj	-1.76	-0.16
3.	Shahbad	-3.61	-0.33
4.	Atru	0.72	0.07
5.	Chhabra	-2.4	-0.22
6.	Chhipabarod	-1.34	-0.12
7.	Antah	8.42	0.77
8.	Mangrol	-9.32	-0.85
9.	Hindoli	1.21	0.11
10.	Nainwa	0.76	0.07
11.	Indragarh	-9.35	-0.85
12.	Keshoraipatan	11.8	1.07
13.	Bundi	1.65	0.15
14.	Khanpur	2.12	0.19
15.	Jhalrapatan	11.64	1.06
16.	Aklera	-10.17	-0.92
17.	Manoharthana	6.35	0.58
18.	Panchpahar	-8.62	-0.78
19.	Pirawa	2.57	0.23
20.	Gangdhar	1.8	0.16
21.	Pipalda	-3.06	-0.28
22.	Digod	-1.87	-0.17
23.	Ladpura	2.54	0.23
24.	Ramganj Mandi	-2.91	-0.26
25.	Sangod	-0.3	-0.03

Appendix 7

Primary Survey, 2023					
S.No.	**Tehsils**	**Literacy rate**	**Illiteracy rate**	**Cultivators**	**Agricultural labourers**
1.	Baran	76	24	13	3
2.	Kishanganj	69.36	30.64	7	10
3.	Shahbad	67.26	32.74	6	10
4.	Atru	74.96	25.04	14	4
5.	Chhabra	70.12	29.88	16	2
6.	Chhipabarod	71	29	13	5
7.	Antah	82	18	10	4
8.	Mangrol	71.56	28.44	14	4

9.	Hindoli	75	14	10	4
10.	Nainwa	78.78	21.21	13	3
11.	Indragarh	79.16	20.83	12	3
12.	Keshoraipatan	77.34	22.66	8	6
13.	Bundi	81.25	18.75	7	6
14.	Khanpur	79.53	20.47	16	3
15.	Jhalrapatan	82.37	17.63	16	2
16.	Aklera	75.83	24.17	13	5
17.	Manoharthana	78.54	21.46	15	3
18.	Panchpahar	71.29	28.71	13	4
19.	Pirawa	70.58	29.42	14	4
20.	Gangdhar	68.15	31.85	15	4
21.	Pipalda	76.36	23.63	11	5
22.	Digod	86.51	13.48	11	2
23.	Ladpura	90.86	9.14	10	4
24.	Ramganj Mandi	77.15	22.85	8	4
25.	Sangod	82.36	17.64	12	3

Appendix 7 (Cont.)

S.No.	Tehsils	Other workers	Crude work participation rate	Dependency ratio
1.	Baran	4	40.67	158.24
2.	Kishanganj	3	44.35	105.82
3.	Shahbad	4	46.13	103.42
4.	Atru	2	41.62	125.37
5.	Chhabra	2	47	115.82
6.	Chhipabarod	2	44.92	115.53
7.	Antah	6	42.21	126.21
8.	Mangrol	2	44.25	122.34
9.	Hindoli	6	44.36	112.82
10.	Nainwa	4	42.42	135.71
11.	Indragarh	5	38.27	157.63
12.	Keshoraipatan	6	45.86	102.25
13.	Bundi	7	42.18	137.03
14.	Khanpur	1	53.24	100.25
15.	Jhalrapatan	2	45.78	115.28
16.	Aklera	2	50.18	105.12
17.	Manoharthana	2	52.59	100.21
18.	Panchpahar	3	43.53	140.26
19.	Pirawa	2	53.29	98.84
20.	Gangdhar	1	47.26	109.71
21.	Pipalda	4	34.54	189.47
22.	Digod	7	38.92	169.69
23.	Ladpura	6	40.83	153.89
24.	Ramganj Mandi	8	57.35	88.67
25.	Sangod	5	61.79	97.28

Appendix 7 (Cont.)

S.No.	Tehsils	Annual Household Income (Rs)	Agricultural Productivity (Quintal/Bigha)	HYV Seeds (%)
1.	Baran	2.5	48.2	100
2.	Kishanganj	0.78	49.15	98
3.	Shahbad	0.78	40.06	98
4.	Atru	2.5	38.62	98
5.	Chhabra	1.52	37.81	97
6.	Chhipabarod	1.56	39.97	95
7.	Antah	3.34	45.32	100
8.	Mangrol	2.48	49.94	99
9.	Hindoli	1.66	38.82	99
10.	Nainwa	2.52	17.6	100
11.	Indragarh	2.48	44.47	100
12.	Keshoraipatan	2.58	67.69	98
13.	Bundi	2.58	45.82	100
14.	Khanpur	1.56	25.17	100
15.	Jhalrapatan	2.54	22.69	100
16.	Aklera	2.42	20.78	98
17.	Manoharthana	2.38	19.63	98
18.	Panchpahar	1.5	23.23	99
19.	Pirawa	1.56	23.2	100
20.	Gangdhar	1.48	23.03	97
21.	Pipalda	1.62	47.85	95
22.	Digod	1.64	47.74	100
23.	Ladpura	3.56	45.98	100
24.	Ramganjmandi	2.52	33.69	98
25.	Sangod	2.5	47.1	100

Appendix 7 (Cont.)

S.No.	Tehsils	Chemical Fertilizers (Kg/Bigha)	Irrigated Area by Tubewell (%)	Irrigated Area by Canal (%)	Irrigated Area by Well (%)
1.	Baran	130	70	0	30
2.	Kishanganj	94	20	80	0
3.	Shahbad	84	100	0	0
4.	Atru	140	60	40	0
5.	Chhabra	116	100	0	0
6.	Chhipabarod	124	100	0	0
7.	Antah	150	50	50	0
8.	Mangrol	130	2	98	0
9.	Hindoli	150	90	10	0
10.	Nainwa	104	100	0	0
11.	Indragarh	140	50	50	0
12.	Keshoraipatan	120	16	84	0
13.	Bundi	80	50	50	0
14.	Khanpur	130	80	20	0
15.	Jhalrapatan	90	0	50	50
16.	Aklera	150	35	35	30
17.	Manoharthana	140	0	50	50

18.	Panchpahar	120	20	10	70
19.	Pirawa	114	21	15	64
20.	Gangdhar	120	27	0	73
21.	Pipalda	160	63	37	0
22.	Digod	150	85	15	0
23.	Ladpura	160	100	0	0
24.	Ramganj Mandi	140	10	0	90
25.	Sangod	140	85	15	0

Appendix 7 (Cont.)

S.No.	Tehsils	Farm Mechanization (%)	Livestock per Household	Livestock Facilities
1.	Baran	69	23	1
2.	Kishanganj	65	37	1
3.	Shahbad	52	38	1
4.	Atru	82	42	0
5.	Chhabra	67	37	1
6.	Chhipabarod	72	31	0
7.	Antah	75	54	2
8.	Mangrol	80	50	1
9.	Hindoli	77	41	0
10.	Nainwa	75	37	1
11.	Indragarh	69	32	1
12.	Keshoraipatan	71	35	1
13.	Bundi	86	38	0
14.	Khanpur	80	47	1
15.	Jhalrapatan	81	62	0
16.	Aklera	75	53	1
17.	Manoharthana	80	41	0
18.	Panchpahar	70	30	1
19.	Pirawa	73	32	0
20.	Gangdhar	69	31	0
21.	Pipalda	76	22	0
22.	Digod	85	32	2
23.	Ladpura	91	43	2
24.	Ramganj Mandi	69	27	0
25.	Sangod	90	47	0

Appendix 7 (Cont.)

S.No.	Tehsils	Primary schools	Upper Primary Schools	Secondary and seniorSec School	Minimum distance to school (km)
1.	Baran	2	2	1	3
2.	Kishanganj	3	2	0	6
3.	Shahbad	2	2	2	3
4.	Atru	2	2	0	4
5.	Chhabra	2	2	0	3
6.	Chhipabarod	2	2	0	3

7.	Antah	4	3	3	1
8.	Mangrol	3	3	1	5
9.	Hindoli	4	4	1	4
10.	Nainwa	4	4	1	6
11.	Indragarh	3	3	2	2
12.	Keshoraipatan	3	2	1	5
13.	Bundi	3	3	2	2
14.	Khanpur	3	3	1	2
15.	Jhalrapatan	4	4	1	2
16.	Aklera	2	2	1	3
17.	Manoharthana	3	2	1	3
18.	Panchpahar	2	2	1	2
19.	Pirawa	2	2	1	3
20.	Gangdhar	2	1	0	4
21.	Pipalda	2	2	0	5
22.	Digod	3	2	2	1
23.	Ladpura	5	4	2	1
24.	Ramganj Mandi	2	2	0	3
25.	Sangod	2	2	0	3

Appendix 7 (Cont.)

S.No.	Tehsils	Hospitals	Minimum distance to hospital (Km)	Drinking Water from Tap/Govt Tanks (%)	Drinking Water from Handpump (%)
1.	Baran	1	3	82	0
2.	Kishanganj	5	6	50	5
3.	Shahbad	2	3	50	0
4.	Atru	0	4	15	0
5.	Chhabra	1	3	52	38
6.	Chhipabarod	0	4	0	30
7.	Antah	5	1	98	2
8.	Mangrol	2	5	20	0
9.	Hindoli	2	6	20	3
10.	Nainwa	3	6	96	2
11.	Indragarh	2	2	40	30
12.	Keshoraipatan	1	5	60	35
13.	Bundi	5	2	40	0
14.	Khanpur	2	2	60	10
15.	Jhalrapatan	5	2	60	0
16.	Aklera	2	3	78	20
17.	Manoharthana	1	3	50	50
18.	Panchpahar	1	2	52	15
19.	Pirawa	1	3	61	20
20.	Gangdhar	0	4	51	17
21.	Pipalda	1	5	0	80
22.	Digod	2	5	50	25
23.	Ladpura	6	1	98	0
24.	Ramganj Mandi	0	3	80	20
25.	Sangod	0	3	97	0

Appendix 7 (Cont.)

S.No.	Tehsils	Drinking Water from Borewell (%)	Households with Latrine (%)	Individuals Availing Banking Facilities (%)	Cooperative society
1.	Baran	18	90	100	1
2.	Kishanganj	45	60	98	0
3.	Shahbad	50	55	97	1
4.	Atru	85	92	100	0
5.	Chhabra	10	63	100	0
6.	Chhipabarod	70	80	100	0
7.	Antah	0	91	100	2
8.	Mangrol	80	92	100	1
9.	Hindoli	77	60	100	0
10.	Nainwa	2	70	100	1
11.	Indragarh	10	100	100	2
12.	Keshoraipatan	5	97	100	2
13.	Bundi	60	98	100	2
14.	Khanpur	30	73	100	1
15.	Jhalrapatan	40	75	100	0
16.	Aklera	2	62	100	1
17.	Manoharthana	0	98	100	1
18.	Panchpahar	33	70	100	1
19.	Pirawa	19	69	100	0
20.	Gangdhar	32	67	100	0
21.	Pipalda	20	97	99	1
22.	Digod	25	100	100	1
23.	Ladpura	2	100	100	2
24.	Ramganj Mandi	0	87	100	0
25.	Sangod	3	100	100	0

Questionnaire

Level of Socio-Economic Development of Hadoti Region

Respondent's profile

Tehsil name…………………………………………………………………………...

Village name……………………………………………………………………….

Household No…………………………………………………………………………...

Name……………………………………………………………………….............

Caste………………………………………………………………………………….

Age……………………………………………………………………………………...

Sex: (1) Male (2) Female

Educational Qualification: (1) Illiterate (2) Elementary

(3) Matric (4) High School

(5) Graduation/Diploma

(6) Post graduation

Marital Status: (1) Married (2) Unmarried

(3) Divorced (4) Widow

Occupation: (1) Farm (2) Non-Farm

Occupation Type: (1) Agricultural labourer (2) Cultivator

(3) Household industry worker

(4) Other ………………………………...

In farming, how much land do you own?

(1) Less than 5 bigha (2) 5-10 bigha

(3) 10-15 bigha (4) 15-20 bigha

(5) More than 20 bigha

Annual income of the household:

(1) Below 2,00,000 (2)2,00,000-3,00,000

(3) 3,00,000-4,00,000(4) 4,00,000-5,00,000

(5) Above 5,00,000

Household Members's Profile

S.No.	No. of members in family (Relation to the respondent)	Age	Sex	Educational Qualification	Marital Status	Occupation
1.						
2.						
3.						
4.						
5.						
6.						
7.						

Agricultural profile

Type of crops:

S.No.	Type of crops	
	Kharif	Rabi
1.		
2.		
3.		
4.		
5.		
6.		
7.		

Agricultural production (Quintals)……………………………………………………….

Method of irrigation:

(1) Tube-well (2) Canal

(3) Other………………………………………………...

Consumption of chemical fertilizers (Quantity)……………………………………

Use of HYV seeds: (1) Yes (2) No

Farm mechanization: (1) Yes (2) No

Type of mechanization……………………………………………………………………

Livestock:

S.No.	Livestock (Type)	Quantity
1.		
2.		
3.		
4.		
5.		
6.		
7.		

Livestock facilities: (1) Yes ☐ (2) No ☐

Infrastructure

Primary school: (1) Yes ☐ (2) No ☐

Upper primary school: (1) Yes ☐ (2) No ☐

Secondary and senior secondary school: (1) Yes ☐ (2) No ☐

Distance from place of residence to school:

(1) Less than 5 Km (2) 5-10 Km ☐ ☐

(3) 10-15 Km (4) More than 15 Km ☐ ☐

Hospitals: (1) Yes (2) No ☐ ☐

Distance from place of residence to hospital:

(1) Less than 5 Km (2) 5-10 Km ☐ ☐

(3) 10-15 Km (4) More than15 Km ☐ ☐

Household with electricity connection:

(1) Yes (2) No ☐ ☐

Households getting tap water from treated source:

(1) Yes (2) No ☐ ☐

Households with latrine:

(1) Yes (2) No ☐ ☐

Households availing banking services:

(1) Yes (2) No ☐ ☐

Cooperative society:

(1) Yes (2) No ☐ ☐

Village is connected by pucca road:

(1) Yes (2) No ☐ ☐

Government policy has impact on development level?

(1) Yes (2) No ☐ ☐

List government policy which helped in development:

S.No	Government policies
1.	
2.	
3.	
4.	
5.	

Has your village/tehsil been developed compared to 1991?

(1) Yes ☐ (2) No ☐

What is the status of current level of development?

(1) High level of development ☐
(2) Moderate high level of development ☐
(3) Moderate level of development ☐
(4) Low level of development ☐
(5) Very low level of development ☐

Are you happy with the current level of development?

(1) Yes ☐ (2) No ☐

Other information ………………………………………………………………

…………………………………………………………………………………..

…………………………………………………………………………………..

…………………………………………………………………………………..

…………………………………………………………………………………..